

ANNUAL REPORT (2006)

DEPARTMENT OF MEDICAL RESEARCH
(LOWER MYANMAR)



Annual Report 2006
Department of Medical Research
(Lower Myanmar)

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Department of Medical Research
(LOWER MYANMAR)
No.5, Ziwaka Road,
Dagon P.O.
Yangon 11191

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HIGHLIGHTS OF RESEARCH FINDINGS

In the year 2006, DMR (LM) has accomplished 88 out of 142 research projects that is 31 on communicable diseases mainly malaria, tuberculosis, dengue, HIV/AIDS, leprosy, influenza, acute respiratory tract infections (ARI), hepatitis B and C, diarrhea and dysentery, wound infections, and Japanese encephalitis; 20 on non communicable diseases such as snake-bite, diabetes mellitus, hypertension, cancer, blood disorders, nutrition, growth and development and cardio vascular diseases; 2 on traditional medicine; 10 on environmental health; 18 on Health Systems Research such as reproductive health, sports medicine and adolescent health 7 on academic and technology development mainly concerning hepatitis B vaccine.

Malaria

In Kawthaung township, *in vitro* drug sensitivity testing of *P. falciparum* parasites to chloroquine, amodiaquine, quinine, mefloquine and artesunate resistance were 92.5%, 82.5%, 27.5%, 5%, and 5% respectively. A certain degree of chloroquine resistant vivax malaria prevailed in Lashio Township. Artemether-lumefantrine (Coartem) drug combination was observed to have 91.67% (33/36) adequate clinical and parasite response, with 2.77% (1/36) early treatment failure and 5.55% (2/36) late treatment failure.

Use of modern drugs and traditional medicine for malaria among household members was studied in 5 townships (Bago, Daik-U, Kyauk-ta-ka, Tharyarwaddy, Oke-Po). Modern antimalarial use reported were mostly artesunate/artemether (64.2%) and mefloquine (21.9%). One-fifth of artesunate use was self-treatment.

Tuberculosis

The drug resistant pattern of multi-drug resistant tuberculosis among treatment failure patients was studied in National Tuberculosis Reference Laboratory, Yangon and among 51 *Mycobacterium tuberculosis* isolates, 12 (23.1%) were Streptomycin, Isoniazid, Rifampicin and Ethambutol resistant isolates.

Hepatitis C

Two clinical trials (effect of iron reduction therapy or phlebotomy and antioxidant biofactor or AOB on treatment of chronic hepatitis C patients) had been conducted. A significant reduction in mean serum ALT (151.1 vs 89.8 IU/L) and serum ferritin levels (251.1 vs 24 ng/ml) were found after 52 weeks of phlebotomy. Treatment was well tolerated by all patients. No major adverse reactions were noted.

Dengue

Laboratory evaluation of the persistency and shelf life of an insect growth regulator (Pyriproxyfen) was conducted using 3rd and 4th stages of *Aedes aegypti* mosquito larvae. The field dosage of Pyriproxyfen 0.01 ppm was effective and complete inhibition of adult emergence was achieved at treated containers. More than eighty percent of the larvae emerged as adults at control containers.

Snake bite

To supplement antivenom production, Russell's viper (*Daboia russelii siamensis*) antivenom in laying hens had been purified. Three injections of a total Russell's viper venom (500µg per hen) given at 4 week intervals yielded 1.85 gm specific IgY per month equivalent to total IgG obtained from 8 rabbits or two goats per month.

The yearly trend of the snake bite (1998 – 2005) was on increase and Mandalay, Magway, Sagaing and Bago (W) divisions had the highest numbers of snakebite ranging from 1,001 to 2,000 per year. Ayeyarwaddy division has the highest case fatality rate 17.75%.

Blood disorders

Complete remission rate of leukemia patients in the Haemato-Oncology Unit of YCH (2003-2006) was 62% in the old schedule and for new Schedule A and B, it was 32% and 86%. Defaulter rate was 20% vs. 7% and 20% and survival rate was 44% vs. 81% and 75% respectively in the old schedule and new schedule A and B.

Diabetes

A study on Type II diabetes patients in North Okkalapa General Hospital revealed the importance of factors related to quality of care for the development of long-term diabetic complications.

Hypertension

The age-standardized prevalence of hypertension and pre-hypertension was 27.2% and 28.8% according to the WHO STEP wise Approach to NCD Surveillance Survey among 4,616 people aged 20 years and above in Yangon Division in 2003.

Health Systems Research

The intervention study of ARI case management among basic health staff (BHS) at Padaung Township found definite improvements in knowledge and practice regarding ARI after the intervention. Findings highlighted the importance of on-job training program to refresh and sustain the acquired skill.

Options for social movements required to improve early diagnosis and prompt treatment of malaria (EDPT) by 600 respondents in Thaton, Pyin Oo Lwin and Hlegu were identified as co-ordination-meetings, cash contribution, voluntary contributions and material contributions.

Operational research on community involvement in DOTS implementation of Tuberculosis Control Programme pointed out that the success rate and cure rate were higher in study area (Pyay) than in control area (Toungoo). The members of Myanmar Maternal and Child Welfare Association were highly motivated and satisfied to perform as DOTS providers.

In a study focusing awareness of female cancers, cervical and breast cancer were perceived as commonest by 400 women in 4 peri-urban townships of Yangon Division.

However, information regarding prevention and treatment procedures needs to be promoted.

A cross sectional study at 5 Teaching Hospitals in Yangon pointed out that house surgeons were at risk of needle stick injury and blood-borne infections while performing procedures on patients. Proper training in per-cutaneous procedures and how to act in case of injury should be made to reduce the number of injuries.

Environmental Health

Nearly, half of the poison cases admitted to Yangon General Hospital and New Yangon General Hospital were drug overdose (40.9%) in 2005-2006, with sedatives (diazepam, alprazolam), antipsychotics (chlorpromazine, clozapine, olanzapine) and antidepressants (amitriptyline) being the commonest. Main causes of mortality include unknown (0.9%), mixed (0.4%) and pesticide (0.2%) poisoning. The study highlighted the importance of analytical support in unknown and mixed poisoning.

Acute drug reactions are one of the main causes affecting compliance and defaulter rate in MDR-TB treatment. The most frequently encountered acute drug events associated with second line anti TB drugs in MDR-TB patients include dizziness/vertigo (47.9%), nausea/vomiting (34.4%) and abdominal pain (24.4%). ADR monitoring may be need to overcome this problem.

Antibacterial activity of *Citrus lemon* (lime) and effect of its juice for decontamination of bacteria from different drinking water sources and food specimens in Yangon was proved.

Traditional Medicine

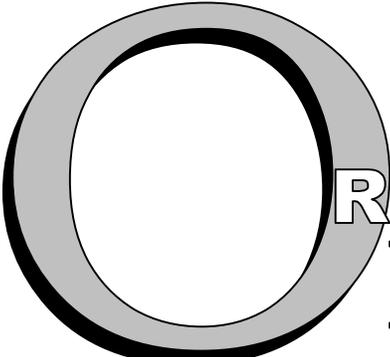
There was a significant decrease in the mean level of total cholesterol in serum of the test group (169.5 ± 41.06 mg/dl vs 255.7 ± 76.12 mg/dl) after 90 days administration of dried Chinese quince fruits (*Cydonia cathayensis Hemsl*) in rats fed with high cholesterol diet. Watery extract of dried quince fruit has serum total lowering effect but controlled clinical trials on human subjects should be carried out.

Laboratory repellency effect of *Cymbopogon winterianus Jowitt* crude extract on *An. dirus* mosquitoes was evaluated. Hundred percent protections from mosquito bites were achieved at 4.5 hours for 2 %, 1.5 hours for 1% and 1.5 hours for 0.5%, respectively.

Technology Development

During the period of 2004-2006, a total of 6 lots of Fermentation processes, yielding 14 grams purified recombinant Hepatitis B surface antigen (HBs Ag) for 2.5 million doses of recombinant HB vaccine, were successfully produced from the recombinant HBsAg expressed *Hansenula polymorpha* yeast strain of Master Cell Bank (MCB) in the GMP standard HB Vaccine Plant by scientists and technicians from DMR (LM).

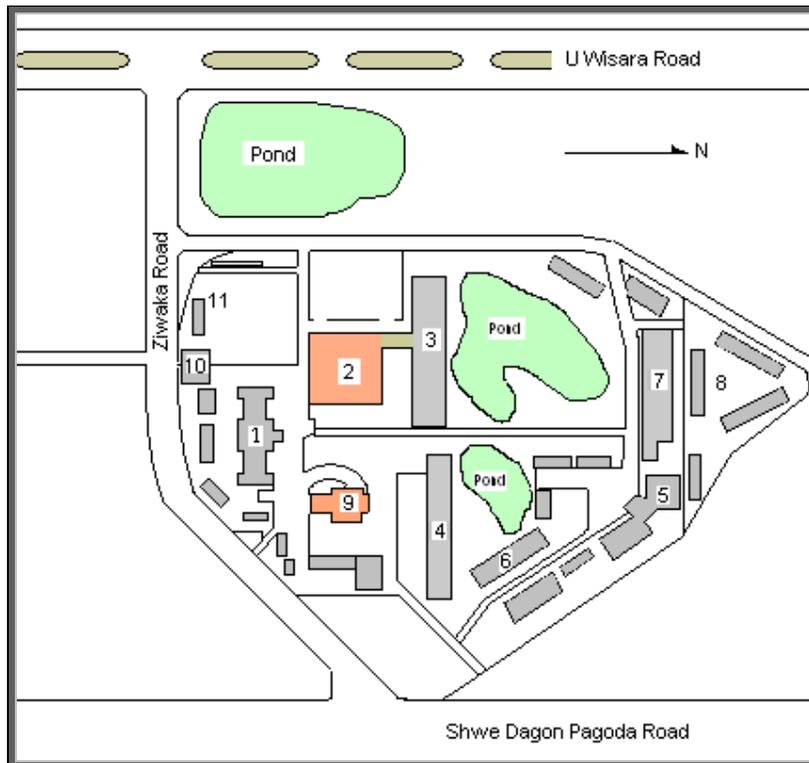
In August, 2006, the DMR HB Vaccine Plant including equipment, facilities, technology and 76 technical staff were transferred to the Myanmar Pharmaceutical Industries, Ministry of Industry (1) to continue vaccine production on a large scale. Thirteen senior scientists from DMR (LM) carried out the technology transfer for production of HB vaccines to the staff of the Ministry of Industry (1) at the HB Vaccine Plant for one year from 2006 August to August 2007. Purified recombinant HBsAg bulk sufficient for formulation of 1.4 million paediatric doses of recombinant Hepatitis B vaccine were handed over to the Ministry of Industry (1).

A large, stylized letter 'O' graphic. It consists of a thick, grey outer ring with a black inner border, creating a hollow center. The 'O' is positioned to the left of the text 'ORGANIZATION PROFILE'.

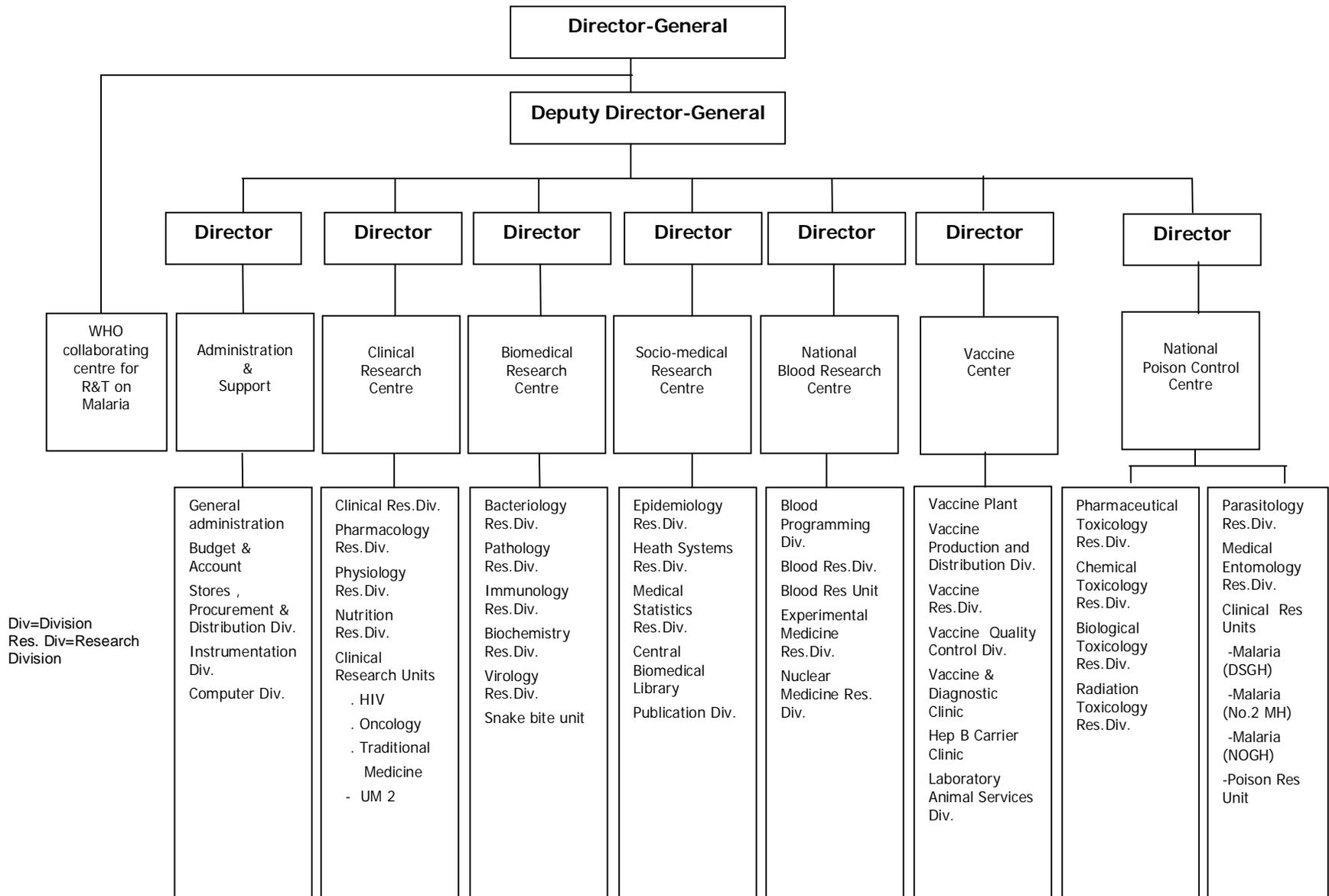
**ORGANIZATION
PROFILE**

Layout Plan

1. Administrative Office and Socio-Medical Research Centre
2. Central Biomedical Library and Auditorium
3. Biomedical Research Centre
4. Clinical Research Centre
5. National Blood Research Centre & National Poison Control Centre
6. Stores and Procurement Division
7. Animal Services Division
8. Staff Quarters
9. Director-General's Residence
10. Vaccine Clinic
11. Power Station



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**DEPARTMENT OF MEDICAL RESEARCH (LOWER MYANMAR)
EXECUTIVE BOARD**



Dr. Kyaw Min
MBBS DAC
Acting Director-General



Dr. Aye Kyaw
BSc MSc PhD (USA)
Director (Research)



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MBBS MMedSc
PhD(Australia) FRCP(Edin)
Deputy Director-General



Dr. Willoughby Tun Lin
MBBS DP&TM
MSc (Medical Parasitology)
PhD FRCPE
Director (Research)



Dr. Than Tun Sein
MBBS DP&TM MPH DipEpi
FACTM PhD
Director (Research)



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Dr. Kyaw Moe
MBBS DPath
MSc(Medical Microbiology)
Director (Research)



Dr. Khin Pyone Kyi
MBBS MMedSc
PhD(Microbiology) FRCP
Director (Research)

ACTIVITIES
&
RESEARCH FINDINGS

BACTERIOLOGY RESEARCH DIVISION

Deputy Director & Head	...	Dr. Mar Mar Nyein BSc MSc PhD(Zoology)
Research Scientist	...	Dr. Wah Wah Aung MBBS MMedSc(Microbiology)
Research Officer	...	Dr. Thin Thin Maw MBBS
	...	Daw Thuzar Myint BSc(Zoology) DPMS(Medical Technology)
Research Assistant (2)	...	Daw Myat Thida BSc(Zoology)
	...	Daw Aye Aye Maw BSc(Mathematics)
Research Assistant (3)	...	Daw Khine Zar Win BA(Myanmarsar)
	...	Daw Aye Yin Shwe BA (Geography)
Research Assistant (4)	...	Daw Ei Ei Soe BSc (Zoology)

The Bacteriology Research Division was engaged in the following research activities on infections (mycobacterium, reproductive tract, acute respiratory and enteric), bacteriological aspects on therapeutics and environmental health. Research with direct implication for effective control of diseases was being focused. One of the main areas was detection of emergence of drug resistant organisms. Monitoring of the aetiological agents and drug sensitivity pattern of diarrhoeal and mycobacterial infections were also performed.

RESEARCH PROJECTS

1. COMMUNICABLE DISEASE

1.1. TUBERCULOSIS

1.1.1. Pulmonary Mycobacterial Diseases among HIV infected patients

This study was carried out to identify Mycobacterium tuberculosis and non-tuberculous mycobacterial infections among HIV infected patients and to determine the anti-TB pattern of HIV-TB co-infected patients. Sputum specimens were collected from HIV infected adults presenting with a clinical presentation suggestive of pulmonary TB attending Specialist Hospital, Waibargi, North Okkalapa. This study is in progress.

1.1.2. Study on multi-drug resistant tuberculosis among treatment failure patients

Treatment failure is one of the unwanted outcomes in tuberculosis management and it is defined when a patient is sputum smear positive at five months or later during treatment. Multi-drug resistant tuberculosis (MDR-TB) cases, which are resistant to at least rifampicin and isoniazid, are those most at risk of treatment failure in previously treated pulmonary tuberculosis patients who are treated with Category II regimen using five first line anti-tuberculosis drugs according to the standardized treatment regimens. A cross-sectional descriptive study was carried out from August 2004 to March 2006 at National Tuberculosis Reference Laboratory, Yangon to explore the drug resistance pattern and possible demographic factors associated with MDR-TB among the Category II treatment failure patients. A total of 52 *Mycobacterium tuberculosis* isolates were

tested for susceptibility to streptomycin (S), isoniazid (I), rifampicin (R) and ethambutol (E). Resistance to at least one of anti-TB drugs was documented in 50 (96.2%) isolates. MDR-TB was found in 31 (59.6%) isolates comprising 12 (23.1%) SIRE resistant isolates, 18 (34.6%) SIR resistant isolates and 1(1.9%) IR resistant isolate. The demographic data and possible contributing factors of drug resistance were evaluated among the drug resistant patients. The number of MDR-TB cases were significantly higher in female patients and those who had past history of tuberculosis and treatment with anti-tuberculosis drugs for more than once ($P < 0.05$). This study highlighted the threat of MDR-TB among re-treatment cases which should be taken into great consideration in further treatment with reserve anti-tuberculosis drugs.

1.2. LEPROSY

1.2.1. Re-establishment of mouse foot-pad isolation for leprosy (collaboration with Leprosy Control Unit)

Mouse foot pad laboratory was established and inoculation of mice with biopsy specimens from lepromatous leprosy patients obtained from Central Special Skin Clinic was done. A total of 11 specimens were inoculated into mouse foot pads by the conventional methods. After 6 months, leprosy bacilli will be harvested monthly up to 24 months.

1.3. ACUTE RESPIRATORY INFECTION

1.3.1. Bacterial pathogens isolated from children suffering from ARI with special emphasis on invasive *Streptococcus pneumoniae*

Fifty two blood samples were collected to perform blood culture from children admitted to Yangon Children's Hospital for severe pneumonia, septicaemia and meningitis from January 2006. Age range was from 2 months to 12 years. Out of 52 samples, the bacterial pathogens were isolated from 15 samples. The pathogens isolated were *Streptococcus pneumoniae* 1 isolate, *Haemophilus influenzae* type B 2 isolates, *Neisseria meningitidis* 2 isolates, *Staphylococcus aureus*, 7 isolates and *Pseudomonas* species 3 isolates. This study is in progress.

1.4. WOUND INFECTIONS

1.4.1. Bacterial pathogens isolated of burns from Acute Burn Unit, Yangon General Hospital

A cross sectional descriptive study was carried out from June 2004 to April 2006 to determine the bacterial profile and antibiotic sensitivity pattern of burn isolates in patients admitted to Acute Burn Unit, Yangon General Hospital. Among 91 burn patients, 38 (41.8%) were culture positive comprising pure isolates (27, 71.1%) and mixed isolates (11, 28.9%). The isolated bacterial pathogens were *Pseudomonas aeruginosa* (17/38, 44.8%), *Staphylococcus aureus* (14/38, 36.8%), *Klebsiella* species (3/38, 7.9%), *Proteus* species (3/38, 7.9%) and *Escherichia coli* (1/38, 2.6%). *Pseudomonas aeruginosa* isolates were sensitive to amikacin (100%), ciprofloxacin (94.1%) and gentamycin (82.3%). Amoxycillin & Clavulanic acid (Augmentin) and cefotaxime appeared to be most effective for *Staphylococcus aureus*. Majority of culture positive cases were from the burn wounds of buttock and leg. Burn injuries of more than 25% of total body surface

area were found in 32(84.2%) and those of less than 25% of total body surface area were found in 6(15.8%) of 38 septic cases.

1.4.2. Antibiotic sensitivity pattern of bacterial pathogens from jaw osteomyelitis cases

Wound swab, pus and bone piece samples were collected from a total of 45 cases of jaw osteomyelitis, age ranged 3-75 years (male 21 and female 24 cases). They were admitted to Department of Plastic, Maxillofacial and Oral Surgery and Dental OPD, YGH. The aerobic and anaerobic bacteria were isolated using conventional methods. Among 45cases, pure isolate obtained from 36/39 (92.3%) and mix isolates from 3/39 (7.7%) cases. The isolated bacterial pathogens were *Staphylococcus aureus* (17/39, 43.6%), *Pseudomonas aeruginosa* (9/39, 23.1%), *Escherichia coli* (8/39, 20.5%), *Proteus* spp. (4/39, 10.3%), *Alcaligenes faecalis* (4/39, 10.3%), *Staphylococcus epidermidis* (2/39, 5.1%) and *Streptococcus haemolyticus* (1/39, 2.6%). Antibiotic sensitivity test was carried out on all isolates.

2. HEALTH SYSTEMS

2.1. REPRODUCTIVE HEALTH

2.1.1. Prevalence of Chlamydia infection among males of infertile couples

From December 2004, urethral swab samples were taken from males of infertile couples visiting the infertility clinics, Yangon. Altogether 70 samples were obtained during the study period. The specimens were processed with ELISA method for detection of Chlamydia infection. All specimens tested were found to be negative by ELISA for Chlamydia antigen.

2.1.2. Prevalence of Reproductive Tract Infections among Family Planning Clinic Attendees at Central Women's Hospital, Yangon

The study is a cross sectional descriptive clinic based study with the funding supported by WHO/HRP. The objectives of the study are to determine the prevalence of RTIs in family planning clinic attendees at Central Women's Hospital. Out of processed 605 specimens, 10.4% was found positive result for *Trichomonas vaginalis* of which only 8.76% was positive at culture. Most of *Candida* positive samples (4.14%) were detected by culture method. Gonococcal growth was found in 1.82% of collected sample during the data collection period. Other bacterial growth (mostly *E.coli* and *Staphylococcus*) was detected among 2.48% of samples.

3. ENVIRONMENTAL HEALTH

3.1. FOOD SAFETY

3.1.1 Antibacterial activity of *Citrus lemon* (lime) and effect of its juice for decontamination of bacteria from different drinking water sources and food specimens.

Antibacterial activity of *Citrus lemon* (lime juice) was recorded when tested on 35 isolates of pathogenic bacteria isolated from clinical sources with various ailments. They were different species of *Escherichia coli* (ETEC, EPEC, VTEC, EAEC and EHEC), *Salmonella*, *Shigella*, *Vibrio*, *Proteus*, *Pseudomonas*, *Bacillus subtilis* and *Staphylococcus*. Zone size in diameter from 14 to 30 mm was obtained by testing with agar disc diffusion technique. The minimum inhibitory concentration (MIC) was also

determined and found to inhibit the bacteria up to 1:64 dilutions. When the juice was treated in contaminated drinking water sources from 12 localities, all bacteria were decomposed soon after the introduction of juice (approximately within 1 minute). Though the growth recovered only after 24 hours of treatment, no growth was demonstrated up to 6-8 hours when 10 ml of juice was treated with 250 ml (1 cup) of contaminated water. The rate of growth reflected with the amount of juice used to treat decontamination. Similarly, antibacterial activity was observed when contaminated noodle samples (10ml/100g of food) were treated with lime juice.

SERVICES PROVIDED

ACADEMIC

Sr. No.	Name	Course	Responsibility
1	Dr. Mar Mar Nyein	MMedSc (Microbiology) PhD (Zoology) Research Methodology	Teaching External Examiner Co-supervisor Facilitator
2	Dr. Wah Wah Aung	MMedSc (Microbiology) Research Methodology	Teaching Facilitator

LABORATORY

1.	Antibacterial activity on plant extracts (n=8)
2.	Bacteriological testing on herbal syrup (n=7)

BIOCHEMISTRY RESEARCH DIVISION

Deputy Director & Head	-- Dr Theingi Thwin MBBS MMedSc(Biochemistry)
Research Officers	-- Dr. Hnin Lwin Htun MBBS -- Daw Thet Thet Mar MSc(Chemistry) -- Daw Mie Mie Nwe BSc(Botany) DFT -- Dr Khin Than Yee MBBS
Research Assistant (2)	-- U Tin Ko Ko Oo BA(Economics) -- Daw Aye Myint Oo BA(Economics) -- Daw Lwin Zar Maw BSc(Chemistry) DFT
Research Assistant (3)	-- Daw May Thu Kyaw BA(Economics)
Research Assistant (4)	-- Daw Thin Thin Aye BSc(Chemistry) -- Daw Thidar Kyaw MSc(Biotechnology)
Laboratory Worker	-- Daw Yi Yi Sein

The Biochemistry Research Division has been actively involved in research activities of the following program areas: non-communicable diseases, nutrition and traditional medicine.

RESEARCH PROJECTS

1. NON-COMMUNICABLE DISEASES

1.1. CARDIOVASCULAR DISEASES

1.1.1. Lipid profile of coronary artery diseases patients from Yangon General Hospital

Determination of serum total cholesterol, HDL cholesterol, LDL cholesterol and lipoprotein (a) or lp(a) levels of thirty acute myocardial (AMI) patients admitted to Cardiac Medical Ward of Yangon General Hospital and thirty age, sex-matched controls were carried out. Mean serum total cholesterol level of AMI patients (163.2 ± 52.8 mg%) was not significantly different from that of controls (182.7 ± 51.5 mg%), ($p > 0.05$). A significant lower mean serum HDL cholesterol of AMI patients (34.72 ± 11.73 mg%) was found in comparison of that of controls (45.2 ± 11.2 mg%, $p < 0.01$). Serum lp(a) levels of AMI patients was significantly higher than that of controls (21.1 ± 10.6 mg% vs 8.4 ± 2.0 mg%, $p < 0.05$).

1.2. NUTRITION

1.2.1. Serum Lipoprotein (a) concentrations of obese children

An overnight (at least ten hours) fasting for determination of serum lipids is difficult in children and fasting blood samples are required to calculate serum LDL-Cholesterol levels by using the formula of Friedewald (1972). To solve this problem, another parameter like LDL-Cholesterol has to be considered. Lipoprotein (a) is the nearly identical structure to the LDL-particle and is associated with an increased risk of coronary heart disease. Therefore, a total of 34 obese children (7-12 years, 25 boys and 9 girls) were selected to measure the serum lipoprotein (a). The mean serum lp (a) levels of obese boys and girls were 11.2 ± 5.0 mg% and 10.6 ± 4.7 mg%, respectively.

1.2.2. Fatty acids profile of commonly consumed fish and beans in Myanmar

A total of commonly consumed 38 varieties of fish (19 fresh water fish, 13 marine fish and 6 brackish water fish) and 18 kinds of bean have been explored. Fat extraction was done from 50 freeze dried fish samples and 18 bean samples. Determinations of fatty acids of these samples by gas chromatography are still in progress.

1.3. SNAKE BITE RESERCH

1.3.1. Purification and characterization of coagulase enzymes inhibitor protein from serum of Russell's viper

In vitro study showed there have been inhibitory activities of Russell's viper (*Daboia russelli siamensis*) serum on phospholipase A, coagulase and caseinolytic enzymes of its venom (RVV). The Russell's viper serum (7.21mg) has neutralized one minimal hemorrhagic dose of its venom. However, the concentration of purified protein from serum of Russell's viper was too low to confirm the coagulase enzymes inhibitor proteins. Therefore, further purification and characterization of coagulase enzymes inhibitor protein from serum of Russell's viper need to be carried out.

2. TRIDITIONAL MEDICINE

2.1. SAFETY AND EFFICACY OF TRADITIONAL MEDICINE FORMULATION AND HERBAL DRUGS

2.1.1. Effect of dried Chinese quince fruits (*Cydonia cathayensis .Hemsl*) on serum total cholesterol and HDL cholesterol levels in rats fed with high cholesterol diet

The effect of administering dried Chinese quince fruits on high-cholesterol-fed rats was studied for a period of ninety days. A total of twenty male Wistar strain rats with 150–200 gm body weight were included in the study. Thoroughly dried Chinese quince fruits were ordered from Lashio (Northern Shan State) and made into a fine powder. All rats were supplemented with a high cholesterol diet which was enriched with coconut oil (25% by weight) and egg yolk (66.6% by weight) to an ordinary feed up to the end of the study. Dried Chinese quince fruit powder was put into water in a ratio of 1:100 (w/v) and boiled for 10 hours to make a watery extract. One ml of watery extract (144 mg dried Chinese quince/kg body weight) and an equal volume of distilled water were administered orally by intragastric intubation daily for ninety days to the test and control group (ten in each), respectively. Serum total cholesterol and HDL cholesterol levels were measured on Day 0, Day 30, Day 60, Day 90. There was a significant decrease ($p=0.02$) in the mean level of total cholesterol on Day 90 in serum of the test group (169.5 ± 41.06 mg/dl vs 255.7 ± 76.12 mg/dl). When serum total cholesterol levels were compared between the test and control group on Day 30 (180.7 ± 31.23 mg/dl vs 218.3 ± 72.93 mg/dl) and Day 60 (167.75 ± 19.76 mg/dl vs 246.5 ± 83.05 mg/dl), they were not statistically significant ($p>0.05$). Serum HDL cholesterol levels of test and control group were not significantly different during the study ($p>0.05$).

2.1.2. Effect of dried Chinese quince supplementation on plasma lipid profile and peroxidation of hypercholesterolemic subjects

Among one hundred adults (18-70 years, both sexes), fifteen persons (8 men and 7 women) were selected as subjects after doing screening tests of hypercholesterolemia (serum total cholesterol >200.00 mg/dl). They were categorized into two groups: one group was given with divided dose of four dried quince fruit tablets after meals and one group was administered with Simvastatin Tablets USP 10 mg after meal. Basal plasma total cholesterol, HDL-cholesterol, triglycerides and LDL-cholesterol and malondialdehyde (MDA) were 220.8 ± 28.5 mg%, 53.9 ± 15.5 mg%, $81.932.2 \pm$ mg%, 143.2 ± 22.7 mg% and 5.1 ± 1.4 $\mu\text{mol/L}$, respectively). Plasma lipids and MDA levels will be determined on Day 45 and Day 90 of dried quince tablets supplementation.

SERVICE PROVIDED

ACADEMIC

Sr.	Name	Course	Responsibility
1.	Dr. Theingi Thwin	2 nd year MBBS (Biochemistry) PhD (Chemistry) Research Methodology Workshop Training on Gel filtration and Electrophoresis to 1 st year MMedSc(Biochemistry) and MMedSc (Pharmacology) students	External Examiner Co-supervisor Facilitator Teaching

BIOLOGICAL TOXICOLOGY RESEARCH DIVISION

Deputy Director & Head	...	Dr. Thaung Hla MBBS MMedSc (Pathology)
Research Scientist	...	Dr. Mo Mo Win MBBS MMedSc (Microbiology)
Research Officer	...	Dr. Theingi Win Myat MBBS MMedSc (Microbiology)
	...	Dr. Ti Kyi Win MBBS MMedSc (Microbiology)
	...	Dr. Mya Mya Aye MBBS MMedSc (Microbiology)
Research Assistant (II)	...	Daw Thin Thin Wah MSc (Zoology)
	...	Daw Tin Tin Htwe BSc (Zoology)
	...	Daw Thazin Myint BSc (Zoology)
Research Assistant(III)	...	Daw May Than Htay MSc (Zoology)
	...	Daw Zin Mi Thein BSc (Maths)
	...	Daw Wai Lwin Oo
Research Assistant (IV)	...	Daw Nilar BSc (Zoology)

The Biological Toxicology Research Division is undertaking research on toxins derived from microorganisms, animals and plants. The division is also involved in poison information service.

SERVICES PROVIDED

ACADEMIC

Biological Toxicology Research Division is actively involved in poison information service to help clinicians from various hospitals throughout the country in diagnostic and therapeutic strategies related to biological toxins.

BLOOD PROGRAMMING DIVISION

Research Scientist & Head	...	Dr. San San Htwe MBBS, MMedSc (Pathology)
Research Officers		Daw San San Oo MSc (Zoology)
	...	Dr. Swe Zin Yu MBBS
Research Assistant (2)	...	U Khine Win BSc (Zoology), PDCS
Research Assistant (3)	...	Daw Nwe Nwe Soe BSc (Chemistry)
	...	Daw Phyu Phyu San BA (History)
	...	U Zaw Min Latt BSc (Chemistry)
	...	U Phyo Ko Ko BSc (Chemistry)
Research Assistant (4)	...	Daw Kaung Bahlwar BSc (Botany)
	...	Daw May Tha Zin BA (Economics)

Blood Programming Division is primarily involved in providing services on blood safety and blood components. Regarding blood safety, screening of infectious diseases in blood donors by providing appropriate test strips, promotion of voluntary non-remunerated blood donors by use of blood mobile services and development of blood donor registry have been carried out. The division promotes the use of blood and/or blood component products in the management of haematological disorders / diseases. In near future, the division will be involved in the production of plasma-derived hepatitis B (HB)vaccine for control of HB viral infection in Myanmar. This division includes 3 sections for effective management of programming; namely blood collection, blood component preparation and quality control.

RESEARCH PROJECTS

1. HEALTH SYSTEMS

1.1. QUALITY OF HEALTH CARE IN HOSPITAL

1.1.1 Monitoring of Hepatitis C virus infection in blood donors

The prevalence of Hepatitis C virus (HCV) in blood donors was monitored while providing services to screening of HCV infection. The donor sera were tested by Rapid Immunochromatographic technique (Cortez, USA) This test is based on the principle of double antigen sandwich immunoassay for determination of anti-HCV in serum. During the year under report, the prevalence rates of anti-HCV among blood donors in Yangon, Mandalay and Magwe were found to be 0.68 % (120/17614), 0.92 % (140/15244) and 1.26 % (38/3020) respectively. The prevalence rates of anti-HCV were apparently reduced compared to the last year data i.e 0.73% (28/2851), 1.3% (42/3213) and 1.96% (11/559) . A downward trend in anti-HCV seropositivity of blood donors was observed thus indicating the success of the HCV control programme among blood donors in Myanmar.

2. ACADEMIC AND TECHNOLOGY DEVELOPMENT

2.1. DEVELOPMENT OF TEST KIT

2.1.1. Optimization of Reverse Passive Haemagglutination (RPHA) using human O red cells for screening of hepatitis B surface antigen (HBs Ag).

In house RPHA reagent for screening of HBs Ag using sheep red cells is less stable. In this study, human O red cells were used as an alternative. Sensitivity and specificity were found to be 86% and 88.3 % in this study and 85.1% and 87.2 % in the previous study compared to the ELISA system. The results obtained were not satisfactory. However, RPHA reagent using human O red cell is more stable than that using sheep red cells.

2.1.2. Production of polyclonal antibody to Hepatitis B surface antigen (HBsAg)

A simple test for screening of hepatitis B virus infection in blood donors is necessary especially in remote and district areas. Production of polyclonal antibody to HBsAg (anti-HBs) was carried out with the purpose of using this antibody in developing dipstick method to detect the HBsAg. Three rabbits were immunized intradermally with 10 µg of recombinant HBsAg for three times at 4 week intervals. The first dose was given in complete Freund's adjuvant and the remaining was in incomplete Freund's adjuvant. Ten days after the last immunization, the rabbit were bled and the antibody levels were determined by anti-HBs (Quantitative) test kit. Two out of three rabbits yielded good immune response. Antisera were stored at -40°C for further use.

SERVICES PROVIDED

LABORATORY

1	Collection of blood from (3388) blood donors at Mingalabuhar Religious organization, Insein and North Okkalapa General Hospitals in Yangon area by use of a blood mobile service in collaboration with respective Blood Banks.
2	Providing of (1620) single blood bags (TERUMO, Japan) to Insein and North Okkalapa General Hospitals
3	Distribution of (46358) anti-HCV ICT test strips (Cortez, USA) to National Health Laboratory, Yangon (North Okkalapa and Thingangyun), Mandalay, Magwe, Pyinmana and Naypyidaw Hospitals.
4	Testing of anti-HCV by using Particle Agglutination test (SERODIA, Japan) in (114) blood samples of donors with HCV infection screened in various hospitals for confirmation of HCV infection
5	Testing of anti-HCV by using Particle Agglutination test (SERODIA, Japan) in (223) HBsAg positive blood samples of donors from Hepatitis B vaccine Plant for production of plasma-derived HB vaccine .
6	Testing of anti-HIV by using ICT test (Hexagon, Germany) in (481) students from University of Marine Technology.

DONOR REGISTRY

Providing registry of (15913) blood doors entries for promotion of safe blood in collaboration with the Computer Division DMR (LM)

BLOOD RESEARCH DIVISION

Research Scientist & Head	...	Dr. Win Pa Pa Naing MBBS MMedSc (Pathology)
Research Officer		Dr. Zin Zin Thu MBBS MMedSc (Pathology) Dr. Than Than Aye MBBS
Research Assistant (2)	...	Daw Win Win Mar BSc (Chemistry) Daw Aye Mya Khine BSc (Maths) Daw Nu Nu Lwin BSc (Zoology)
Research Assistant (3)	...	Daw May Htwe BSc (Chemistry) Daw Aye Thandar Khine BA (Geography) Daw Aye Thidar Saing BSc(Botany)
Research Assistant (4)	...	Daw Phyo Phyo Wai BA (Economics)

Blood Research Division is primarily involved in research studies on haematological diseases and disorders, and the diagnosis and management of common malignancies to identify and solve the health problem relating to these. The clinical arm is further supported by the Clinical Research Unit on Haematology at the Yangon Children's Hospital.

RESEARCH PROJECTS

1. COMMUNICABLE DISEASE

1.1 VIRAL HEPATITIS

1.1.1 Role of iron reduction therapy in chronic hepatitis C infection patients

Hepatitis C virus (HCV) is the commonest cause of chronic viral hepatitis and a significant cause of cirrhosis, hepatitis failure and hepatocellular carcinoma. HCV infection is worldwide health problem and also it is an emerging health problem in Myanmar. In patients with chronic hepatitis C with no other cause of iron overload, iron itself is a co-factor in the development of liver injury and correlates with disease severity. Therefore this project was carried out to determine the efficacy of iron reduction therapy in subjects with hepatitis C infection. A total of 24 patients (age range 25 to 73 year, mean 40.24yr \pm 8.23yr) have been recruited from blood donors and Hepatitis Carrier Clinic. Mean (SD) of serum ALT level was 151.8 (87) IU/L, serum ferritin level was 251.1 (372.7) ng/ml. A Complete blood film, haemoglobin concentration, PCV, serum ALT, serum iron, serum ferritin were monitored prior to every visit of phlebotomy. Reductions in mean serum ALT level were at 4 weeks (151.8 vs 113.6 IU/L), at 16 weeks (151.8 vs 100.6 IU/L), at 28 weeks (151.8 vs 100.9 IU/L), at 36 weeks (151.1 vs 109.4 IU/L), at 44 weeks (151.8 vs 84.31 IU/L) of phlebotomy, at 52 weeks (151.1 vs 89.8 IU/L). Significant reductions in mean serum ferritin level were at 4 weeks (251.1 vs 116.4 ng/ml), at 16 weeks (251.1 vs 51.7 ng/ml), at 28 weeks (251.1 vs 41.7 ng/ml), at 36 weeks (251.1 vs 21 ng/ml), at 44 weeks (251.1 vs 16.69 ng/ml), at 52 weeks (251.1 vs 24 ng/ml) of phlebotomy.

2. NON-COMMUNICABLE DISEASE

2.1 HAEMATOLOGICAL DISORDERS

2.1.1 Phenotypic analysis of acute leukemia

Acute leukemia is a heterogeneous group of neoplastic disease and characterized into two main groups, lymphoid and myeloid. Immunophenotyping is of great importance and it provides more accurate diagnosis, classification as well as determination of prognosis which helps the management of the patient. This study was conducted to analyze the immunophenotype of 49 patients with acute leukemia. Of 49 patients studied (17/49) 34.69% had acute myeloblastic leukemia (AML), (32/49) 65.31% had acute lymphoblastic leukemia (ALL) and/or leukemia/lymphoma. The average age of AML and ALL and/or leukemia/lymphoma patients were (9.11) and (11.3) years, respectively. The most common phenotype is B cell lineage (23/32) 71.8% and the others (9/32) 28.2% were T cell lineage ALL. Among B cell lineage: common ALL were (15/32) 46.8% and Pro B-ALL were (8/32) 25%. In this study, T cell lineage is slightly higher than the other reported data (15 to 20%).

2.1.2 Determination of terminal deoxynucleotidyl transferase (Tdt) in lymphoid neoplasm.

Terminal deoxynucleotidyl transferase (Tdt) is a unique intranuclear DNA polymerase, a useful marker in the diagnosis of acute lymphoblastic leukemia (ALL) (French-American-British [FAB] L1 and L2) and distinguishing lymphoblastic leukemia/lymphoma from mature B-lymphoid neoplasms, such as Burkitt lymphoma (FAB L3). In this study Tdt positive lymphoid cells in 24 out of total 34 cases were observed. All Tdt positive cases were ALL (L1 and L2) and the rest 10 Tdt negative cases were leukaemic infiltration of lymphoma (Tdt-CD 19+ 7 cases and Tdt-CD 3 + 3 cases). All of them are being treated as acute lymphoblastic leukemia.

2.1.3 Immunophenotypes and karyotypes of leukemic cells in acute lymphoblastic leukemia

Advances in immunophenotyping and cytogenetic for leukemic blast cells is essential for the classification of ALL subtypes, prognostic assessment and therapeutic regimens. The study was conducted to analyze the cytogenetic abnormalities of 7 patients with ALL by conventional cytogenetic method. 6 cases are childhood ALL and only one case of adult type. The average age was 14.7 year. Of these 5 cases are T-ALL and 2 cases are B lineage ALL. Cultures of two samples were contaminated and the remaining five cases were unanalysable because of poor quality metaphase, Steps are planned to use the modified G banding to get structural abnormalities of these cases.

2.1.4 Molecular diagnosis of fusion genes in pediatric acute lymphoblastic leukemia

Acute lymphoblastic leukemia is the most common childhood tumor. Clonal chromosomal abnormalities can be identified in more than 75% of the cases of acute lymphoblastic leukemia. Of which certain fusion gene transcripts like MLL-AF4, E2A-PBx are associated with unfavourable outcome but TEL-AML1 fusion gene demonstrates good prognosis. These fusion gene transcripts play an important role in prognostic

assessment as well as therapeutic implication. A total of 17 B lineage acute lymphoblastic leukemia patients attending the Yangon Children Hospital (YCH) were studied to identify the fusion gene from leukemic blast cells of peripheral blood and/or bone marrow aspirate by RT-PCR using the E2A-PBx and MLL-AF4 gene amplification. Only one case (15.88%) was E2A-PBx fusion gene positive and gene transcript of MLL-AF4 were negative in all cases.

SERVICES PROVIDED

LABORATORY

1.	Immunocytochemical staining of 34 blood films of ALL patients from Clinical Research Unit (Hematology), Yangon Children's Hospital.
2.	Cytochemical staining of 54 blood film of acute leukemia patients of YCH and YGH.

CHEMICAL TOXICOLOGY RESEARCH DIVISION

Deputy Director & Head	...	Dr. San Aye MBBS MMedSc (Biochemistry)
Research Officer	...	Daw Khine Thin Naing MSc (Analytical Chemistry)
	...	Daw Khin Khin Aye BSc (Chemistry), DS
Research Assistant (2)	...	Daw Than Than Swe BSc (Chemistry)
	...	U Aung Myat Kyaw BA (Economic), DFT
	...	Daw Tin Nwe Htwe BSc(Chemistry), DFT
Research Assistant (3)	...	Daw Ohnmar Win
	...	Daw Tin Tin Htike
	...	Daw Nilar Aung BSc (Mathematics)
Research Assistant (4)	...	Daw Aung Aung Maw BSc, MSc, MRes (Zoology)
	...	Daw Myo Myo Aye BSc (Chemistry)
Laboratory worker	...	Daw Thandar Wint Wint Aung

The Chemical Toxicology Research Division is engaged in Poison Information Services, Pesticide Research and Research on Chemical Pollutants.

RESEARCH PROJECTS

1. ENVIRONMENTAL HEALTH

1.1. SAFETY OF WATER

1.1.1. Determination of pesticide residues contamination in fish, domestic used water and food.

Water samples had been collected from Waw Township, Bago Division. Totally, twenty seven water samples from ten villages and two wards of Waw town had been collected. The division had established the method to determine the pesticide residue in water as well as in fish and foods.

1.1.2. Determination of particulate-bound cyanide in air of fish-paste factory and plastic factory workplace.

Three air samples from each of ambient air in fish-paste and plastic factory workplaces were collected for one hour as pilot study and analyzed according to the standardized method. In the pilot study, there was no detectable amount of particulate-bound cyanide in the workplaces. Air samples collection for 8 hours will be performed in above mentioned workplaces and analyzed so as to represent the working hours.

SERVICES PROVIDED

ACADEMIC

Sr.	Name	Course	Responsibility
1.	Dr. San Aye	M. Med. Sc (Forensic Medicine) Post-graduate teaching	Teaching
2.	Dr. San Aye	Training on Risk Analysis Application to Food Inspectors, DOH, FDA	Teaching
3.	Dr. San Aye	Research Methodology	Facilitator

CLINICAL RESEARCH DIVISION

Research Scientist & Head	...	Dr. Han Win MBBS MMedSc(Int Med)
Research Scientist	...	Dr. Htay Kyaw MBBS MMedSc(Int Med)
Research Officer	...	Dr. Yae Chan MBBS
	...	Dr. Wai Moe Lwin MBBS
	...	Daw Than Than Lwin BSc(Zoology)
	...	Daw Sandar Kyi BSc(Chemistry) Dip in Japanese
Research Assistant (2)	...	Daw Kyi Kyi Win Zaw BA(Myanmarsar)
	...	Daw Myat Myat Thu BA(Economics)
	...	Daw Kyu Kyu San BA(Geography)
	...	Daw Ni Ni Aye BSc(Botany)
	...	Daw Khin Thida Wai BA(Psychology)
Research Assistant (3)	...	U Win Lwin BA(Economics)
	...	Daw Tin Htar Lwin
	...	Daw Aye Hnin Phyu BSc(Botany)
	...	Daw Khin Moe Latt BA(Myanmarsar)
Research Assistant (4)	...	Daw Myo Myo Kyaw BSc(Chemistry)
	...	Daw Swe Swe Aung BSc(Marine Biology)
	...	Daw Kyi Kyi Han BA(Geography)
Laboratory worker	...	Daw Zin Mar
	...	Daw San Thwin Oo

Clinical Research Division is primarily involved in research activities of the following programme areas: health and environment, tobacco, Acute Respiratory Infections (ARI), tuberculosis and non-communicable diseases with emphasis on cancer, diabetes mellitus and hypertension.

RESEARCH PROJECT

1 COMMUNICABLE DISEASES

1.1 TUBERCULOSIS

1.1.1. Smoking in relation to pulmonary tuberculosis in adults

This study was carried out at Secondary Health Centre in Kyimyindine Township. A total of 110 subjects (51 tuberculosis cases and 59 healthy controls) were so far recruited since December 2006. Among the cases, 27 (52.9%) were current smokers, 9 (17.6%) ex-smokers, and 15 (29.4%) non-smokers. Among controls, 11 (18.6%) were current smokers, 19 (32.2%) ex-smokers, and 29 (49.1%) were non-smokers. The study is being continued to have required sample size.

1.1.2. 1.1.2 Gender difference in health seeking behaviors of tuberculosis patients: a qualitative and quantitative study

This study will be carried out at Tuberculosis centre (Yangon Division) to determine the health care seeking behaviors of tuberculosis patients from gender perspectives. Data collection tool (survey proforma) has been developed, pretesting done, and survey team trained for field data collection.

1.2 ACUTE RESPIRATORY TRACT INFECTION

1.2.1. Intervention study of ARI case management among BHS at Padaung Township (Bago West Division)

The study was conducted with the objectives of: determining the existing knowledge and practice of BHS on management of ARI; to conduct a training workshop according to standard guidelines; to assess their knowledge and practice at post training period; and to evaluate the effectiveness the ARI case management strategy carried out within the programme. It was carried out in Padaung Township (Bago West Division). Assessments were made at baseline and 3 months after the training. In both assessments, BHS were interviewed by using the same questionnaire. Two FGD sessions were also conducted to support the questionnaire assessment information. Age of BHS ranged from 24-60 years and duration of service was 0-39 years. Majority were from sub-centers (34%) and females (88%). Majority had sufficient knowledge on ARI case management except prescribing antibiotics in pneumonia. Some confusion exists among BHS in differentiating between signs of pneumonia and severe pneumonia. Importance of “exclusive breast feeding” and “complementary feeding” as the preventive measures of ARI was not clearly recognized by the respondents. More than one-third of BHSs had lack of experience in managing pneumonia and severe pneumonia cases. Regarding their actual practice on case management, about half had weakness on management of pneumonia and severe pneumonia. Even worse, very few (11.6 %) correctly mentioned about the management of prolong cough. After the training, BHS got better in; their knowledge about some important signs of ARI, knowledge on how to do when they meet an ARI case with severe stage, and knowledge regarding case management at various stages. There were also improvements in their practice especially in treating pneumonia and prolong cough. Despite some constraints, definite improvements were found in knowledge and practice among BHS after intervention showing the effectiveness of the present training program. Although knowledge about ARI case management was improved, impact of the programme would be measured apparently only after some interval of time. Thus changes of morbidity should be monitored in coming years in the township. This study highlighted that frequent on-job training program are needed to refresh and sustain BHS acquired skill.

2 NON-COMMUNICABLE DISEASES

2.1. DIABETES

2.1.1. Risk factors for the development of long term diabetic complications

The aim of this study was to identify not only the path-physiological but also the quality of care related risk factors that leads to the development of long-term diabetic complications. It was carried out in outpatient diabetic clinic and medical ward of North

Okkalapa General Hospital. Type II diabetes patients with chronic complications (critical limb ischaemia, amputation, chronic renal failure [serum creatinine >3 mg/dl], dialysis treatment, diabetic neuropathy, proliferative retinopathy) were included in the study as cases. Patients not affected by any of the above complications were taken as controls. A total of 292 patients (142 cases and 150 controls) were included in the study. It was found that some factors were related to major chronic diabetic complications. These included male sex (OR= 1.52, 95% CI = 1.22-1.9), duration of diabetes > 20 years (OR= 2.24, 95% CI = 1.62-2.8) as compared to those with \leq 20 years, and presence of uncontrolled hypertension (OR= 1.71, 95% CI = 1.33-2.19). Patients who were not regularly attending a health care facility (OR= 1.82, 95% CI = 1.42-2.6) and those who needed help for access to such a facility (OR= 1.48, 95% CI = 1.1-1.97) were also at a higher risk. This study showed that the factors related to quality of care were also important for the development of long-term diabetic complications.

2.2. TOBACCO

2.2.1. Smoking in an urban community: prevalence, associated factors and behavior among adult males in Kyimyindine Township

Smoking is the single most important preventable cause of diseases and premature death in the world today. It is a major public health problem in developing countries. The objectives of this study were to estimate the prevalence, to find out the associated factors of smoking, and to determine the behaviors of adult male smokers in Kyimyindine Township. A cross-sectional survey was conducted among 486 adult males, aged 15 years and above in March 2006. Overall prevalence of current smokers was 46.1%. The factors associated with smoking were presence of paternal smoking (OR= 1.52, 95% CI= 1.05-2.2), peer smoking (OR= 1.86, 95% CI= 1.22-2.83) and education. Respondents with university/ college level of education were less likely to smoke than those of primary school level (OR= 0.55, 95% CI= 0.39-0.79). More than half (58.5%) started smoking before 20 years of age, and 74.1% smoked more than 5 years. Twenty five percent of smokers also used tobacco in other form. Large numbers smoked at home (70.1%) and at public places (52.2%). It was found that smoking is prevalent among adult males, most of them begin to smoke rather early in life and continue for many years. Smoker's behaviors also need to be changed. Health education and intensive anti-smoking campaigns through media are important measures for smoking cessation and changing their behaviors.

2.3. CANCER

2.3.1. Assessment of community's behaviors towards cancer in a community

This cross-sectional study was carried in Hlaing-thar-yar Township, Yangon Division in 2006 with the objective of assessing community's knowledge, opinion, attitude, and practice of prevention regarding cancer. A total of 400 randomly selected subjects in both urban and rural were interviewed with pre-tested questionnaire. The mean age of participants was 39 ± 11.33 year. Median income of respondents was 50,000 Kyats per month (10000- 300000). Forty four percent finished primary level of education and nearly 71% were female. Half were dependent and 28.6% were working their own business. Very few (2.3%) were Indian and the rest were Myanmar. Wooden and bamboo houses were dominant (49.6 % and 35.6% respectively). About 80% of respondents were married. Twenty four percent were smokers and among them 80% used cheroot. The

median time of eating vegetable, fruit and fish were 8 (1-24) times; 4 (0-15) times, and 10 (0-21) times per week respectively. All of respondents had heard about cancer. One third of respondents were aware that the food can also cause cancer. Thirteen percent of them had cancer patients in their families and relatives. The health centers (33.1%) and the neighbors (32.3%) were found to be common knowledge sources regarding cancer. The breast; cervix, and stomach were most common sites for cancer which was answered by 41.4% of the respondents. The second commonest sites were lung and liver. About 90% of study subjects knew that abnormal swelling on the body and breast lump were regarded as an early sign of cancer. More than half of respondents knew prolonged wound healing, abnormal bleeding from orifices, unusual hair loss, chronic cough and cough with blood stained sputum as an early signs of cancer. About 90% and 75% of respondents answered lump in breast and difficulty in swallowing were regarded as an early signs of cancer. Self breast examination (86.2%) and mammography (86.7%) were found to be methods of diagnosis for cancer responded by interviewees. Regarding treatment, surgery (33.6%) and radiotherapy (95.5%) were commonly cited methods, but hormonal method was known by less than one fourth of interviewees. More than 90% of them knew that smoking and alcohol drinking behaviors were related to cancers. According to their opinions, early diagnosis (87.4%) of cancer is an important and it can be hereditary (66.4%) in nature. Sixty two percent of respondents thought sitting near the smoker should be avoided and 45.9% considered every body had a tendency for contracting cancer. Approximately one third of them did self breast examination and only 14% of the interviewees got Hepatitis B vaccination. Analysis is in progress.

3 ENVIRONMENTAL HEALTH

3.1. AIR POLLUTION

3.1.1. Acute respiratory infections (ARI) and respiratory function among 5-12 age school children due to effect of mosquito coil

The objective of study was to find out association between mosquito coil smoke exposures, respiratory ill health and lung functions changes among 6th, 7th, and 8th grade school children in No.4 State Primary School, Dawpon Township, Yangon Division. A total number of children recruited were 193. Interviewing questionnaire, weight and height measurement, and spirometric measurement of lung functions were undertaken by skill research assistants during December 2006. The mean age of student was 11.65 ± 1.35 and 50.3% were male. Their mean height and weight were 139 ± 9.33 cm and 30.33 ± 7.59 Kg. Average total number of persons living in the same house was 7.37 ± 3.2 and mean number of persons who share the same bed with the study subject was 2.35 ± 1.13 persons. Nearly thirty percent of students suffered respiratory ailment two weeks before interview and among which 32.1% experienced nasal discharge and 10% had sore throat. Out of 193 students 92.7% used mosquito coils. More than 60% utilized “*gozila*” brand mosquito coil. Forty five percent were found to be using mosquito coil daily. The median hour used was 3 and it ranged from 1 to 16 hours. About one third had separate cooking places. A few houses (5.2%) had smoke outlet in their kitchens and more than halves used stove with charcoal. About 80% utilized pieces of wood for initiation of making fire. Scented stick use was found in 70% of students’ houses. About ten percent of their families had asthma. Round about one fourth of students were hospitalized during neonatal period. Only 7.3% of students experienced asthma themselves. Before mosquito coil exposure the mean volume of FEV₁, FVC, and PEF_R of male and female students

were 1630.36 ± 400.56 ml vs. 1603.59 ± 326.67 ml, 1755.08 ± 438.62 ml vs. 1731.50 ± 342.07 ml, and 242.48 ± 57.60 L/min vs. 218.25 ± 38.18 L/min respectively. Further analysis is in progress.

SERVICES PROVIDED

ACADEMIC

Sr. No.	Name	Course	Responsibility
1.	Dr.Han Win	Research Methodology, (September, 2006. DMR)	Teaching
2.	Dr.Aung Thu	Research Methodology, (September, 2006. DMR)	Teaching

CLINICAL RESEARCH UNIT (HAEMATOLOGY)

Head of Unit	... Professor Dr Aye Maung Han Professor and Head of Child Health, Yangon Children Hospital
Research members	... Professor Dr Rai Mara, Professor and Head of Clinical Hematology Department, Yangon General Hospital ... Dr Aye Aye Gyi, Consultant Hematologist, Clinical Hematology Dpt, YGH ... Dr Aye Aye Khine, Consultant Hematologist, YCH. ... Dr Mya Mya Aye, Consultant Oncologist, YCH ... Dr Htay Htay Tin, Senior Consultant Pathologist, (YCH) ... Dr Khin Pyone Kyi, Director (Research), Department of Medical Research (LM) ... Dr San San Htwe, Research Scientist (Blood Research Division), DMR (LM) ... Dr Zin Zin Thu, Research Officer (Blood Research Division), DMR(LM)
Administrative Incharge	... Dr Win Pa Pa Naing, Research Scientist (Blood Research Division), DMR(LM)

RESEARCH PROJECT**1. NON-COMMUNICABLE DISEASES****1.1. CANCER****1.1.1. Outcome of leukemia patients in the Haemato-Oncology Unit of YCH (2003-2006)**

Leukemia is the most common haematological malignancies in childhood. Among these, acute lymphoblastic leukemia is the most common malignancy. Recently, the cure rate of childhood ALL with current treatment based on risk stratification regiment ranges from 75 to 80%. In Yangon Children Hospital, there were were 2 types of treatment protocols used in the management of childhood acute lymphoblastic leukemia. The old protocol which started in 2002 (based on UKALL 11) and new protocol (based on UKALL 2003) which was introduced in 2004. A total of 88 acute lymphoblastic leukemia cases, 34 patients were treated according to old schedule whereas 54 patients on new schedule. *Complete remission rate* (CR) was 62% in patients in the old schedule and for new Schedule A & B it was 32% and 86% respectively. *Partial remission rate* (PR) is 9% in the old schedule and 23% in the new schedule A. No PR in patients with schedule B. *No remission rate* (NR) is 3% in old schedule and 2% in new schedule. *Mortality rate* was 35% of patients in the old schedule and 11% and 7% in the new schedule A and B respectively. *Relapse rate* was 6% in the old schedule and 7% each in both types of new schedule. *Defaulter rate* was 20% in the old schedule and 7% and 20% respectively in the new schedule A & B. *Survival rate* was 44% in old schedule and 81% and 75% respectively in new schedule A& B. Immunophenotyping was done in 43 patients. Among them 29 patients (67%) of B lineage and 14 patients (33%) of T lineage were observed. Fusion gene E2A PBX is found in only one out of 25 cases. Survival was improving with new schedule 81% and 75% respectively compare to the old schedule (44%). In fact reason for slightly lower rate of survival in Schedule B was due to more defaulter cases rather than expired cases. Defaulter rate in our unit is still high (20%). It was also observed that early deaths were getting lesser now.

CLINICAL RESEARCH UNIT (HIV)

Head of Unit	...	Professor Dr. Rai Mra, MBBS MRCP FRCP
Research Counterpart	...	Dr. Kay Thwe Han, MBBS
Unit Members	...	Dr. Htin Aung Saw, MBBS MSc
	...	Dr. Wynn Naing, MBBS MPH Dip in Derm.

RESEARCH PROJECTS

1. COMMUNICABLE DISEASES

1.1. HIV/AIDS

1.1.1. Hepatitis B and C virus co-infection among HIV infected patients.

In Myanmar, previous study reported that approximately 10% of the general population and 3% of blood donors are HBs Ag and HCV Ab positive. As the risk factors for HIV, HBV, and HCV are similar, the co-infection are also most likely to occur. Disease interactions including accelerated disease progression, reactivation of hepatitis B viral infection after discontinuation of antiretroviral drugs, and development of drug resistance in hepatitis B virus due to prolong exposure to single drug which is one of the antiretroviral therapy (ART). Therefore to find out the HBV and HCV co-infection rate among HIV population and the clinical status of the co-infection, a hospital based cross sectional analytical study was carried out at the Specialist Hospital, Waibargi from May to June 2006. A total of 119 patients with confirmed HIV antibody test were included in the study. After obtaining consent, questionnaires on their risk factors were completed and enrolled subjects were tested for HBs Ag and HCV antibody, liver enzyme levels, and ultrasonography of the abdomen. The mean age of the study population was 36.6 yr, and 65% were male patients. Regarding past history, 12 patients had the history of blood transfusion, 7 had injecting drug use, and 30 had tattooing. Fifteen patients gave the past history of hepatitis. As for clinical staging according to WHO, 16.8% (20/119) were stage I, 15.1% (18/119) were stage II, 52.1% (62/119) were stage III, and 16% (19/119) were stage IV. The mean CD4 count of the study population was 86 cell/mm³ with the lowest value of 5 cell/mm³ and the highest value of 277 cell/mm³. HBs Ag was detected in 20% (24/119) and HCV Ab was positive in 9.2% (11/119). Two patients was noted to be co-infected with both HBV and HCV. Among the patients who gave the history of injecting drug use, 2 were HCV Ab positive and 3 were HBs Ag positive. Liver enzymes were also studied in patients with hepatitis virus co-infection. Three out of 11 HCV Ab positive patients showed raised liver enzyme levels and 7 out of 24 HBs Ag positive patients had raised ALT level. Ultrasonography of the abdomen was done in 14 of HBs Ag positive, 8 of HCV Ab positive patients, 57 HBs Ag negative and 63 HCV Ab negative patients. Ultrasonographic findings of hepatitis viral co-infected patients were compared with those of HIV infected patients with no co-infection and showed no difference. The study could highlight that the prevalence rate of HBs Ag and HCV Ab were higher than the general population. Co-infection with both hepatitis virus B and C was detected in two patients in the study.

CLINICAL RESEARCH UNIT (MALARIA-DSGH, MINGALADON)

Head of Unit	... Professor Colonel Marlar Than. MBBS MRCP(UK) FRCP(Edin) FRCP (Lond) FACTM. Dr. Med. Sc (General Medicine) –Honorary. Advisor- Directorate of Medical Services MOH.
Assistant to Head of unit	... Professor Lt. Colonel Win Win Myint MBBS MMedSc (Int. Med) MRCP(U.K) Consultant Physician DSGH Mingaladon.
Administrative In-charge	... Dr. Myat Phone Kyaw MBBS MMedSc(Biochem) FACTM. Ph.D (Sri Lanka) Deputy Director, Experimental Medicine Research Division. DMR (Lower Myanmar)
Research Members	... Professor/ Colonel Myo Nyunt MBBS,D Path., DCPM Phil (London) ,FACTM ,PhD . Consultant Pathologist /Professor & Head .Dept. of Pathology DSGH Mingaladon. .. Lt Col Khin Maung Aye MBBS. DTM&H Commanding officer .Health Disease Control Unit Dr Thaw Zin. MBBS; MMedSc;FACTM; PhD(NSW) Deputy Director(Research) Pharmaceutical Toxicology Research Division DMR (Lower Myanmar) ... Lt. Colonel Khin San San MBBS , MMed.Sc (Microbiology) DSGH Mingaladon. ... Lt Col. Khin Phyu Pyar MBBS MMedSc (Int. Med) MRCP(U.K) Consultant Physician DSGH Mingaladon ... Capt Than Htut MBBS, M Med.Sc(Int.Med) Medical Officer DSGH ... Capt Daw Khin Nyo Nursing Officer, CRU, DSGH
Laboratory worker	... WO II Ye Myint

RESEARCH PROJECTS

1. COMMUNICABLE DISEASES

1.1. MALARIA

- 1.1.1. A clinical study of efficacy and safety of oral Dihydroartemisinin – Piperaquine Artekin) in uncomplicated falciparum malaria in adults.

This is a hospital based 28 days clinical trial of Artekin on a total of 30 uncomplicated falciparum malaria patients, carried out between July 2005 to June 2006. Test drug:-Artekin compound tab. (containing Dihydroartemisinin 40 mg plus Piperaquine 320 mg) manufactured from Holleykin Pharmaceutical Co., Ltd Guangzhou, Peoples' Republic of China given 2 tablets each at 0, 6, 24 and 32 hours. Initial parasitaemia was 13528.9 ± 1909.3 per cu mm, Fever Clearance Time (FCT) was 12.4 ± 13.1 hours, Parasite Clearance Time was 46.8 ± 22.1 hours. There was no early treatment failure (ETF) or late treatment failure (LTF). Adequate clinical and parasitological response (ACPR) was 100%. There were no serious side effects. Therefore Artekin is safe and effective for use in the treatment of uncomplicated falciparum malaria in adults.

- 1.1.2. A clinical study of efficacy and safety of Amodiaquine – Artesunate (Larimal) in uncomplicated falciparum malaria in adults.

A hospital based, 28 days clinical trial to determine the therapeutic efficacy, safety and tolerability of tablet Amodiaquine – Artesunate (Larimal) in the treatment of uncomplicated falciparum malaria patients, was carried out between January to September 2006. Larimal 4 tabs [2 tabs of Amodiaquine hydrochloride and 2 tabs of Artesunate 50 mg] was given, 12 hourly for 3 days. Initial parasitaemia was 13528.9 ± 1909.3 per cu mm, Fever Clearance Times (FCT) was 12.4 ± 13.1 hours and Parasite Clearance Time (PCT) was 46.8 ± 22.1 hours. Median parasite clearance was 42 hours. There was no early treatment failure (ETF) and adequate clinical and parasitological response (ACPR) was 100%. There were no serious side effects. Therefore Larimal is safe and effective for treatment of uncomplicated falciparum malaria in adults.

- 1.1.3. Efficacy and Safety of Dihydrodawn -Mefloquine compared to dihydro-artemisinin Piperaquine (Artekin) in uncomplicated falciparum malaria in adults.

A hospital based, 28 days clinical trial was done at CRU (Malaria) No.1 DSGH 1000 Bedded, Mingaladon, between July, 2005 to June, 2006, to determine the therapeutic efficacy, safety and tolerability of Dihydro-dawna plus Mefloquine compared to Artekin-compound tab in the treatment of uncomplicated falciparum malaria patients in adults. Dihydrodawn [20mg] - 6 tablets together with Mefloquine [250mg] 2 tabs was given daily for 3days in the test group (n= 22) and 2 tablets of Artekin-compound tab [40mg Dihydroartemisinin and 320 mg Piperaquine phosphate] from Holleykin Pharmaceutical Co., Peoples' Republic of China was given each at 0, 6, 24 and 32 hours in the control group (n=22). Initial parasitaemias were 17752.72 ± 36339.49 and 16551.11 ± 37216.23 per cu mm, Fever Clearance Times were 17.79 ± 21.76 and 12.45 ± 12.34 hours and Parasite Clearance Times were 40 ± 18.89 and 41.95 ± 19.92 hours respectively in Dihydrodawn and Artekin groups. There was no early treatment failure (ETF) and adequate clinical and parasitological response (ACPR) was 100% in both groups. There were no serious side effects. Therefore Dihydro-dawn plus Mefloquine is

as safe and as effective as Dihydroartemisinin - Piperaquine (Artekin) for treatment of uncomplicated falciparum malaria in adults.

SERVICES PROVIDED

ACADEMIC

Sr. No.	Name	Course	Responsibility
1	Professor Colonel Marlar Than	M Med Sc (Int Med) M Med. Sc. (Pharmacology)	Reader/Examiner
2	Professor Lt. Colonel Win Win Myint	M Med Sc (Int Med)	Reader/Supervisor
3	Lt. Colonel Khin Phyu Pyar	M Med Sc (Int Med)	Reader/Supervisor

LABORATORY

1.	4660 Peripheral Blood films for Malaria Parasites
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CLINICAL RESEARCH UNIT (CEREBRAL AND COMPLICATED MALARIA)

Head of Unit	... Professor Dr Than Than Aye MBBS MMedSc (Internal Medicine) DrMedSc (General Medicine) FRCP (Edin)
	... Dr Mar Mar Kyi MBBS MMedSc (Internal Medicine) MRCP
Administrative In-charge	... Dr Myat Phone Kyaw MBBS MMedSc (Biochemistry) PhD(Colombo)
Research Medical Officer	... Dr Myat Htut Nyunt MBBS
Technician	... Daw Khine Khin Maw

RESEARCH PROJECTS

1. COMMUNICABLE DISEASES

1.1. MALARIA

1.1.1. Clinical Profile of severe and complicated malaria patients

The clinical profiles of severe and complicated malaria cases admitted to NOGH were thoroughly assessed during 1 January to 31 December 2006. It was reported that a total of 311 malaria cases (Clinical suspected malaria) were admitted to NOGH. In which, 110 cases were admitted as severe and complicated malaria (SCM) and 99 cases admitted as confirmed uncomplicated malaria. Over all slide positive rate was 67.2%. Cerebral malaria occurred in 61 patients (55.5%) in which 2 cases were associated with retro viral infection. The single organ dysfunction occurred in 18 patients (16.36%) (Hepatitis 13, acute respiratory distress syndrome 1, acute renal failure 4). The patient come with system dysfunction was 15.45% (n=17) (severe anaemia 12, Hyperpyrexia 2, Algid type 2, black water fever 1). Multi-organ dysfunction (two or more organ involvement) occurred in 10 patients, 9.09% of the cases. Overall mortality was 20%. There were 15 fatal cases in cerebral malaria (Mortality rate, 24.6%) and 4 cases in multi-organ dysfunction group (40% mortality). All patients contacted malaria from different endemic areas. A total of 120 SCM cases Cerebral malaria 54.1% (n=65) in which 4 cases had septicaemia and 5 cases had retro viral infection, single organ dysfunction 20.8% (n=25), system dysfunction was 18.3% (n=22), multi-organ dysfunction 6.6% (n=8) were admitted in 2005 with overall mortality 5.8%. Mortality was high in 2006 because most of the fatal cases expired within 24 hours after admission. Thorough assessment of the patients, proper and intensive management for complications in severe and complicated malaria patients is essential to reduce mortality.

1.1.2. Endotoxaemia in severe and complicated falciparum malaria

Hospital based descriptive study was carried out to detect gram-negative bacterial toxins in severe and complicated falciparum malaria cases admitted at North Oakkalarpa General Hospital, by using the most sensitive E-Toxate method. Antibiotic usage by physician was also noted. Endotoxaemia was recorded in 60.8% of the patients. Mortality of endotoxaemia patients and those of without endotoxaemia were not significantly different. Positive correlation existed between days of symptoms before admission and endotoxaemia. Concerning the use of antibiotic in these cases, significant difference was not found between the two groups: endotoxin positive group that was not taken antibiotics

(80.7%) and endotoxin negative group treated with antibiotic (53.8%). The clinicians used antibiotics to treat the bacterial infections associated with malaria without measuring endotoxin has no significant effect. Endotoxaemia was present in severe falciparum malaria infection, but it is not a prognostic indicator.

SERVICE PROVIDED

LABORATORY

- | |
|---|
| 1. Blood for MP Parasite (total 728 samples- 700 from the admitted cases, 28 from the out patients) |
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CLINICAL RESEARCH UNIT (ONCOLOGY)

Head of Unit	... Asso.Professor Dr. U Soe Aung MBBS MMedSc (Internal Medicine), MRCP FRCP IT (Canbridge)
Administrative In-charge	... Dr. Aung Thu MBBS MMedSc (Public Health) DTM & H MCTM (Master of Clinical Tropical Medicine)
Members	... Dr. Daw Myat Myat Ohn Khin MBBS Professor Dr. Daw Thida San MBBS DMRT MMedSc (Radiation Oncology) ... Professor Dr. Daw Win Mar MBBS MSc (Nuclear Medicine) ... Dr. U Phone Myint MBBS MMedSc (P & TM) MSc (Health Economics) ... Dr. Han Win MBBS MMedSc (Internal Medicine) ... Dr. Aung Myo MBBS MMedSc (Medical Oncology)

RESEARCH PROJECTS

1. NON-COMMUNICABLE DISEASE

1.1. CANCER

1.1.1. Cost-analysis of different chemotherapy regimes used for breast cancer patients at Cancer Ward, NYGH

Breast cancer is one of the commonest cancer affecting women, causing extreme distress to the patient and inflicting profound economic crisis to the family, loss of income and depletion of resources in seeking treatments. The main problem encountered in cancer chemotherapy is the narrow therapeutic index, wide inter-individual variability in response to treatment, the cost, availability and choice of appropriate regime for a particular patient. Thus, systematic decision-making processes, based on evidence, social values, with efficient use of resources that benefits majority of target population and main aim of the study was to explore the socio-demographic status, clinical profile of patients, and the medial cost and outcome of different chemotherapy regimes used for the treatment of breast cancer at YGH. A total of 97 patients, mean age 51.7 ± 10.3 (range 33-75) years (inclusion criteria: clinical stage II/III, locally advanced or metastatic, around 80% in Karnofsky Performance Status Scale), and undergoing cancer chemotherapy at the Cancer Ward, from 2005 February to December, were studied. Patients treated were mainly non-earners (72.2%) and from Yangon area (58.7%). Majority were treated for ductal carcinoma (invasive 79.4%; infiltrated 10.3%; intra 1.0%), stage II/IIIB, with or without lymph node involvement and metastasis. The remaining (9.3%) were diagnosed as adenocarcinoma, medullary carcinoma, papillary carcinoma and recurrent cancers. Patients were subjected to surgery (83.5%), radiotherapy (86.6%) and hormonal therapy (3.1%). The most frequently employed chemotherapy regime was the cyclophosphamide, methotrexate, 5-FU (CMF-1; 66% and CMF-IV, 5.6%) regime. Other regimes include adriamycin, cyclophosphamide (AC; 17.5%), combinations (AC+CMF-1; 10.3%) and taxol (AC+C+Tax; 1.03%). Median cost consists of direct medicinal (drugs) and non-medicinal costs (adjunct therapies, hormone, surgery, radiotherapy, consumables like syringes, IV line, drip), and indirect costs (number of travel and hospitalization, cost of laboratory investigations and treatment of adverse reactions should they occur). With

52.6% successfully completed the six-cycle treatment and 24.7% still continuing, the cost was only calculated in those who completed the standard (CMF-1) regime was comparatively less costly (Kyats 29,600-34,400) than other regimes (CMF-IV, Kyats 30,700-34,700; AC, Kyats 97,100-97,900; Taxol, excess of Kyats 238,500) in monetary terms with additional cost for surgery, radiotherapy etc. Cost of investigation can range from Kyats 19,700-33,700. Adverse effects including laboratory parameters were not significantly different between different regimes but whether there is any difference in effectiveness, long-term prognosis, quality of life or disease-free survival still needs to be assessed in the subsequent years.

1.1.2. Establishment of community-based surveillance system for women cancer patients in satellite townships

The study was a community-based study employing both qualitative and quantitative approaches with aiming to develop community based surveillance system for early detection of women cancers. It was conducted with the objectives of estimating perceived magnitude of women cancer problem, assessing community awareness of those cancers and disseminating information for establishing population based cancer registry.

Among 35 townships of Yangon Division, 4 townships namely Hlaing Thar Yar, Shwe Pyi Thar, South Dagon and East Dagon Townships were selected purposely to cover the criteria of peri-urban or newly developed satellite townships. Out of 4 townships selected, data collection was completed for 2 townships (Hlaing Thar Yar and Shwe Pyi Thar). To assess community awareness about common women cancers, both quantitative and qualitative data collection methods were used. For quantitative survey, 216 women from out of 400 women to be selected were interviewed face to face using structured questionnaire. For the qualitative assessment 4 focus group discussions (FGD) were done using FGD guide. Half day training workshop was done in each township for the development of community based surveillance system for early detection of women cancers. Basic health staff and local M.C.W.A (Maternal and Child Welfare Association) members participated in that training. Referral pathway for suspected cases was discussed and established.

Preliminary findings from the quantitative assessment revealed that sampled women were aged between 40 to 75 years (mean age=48.6 years). Majority of them were married (69%) and only a few were attended university or graduate (0.9%). Their family incomes were ranged from 6000 Kyats to 150000 Kyats pre month. Regarding awareness of common women cancers, all respondents (100%) were aware of the breast cancer and only (76.9%) were aware of cervical cancer. Breast lump was pointed out as a condition that will later develop into cancer by (52.3%) and only (34.7%) mentioned that it would be painless in early stage. Almost all of them (97.7%) said that the disease could be cured at early stage. Surgical procedure was indicated as a main treatment option for breast cancer (94.9%). Sixty point six (60.6%) of the responded agreed that it was preventable. Abnormal bleeding per vagina was indicated as a main symptom of cervical cancer (56.5%). When enquire for the risk of development of cervical cancer, uncleanliness of the vagina and perineal area was indicated by (67.1%) of the respondents. About three-fourth (72.2%) said that the disease could be cured at early stage. Surgery was mentioned again as a main treatment option (71.8%). Majority of them (92.2%) stated that relatives/ friends were their main source of information about female cancers. Only (37.5%) mentioned the health staff as a source of information. Government hospitals/ clinics were identified as a main treatment centre available for cancer patients (98.1%). Qualitative

analysis was now in progress. Detailed analysis and triangulation of findings will be done after the completion of data collection.

SERVICES PROVIDED

ACADEMIC

Sr. No.	Name	Course	Responsibility
1.	Dr. U Soe Aung	Preparation of yearly Yangon Cancer Registry Report and Provision of registry data to researchers from various institutions	Registry In-charge
2.	Dr. U Soe Aung	Committee on the Study of Ethics, Morality, Professionalism and Doctor-Patient Relationship (MAMS)	Secretary
3.	Dr. U Soe Aung	M.Med.Sc (Medical Oncology) and post-graduate students from various disciplines & specialties training	Course chairman
4.	Dr. U Soe Aung	Teaching Medical Statistics to the MRCP Part-I candidates, as needed	Lecturer
5.	Dr. U Soe Aung	MMA	Journal Secretary
6.	Dr. U Soe Aung	Final Part-II MBBS (Clinical examinations)	Co-examiner

CLINICAL RESEARCH UNIT (TRADITIONAL MEDICINE)

Head ... Dr. Thein Kyaw MBBS
 Technical in charge ... Dr. May Aye Than MBBS MMedSc (Pharmacology)

Clinical trials, experimental and sub acute toxicity were conducted on reputed medicinal plants for their therapeutic efficacy and safety.

RESEARCH PROJECTS

1. NON-COMMUNICABLE DISEASE

1.1. TRADITIONAL MEDICINE FORMULATION

1.1.1. Clinical trial of diuretic potential of MAT/ MP 013 on healthy volunteers

A clinical trial to determine the diuretic potential of Myanmar medicinal plant of MAT/ MP 013 was carried out on 9 healthy volunteers. The plants were also purchased from market and prepared the drugs in Pharmacology Research Division. All volunteers who wished to participate in this trial were examined medically free from renal diseases, to exclude by doing urine for routine examinations, blood for urea and creatinine. Nine out of 18 healthy volunteers were put under the controlled setting of over night fasting. Fluid intake restricted up to 250ml and standardized meal immediately preceding the drugs administration time. The urine out put under these conditions within 4hours was collected as for the control readings. On the next day the subjects were gain put under these conditions and test drugs (5g) orally. Urine out put was collected for 4hr and urine sample for later electrolyte determination were stored at minus 20 degree celcius. After one-week rest the same procedure was repeated with furosemide 40mg orally. The mean urine output of control showed 194.89 ± 20.19 ml, mean urine output of tested showed 353.75 ± 60.53 ml and standard furosemide showed 808.33 ± 98.59 within 4hr respectively. The test drugs showed significant increased in mean urine volume ($p < 0.05$) at 2hr, 3hr and 4hr and standard drugs showed significant increased in mean urine volume ($p < 0.0005$) through out the study. The untoward side effects were also monitored. Clinically evident acute side effect was not detected in test group. The study is in progress.

1.1.2. Dose finding study of hypoglycemic potential of MAT/ MP 014 on maturity onset diabetes

Preliminary dose finding study of MAT/ MP 014 was done on 3 maturity onset diabetes patients. The patients were tested for oral glucose tolerance test for base line examination. Three days after withdrawal of all antidiabetic drugs. After that MAT/ MP 014 seed 2g, orally per day for 2 days was given and fasted at 2nd night. On next day, after fasting blood sample was collected, the 3rd dose was given and oral glucose tolerance test was done. Then 3 days washout the same procedure was repeated with 4g/kg and 5g/kg. The untoward side effects were also monitored. The patients tolerated the drugs well and except for mild gastrointestinal upset, no serious side effects had been reported.

CLINICAL RESEARCH UNIT (TOXICOLOGY)

Unit Advisors	...	Professor Dr. Saw Naing
	...	Professor Dr. Tin Myint
Head of Unit	...	A/Professor Dr. Thiwa Tiin MBBS MMedSc (Int Med) MRCP (UK)
Members	...	Dr. W Tun Lin MBBS DP&TM (Ygn) MSc (MedPara) PhD (Australia)
	...	Dr. Thaw Zin MBBS MMedSc (Pharmacology) FACTM PhD (Australia)
	...	Dr. San Aye MBBS MMedSc (Biochemistry)
	...	Dr. Thaung Hla MBBS MMedSc (Pathology)
	...	Dr. Kyi Lin, MBBS MMedSc (Anaesthesia)
	...	Dr. Saw Aung Moe Aye MBBS
	...	Dr. Ohnmar May Tin Hlaing MBBS
	...	Daw Kyi May Htwe BSc (Chemistry)
Secretary	...	Dr. Khin Chit MBBS MMedSc (Pharmacology)

The Clinical Research Unit (Toxicology) was established under the National Poison Control Centre, on 11 June, 2004, with the main objective of conducting evidence-based clinical studies concerning prevention, diagnosis and management of poisoning. The output of these studies will provide a clearer direction in the management procedures including formulation of guidelines, support appropriate patient care and ensure efficient use of available resources including antidotes. Additional collaborators will include professionals from departments under the Ministry of Health, selected major hospitals, and postgraduate students.

RESEARCH PROJECTS

1. ENVIRONMENTAL HEALTH

1.1. PHARMACOLOGICAL HAZARDS

1.1.1. Clinical Profile of Acute Poison Cases admitted to Poison Treatment Centre, New Yangon General Hospital (2004-2005).

Acute poisoning remains one of the commonest medical emergencies inflicting a substantial burden on health care system and patient family, as well as contributing significantly to ICU admissions, cost of hospitalization and patient care. A clinical profile of acute poison cases was done to explore the trend of acute poisoning, associated risk factors and outcome of management so as to formulate guidelines for management and prevention of accidental poisoning, reduce harmful interventions, estimate logistic supplies needed at the Poison Treatment Centre and appropriate use of available resources. The study conducted from July 2004 to June 2005, indicated 375 (13.7%) out of a total of 2743 admissions to be acute poisoning with a slight prevalence of females (53.3% of total poisoning cases) over males (46.7%). Self-poisoning constituted 65.9%, with 43.7% occurring between the ages of 16-25 years. Majority are dependent (29.1%),

low education (secondary; 64.5%), middle income class. Drug overdose stood the highest (41.2%), followed by pesticides (20.3%), food (8.3%), corrosives (5.9%), mixed (3.2%) and unknown (9.3%) poisoning. Major precipitating factors being family problems (37.6%), mental problems including alcoholism and drug abuse (19.2%), financial difficulties (11.5%) and love affairs (5.9%). About 4.8% of the cases were unconscious on admission, while the rest presented with GI symptoms (nausea, vomiting; 46.7%), CNS (drowsiness, headache, disorientation, blurring of vision; 48%) and respiratory distress (12%). Psychiatric assessment indicated 23.2% as mood disorder, 26.7% as acute stress reaction, 25.6% as alcoholism and 3.2% as schizophrenic psychosis with suicidal tendency. The rest are within normal limits. About 12.8% of the cases required ICU treatment and median duration of hospital stay ranged from 2-5 days. Most patients ultimately recovered (91.7%), but 8.3% expired in spite of treatment. Main causes of mortality include unknown poisoning (3.2%), mixed (1.6%) and pesticide (1.3%). The study highlighted the magnitude of poisoning and the need of research on poison identification/analysis, clinical and laboratory indicators for prognosis, outcome of treatment including supportive interventions and antidotal therapies to prevent unnecessary mortality and morbidity.

1.1.2. Study on paracetamol poisoning: assessment of outcome of treatment with oral n-acetylcysteine at NYGH.

Acute paracetamol poisoning is an increasingly common intentional poisoning in Myanmar. Since clinical symptoms seldom indicate the seriousness of poisoning until hepatic necrosis develops, full history including patients' drinking habits, amount and time of ingestion as well as concomitant intake of other drugs (e.g. enzyme inducers like rifampicin, phenytoin, phenobarbitone or alcohol) and analysis of paracetamol concentration in relation to time of ingestion is necessary. The present study correlates the clinical aspects of diagnosis and treatment with the laboratory parameters so as to have basic knowledge on the role of emergency and intensive care management and the factors which may influence the patients' final outcome. A total of 25 patients (aged 24.2 ± 7.3 years; 9 males and 16 females), admitted to poison treatment centre, NYGH, for acute paracetamol overdose during the year 2004-5 were studied. The average amount of ingestion is 30.2 ± 17.9 (10-80) tablets and the median time lapse for arrival to hospital was 8.5 ± 5.2 hours (4.4 - 28.5) hours. Paracetamol concentrations at the time of admission ranged from 0.16 - 47.2 mg/L and gastric aspirate were even higher (>50 mg/L). Drug history revealed concomitant ingestion of drugs such as diazepam, chlorpheniramine, amitriptyline and mixture as cold tablets in 4 patients. All patients were clinically stable on admission and laboratory parameters, Hb (13.4 ± 1.4 g/dl), bilirubin (11.7 ± 7.6 μ mol/L) and urea (9.1 ± 4.8 mmol/L) were within normal limits. Three patients (12%) who later developed high alkaline phosphatase (213-340IU/L), SGOT (193-416IU/L) and SGPT (175-1120IU/L) levels, needed ICU admissions. No significant correlation was seen between clinical and laboratory parameters. Except for 4 patients with low-risk (<15 tablets), remaining 21 patients were given oral n-acetylcysteine, which was later terminated in 6 patients on day-2 because of subsequent low levels of paracetamol indicated on the normogram. Analysis of paracetamol and its metabolites by HPLC indicated a significant inhibition of toxic metabolite formation by oral n-acetyl-cysteine. All patients fully recovered without any signs of hepatic damage at the time of discharge. The study highlighted the effectiveness of oral n-acetylcysteine, and paracetamol plasma levels as valuable indicators for planning of effective treatment programs, either as decision-making of need of antidotal therapy to prevent hepatic

damage, or as saving cost and labor by preventing unnecessary interventions and ICU admissions.

1.2. CHEMICAL HAZARD

1.2.1. Assessment of factors influencing outcome and antidotal therapy in organophosphate poisoning: responsiveness to pralidoxime and toxicokinetics

Organophosphorus (OP) poisoning contributes a significant health problem and accounts for 13.4% of total admissions at the Poison Treatment Centre, NYGH (July 2003 to March 2004). One of the factors influencing the outcome is the cholinesterase levels and the phase 1 study aims to correlate the severity of symptoms and cholinesterase activity. All acute OP poisoning admitted to the Poison Treatment Unit, NYGH, from 2004-5, were recruited and the degree of severity of poison assessed by clinical features on admission and continued monitoring during the hospital stay. Patient selection criteria includes qualitative detection of OP in biological fluids (gastric lavage, vomitus, urine or blood) and quantitative analysis of reduction in the plasma cholinesterase levels of <50% of normal, confirming the diagnosis of poisoning. Out of a total of 349 admissions, 59 (16.9%) were recruited for OP poisoning and were classified as mild (44.1%), moderate (30.5%) and severe (25.4%), in accordance with the scoring for clinical severity. More than half (25.4%) of severe poison patients were admitted to ICU, out of which 18.6% required mechanical ventilation. All patients received the required supportive therapy of correction fluid-electrolyte imbalance, inotropic support for circulatory failure, ventilatory support for respiratory depression and parenteral antibiotic therapy for secondary bacterial infection. Specific therapy include atropine, IV infusion of 0.02-0.08mg/kg/h depending on clinical severity to combat muscarinic effects and pralidoxime, either as IV bolus 30mg/kg followed by 1-2 further doses as necessary, or IV infusion 8mg/kg/h up to maximum 12g in 24 hours, to combat nicotinic effects. Assessment of vital signs, conscious level, heart rate, blood pressure and pupil size, was done. Regarding outcome, 79.7% had complete recovery while 13.6% expired in spite of treatment and the rest (6.7%) absconded without discharge. Analysis of cholinesterase levels showed mean plasma cholinesterase levels of 164.5 μ mol/ml/h for mild; 89.1 μ mol/ml/h for moderate; and 61.4 μ mol/ml/h for severe categories of OP poisoning respectively. Statistical analysis using ANOVA indicated a negative but highly significant correlation between plasma cholinesterase levels and clinical severity ($p < 0.001$). In 2 out of 8 fatal cases, the cholinesterase enzyme activity was found to be as low as 25 μ mol/ml/h. Analysis of pralidoxime and atropine levels in blood for support of management and prognosis has been planned for the phase-2 study.

EPIDEMIOLOGY RESEARCH DIVISION

Deputy Director & Head	... Dr. San Shwe MBBS MMedSc(Public Health)
Research Scientist	... Dr. Khin Thet Wai MBBS MMedSc(Public Health) ... Dr. Kyu Kyu Than MBBS MMedSc(P&TM) MA(Population & Reproductive Health Research) (Institute for Population and Social Research, Mahidol University)
Research Officer	... Daw Tin Tin Than BSc(Zoology) ... Dr. Ko Ko Zaw MBBS MPH(Epidemiology & Biostatistics) (Boston University) ... Dr. Ohnmar MBBS MSc(Epidemiology & Biostatistics) (Prince of Songkla University, Hat Yai, Thailand) ... Daw Sao Mya Kyi BEcon(Statistics) ... Daw Moe Thida BSc(Zoology) ... Dr. Poe Poe Aung MBBS ... Dr. The' Maung Maung MBBS
Research Assistant (2)	... Daw Khin Thet Thet BSc(Physics) ... Daw Kyi Kyi Mar BSc(Mathematics) ... Daw Wai Wai Myint BA(Economic) ... Daw Tin Tin Wai BSc(Mathematics)
Research Assistant (3)	... U Ohn Hlaing ... Daw Yee Yee Win BA(Myanmarsar) ... Daw Zin Mar Aye BSc(Biology)
Research Assistant (4)	... Daw Aye Win Khine BA(History) ... Daw Lwin Lwin Ni BSc(Mathematics)
Laboratory Worker	... U Khin Maung Zaw

Epidemiology Research Division mainly focuses research activities on HIV/AIDS, Tuberculosis, Malaria, Communicable diseases (Leprosy), Non communicable diseases (Hypertension) and Human Reproductive Health/Women and Child Health.

RESEARCH PROJECTS

1 COMMUNICABLE DISEASE

1.1. MALARIA

1.1.1. Use of modern drugs and traditional medicine for malaria among household members

This study was undertaken in 5 townships (Bago, Daik-U, Kyauk-ta-ka, Tharyarwaddy, Oke-Po in Bago Division to determine the use of modern drugs and traditional medicine for malaria. Findings showed that modes of transmission of malaria by 411 key household respondents included infected mosquito bite (79%), use of stream water (75%) and eating banana (47.7%). Only 9.2% could answer it correctly. Among

2096 household members, 507 (24.2%) reported history of malaria. Modern drug use (93.3%) was higher than traditional medicine (43.8%) and 78.4% of modern drug use was prescribed by health staff. None of the children under 5 used traditional medicine only. Modern drugs use included artesunate/artemether (64.2%), mefloquine (21.9%), quinine (5.8%), chloroquine (3.3%), sulfadoxine–pyrimethamine (3.3%) and antipyretics only (19.3%). One-fifths of artesunate use was self-treatment. Incorrect use of artesunate was 52%. The use of prepackaged modern drugs from local shops was 12.4% and some contained antimalarials. Some traditional medicine packets contained antipyretics like aspirin. Commonest reasons for traditional medicine use were usual practice (60.6%), perceived curability (57.1%) and unavailability of modern medicine (46.5%).

1.1.2. Intensifying health promotion in malaria: options for social movements in endemic areas of Myanmar (Funded by WHO/HPSR, Geneva)

Options for social movements required to improve early diagnosis and prompt treatment of malaria (EDPT) were identified by 600 structured interviews from 300 rural households in Thaton, Pyin Oo Lwin and Hlegu districts. Altogether 300 men and equal number of women participated. Over 70% were aware of where to seek early diagnosis and prompt treatment for suspected malaria. Barriers to actual practice included weather constraint, travel hours, travel means, and cash difficulty. Bridges were access to trained health staff or volunteers and enthusiastic village leaders. Rural health centres (66%) and general practitioners' clinics (82%) were mostly known by respondents as specific places to acquire EDPT. They were fully aware of diagnostic microscopy but not of 'Rapid diagnostic test'. Villagers defined that social movements implied co-ordination-meetings, cash contribution, voluntary contributions and material contributions. Some 84% provided their opinions that there should be strong links among health staff, volunteers and NGOs in the village to enhance the acceptance of EDPT services. Over 90% thought that people will accept EDPT services more if they get full information, if only diagnostic facilities were available at their village, acceptance of EDPT services might be improved and if only antimalarials were available at reasonable price, people will try appropriate treatment for suspected malaria. Whether the area is high, moderate or low endemicity, enabling factors for community acceptance in strategies related to social movements in EDPT do not differ. Appropriate partners are to be identified for effective planning and implementation. Moreover, ways to collaborate and negotiate among each other is to be strengthened for an integrated works in social movements for EDPT. With limited available resources in the NMCP, there is a demand for new mechanisms in rural areas to prevent weak or lack of co-ordination in social movements. An operations research should be further conducted to select and prioritize cost-effective strategies for social movements in EDPT.

1.2. TUBERCULOSIS

1.2.1. Operational research on community (non-governmental organizations) involvement in DOTS implementation of Tuberculosis Control Programme

An intervention study with quasi experimental design was undertaken in Pyay township as the study area and Taungoo as the control area basing on similar demographic characteristics. The main objectives were to assess and compare the case detection rate (CDR), compare the sputum conversion rate, detect and compare the success rate and provide inputs for National TB Control Program (NTP), Myanmar with a view of strengthening collaboration between public health services and Non

Governmental Organizations (NGOs) in TB control. The intervention was utilization of trained MCWA members who were assigned as DOTS providers in the study area. Periodic supervision was made by the research team. During intervention period of 18 months a total of 46 Maternal and Child Welfare Association (MCWA) members actively participated in DOTS provision. Of the attached MCWA members, 87% provided treatment to TB patients. The new case of smear positive detected within the intervention period in Pyay was 3.1 per 1000 population. Case detection at Toungoo was 1.04 per 1000 population. Success rate and cure rate were higher in study area than in control area. MCWA members were highly motivated and satisfied to perform as DOTS providers. The active performance of MCWA members enhanced not only more awareness of TB in the community but also promoted collaboration and coordination between TB control program and the community. The effect of the collaboration accelerated the program work force in study area to attain successful DOTS implementation.

1.2.2. Assessment of DOTS program in township level

This study was funded by WHO/APW and the study area selected was Pyay. The objectives of the study were to identify proportion of TB cases detected by township TB control program and to find out selected indicators under DOTS such as treatment success rate, cure rate and treatment failure rate of TB cases. Preparation for data collection tools like format, questions and check lists have been developed. Data collection will be done in March 2007 in Pyay.

1.3. HIV/AIDS

1.3.1. Reproductive health needs of HIV positive women

The study is a hospital based exploratory study funded by WHO/APW. The objective of the study is to understand the reproductive health needs of HIV positive women in order to provide effective programme for HIV positive women and their future offspring's. A total of 5 Serial Indepth Interviews have been completed upto date. Data collection process is still in progress.

1.3.2. Effect of clinic-based education and peer education on HIV-related knowledge, attitude and behaviours among young people: a quasi-experimental study in Shwe-Pyi-Thar Township

The study aims to assess the effect of clinic-based education and peer education on knowledge, attitude, behaviours related to HIV among young people in Shwe-Pyi-Thar, Yangon. Ten general practitioners and 20 local youth educators were trained on HIV prevention using interpersonal communication. Then they educated 500 youths in Shwe-Pyi-Thar Township on HIV preventive knowledge and behaviours. HIV knowledge score is 10% higher in youths who received HIV education from youth educators. The main reasons for the difference are that education session by youth educators were outreach in nature, more interactive and took a longer time. So, outreach HIV education by youth (peer) educators was found to be the more effective strategy than clinic-based HIV education by general practitioners.

1.4. LEPROSY

1.4.1. Case studies on social challenges of Person Affected by Leprosy (PAL)

The main objective of the study is to recommend strategies for rehabilitation program by exploring social challenges among PALs. The specific objectives were to explore major social challenges among PALs, and to compare challenges in social life

among PALs in three different areas of Myanmar. It was funded by the International Medical Centers of Japan. Pretest and field survey in Mawlamyang, Mandalay and Nungshwe was completed. Data entry and analysis are in progress.

2 NON-COMMUNICABLE DISEASES

2.1. HYPERTENSION

2.1.1. Prevalence of hypertension and its associated factors in adult population in Yangon Division

This study is part of the Myanmar WHO STEP wise Approach to NCD Surveillance (STEPS) Survey conducted by Department of Health and DMR (Lower Myanmar) in 2003-2004. This community-based cross-sectional study was performed among 4616 people aged 20 years and above in Yangon Division in 2003 to determine the prevalence of hypertension, prehypertension and factors associated with hypertension. Face-to-face interview, physical examination and blood tests were done among the study participants; their blood pressure was measured with Omron digital blood pressure monitor (DAPM) after 5-minute rest. The crude prevalence of hypertension (systolic blood pressure 140 mm Hg or diastolic blood pressure 90 mm Hg or use of antihypertensive drugs) was 33.8% (95% CI, 32.1% to 35.6%) overall and it was 33.4% among men and 34.1% among women. The crude prevalence of prehypertension (systolic blood pressure=120 to 139 mm Hg or diastolic blood pressure=80 to 89 mm Hg) was 29% (95% CI, 27.2% to 30.8%) overall and it was 32.3% among men and 26.4% among women. The age-standardized prevalence of hypertension and prehypertension is 24.1% and 29% according to the 2003 Union of Myanmar population structure. The age-standardized prevalence of hypertension and prehypertension is 27.2% and 28.8% according to the WHO Standard Population structure. The multiple logistic regression showed that age, low physical activity, high intake of alcohol, obesity, high level of total cholesterol and diabetes mellitus were associated with hypertension in adult population. Among the hypertensive participants, 53% were aware of their hypertension and 32% were currently taking anti-hypertensive medication but only 11% had their hypertension controlled. The study highlights the need to strengthen the control and prevention activities of hypertension and to integrate its control with that of other non-communicable diseases which share common risk factors.

3. HEALTH SYSTEMS

3.1. REPRODUCTIVE HEALTH

3.1.1. Effectiveness of adolescent reproductive health training on reproductive health communication between parents and adolescents

This study aims to assess the effectiveness of adolescent reproductive health training of parents on reproductive health communication between adolescents and their parents. Preliminary visit was made to the study sites and the investigators discussed with responsible persons of North Okkalapa Township Health Division to recruit parents and adolescents into the study and will complete the baseline assessment and training of parents by the end of April. The baseline questionnaire and the training materials are being developed. The finding from this study will provide evidence-base results that can be used in developing strategies to improve RH communication between parents and their adolescents.

3.1.2. Baseline assessment of essential new born care in Ayeyarwaddy and Magway Division

The objective of the study is to assess the practices of essential newborn care both from the provider perspective and community perspective before and after the interventions for essential newborn care programmes in Ayeyarwaddy and Magway Division. The study is done in 3 townships (Kyankhin, Inkapu and Yaykyi townships) in Ayeyarwaddy Division and 2 townships (Salin and Seitpyu township) in Magway Division. The baseline assessment composed of both Quantitative and Qualitative Assessments. The baseline data collection has been completed in 4 townships with 800 mothers with under (1) children and 126 MW for the questionnaire survey. A total of 16 focus group discussions with mothers under 1 year children and 8 focus group discussion with MW has been completed. Data cleaning for the quantitative data and transcription of field notes for the qualitative data is still in progress.

SERVICES PROVIDED

ACADEMIC

Sr. No.	Name	Course	Responsibility
1.	Dr. San Shwe	Research Methodology Workshop	Teaching
2.	Dr. San Shwe	Ph.D. (Psychology) Yangon University	External Examiner
3.	Dr. San Shwe	M.Med.Sc (P.H), University of Medicine 1	Co-examiner
4.	Dr. San Shwe	Final Part I, University of Medicine 1	External Examiners
5.	Dr. San Shwe	Master of Public Health (MPH)	Secretary of curriculum development committee: Health Social and Behavioural Science course for MPH program
6.	Dr. San Shwe	Symposium on knowledge management to narrow the know do gap	Teaching
7.	Dr. San Shwe	Academic committee, Myanmar Health Research Congress	Secretary
8.	Dr. Khin Thet Wai	Master of Public Health (MPH)	Member of Curriculum Development Committee: Biostatistics course for MPH program

Sr. No.	Name	Course	Responsibility
9.	Dr. Khin Thet Wai	Best paper selection committee, Myanmar Health Research Congress	Secretary
10.	Dr. Kyu Kyu Than	Research Methodology Workshop	Teaching
11.	Dr. Kyu Kyu Than	Master of Public Health (MPH)	Curriculum Development Committee: Health Social and Behavioural Science course for MPH program
12.	Dr. Kyu Kyu Than	M.Med.Sc (P.H), University of Medicine 1	Supervisor, Co-examiner, Teaching
13.	Dr. Kyu Kyu Than	Final Part I, University of Medicine 1	External Examiner
14.	Dr. Kyu Kyu Than	Academic committee, Myanmar Health Research Congress	Member
15.	Dr. Ko Ko Zaw	Research Methodology Workshop	Teaching
16.	Dr. Ko Ko Zaw	Master of Public Health (MPH)	Member, Curriculum Development for Epidemiology
17.	Dr. Ohnmar	Research Methodology Workshop	Teaching
18.	Dr. Ohnmar	Master of Public Health (MPH)	Member, Curriculum Development committee for Biostatics course for MPH program

EXPERIMENTAL MEDICINE RESEARCH DIVISION

Deputy Director & Head	...	Dr. Myat Phone Kyaw MBBS MMedSc (Biochemistry) PhD(Colombo)
Research Scientist	...	Dr. Yi Yi Kyaw MBBS MMedSc (Microbiology) ... Vacant
Research Officer	...	Dr. Kyaw Soe MBBS ... Dr. Myat Tin Htwe Kyaw MBBS ... Daw Ohmar Lwin BSc (Zoology) ... Daw Haymar Hpoo BSc(Chemistry) ... Dr. Yin Yin Win MBBS ... Dr. Mon Mon Aung MBBS
Research Assistant (2)	...	Daw Baby Hla BSc (Chemistry) ... U Aye Tha BSc (Mathematics)
Research Assistant (3)	...	Daw Phyu Phyu Aye BSc (Zoology) ... Daw San Yu Hlaing BSc (Botany) ... Daw Hnin Nu Htwe BA (History)
Nurse	...	Daw San Nwe
Research Assistant (4)	...	Daw Wai Myat Thwe BSc (Botany) ... U Myat Min Oo ... Vacant
Laboratory Worker	...	Vacant

The Experimental Medicine Research Division is primarily involved in research studies on hepatology and gastro-intestinal diseases and disorders of national importance. The division is investigating the prevalence of hepatitis B infection in different geographical areas and population groups and determination of the associated factors with the aim of determining the burden of hepatitis B infection and to identify ways of controlling it. The division is concerned with the management and diagnosis of hepatitis B and hepatitis C carriers and is being carried out at the Hepatitis Carrier Clinic. The division is also involved in technology development of early detection of liver cancer.

RESEARCH PROJECTS

1. COMMUNICABLE DISEASES

1.1. VIRAL HEPATITIS

1.1.1. Prevalence and molecular characterization of hepatitis B infection in border areas of Myanmar.

This study was carried out for better understanding of differential prevalence and molecular epidemiology of hepatitis B in Myanmar and to determine the associated factors of the disease in border areas of Myanmar. A survey was carried out in North-eastern border(Muse), North-western border (Tamu), Southern border (Kawthaung) and

Eastern border (Tachileik) townships revealed 13.2%, 4.9%, 7.1% and (3.8%) respectively. At present a study is being conducted at Western border area (Maung Taw) and laboratory investigations are still in progress.

1.1.2. Clinical trial of antioxidant biofactor in management of chronic hepatitis C infection

The present study was conducted to determine whether antioxidant biofactor (AOB) is effective in apparently healthy HCV antibody positive carriers. This study was a long term study and it is a continuing project of 2003-2004. Total of forty patients (22 males, 18 females) with HCV sero-positivity with various titers of liver enzymes levels were participated in this single arm clinical trial in collaboration with Okayama University, Japan. Their ages ranged from 27 to 68 years with mean (SD) age of 44.8 ± 11.8 years. AOB was taken orally with the recommended daily dose of 3x2 sachets, containing 3 g of powder each in two packs three times per day for at least 3 year. The outcome measures included liver function test including serum alanine aminotransferase (ALT), aspartate aminotransferase (AST). Complete medical history taking, thorough clinical examination and liver enzyme status were carried out at the initial visit and at every 3 months. Ultrasonography was carried out at the start and at every year. Deterioration of liver status was not noted in 26 subjects who had finished one year therapy, 10 subjects after 2 years and also in 3 subjects after 3 years period. Among 40 subjects, initial mean (SD) serum ALT level was (42.7 ± 21.4) IU/L and a maintenance of mean serum ALT levels at 6 months (37.7 ± 14 IU/L), at 9 months (37.2 ± 17.4 IU/L), at 12 month (41.3 ± 18.2 IU/L), at 18 month (36.6 ± 13.9 IU/L), at 24 month (33.2 ± 14.2 IU/L), at 30 months (36.3 ± 21.3 IU/L) and at 36 months (31.3 ± 16.7 IU/L) were observed among 32 subjects. Liver enzyme levels were gradually decreased from 42.7 IU/L to 31.3 IU/L (normal value 3 - 33 IU/L). Treatment was well tolerated by all patients. No major adverse reactions were noted. The study is still in progress.

2. NON COMMUNICABLE DISEASES

2.1. HAEMATOLOGICAL DISORDERS

2.1.1. Hepatic function status in Thalassaemic children

Thalassaemic patients require regular blood transfusion and there is frequent occurrence of viral hepatitis. The aim of study is to know liver function status in Thalassaemic patients with the objectives of determination of biochemical indices of liver function and iron status in Thalassaemia major patients and to evaluate any relationships between biochemical indices. The study was carried out in 36 major thalassaemic children and their mean age of study group was 125.3 ± 7.21 months, minimum 48 months and maximum 204 months. There was high prevalence rate (29%) of hepatitis C infection in thalassaemic children and male were slightly higher prevalence (31%) than female (29%)($p=0.244$). In this study we found that age of first blood transfusion is earlier, the higher the chance of ALT elevation. The HCV infected thalassaemic children had significantly higher level of serum ferritin level although taking regular iron chelation therapy. This study also highlights the fact that iron overload is present in HCV infected thalassaemic children and more increase chance of occurrence of liver cirrhosis.

3. ACADEMIC AND TECHNOLOGY DEVELOPMENT

3.1. DEVELOPMENT OF VACCINE

3.1.1. Phase III trial of locally produced plasma derived hepatitis B vaccine

This study was conducted at Thingangyun Sanpya Hospital and South Dagon Township hospital during 7 March to 6 September 2006. Complete medical history of the mother who had delivered a healthy baby was recruited and informed consent was taken. A blood samples were collected from mothers for screening hepatitis B virus antigen, hepatitis C virus and human immunodeficiency virus infection. If the baby is suitable to enter the study after examination, the baby will be vaccinated and observed for about 30 minutes. Adverse events followed after vaccination was observed. A diary cards were given to record any responses of the baby. After 1 month physical examination and vital signs of the baby was carried out and also checked the diary card. Second dose of hepatitis B vaccine was administered. At 2 months from the first vaccination, physical examination, the vital signs of the baby and the diary card were checked. Then 1-2 ml of blood was taken from the baby. The final dose hepatitis B vaccine was administered. At 4 months, same procedure of previous visit was carried out except vaccination. The quantitative determination of antibody to hepatitis B surface antigen was conducted using EIA (Enzyme-linked Immunoassay, AUSAB Test Kit produced by Abbott Laboratories, USA). The antibody levels of serums were calculated from standard curve of control positive samples (5, 10, 50, 100, 500 and 1000 mIU/L concentrations). A total of 201 children has been enrolled at the beginning, 5 children dropped out after first vaccination. In which one child expired at hospital with neonatal sepsis 4 days after delivery and 4 children cannot follow at their places as parents were moved to other places. One child received accidental hepatitis B vaccine and was deleted after second vaccination. Lastly 3 parents refused to collect serum second time, one child received accidental hepatitis B vaccination, 7 parents moved to other places and one child expired with acute respiratory tract infection 2 weeks after 3rd vaccination, so that a total of 183 children has finished as per protocol. In which 166 children (90.7%) had developed successful antibody titre of more than 10 mIU/l. Antibody titre can be measured first time in 189 children after second vaccination. In which 153 children (80.9%) had sufficient antibody titre as intention to treat population. In per protocol population, seroconversion rate after second vaccine was 81.4% (149 out of 183 children). Antibody mean titre in per protocol population after full course of vaccination was 415 ± 256.6 mIU/l and after second vaccine was 203.5 ± 236.1 mIU/l. Antibody mean titre in intention to treat group was 203.3 ± 234.6 mIU/l. after second vaccine. The safety and efficacy results were satisfactory.

3.1.2. Phase III trial of locally produced recombinant hepatitis B vaccine

This study was conducted at Thingangyun Sanpya Hospital and South Dagon Township hospital during 26 December 2005 to 26 November 2006. Complete medical history of the mother who had delivered a healthy baby was recruited and informed consent was taken. A blood samples were collected from mothers for screening hepatitis B virus antigen, hepatitis C virus and human immunodeficiency virus infection. If the baby is suitable to enter the study after examination, the baby will be vaccinated and observed for about 30 minutes. Adverse events followed after vaccination was observed. A diary cards were given to record any responses of the baby. After 1 month physical examination and vital signs of the baby was carried out and also collected checked the diary card. Second dose of hepatitis B vaccine was administered. At 2½ months from the first vaccination physical examination, the vital signs of the baby and the diary card were

checked. Then 1-2 ml of blood was taken from the baby. At 6 months from the first vaccination physical examination, the vital signs of the baby and the diary card were checked. The final dose hepatitis B vaccine was administered. At 7½ months, same procedure of third visit was carried out. The quantitative determination of antibody to hepatitis B surface antigen was conducted using EIA (Enzyme-linked Immunoassay, AUSAB Test Kit produced by Abbott Laboratories, USA). The antibody levels of serums were calculated from standard curve of control positive samples (5, 10, 50, 100, 500 and 1000 mIU/L concentrations). A total of 151 children has been enrolled at the beginning, 6 children has been dropped out after first vaccination. In which four children withdraw by their parents and 2 children cannot follow at their places as parents were moved to other places. One child received accidental hepatitis B vaccine, one child expired with Beri Beri at the age of 2½ months (2 weeks after second vaccination) and one child moved to other places after second vaccination. Accidental vaccination again occurred after first blood collection in 4 children and one child expired with Pneumonia and Beri Beri, one which moved to other places, that these 6 children can not vaccinated third dose at their age of 6 months. Lastly 2 parents moved to other places that a total of 134 children has finished as per protocol. All 134 children (100%) had developed successful antibody titre of more than 10 mIU/l. Antibody titre can measured first time in 142 children after second vaccination. In which 123 children (86.62%) had sufficient antibody titre as intention to treat population. In per protocol population, seroconversion rate after second vaccine was 86.57% (116 out of 134 children). Antibody mean titre in per protocol population after full course of vaccination was 610.7 ± 177.0 mIU/l and after second vaccine was 129.8 ± 175.5 mIU/l. Antibody mean titre in intention to treat group was 127.8 ± 174 mIU/l after second vaccine. This vaccine produced at the vaccine plant in Myanmar is considered to be safe and has satisfactory development of hepatitis B antibody with 100% seroconversion.

3.2. MARKERS OF DISEASE

3.2.1. Establishment of quantitative detection of alpha-foeto protein for use in early detection of hepatocellular carcinoma

In Myanmar, the incidence of hepatocellular carcinoma (HCC) is high and failure to diagnosis HCC early led to high mortality from HCC. Infection with viral hepatitis B and C could also lead to the development of chronic hepatitis and in later years, hepatocellular carcinoma. It is now evident that early treatment of HCC could improve the survival rate of such patients and measure for early diagnosis of HCC is in need in Myanmar situation. The aim of the study is to determine whether the serially determination of serum alpha-fetoprotein level is helpful in early detection of hepatocellular carcinoma in those who have high risk to develop malignancy. It is prospective longitudinal hospital and laboratory based study and alpha fetoprotein level will be determined serially by in house ELISA method. The study is still in progress.

3.3. BLOOD SAFETY

3.3.1. Compliance of health care providers on a simple needle disposal container.

The compliance and effectiveness of a needle disposal method using simple metal cans was investigated in a cohort of new House Surgeons (HSs) posted at medical wards and paediatric wards of North Okkalapa General Hospital (NOGH) and San Pya Hospital (SPH), all medical wards of Yangon General Hospital (YGH) and medical wards of

Yangon Children Hospital (YCH). The study population was divided into two groups: HSs posted at 3 medical wards of YGH and paediatric wards of NOGH and SPH; and HSs posted at medical wards of NOGH and SPH and medical wards of YCH. Those using simple needle disposal metal cans were regarded as test group and those using the existing routine method were regarded as the control group. The routine method is to cap the needle with syringe on table, then took out needle with cap by hand and places the needle and syringe separately (needle with cap in plastic bottle and syringes in the box). At the start of the study, simple needle disposal metal cans were provided to group 1 and group 2 was permitted to follow the existing routine method. After a period of 45 days, group 2 was provided with the simple needle disposal metal cans whereas group 1 was switched over to the routine needle disposal method. A total of 21834 parental injections; intramuscular injections 9.6%, intravenous injections 56%, infusions 17.8%, blood collection for laboratory tests 16.1%, were used in all medical wards and 23235 parental injections; intramuscular injections 7.5%, intravenous injections 60.6%, infusions 10.6%, blood collection for laboratory tests 19.8% in all paediatric wards during study period. The incidence of needle stick injuries was 0.09% in test group and 0.15% in control group in first 45 days period and 0.04% and 0.05% respectively in second 45 days period. Of the total 90 days study period, a significantly higher incidence of NSI occurred in the control group (0.1% vs 0.06%, $p=0.002$). The majority of the contents of the simple needle disposal metal cans were needles with caps (66.7% to 81.3%), needles (10.2% to 27.8%), cannulas (1.6% to 9.1%), lancets (0.7% to 6.1%), and butterfly needles (0.5% to 1%). During first 45 days period 62.8% of different types of needles were collected by metal cans from Paediatric wards of NOGH and Sanpya hospital, and 79.8% of Medical ward YGH. During second 45 days period 69.7% of injections from child wards of YCH and 41.7% of injections from medical wards NOGH and Sanpya hospitals were used metal cans. It was found that simple needle disposal cans can accommodate common needles and appliances and they could significantly reduce the occurrence of NSI in house surgeons.

SERVICES PROVIDED

LABORATORY

1. Testing of Liver Function tests on sera of (1326) hepatitis carriers.
2. Testing of various biochemical tests (urea, sugar, uric acid, cholesterol) on sera of (296) hepatitis carriers.
3. Testing of HBsAg by ELISA on sera of (1477) Hepatitis B vaccine clinic attendants.

HEALTH SYSTEMS RESEARCH DIVISION

Deputy Director & Head	...	Dr. San Hla Mu MBBS MMed Sc(Public Health)
Research Scientist	...	Dr. Le Le Win MEcon(Statistics) PhD(Queensland)
Research Officer	...	Dr. Saw Saw MBBS PhD(Melbourne)
	...	Dr. Ngu Wah Hlaing MBBS
Research Assistant (2)	...	Daw Cho Cho Myint BA(Economics)
Research Assistant (3)	...	Daw San San Aye BA(History)
	...	Daw Thandar Min BSc(Maths)
Research Assistant (4)	...	U Aung Soe Minn
	...	Daw Tin Zar Aung BA(Economics)

HSR Division focuses research on HIV, TB and Non communicable diseases (Smoking) in areas of social science.

RESEARCH PROJECTS

1. COMMUNICABLE DISEASES

1.1. TUBERCULOSIS

1.1.1. Strategies for public-private partnership in TB control: involvement of private practitioners in Myanmar.

The aim of the study was to explore current practices in TB control and to identify possible strategies to enhance the partnership. The study was carried out in 2004 in two peri-urban townships in Yangon Division by using quantitative and qualitative approaches. Basic Health Staff (BHS), NTP staff, General practitioner (GPs) and TB patients from public and private clinics were included in the study. The current practices of GPs to diagnose and treat TB were not in line with the NTP guideline, and GPs had poor knowledge of DOTS (Direct Observed Treatment Short Course Chemotherapy). About 40% of GPs were not trained in TB, which led to delay in diagnosis at GP clinics and late referral. The majority of BHS and GPs could not observe patients taking drugs. In the Myanmar context where a significant proportion of population still live in extended families, family members may be more reliable to observe patients taking anti-TB drugs. The GP was the first point of contact for most patients and patients preferred to receive treatment at GP clinics because of the inconvenient opening hours of the Township Health Department, the unavailability of sputum microscopy service, long waiting time and the necessity of documentation to receive free treatment at public sector. However, the majority of patients were also concerned about the cost of treatment at GP clinics. All GPs desired feedback from the public sector for referred patients. None of the GPs mentioned financial loss from referring TB patients to the public sector. They reported that concern about their patients' financial status was the main reason for referring them to the public sector for free treatment. However, BHS were critical of GPs referring poor patients to the public sector, while keeping wealthier patients for their benefits. Collaboration between public general hospitals and the NTP is also crucial for successful partnership. Both public staff and GPs agreed that the involvement of GPs in TB control would be of benefit to TB patients and the NTP. The majority of GPs (86.5%) were willing to collaborate with the public sector although they were concerned

about paperwork and record keeping. The GPs suggested having someone in the public sector to co-ordinate between GPs and the Township Health Department. It is also essential to address major issue such as lack of trust, limited resources in the public sector and weakness in township level coordination for the successful and sustainable partnership in future.

1.2. LEPROSY

1.2.1. Case studies on social challenges of Person Affected by Leprosy (PAL) in three selected areas of Myanmar

The main objective of the study was to recommend strategies for rehabilitation program by exploring social challenges among PALs with the specific objectives of determining major social challenges among PALs, comparing challenges in social life among PALs in three different areas of Myanmar. It was funded by the International Medical Centers of Japan. Pretest and field survey in Mawlamyang was completed in November, 2006. Data collection in Mandalay and Nyaungshwe was carried out in February, 2007. Data entry and analysis is in progress. This was a collaboration study with Epidemiology Research Division, Department of Medical Research (Lower Myanmar).

1.2.2. Options and feasibility of integration of basic health staff in Leprosy Control Programme in post-elimination era

Integration of BHS for the leprosy control activities need to be revised and modified to be more adaptable with situation at post-elimination era. The study aimed to search the options of various integration procedures. Study was a cross-sectional descriptive design conducted mainly with quantitative approach which was triangulated by qualitative procedures for some issues. The study was designed to be conducted in two phases. Phase I was started at October 2006 with preparation of data collection tools. Study areas were two purposively selected townships in Bago Division and Ayeyarwaddy Division. Bago Division is chosen for initiating Prevention of Disability/Worsening Disability (POD/POWD) programme and also to get better managerial and technical efficiency in data collection task, thus quality of data will be improved. Ayeyarwaddy Division was chosen for best comparison with Bago Division to be able to compare and contrast between those BHS at area with and without POD/POWD intervention activities. Townships were listed in order of magnitude of leprosy control activities and among them two townships with highest activities were selected for the study. Padaung Township at Bago Division and Zalun Township at Ayeyarwaddy Divisions were selected. Study population was all BHS not including health assistants (HAs) and lady health visitors (LHVs) in the selected townships. Four PALs from each township were requested to participate in qualitative portion of the study. Selection of PALs was in convenience of field survey procedure and willingness of PALs. Both new and old cases were recruited. Three data collection methods and tools were used. For the detection of technical knowledge, experience on leprosy control activities and problems encountered, self-administered questionnaire was used. To explore workload and perceptions on sharing responsibilities, face-to-face interview questionnaire was used. For qualitative data, e individual depth interview (IDI) was used. Discussions were mainly on patients' perspective of existing BHS services and their opinions for better integration. All the tools for data collection were pre-tested. Pre-testing was done at Mayanchaung RHC, Hlegu Township at 5 Dec 2006. Revision of word phrasing at some questions was made

in accordance to have easier understanding of questions by BHS. Interviewers were trained by the investigators before pretest and actual data collection. IDIs were conducted only by investigators. Data collection was done in Padaung at 8 Dec 2006 to 10 Dec 2006 and in Zalun at February 27-28. Total of 37 BHS and 4 PAL in Padaung and 47 BHS and 4 PAL in Zalun had been interviewed. Data cleaning and entry are now in progress. This was a collaboration study with Medical Statistics Division, Department of Medical Research (Lower Myanmar).

2. NON-COMMUNICABLE DISEASE

2.1. TOBACCO

2.1.1 An exploratory study on willingness to change the smoking practice of urban adolescents: a qualitative approach

To identify individual-based willingness and ability to change the smoking practice of urban adolescents, ten out-of-school adolescents from a randomly chosen urban township of Yangon division will be selected. Self-administered questionnaire and group discussions will be used to find out their perceptions and barriers regarding smoking/quitting/reducing cigarettes. Different intervention based on individual's need and smoking condition will be considered accordingly and stages of change in smoking will be recorded. Questionnaire and discussion guideline have developed and research tools were pre tested. Research team was trained for data collection. Main survey will be carried out during 2007.

SERVICES PROVIDED

ACADEMIC

Sr.	Name	Course	Responsibility
1.	Dr. San Hla Mu Deputy Director	Common module for PhD candidates	Teaching
2.	Dr. Le Le Win Research Scientist	Common module for PhD candidates	Teaching
3.	Dr. San Hla Mu Deputy Director	Research Methodology Workshop	Teaching
4.	Dr. Le Le Win Research Scientist	Research Methodology Workshop	Teaching

IMMUNOLOGY RESEARCH DIVISION

Deputy Director & Head	...	Dr. Khin Nwe Oo MBBS MMedSc (Microbiology) PhD
Research Scientist	...	Dr. Khin Saw Aye MBBS MMedSc (Pathology)
Research Officer	...	Dr. Yin Min Htun MBBS MMedSc (Pathology)
	...	Dr. Aye Aye Win MBBS MMedSc (Pathology)
	...	Dr. Win Le May MBBS
Research Assistant (2)	...	Daw Nwe Nwe Yin BSc (Physics)
	...	Daw Khin Than Maw BSc (Chemistry)
Research Assistant (3)	...	Daw San Kalaya Htwe BSc (Chemistry)
	...	Daw Tin Tin Han BSc (Zoology)
Research Assistant (4)	...	Daw Sandar Htun BSc (Zoology)

Immunology Research Division is engaged in leprosy, tuberculosis and snake bite research. During 2006, the division has involved in research on serological response to chemoprophylaxis in extended contacts in leprosy, monitoring on drug resistant leprosy, the role of immuno-histopathology and PCR in the diagnosis of leprosy, diagnosis tool for tuberculous infection and disease in childhood pulmonary tuberculosis, the role of immunohistochemistry and special stain in diagnosis of tuberculous lymphadenitis and production of Russell's viper (*Daboia russelii siamensis*) antivenom in laying hens.

RESEARCH PROJECTS

1. COMMUNICABLE DISEASE

1.1. TUBERCULOSIS

1.1.1. Diagnosis tool for pulmonary tuberculosis in childhood

This study was carried out to detect tuberculosis among children who were contacts of smear positive pulmonary tuberculosis patients. It was done on 53 children contacts between September 2006 and January 2007. They underwent clinical evaluation, chest radiography, tuberculin skin testing and their sera were tested using in-house ELISA test. On this sera, these tests were positive as followings: tuberculin skin test - ≥ 10 mm induration size, in-house ELISA- OD value ≥ 0.208 in < 5 years old and ≥ 0.375 in > 5 years old, clinical scoring - ≥ 7 and Chest X ray- Primary complex and Koch's lung. Among these 53, 23 were referred to Yangon TB center. These 23 contacts were all positive to in-house ELISA test. Among these 23, 16 were positive to TST, 11 to clinical scoring and 12 to CXR. Out of them 8 contacts were diagnosed as childhood pulmonary TB and anti TB treatment was given by Yangon TB center. Their CXR show Kochs lung in 3 cases and Primary complex in 5 cases. The other 7 contacts were followed up 3 monthly to one year. Therefore from these 53 children contacts, 8 were treated with anti TB treatment and another 7 were followed to know if they develop to active disease. This study is in progress.

1.1.2. The role of immunohistochemistry and special stain in diagnosis of tuberculous lymphadenitis

The study was carried out to determine the histopathological features of lymph node biopsies by Haematoxylin & Eosin (H&E) stain, histochemical stain with Ziehl-Neelsen (Z-N) and immunohistochemistry (IHC) with BCG. Forty eight cases of cervical lymphadenitis biopsy samples were collected from surgical wards, YGH. Routine Haematoxylin and Eosin (H&E) was performed on 48 samples of cervical lymphadenitis, 15 cases (31%) were diagnosed as tuberculous lymphadenitis and 33 (69%) cases were chronic non specific lymphadenitis. Z-N (AFB) stain was positive in all tuberculous lymphadenitis cases and 8 (24%) cases of chronic non specific lymphadenitis. This study will be continued.

1.2. LEPROSY

1.2.1. Serological response in extended contacts given chemoprophylaxis for leprosy - a randomized controlled trial

Chemoprophylaxis was given to high risk group of extended contacts of new leprosy cases in Nyaungdon Township, Ayeyarwaddy Division, Myanmar and serological response was followed up for two years. In September 2003, blood samples were collected from 829 contacts after getting informed consent and sera were tested for immunoglobulin M antibodies using NTP-BSA ELISA test. These 300 seropositives were randomized to treated and non-treated groups. In each group 102 each were enrolled in adults and 48 each in children. A single dose of ROM (rifampicin, ofloxacin and minocycline) and RMP (rifampicin) by body weight was administered to treated group of above 15 years and those below 15 years respectively. The vitamins as placebo were administered to non-treated group. The blood samples of all contacts were collected again in August 2004 and August 2005 and ELISA was carried out on paired samples on one plate. The mean optical density (OD) titers before vs after chemoprophylaxis were 0.24 vs 0.10 and 0.20 vs 0.09 in treated and non-treated group respectively in adults and 0.25 vs 0.11 and 0.22 vs 0.11 respectively in children after one year. These were 0.24 vs 0.17 and 0.20 vs 0.19 respectively in adults and 0.25 vs 0.19 and 0.22 vs 0.20 respectively in children after two years. The difference of mean antibody titers before and after chemoprophylaxis in treated group was significantly lowered compared to non-treated group in adults but was not significant in children. The findings show that there is a significant role of chemoprophylaxis on serological response in the form of decreasing antibody titer among the adult group of extended contacts. In 2006, new cases (incidence cases) were found out using "Special Selection Group Survey" in study population especially on treated and non-treated group during September. New cases were not detected in these two groups. New case finding will be carried out again in 2007 and 2008.

1.2.2. Detection of drug resistance in leprosy by PCR and Dot Blot Hybridization (continuation)

Currently recommended multi-drug therapy (MDT) for treating leprosy should control the spread of drug resistant strains. However, drug resistance in leprosy needs to be monitored in Myanmar. In this study, it has been determined by polymerase chain reaction (PCR) followed by dot blot hybridization to detect mutations. A total of 100 multibacillary leprosy cases taking MDT treatment attending Central Special Skin Clinic,

Yangon General Hospital were determined folP1, gyrA and rpoB gene mutations for dapsone, quinolone and rifampicin resistance respectively. Drug resistance in leprosy was detected in 7 cases (7%). Dapsone resistance was detected in 3 cases (3%), rifampicin resistance in one case (1%) and quinolone resistance in 2 cases (2%). Resistance in both dapsone and rifampicin was one case (1%). These results were reported to DOH and WHO, drug regime was changed in resistant cases. This study will be carried out in 2007.

1.2.3. The role of immunohistopathology and PCR in the diagnosis of leprosy

The aim of the study is to determine the role of immunohistopathology and polymerase chain reaction (PCR) for the diagnosis of leprosy. A total of 112 skin biopsy specimens from leprosy patients attending at Central Special Skin Clinic, Yangon General Hospital have been examined by Hematoxylin and Eosin (H&E) stain, modified Fite-Faraco (FF) technique for *M. leprae*, Immunohistopathology staining with the antibody against the Phenolic Glycolipid-1 (PGL-1) and Bacille Calmette-Guerin (BCG) using Avidin Biotin Complex (ABC) method and Polymerase Chain Reaction (PCR) using the primers amplifying the 130 base-pair fragment of the gene from the 16S ribosomal RNA of *Mycobacterium leprae*. FF, BCG, and PGL-1 staining compared to PCR provided virtually 100% specificity, but only 50%, 60% and 66% sensitivity in detecting the organisms in clinical samples respectively. Application of histopathology, histochemistry, immunohistopathology and molecular techniques (PCR) for identification of *M. leprae* were proved to be useful for early diagnosis of leprosy, which are important to maintain the achievements of Leprosy Elimination Programs in Myanmar.

2. NON-COMMUNICABLE DISEASES

2.1 SNAKE BITE

2.1.1. Production of Russell's viper (*Daboia russelii siamensis*) antivenom in laying hens

Traditional antivenoms raised in horses carry complement mediated side effects, serum sickness and occasional anaphylactic shock. In order to circumvent these side effects and to supplement antivenom production, it was attempted to raise Russell's viper (*Daboia russelii siamensis*) antivenom in laying hens. Three injections of a total Russell's viper venom (500µg per hen) given at 4 week intervals yielded 1.85 gm specific IgY per month which is equivalent to total IgG obtained from 8 rabbits or two goat per month. The IgY antibody extracted from egg yolk with polyethylene glycol 6000 could withstand 2LD₅₀ dose of the immunizing venom (E.D₅₀=29.7µl/mouse). Antibody IgY level in egg yolk was determined by indirect enzyme immunoassay method and specificity of the antibody was checked by immunodiffusion. The antibody could be detected as early as 2 weeks after the first immunization and peak antibody levels were maintained up to 20 weeks before declining to a low level. The major advantages of the avian antivenom are the eggs from immunized hen provide a continual source of antibody, inexpensive to keep hens as laboratory animals and required only 3 injections using minute amounts of the venom (500µg/hen). The study highlighted that antivenom of interest could be raised by using this simple technique and the avian Russell's viper antivenom could be used for treating Russell's viper bite cases as well as to supplement antivenom production of the country.

2.1.2. Poisonous snakebites of Myanmar (1998-2005) with special references to the bites and case fatality rate.

Retrospective study of data collected by the Department of Health Planning on bites and case fatality rate of poisonous snakes of the whole country from 1998-2005 were analysed. The objective of the study is to determine the trend, number of bites and case fatality rate of poisonous snakes bites of the states and divisions. The average poisonous snakebites (1998-2005) of the whole country are 8107 (6529-9600) with a case fatality rate of 7.43% (4.93-8.82%). The yearly trend of the snake bite is on increase and Mandalay, Magway, Sagaing and Bago (W) divisions have the highest numbers of snakebite ranging from 1001 to 2000 per year and Chin, Kachin, Shan (East and North), Rakhine and Kayah states and Tanintharyi division, each has less than 50 per year. Townships with no report of snakebite are also highlighted. Ayeyarwaddy division has the highest case fatality rate 17.75%, followed by Rakhine state 10% and Magway division 8.96%. The exceptionally high fatality rate (11-40%) of 24/26 townships of Ayeyarwaddy division needs to be investigated. The information obtained from the study will be useful for the policy makers and project managers concerned, in planning, distribution and in estimating the amount of antivenom required for the whole country.

SERVICES PROVIDED

ACADEMIC

Sr. No.	Name	Course	Responsibility
1	Dr. Khin Nwe Oo	MMedSc (Microbiology) PhD (Zoology) Research Methodology	Supervisor External Examiner Co-supervisor Facilitator
2	Dr. Khin Saw Aye	MMedSc (Pathology) Research Methodology	Teaching External examiner Teaching External examiner
3	Dr. Aye Aye Win	MMedSc (Pathology) MMedSc (Microbiology) BPSC (Medical Technology)	Teaching Teaching Teaching

LABORATORY

1.	ELISA test for sero-diagnosis of tuberculosis (n = 60)
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MEDICAL ENTOMOLOGY RESEARCH DIVISION

Deputy Director/Head	.. U Pe Than Htun BSc(Zoology) DAP&E MSc(Med Para)
Research Scientist	.. Dr Thaung Hlaing MBBS DTM&H MCTM
Research Officer	.. U Sein Min BSc(Zoology)
	.. Dr Yan Naung Maung Maung MBBS MMedSc(Public Health)
	.. U Sein Thaung BSc(Zoology)
Research Assistant II	.. Daw Khin Myo Aye BSc(Botany)
	.. Daw Yee Yee Myint BSc(Zoology)
Research Assistant III	.. Daw Chit Thet Nwe BA(History)
	.. Daw Thuzar Nyein Mu BA(Economics)
Research Assistant IV	.. Daw Moe Thuza Min BSc(Zoology)
Laboratory Worker	.. U Thi Ha

The Division undertook research projects on vectors of malaria and dengue haemorrhagic fever. Insecticide susceptibility status of vectors and suspected vectors of malaria were also explored at the selected study sites in coastal area and central Myanmar. The identification of vectors and suspected vectors of malaria from the field study sites were carried out during the reporting period. Laboratory repellency effect of *Cymbopogon winterianus* Jowitt (pygV i q D \$) crude extract on *An. dirus* mosquitoes was continued as part of the traditional medicine project. Cytogenetic studies of *Anopheles culicifacies* and molecular identification of *Anopheles minimus* was conducted and upgrading of molecular entomology laboratory was continued with the allocation of supply and equipments from regular budget 2005/2006. An additional project on population genetics and genomics of *Anopheles* mosquitoes was initiated in collaboration with Manchester University, UK. Regarding the DHF vector studies, a new WHO/TDR project on targeted dengue vector control was conducted during the reporting period. A simulated field evaluation of an Insect Growth Regulator (Pyriproxyfen) was conducted on *Aedes aegypti* mosquitoes and the remaining ongoing project on molecular genetics and gene flow of *Aedes aegypti* mosquito was continued during the reporting period.

RESEARCH PROJECTS

1. COMMUNICABLE DISEASE

1.1. MALARIA

1.1.1. Assessment of the insecticide susceptibility status of *Anopheles* mosquitoes in Myanmar

Monitoring insecticide susceptibility status in some anophelines had been undertaken in Pyin Oo Lwin Township, Mandalay Division using WHO test kits. Batches of anophelines were exposed to standard impregnated papers using the standard exposure time of one hour. It was found that *An. minimus* was susceptible to deltamethrin 0.025%,

Icon 0.1 and DDT 4% *An. annularis* was found to be susceptible to malathion 5%, permethrin 0.25% and Icon 0.1% respectively in Pyin Oo Lwin Township. All other species namely *An. maculatus*, *An. stephensi*, *An. aconitus* and *An. barbirostris* were found to be susceptible to the insecticides tested comprising of permethrin 0.25%, Icon 0.1% and DDT 4%. Similarly in Sittwe Township, Yakhine State, insecticide susceptibility tests were carried out and it was found that *An. sunaicus* was also susceptible to deltamethrin 0.025%, Icon 0.1 and DDT 4%.

1.1.2. Identification and incrimination of anopheline vectors using *An. dirus* as standard for comparison

Vectors and suspected anopheline vectors of malaria were collected and identified from Kachin State, Mandalay Division and Yakhine State in September and October respectively in 2006. A total of 78 *Anopheles* mosquitoes comprising 18 *An. dirus*, 21 *An. minimus*, 26 *An. sunaicus* and 13 *An. annularis* were collected and identified morphologically using standard methods. Specimens were dissected for detection of *Plasmodium* sporozoites from salivary glands and they were found negative for malaria parasite. The equipments and laboratory reagents mainly for sporozoite Enzyme Linked Immunosorbent Assay (ELISA) required for extension of this project were received from WHO between August and October 2006. Preparations for field surveys and laboratory tests are being underway. Site selection has been made after consultations with the Yangon and Bago Divisions Health Authorities and the Vector Borne Diseases Control (VBDC) program. ELISA method for vector incrimination was successfully standardized in the laboratory at the Medical Entomology Research Division.

1.1.3. Development of cytogenetic method for *Anopheles culicifacies* species complex in Myanmar

As part of the development of a standardized cytogenetic method for the identification of *An. culicifacies* in Myanmar, mosquito specimens were collected from Nyaung Win village tract at Pauk Khaung Township in Bago Division. From night time cattle bait collection, night time resting and daytime resting collection, a total of 600 female *An. culicifacies* were collected in one week. About 100 ovary specimens each from early gravid, half gravid and semi gravid mosquitoes were removed and preserved in Carnoy's fixative in the field. Ovary specimens were brought back to the laboratory at the MERD, DMRLM. The step by step processing and preparation of ovarian nurse cell polytene chromosomes are underway to be able to identify the species complexes and method development. This project will be continued and completed in 2007.

1.1.4. Determination of *An. culicifacies* species complex in Bago Division

Laboratory colonization of *An. culicifacies* mosquitoes were continued in the laboratory. The establishment of a colony of *An. culicifacies* mosquitoes originated from previous collection of 5 adults and 15 larvae from OKtwin Township were not satisfactory due to the limitation in the laboratory condition. Dusk to dawn simulation of lighting period is required especially with *An. culicifacies* species and the possibilities of the installation of lighting apparatus will be explored. In the mean time, more *An. culicifacies* mosquitoes were collected from Pauk Khaung Township and a total of 23 Adult mosquitoes and 43 larvae were brought back to the laboratory to continue the colony to obtain at least to the F1 generation. This process will be able to conduct the cytogenetic analysis and the project will be continued in 2007.

1.1.5. 1.5 Molecular identification of *An. minimus* species complex in Myanmar

Collection of *An. minimus* mosquitoes from Pyin Oo Lwin area were continued for the longitudinal study of *An. minimus* species complexes. Some of the wild caught specimens were identified, properly killed and preserved in the field for further molecular analysis. A total of 24 *An. minimus* adult mosquitoes and 80 larvae specimens were brought back alive to the laboratory to continue the rearing and colony establishment. F1 progeny of the *An. minimus* were also used for molecular analysis for species complex. In collaboration with Biochemistry Division, Center for Vector and Vector-borne Diseases (CVVD), Mahidol University, Bangkok, Thailand, using multiplex PCR method, a total of 20 laboratory reared *An. minimus* were identified as species C. Similarly, in collaboration with Malaria Research Center, New Delhi, India, using amplification of D3 region and ITS 2 region of mtDNA, a total of 24 wild caught *An. minimus* were also identified as species C. Therefore, presence of *An. minimus* species C has been confirmed in Pyin Oo Lwin area. Presence of *An. minimus* species A has yet to be verified in this area as the species A and C can coexist together. In South East Asia presence of *An. minimus* complexes of A, C and D are well documented. Apart from Pyin Oo Lwin area, further investigation of *An. minimus* species complexes from other parts of Myanmar will be conducted in the future.

1.1.6. Laboratory repellency effect of *Cymbopogon winterianus* Jowitt (ပျံ့ပျံ့ ဝါး) crude extract on *An. dirus* mosquitoes.

Evaluation of the efficacy of *Cymbopogon winterianus* Jowitt against *Anopheles dirus* mosquito (a major vector of malaria in Myanmar) was continued in the laboratory. A 10 percent emulsified concentration (EC₁₀) stock solution of *Cymbopogon winterianus* Jowitt. (ပျံ့ပျံ့ ဝါး) (Steam distillation extract) was prepared by dissolving it in acetone. Based on the preliminary screening tests, further dilutions of the stock solution were prepared to obtain 2%, 1 % and 0.5 % concentrations for repellency tests. Tests were conducted by exposing untreated and treated human forearm inside a screen wire mesh cage measuring 30cm x 30 cm x 30cm containing 50 *An. dirus* adult female mosquitoes. The exposure period was 15 minutes for each replicate. A total of 900 laboratory reared adult mosquitoes were used as control and test specimens for three concentrations. 100 % protections from mosquito bites were achieved as 4.5 hours for 2 %, 1.5 hours for 1% and 1.5 hours for 0.5% respectively. Regarding the residual effectiveness, at 6 hours after application, 2% concentration provides 80 % protection, 1% concentration provides 61% protection and 0.5% provides 20 % protection respectively. At least one more concentration which will be higher than 2% concentration is required to be evaluated. After completing the required tests, the results will also be compared with the effectiveness of locally available repellent named Odomos (commercially available mosquito repellent which contains 12 % Diethyl benzamide). The continuous rearing of *An. dirus* colonies (Mudon strain, Mon State) as part of these studies were continued during the reporting period.

1.1.7. Population genetics and population genomics of *Anopheles* mosquitoes in Southeast Asia

This research is the part of the collaborative project with Manchester University. The overall aim of the project is to determine the distribution of genetic diversity within species (across geographical areas) and between species (across the genome) of *Anopheles* mosquitoes. To determine the population structure and population genomics of

Anopheles mosquitoes in Myanmar, molecular methods will be applied using mosquito samples collected from natural populations in the country. Field surveys were conducted in Kachin State, Mandalay Division, Yakhine State and Tanintharyi Division during September and October 2006. A total of 300 vector mosquitoes comprising *An. dirus*, *An. minimus* and *An. sundaicus* species were collected using standard procedures. Systematic sample collection, identification and proper storage were conducted in both in the field and laboratory at the MERD- DMRLM. Investigations of the genetic datas using molecular methods are underway at the Biological Science Laboratory at the Manchester University.

1.2. DENGUE

1.2.1. Targeted dengue vector interventions for efficient and sustainable dengue control in Myanmar

The aim of the study is to improve dengue vector management through targeted interventions. The objectives are: (1) to analyse how much targeted interventions reduce the overall vector population compared with conventional control method (2) to analyse if the targeted intervention is more efficient, feasible and acceptable than the conventional control method for vector control programmes and the community and (3) to determine whether it is possible to derive an appropriate classification scheme and interventions which facilitate their location and control. Five townships (Mingalar Taung Nyunt, North Dagon, South Okkalapa, Thingan Gyun and Tamwe) in Yangon Division were selected based on set criteria and twenty clusters (each cluster comprising of about 100 households) were studied.

The project commenced in July 2006 and after the baseline survey, the clusters were paired by targeted and non-targeted interventions and 1st evaluation was carried out in August and 2nd evaluation was carried out in January 2007. The total premise surveyed during the baseline period was 1993. For the 1st evaluation and 2nd evaluation, the total premises were 1876 and 1904 respectively. It was found that the number of pupae per person was 0.77 during the baseline survey for the 5 townships combined. The Breteau Index was 103. Each township was divided into moderate to high socio-economic status and low socio-economic status. Two clusters each were selected from two different socio-economic strata, making a total of 4 clusters in each township. Thus 10 clusters (5 pairs) were compared for each socio-economic stratum.

During the 1st evaluation, the number of pupae per person was reduced to 0.21 and the Breteau Index was reduced to 30. During the 2nd evaluation, the number of pupae person was reduced to 0.18 and the Breteau Index was reduced to 18. It was found that the percentage reduction of pupae per person during the post-intervention evaluations were significant ($p < 0.01$) but was not significant between targeted and non-targeted interventions ($p > 0.05$) indicating that the two different interventions reduced the vector population in a similar pattern ($p > 0.05$, $n_1 = 10$ and $n_2 = 10$; Wilcoxon Rank Sum Test). According to the Dispersion Index, the pupae were distributed mainly in drums, rectangular cement tanks and flower vases/bowls for spirit worship.

The *Ae aegypti* female adults caught by aspirators were reduced from 2.1 per house to 1.2 per house and 0.8 per house in the first and second evaluations respectively. Social science data were still being analyzed regarding feasibility, acceptability and sustainability of the targeted interventions. Cost-effectiveness study is also being undertaken. A detailed report is being prepared and will be submitted to WHO/TDR.

1.2.2. Laboratory and simulated field evaluation of an Insect Growth Regulator (Pyriproxyfen) on *Aedes* larvae for the prevention and control of Dengue and DHF in Myanmar

Laboratory evaluation of the persistency and shelf life of an insect growth regulator (Pyriproxyfen) was conducted using 3rd and 4th stages of *Aedes aegypti* mosquito larvae. Three years old Pyriproxyfen .5 % granule were mixed with water at the rate of 0.2 mg Pyriproxyfen/litre to obtain the recommended field concentration of 0.01 ppm active ingredient. The standard assays comprising treated and control glass beakers (500 ml) were conducted with replicates in the laboratory. At the recommended dosage, three years old Pyriproxyfen achieved complete kill in the laboratory and its effectiveness persist for up to six weeks. Three years is the recommended shelf life of the manufacturer. A simulated field trial was also carried out using this compound and laboratory reared *Aedes aegypti* mosquitoes around Entomology Insectary in the DMRLM compound. A total of four metal drums (200L) and six Bago jars (60L) were used for each replicate. Known number of mosquito larvae i.e. 50 to 100 mosquitoes were released into preconditioned and half filled water containers designated for control and treatment. The field dosage of Pyriproxyfen 0.01 ppm was applied into treated containers and all containers were covered with standard nylon mosquito netting materials to prevent egg lying from outside population and to prevent escape from test population. Mortality or survival was counted every three days until the complete emergence of adults. Three replicates were tested and it was found that Pyriproxyfen was effective and complete inhibition of adult emergence was achieved at treated containers. More than eighty percent of the larvae emerged as adults at control containers.

1.2.3. Genetic population structure and gene flow in *Aedes aegypti* mosquitoes in Southeast Asia

This research is part of the collaborative project with Manchester University. Dr Thaung Hlaing, a PhD student attending at the Manchester University in this project, arrived back in Yangon during August to conduct field survey and to collect additional specimens in Myanmar. During his stay in Myanmar, the survey was conducted in Meikhtilar Township to collect *Aedes* mosquito samples and field data. Dr. Thaung Hlaing left Yangon in September to continue his second year PhD program at Manchester University. Dr Thaung Hlaing has successfully completed his second year PhD program on Mosquito Molecular Genetics at the Manchester University, UK. DNA extraction of *Aedes aegypti* mosquitoes from various parts of Myanmar and mtDNA sequencing were conducted in his second year course and microsatellite genotyping and analysis will be conducted next year.

SERVICES PROVIDED**ACADEMIC**

Research Methodology training was conducted by DMR-LM from 26-7-05 to 28-7-05 and the following staff member participated as a facilitator.

Sr. No.	Name	Course	Responsibility
1	U Pe Than Htun	Research Methodology	Facilitator

Training workshop on function of an entomological laboratory and its application technique including identification and biology of mosquitoes was conducted by DMR-CM from 18-12-06 to 25-12-06 and the following staff members participated as resource person and facilitator.

Sr. No.	Name	Course	Responsibility
1	U Pe Than Htun	Training Workshop	Resource Person
2	U Sein Min	Training Workshop	Facilitator

As part of the activities of the “WHO Collaborating Centre for Research and Training on Malaria (WHO CC No. 205)” and in collaboration with Manchester University, the following PhD students were trained on field sampling and collection of malaria vectors, biology, bionomics and morphological identification of Anopheles mosquitoes from 16th September 2006 to 31st October 2006.

Sr. No.	Name (Nationality)	Course	Address
1	Ms. Katy Morgan BSc, MSc (British)	PhD student in Genetics	Faculty of Life Sciences, Manchester University
2	Ms. Magdalena Zarowiecki BSc, MSc, MRes (Swedish)	PhD student in Genetics	Faculty of Life Sciences, Manchester University

LABORATORY

1 Colonisation and maintenance of major vectors for basic and applied studies

Colonisation of mosquito vectors was continued in the laboratory as in the previous years. *An. dirus* (Mudon Strain) were reared continuously and are now in the F₂₃₆ generation. Malaria infection studies are being carried out using this *An. dirus* from Mudon as a control for comparative purpose. *An. dirus* from Oktwin Township has been colonized up to F₁₇₁ generation and *An. dirus* from Than Byu Zayat was now in F₄₉ generation. The colony of *An. minimus* from Pyin Oo Lwin was successfully reared in the insectary and now in the F₅₀ generation. A new batch of *An. dirus* from Mudon was also reared in the laboratory and now they are in F₂₅ generation.

2 Development of the molecular entomology laboratory facilities

Development of molecular entomology facilities were continued during 2006. Funded by the local budget, a new electronic balance was augmented to the existing laboratory facilities. In addition to the local funding, a thermo mixer, a vortex shaker, three adjustable volume pipettes were acquired with support from WHO regular budget during the reporting period.

New batches of *An. dirus* mosquitoes from Mudon Township from Mon State and *An. minimus* mosquitoes from Pyin Oo Lwin Township were collected to upgrade the existing laboratory colonies and iso-female lines of both mosquito species. Standardization of the molecular identification methods for *An. dirus* species complexes were explored in the laboratory. Mosquito DNA extraction, purification, PCR amplification, gel electrophoresis and documentation were conducted. Some of the required reagents and PCR facilities were shared by Parasitology Research Division. Species specific primers were kindly provided by Manchester University. Further tests and development are still required by using mosquito specific DNA purification kits and/or suitable DNA extraction and purification protocols.

MEDICAL STATISTICS RESEARCH DIVISION

Research Scientist & Head	...	Dr. Kyaw Oo MBBS MMedSc (Preventive & Tropical Medicine) MSc (Epidemiology & Biostatistics)
Research Officer	...	Dr Myo Myo Mon MBBS MMedSc (Public Health)
	...	Dr Yin Thet Nu Oo MBBS MIRB (Monash)
Research Assistant (2)	...	U Nyo Aung BSc(Zoology) Daw Khin Sandar Oo B Com
Research Assistant (3)		U Tin Ko Kyi
Research Assistant (4)		U Phyto Min Oo

Medical Statistics Division has been actively engaged in conducting a number of research projects in area of reproductive health, leprosy and tuberculosis. Services of statistical advice, teaching and training on research methodology and data analysis are also provided to various researchers and post-graduate students.

RESEARCH PROJECTS

1. COMMUNICABLE DISEASES

1.1 LEPROSY

1.1.1 Options and feasibility of integration of basic health staff in Leprosy Control Programme in post-elimination era

Integration of BHS for the leprosy control activities need to be revised and modified to be more adaptable with situation at post-elimination era. The study aimed to search the options of various integration procedures. Study was a cross-sectional descriptive design conducted mainly with quantitative approach which was triangulated by qualitative procedures for some issues. The study was designed to be conducted in two phases. Phase I was started at October 2006 with preparation of data collection tools. Study areas were two purposively selected townships in Bago Division and Ayeyarwaddy Division. Bago Division is chosen for initiating Prevention of Disability/Worsening Disability (POD/POWD) programme and also to get better managerial and technical efficiency in data collection task, thus quality of data will be improved. Ayeyarwaddy Division was chosen for best comparison with Bago Division to be able to compare and contrast between those BHS at area with and without POD/POWD intervention activities. Townships were listed in order of magnitude of leprosy control activities and among them two townships with highest activities were selected for the study. Padaung Township at Bago Division and Zalun Township at Ayeyarwaddy Divisions were selected. Study population was all BHS not including health assistants (HAs) and lady health visitors (LHVs) in the selected townships. Four PALs from each township were requested to participate in qualitative portion of the study. Selection of PALs was in convenience of field survey procedure and willingness of PALs. Both new and old cases were recruited. Three data collection methods and tools were used. For the detection of technical knowledge, experience on leprosy control activities and problems encountered, self-administered questionnaire was used. To explore workload and perceptions on sharing responsibilities, face-to-face interview questionnaire was used. For qualitative data, individual depth interview (IDI) was used. Discussions were mainly on patients' perspective of existing BHSs services and their opinions for better integration. All the tools for data collection were pre-tested. Pre-testing was done at Mayanchaung RHC,

Hlegu Township at 5 Dec 2006. Revision of word phrasing at some questions was made in accordance to have easier understanding of questions by BHS. Interviewers were trained by the investigators before pretest and actual data collection. IDIs were conducted only by investigators. Data collection was done in Padaung at 8 Dec 2006 to 10 Dec 2006 and in Zalun at February 27-28. Total of 37 BHS and 4 PAL in Padaung and 47 BHS and 4 PAL in Zalun had been interviewed. Data cleaning and entry are now in progress.

1.1.2 Factors affecting the outcome of prevention of disability (POD) programme in selected townships

The study was a cross sectional descriptive study employing both quantitative and qualitative methods with the objectives of analyzing the situation of POD (Prevention of Disability) programme in the selected townships, identifying the service factors facilitating or prohibiting the POD service in these townships, identifying the client factors facilitating or prohibiting the POD service in these townships and to recommend possible solutions to improve these services. Out of 9 POD programme townships, Minbu and Sagaing were selected purposely.

Record review from 9 programme townships was done for secondary data analysis and in-depth interviews (IDI) will be performed to PALs (people affected by leprosy) and health care providers for qualitative assessment.

Data collection tool was developed and pre-testing of the tool was done in CSSC (Central Special Skin Clinic).

1.1.3 Stigmatization among disabled persons affected by leprosy

In order to develop strategies for improving social image and restoring self confidence of persons affected by leprosy in the community, this study was conducted to identify social stigma among disabled persons and to differentiate stigmatization between persons disabled due to leprosy and not due to leprosy. The study is cross sectional comparative design. Aunglan Township, one of the nine areas of JICA disability survey was purposely selected. Out of registered 150 persons affected by leprosy (PALs) with GI and II disability, 97 were interviewed during 2004 and 2005. Data collection method was face-to-face interviews using structured questionnaires. In comparison, 97 disabled persons affected by other diseases (Non-PAL) were also interviewed. Gender and education levels were not different between PALs and non-PALs. Proportion of married and divorced was higher among PALs than those of non-PALs (61% vs.40% and 7% vs. 3% respectively). Proportions of persons who had a job were not different. Among unemployed, PALs gave reasons more with “depending on offspring” and “getting older” while non-PALs gave reasons more with “physically disabled”. Male PALs were getting more leader role in the family in comparing to Non-PAL (87% vs. 49%). During the festive occasions, slightly higher proportion of “non-invitees” among non-PAL than PALs was found. The responses shows obviously high level of self-stigmatization among both PALs and non-PALs but two groups were not significantly different. Similar patterns of stigmatization were found in the persons during social occasions and village affairs. About 10% higher in PALs than non-PALs on perceived being-discrimination shows that PALs might have self-stigmatization due to the disabilities affected by leprosy. Findings highlight stigma of PALs is not caused by physical disabilities but by disfigurement. And also, prevention of disfigurement and psycho-socio rehabilitation is crucial for improvement of quality of life of PALs.

1.2. ACUTE RESPIRATORY TRACT INFECTION

1.2.1. Intervention study of ARI case management among BHSs at Padaung Township (Bago West)

The project was conducted to have relevant information on existing knowledge and practice of BHS in recognizing and managing ARI, particularly pneumonia and to strengthen knowledge and skill of BHS to achieve sustainability of their knowledge on management of ARI. In collaboration with Department of Health and Township Health Department (Padaung), the study was carried out using quasi-experimental design. Padaung Township in Bago Division was selected purposively as study site. All BHS in the township such as medical doctors, nurses in hospitals, HAs, LHVs, PHSs and MWs were included in base line assessment, ARI case management training (after baseline assessment) and re-assessment of ARI case management practices (after 3 months of the training). Baseline assessment was made by interviewing BHS using pretested questionnaire. Reassessment was also done using the same questionnaire. Two Focus Group Discussion (FGD) sessions were also conducted using set guideline to support the questionnaire assessment information. Three-days training workshop was conducted in the township participating by all BHS using existing training modules which were developed by ARI control programme. Age of study population ranged from 24-60 years and total service was 0-39 years. Majority of BHS (34%) in this study was at sub-center. On baseline assessment, some confusion among BHS in understanding between signs of pneumonia and severe pneumonia was found. "Signs of severe pneumonia" and "defined duration of prolong cough" were found less understood than other knowledge on ARI cases by BHS. More than one-third of BHSs had no experience in managing pneumonia and severe pneumonia cases. It may be due to three reasons that; 1) BHS might refer the diagnosed cases to higher health center, 2) BHS might not make diagnosis all the cases they meet pneumonia or severe pneumonia, or, 3) BHS might answer "no" although they met the cases and refer but they may not think the referring as a kind of management. Majority of BHS could answer correctly on knowledge questions about ARI case management. Knowledge about antibiotic prescribing on pneumonia case of 70% of BHS was found followed the guidelines. Weaknesses of BHS identified on baseline assessment were in; 1) management of pneumonia and severe pneumonia, 2) management of prolong cough and 3) appropriate use of antibiotics in managing ARI cases. Improvements after training were; 1) knowledge about some important signs of ARI, 2) awareness of important early sign, 3) knowledge on how to do when they meet an ARI case with severe stage and 4) overall improvement of knowledge regarding ARI case management at various stages.

2. NON-COMMUNICABLE DISEASES

2.1 CANCER

2.1.1. Women's awareness of common female cancers in selected peri-urban townships

With the objectives of estimating perceived magnitude of female cancer problem and assessing community awareness of those cancers, a community-based study was conducted employing both qualitative and quantitative approaches. Triangulation of research methods was done to validate the findings. Among 35 townships of Yangon Division, 4 townships namely Hlaing Thar Yar, Shwe Pyi Thar, South Dagon and East Dagon Townships were selected purposely to cover the criteria of peri-urban or newly developed satellite townships. For quantitative survey, 400 women were interviewed

using a structured questionnaire. Six focus group discussions were done for the qualitative assessment.

Mean age of sampled women was 48.4 years and majority were married, dependent and primary school passed. Cancer breast, uterus and larynx were mentioned as the most common female cancer according to their perceived magnitude.

Almost all (99.3%) were aware of breast cancer and only (69.5%) were aware of cervical cancer. Breast lump was considered as a condition that will later develop into cancer by (38.8%) and (41.5%) mentioned that it was painless in early stage. Majority of the sampled women (93.2%) agreed that breast self-examination can be done to detect the breast lump. During the qualitative assessment, most of the participants actively discussed and they mentioned all treatment options for breast cancer. They said that chemotherapy and radiotherapy can be given if the disease is in early stage and surgery was considered if the disease is in advanced stage.

Abnormal bleeding per vagina and white discharge were mentioned as main symptoms of cervical cancer (76.3%, 63.3%). Regarding the risk of cervical cancer, female hygiene was indicated by (88.5%) and number of sexual partners by (77.0%). Majority of the participants in the qualitative study also discussed these symptoms and risk factors. Almost all of them said that both diseases can be cured at early stage and surgery was mentioned as a main treatment option. Both cancers were considered as preventable by half of the respondents. However, some preventive measures they mentioned were unclear and vague. Some traditional beliefs were still prevalent in the community.

Regarding the survival of cancer, breast cancer was considered as the most favourable cancer for survival by most of the respondents (87.5%) followed by cancer in general and cervical cancer (68.0%, 56.0%). Relatives/ friends were stated as their main source of information (90.5%) and only (29.0%) mentioned health staff. Government hospitals/ clinics were identified as the main treatment centre available for cancer patients (97.3%). During the FGD sessions, majority stated government hospitals and not a few stated traditional healers of various kinds such as monks, traditional medicine clinics and “Out-lan Sayar” (lower spirit medium). Majority went there with the hope of cure, relief and lesser cost compared to western medicine.

The above findings highlight that even though cervical and breast cancer were perceived as commonest female cancers, information regarding prevention and treatment procedures needs to be promoted for the health of all women.

3. HEALTH SYSTEMS

3.1. REPRODUCTIVE HEALTH

3.1.1. Prevalence of Reproductive Tract Infections at the Family Planning Clinic at Central Women’s Hospital, Yangon

The study is a cross sectional descriptive clinic based study. The objectives of the study are to determine the prevalence of Reproductive Tract Infections (RTIs) in family planning clinic attendees at Central Women’s Hospital, to identify their demographic and behavioral characteristics and to document the women’s perception on the importance of reproductive tract infections and to identify the gonococcal antimicrobial susceptibility. Seven hundred family planning clinic attendees are estimated to be enrolled over a period of ten months at the Central Women’s Hospital (CWH), Yangon. This study will provide the prevalence of reproductive tract infections, gonococcal antimicrobial susceptibility

and document the women's behavioral characteristics and perceptions on the importance of RTIs. Out of 605 specimens processed, positive result for *Trichomonas vaginalis* was found in 10.74% out of which only 8.76% was positive at culture. *Candida* positive samples were detected in 4.14% of samples of which mostly by culture method. *Gonococcus* was found in 1.82% of specimen. Other bacterial growths (mostly *E coli* and *Staphylococcus*) were detected in 2.48% of samples. Herpes Simplex 2 IgG was detected in 8.15% of samples. Out of 700 family planning clinic attendees 650 samples (92.8% of calculated sample size) were collected.

3.1.2. Factors associating with antenatal care seeking practice of pregnant women with hypertensive disorders

The study will find out improper antenatal care seeking practices of pregnant women who develop hypertension during pregnancy, and also their maternal and foetal outcome. Among the various factors associating with antenatal care practices such as socioeconomic, cognitive, cultural factors, such factor contributing as significant barriers will also be identified. This study will identify cause and preventable factors of pregnant women with hypertensive disorders relating to occurrence of serious complications. Awareness of the importance and preventability of hypertensive disorders during pregnancy will be improved to the pregnant women. Accessibility to antenatal care services will also be improved among pregnant women with hypertensive disorders and thus will be contributing to reducing the Maternal Mortality Ratio. This is a cross sectional comparative study. Data collection works were conducted in Obstetric and Gynaecology unit of Thingangyun San Pya Hospital Yangon. Patients admitted to the unit through emergency obstetrics care unit and out patient department during the study period were recruited. Patients' demographic records including age, parity, education, socio-economic status along with antenatal care record, level of care and distance from hospital were noted. Data collection tools were developed. Interviewers were trained for data collection works. Data entry file structure was developed in Epi Data software. Outcome variables will be related to pregnancy outcomes (maternal morbidity such as preeclampsia and eclampsia, preterm delivery rate, labour induction, emergency Caesarean section and stillbirth and overall perinatal morbidity rate). Socio-demographic and economic variables, knowledge and attitudes towards hypertensive disorders, obstetric history, antenatal care seeking practices will be possible factors associating with pregnancy outcomes. Association of antenatal care seeking and women's socio-demographic background characteristics will also be analysed.

3.1.3. Providers' perception and the problems encountered in providing adolescent reproductive health (ARH) services in selected township

The study was a community-based exploratory study using both qualitative and quantitative approaches. It was conducted with the objectives of determining the providers' knowledge and perception on ARH services, identifying the problems encountered in providing ARH services and disseminating information for ARH programmes in creating adolescent-friendly reproductive health services. Two townships from 20 townships with ARH corner were selected randomly. All the Basic Health Staffs (BHSs) from the selected townships were included (excluding medical doctors). Focus group discussions (FGD), In-depth interviews (IDI) and Key informant interviews (KII) were carried out for qualitative assessment. Pre-tested structured questionnaire was used for quantitative survey. Out of two study townships, data collection for one township was completed. Two FGD sessions, four IDIs and two KIIs were performed in that township.

Data entry was done by using Epidata 3.0 software and analysis will be done with SPSS 11.5 software. Qualitative data analysis was still in progress.

4. ENVIRONMENTAL HEALTH

4.1 BIOLOGICAL HAZARDS

4.1.1. Syringes and needles disposal practices by House Surgeons

Needle stick injury (NSI) is regarded as an important cause of the transmission of such blood-borne viruses to health care staff. Medical students and interns are those with the highest risk. It is unknown when NSIs are most likely to occur during medical training. Although several batches of new medical graduates have completed their years as House Surgeons at different hospitals in Myanmar in recent years, there is lack of information on the occurrence of needle stick injury and needle disposal services. Aiming to promote measures for preventing NSIs, a hospital-based cross-sectional descriptive study was carried to explore the retrospective prevalence of needle stick injury among house surgeons and to investigate their practice regarding injection instrument waste disposal. Medical doctors at all medical wards of Yangon General Hospital, medical wards of North Okkalapa General Hospital and Sanpya General Hospital, paediatric medical wards of Yangon Children Hospital and Sanpya General Hospital were investigated by self-administered questionnaire. High response rates (more than 95%) were obtained for questions on needle re-capping, injury obtained during recapping and separation of needle and syringe before discarding, needle discarding practices, and disposal of containers. Among the 210 responding subjects, 206 (98%) recapped the needle after giving injections. Of those who recapped the needle, 75 (36%) handle the cap during recapping process. The remaining 131 subjects recapped the needle without handling the cap. Among 206 subjects who practiced recapping, 60 (29%) disclosed that they experienced injury during recapping. A slightly higher rate of injury was observed among subjects who handle the cap during the recapping process as compared to those who recapped the needle without handling the cap (34% vs 26%). The majority 162 subjects (78%) separated the needle before discarding the syringe. Of those who separated the needle from the syringe almost all 152 subjects (94%) used both hands. A small percentage (6.2%) of needle separators experienced injury during separation. One hand for separation the needle from syringe had a slightly higher experience of injury during separation than those who used the two hands method (10% vs 6%). The most commonly used container for discarding needle and syringes was used plastic drinking water bottle (71%) followed by WHO Card Box (18%). However, only 59 (28%) of the respondents said the containers were within arm's reach and 150 (72%) of them stated that they had to walk to the reach the container. Among the study population, nearly (55%) perceived that they are safe with the current practicing needle and syringe disposal system. This study showed that House Surgeons are at risk of needle stick injury and blood-borne infections during their clinical activities while performing procedures on patients. Efforts need to be made to ensure greater awareness amongst House Surgeons about the risk of mucocutaneous and percutaneous injuries. Proper training in percutaneous procedures and how to act in case of injury should be made to reduce the number of injuries.

SERVICES PROVIDED

ACADEMIC

Sr. No.	Name	Course	Responsibility
1.	Dr. Kyaw Oo	Common module for PhD and Doctorate candidate DMS	Teaching
		Research Methodology Workshop 2006, , DMR(LM)	Teaching & Facilitation
		M Med Sc (Paediatrics, Internal Medicine, Obstetric and Gynaecology, Public Health, Microbiology, Physiology, Biochemistry) Ph.D. (Physical Medicine, Ophthalmology,)	Statistical support
		Examination for the candidate of Bachelor and Master degrees in Universities of Medicine (PSM Departments)	External Examiner
2.	Dr. Myo Myo Mon	Development of curriculum of biostatistics core course to be used in University of Public Health, Yangon (UM1)	Member
		Research Methodology Workshop 2006, , DMR(LM)	Teaching
3.	Dr Yin Thet Nu Oo	Common module for Ph.D. and Doctorate candidate DMS	Teaching
		Health Social Science Group meeting (9.3.2006)- Talk on “ Learning Research Bioethics in an international context”	Teaching
		Seminar on “Informed consent writing”	Teaching
		Scientific Talks on Informed Consent – “Informed consent in clinical trials involving children as research participants”	Teaching
		Research Methodology workshop – Lecture on “ Research Bioethics”	Teaching

NUCLEAR MEDICINE RESEARCH DIVISION

Research Scientist & Head	---	Dr. Aye Aye Yee MBBS, DipMedSc (Nuclear Medicine)
Research Officer	---	Daw Mu Ya Than BSc (Chemistry)
	---	Daw Yin Yin Win BSc (Chemistry)DCSC
Research Assistant (2)	--	Daw Aye Aye Maw BSc (Chemistry)
		Daw Moe Moe Han BSc Hons (Meteorology) MSc (Engineering Physics) MRes (Physics)
Research Assistant (3)	---	Daw Baby Than BSc (Chemistry)
Research Assistant (4)	---	Daw Sandar Aung BSc (Zoology) MSc (Zoology) MRes (Zoology)
Laboratory Attendant	---	Daw Ma Gyi

The Nuclear Medicine Research Division has been actively involved in research studies on essential health technologies, non-communicable diseases, and malaria.

RESEARCH PROJECTS

1. COMMUNICABLE DISEASES

1.1. MALARIA

1.1.1. Establishment of bulk reagent methodology for detection of *Plasmodium falciparum* sporozoite antibodies

Malaria ranks as first priority disease in Myanmar. For effective control of malaria, the situation of malaria transmission in the area must be known as much as possible. Of several indicators, anti-sporozoite antibody is considered as a useful indicator for assessing the transmission and could be used to monitor the progress of vector control programmes.

The development of an in-house Indirect Enzyme Immunosorbent Assay (EIA) system using synthetic peptide NANP₃ as the solid phase and peroxidase labeled anti-human IgG (Rabbit) as the conjugate. Checkerboard titration was carried out and the dilutions determined. The anti-sporozoite antibody levels of 384 subjects from Tarchileik (mean age 34.71 ± 19.2yrs) were determined. The mean antibody levels ranged from 0.08µg to 21.9µg. No significant difference in the anti-sporozoite antibody positive rate was found between males and females (29.2% vs 37.6%). A positive correlation (r = 0.32) with age (p<0.001) was found and highest anti-sporozoite antibody positive rate was found in 20-40yr age group followed by 40-60yr age group. No association was found with history of malaria. The developed EIA could be used to assess the degree of malaria transmission in a locality.

The optimal concentration of circumsporozoite antigen NANP₃ 100µl used for coating the plate is observed to be 2.5µg/ml. Optimal blocking with 5%BSA-PBS was achieved after 1hr incubation at 37°C. The test showed the sensitivity level of detecting circumsporozoite antibody 0.625µg/ml. The optimal time for incubation with 1:1000

peroxidase labeled antibody conjugate was achieved after 1hr. The standard curve obtained. A total of 384 investigated subjects, 113(33.3%) were males and 271(66.7%) were females. The average age was 34.71 ± 19.2 yrs.

By use of calibration sera provided with the test, the cutoff value for measurement of CS antibodies was defined as $7.38 \mu\text{g/ml}$. Serum specimens from 135 (35.2%) of the 384 subjects were positive and 249 (64.8%) were negative. No significant difference in the anti-sporozoite antibody positive rate was found between males and females. A positive correlation ($r=0.32$) with age ($p<0.001$) was observed and the anti-sporozoite antibody positive rate was highest in 20-40yr age group followed by 40-60yr age group.

1.2. SEXUALLY TRANSMITTED DISEASES

1.2.1. Detection of Chlamydial infection by Polymerase Chain Reaction method

Six hundred and fifty (650) endocervical swab samples have been collected and stored at -80°C awaiting the procurement of reagents and consumables needed for the Polymerase Chain Reaction method for the detection of chlamydia antigen in the samples. Procurement of the reagents is being arranged by the WHO/HRP head quarters.

2. NON-COMMUNICABLE DISEASES

2.1. CANCER

2.1.1. The use of tumor marker CA 15.3 as the prognostic indicator for monitoring of patients with carcinoma breast

This study was carried out to monitor the progress of disease after management including surgery, chemotherapy, radiotherapy and combined therapy. The aim of the study was to determine the stage of breast cancer, response to treatment and recurrence after treatment. A total of 28 cases of carcinoma breast patients were selected to determine the tumor marker CA 15.3 levels before and after treatment. Determination of the level of CA 15.3 was done by using the ELISA test kit for Breast Cancer Antigen 15.3 (Omega Diagnostics Ltd, Scotland, United Kingdom). The CA 15.3 level was significantly lower after treatment. (p value < 0.005). From this study, determination of CA 15.3 levels could be used as a prognostic indicator in the management of carcinoma breast.

3. ACADEMIC AND TECHNOLOGY DEVELOPMENT

3.1. DEVELOPMENT OF TEST KIT

3.1.1 Development of the in-house TSH EIA

Development of the in-house TSH EIA was carried out as a substitution for the in-house TSH RIA. Thyroid Stimulating Hormone (TSH) is a glycoprotein with molecular weight of 28000, which is composed of an alpha and beta subunit. Anti-TSH monoclonal antibody was used for coating the 96 well plate with the different concentrations of (1, 2, 4, 8, 16 $\mu\text{g/ml}$). Anti-TSH HRP conjugate was used in different dilutions as a second antibody (1:500, 1:1,000, 1:2,000, 1:3,000 and 1:4,000 dilutions).

Samples of different TSH standards (0, 0.5, 1, 2, 4, 7, 18, 30 m IU/L) and quality control samples of Bio-Rad (0.39 m IU/L, 4.9 m IU/L, 30.4 m IU/L) were used for the assay. The optimal coating concentration was $2 \mu\text{g/ml}$ and the optimal dilution of the conjugate was 1:3000.

3.1.2 Detection of neonatal hypothyroidism in Eastern Shan State using dried cord blood samples

Training of the health personnel for collection of cord blood samples and health education about congenital hypothyroidism was carried out during the field survey to Tarchileik Township, Eastern Shan State in February 2006. A total of forty (40) trainees including (26) midwives, (4) LHVs, (4) doctors, (2) Health Assistants, Trained Nurse, Sister, Public Health Supervisors (PHS I and PHS II) were trained for the collection of cord blood samples as blood spots. (2000) filter paper cards attached with neonatal hypothyroid screening forms, (600) stamped envelope, (40) boxes of surgical gloves, (500) pairs of disposable gloves and (100) pamphlets were distributed to the health personnel for cord blood sample collection. (135) blood spot samples were received for the neonatal hypothyroidism screening.

NUTRITION RESEARCH DIVISION

Deputy Director & Head	... Dr. Phyu Phyu Aung MBBS MMedSc(Physiology) MPS-FNP(Philippines)
Research Scientist	... Dr Aung Thu MBBS MMedSc (Public Health) DTM&H MCTM(Mahidol University,Thailand)
Research Officer	... Dr Moh Moh Hlaing MBBS MMedSc (Public Health) ... Dr Moe Thidar Kyaw MBBS MMedSc (Biochemistry) ... Dr Mya Ohnmar MBBS ... Daw Aye Aye Than BSc(Zoology) ... Daw Sandar Tun BSc Hons(Zoology)
Senior Nurse	Daw Nan Aye Hlaing Htay
Research Assistant (2)	... U Sein Maung Than BSc(Chemistry) U Mg Mg Myint BSc(Zoology) Daw Thidar Khine BSc(Chemistry)
Research Assistant (3)	Daw Lei Lei Myint BSc(Chemistry) Daw Su Su Hlaing BSc (Chemistry) Daw Khin Hnin Wint Phyu BSc(Chemistry) Daw Yin Yin Aye BA(Eco)
Research Assistant (4)	Daw Nyein Nyein Win
Laboratory Worker	

The Nutrition Research Division is primarily involved in research activities of the following program areas: micro-nutrient deficiencies, food safety and major chronic non-communicable diseases.

RESEARCH PROJECTS

1. NON-COMMUNICABLE DISEASES

1.1. NUTRITION

1.1.1. Improving dietary practices of adolescence through nutrition education and behavior modification

Proper nutrition is important in adolescents because second growth spurt takes place at the period of adolescence. More calories and nutrients are required and 20% of total growth in height and 50% of adult weight gain occurs in this period. Therefore, nutrition during adolescence should provide necessary nutrients to meet demands of physical and intellectual growth and development. The present study aims to investigate whether behaviour modification through nutrition education could improve the dietary practices of the school-going adolescents of Myanmar. Before intervention, food intake and eating habits of the one hundred subjects were determined by employing 24-hour recall/food diary and structured questionnaire. Then nutrition education on healthy eating

(using food guide pyramid) and major nutritional problems of Myanmar were given in small groups. Education materials were distributed to the subjects. Four months after giving nutrition education, the same subjects were assessed again for dietary practices and food habits. Data analysis is still in progress.

1.1.2. Complementary feeding practices in rural areas of Yangon, Myanmar

The study aims to assess the current complementary feeding practices and nutritive values of commonly given complementary foods in the selected rural area of Yangon. It is conducted on the lactating mothers of the Theik-too-kan village of Thonegwa township. Initial qualitative research was carried out to develop the structured questionnaire. Two FGDs each for lactating mothers of high and low income families. Key informants' interviews were also done. Data are not analyzed yet. Development of structured questionnaire and nutrient analysis of the commonly given complementary foods are still need to be done.

1.1.3. Micronutrient status of active tuberculosis patient

The study aimed to determine the micronutrient status of patients with active pulmonary tuberculosis to provide evidence-based data for further implementation of micronutrient supplementation to tuberculosis patients as micronutrients vitamin A and zinc are claimed to boost immunity and in attacking tuberculosis. Thirty new untreated active pulmonary tuberculosis patients, aged between 15-59 years, attending the out-patients' department of Union Tuberculosis Institute in Yangon were participated as cases. They had two initial sputum specimens positive for acid fast bacilli for microscopy and clinical and radiographic finding consistent with pulmonary tuberculosis. Controls (thirty in number) were healthy subjects with no history of tuberculosis (confirmed by negative for acid fast bacilli for microscopy and negative radiographic finding), matched with cases for sex and age and socioeconomic status. Serum vitamin A and zinc levels and dietary habits of active pulmonary tuberculosis patients and control subjects were determined. Among 30 cases, 56.7% were males and 43.3% were females. The mean age of subjects was 33.8 ± 12.2 years. Most of the cases were from low income family. Seventy three percent of subjects were undernourished ($BMI < 18.5$). Mean BMI of the cases was 17.03 ± 1.99 kg/m² and mean serum vitamin A level was 13.73 ± 2.89 µg/dl (cut off point for low serum vitamin A deficiency was < 20 µg/dl). Serum vitamin A level of well nourished cases (14.13 ± 3.22 µg/dl) was higher than that of undernourished cases (13.58 ± 2.83 µg/dl). The mean age of controls was 35.95 ± 12.26 years and mean BMI of controls was 19.9 ± 2.35 kg/m². Serum zinc level of cases and controls and serum vitamin A level of some control have not been analyzed yet.

1.1.4. Study on prevalence of Anaemia in Adolescent Boys in Yangon

A study on the prevalence of anaemia in out of school adolescent boys in rural area of Htandabin Township, Yangon was conducted during the period from May 2006 to November 2006. It was aimed to find the prevalence of anemia among the out-of-school adolescent boys as no data is available yet for anemia in adolescent boys. Although physiologically girls are more likely to have anemia, in Myanmar if boys are out-of-school, then the families must be very poor. A total of 308 out of school boys were included in the study. Dietary intake of iron rich foods, iron absorption facilitators/inhibitors, knowledge on health and nutrition were assessed with semi-structured questionnaires. Haemoglobin level was determined by using Hamocue

haemoglobinometer. The prevalence of anaemia in 10 - < 14 years aged group and 14 - 19 years aged group in out of school adolescent boys were 24.5% and 34.2 % respectively. For 14-19 years group boys the prevalence of anemia was higher than that of adolescent girls of the same community (25%). Cut off point for anaemia is <12 g/dl for adolescent boys less than 14 years and <13g/dl for adolescent boys above 14 years as proposed by WHO. Mean haemoglobin level of out off school adolescent boys was 13.31 ± 1.69 g/dl. Data analysis on dietary intake and knowledge on health and nutrition was still in progress.

1.1.5. Vitamin A status of Adolescent and pregnant mothers

Vitamin A deficiency is one of the major causes of morbidity and mortality among preschool children in developing countries, and also, vitamin A deficiency is one of the major nutritional problems of Myanmar. The study aims to access the Vitamin A status of selected school children (7-9 years) and pregnant mothers of Myanmar. It will be school and community based cross-sectional study. One hundred school-going children (7-9 years) and 75 pregnant mothers will be chosen by multistage sampling method from Yangon division. Training of the survey team, standardization of the laboratory method, construction and pre-testing of the structured questionnaire had been done.

1.1.6. Oil consumption in Yangon, Myanmar

In the two randomly selected townships of Yangon, New Dagon South and Lanmadaw, 60 housewives attending the antenatal clinics were interviewed on the oil consumption. Nearly 75% of the study population in New Dagon South consumed palm oil as cooking oil, while the rest used peanut oil. Per capita daily oil consumption ranged from 0.33 ticals to 4.17 ticals. In Lanmadaw 75% consumed peanut oil and the rest 25% took palm oil. Per capita daily oil consumption ranged from 0.36 to 5.55 ticals.

1.1.7. Barriers to adequate intake of fruits and vegetables among people residing in Myanmar

Fruits and vegetables consumption of the people from Yangon was found to be low in the study conducted in 2003-4. More than 95% of the study population (4484 subjects) from 15 randomly selected townships (10 urban and 5 rural) were taking less than 5 servings of fruits and vegetables. Daily intake of 5 servings of fruits and vegetables was found to have protective effect on the major chronic non-communicable diseases. To explore the reasons underlying the low fruits and vegetables consumption, 2 urban townships were randomly selected from Yangon Division and focus group discussions and in-depth interviews were done on the housewives from the selected townships (New Dagon South and Lanmadaw). The following barriers to fruits and vegetables consumption were explored:

Fruits:

- Did not eat fruits everyday as they thought that it would cause extra expense
- Fruits were expensive
- Did not know how much to eat everyday
- Did not have the habit of taking fruits daily since childhood
- Ate sometimes, not because of the cost, but just did not feel like eating fruits everyday

- Did not give preference to buying fruits when went to the market as children did not like fruits
- Not readily available at food stalls

Vegetables:

- Ate vegetables everyday but amount was small; they did not know that how much to eat vegetables daily and to eat varieties
- Did not eat vegetables everyday as they did not go to the wet market everyday; no storage facility
- Varieties were not bought: non-availability, price, likeness
- Many of them knew that vegetables are good for health
- Simply did not like vegetables

SERVICES PROVIDED

ACADEMIC

Sr. No.	Name	Course	Responsibility
1.	Dr. Phyu Phyu Aung	Sports Nutrition 1 st year MMedSc (Physiology) 2 nd year MBBS MMedSc (Physiology)Thesis MMedSc (Public Health) Thesis	Teaching Teaching External Examiner External Examiner External Examiner
2.	Dr. Moe Thidar Kyaw	Sports Nutrition	Teaching

PHARMACOLOGY RESEARCH DIVISION

Deputy Director & Head	...	Dr. May Aye Than MBBS MMedSc (Pharmacology)
Research Officer	...	Dr. Khine Khine Lwin MBBS MMedSc (Pharmacology)
	...	Daw Mu Mu Sein Myint MSc (Zoology)
	...	Dr. Min Won MBBS
	...	Daw Khin Tar Yar Myint MSc MRes (Chemistry)
	...	Dr. Ohnmar Kyaw MBBS
Research Assistant (2)	...	Daw Win Win Maw BSc (Physics)
	...	Daw Mar Mar Myint BA (Geography)
	...	Daw Myint Myint Khine
	...	Daw Phyu Phyu Win BSc (Botany)
Research Assistant (3)	...	Daw San San Myint BA (Myanmarsar)
	...	Daw Thandar Myint BSc (Chemistry)
	...	Daw Mya Thet Lwin BA (Business Management)
Research Assistant (4)	...	Daw Nu Nu Win MSc (Botany)
	...	Daw Hla Phyo Lin BSc (Chemistry)
Laboratory Worker	...	Zin Lu Aye

The research activities of the division mainly involve two major areas of modern allopathic medicine and traditional herbal medicine research. Research into modern allopathic medicine includes clinical pharmacokinetic-dynamic studies of drugs currently used for treatment against the National Health Plan (NHP) priority diseases such as malaria, tuberculosis, diabetes and cancer, as well as, pharmaco-epidemiology and pharmaco-economic studies aimed towards rational drug use. Research into traditional medicine includes study in basic toxicological and pharmacological research as well as clinical research into single plants and their constituents.

RESEARCH PROJECTS/ SERVICES PROVIDED

1. COMMUNICABLE DISEASES

1.1. MALARIA

1.1.1. Clinical and pharmacological factors influencing the efficacy and safety of Artekin in Myanmar

Studies on efficacy, safety and rational use of artemisinin-based combinations (ACT) as the first-line treatment in malaria necessitate search for suitable partner drugs, clinically, economically and pharmacokinetically, as well as careful regulation of their use for ensuring prolong therapeutic life span of these valuable drugs. The present study was conducted at and in collaboration with the CRU (Malaria), DSGH, as part of the above project to determine the clinical and pharmacokinetics factors influencing the efficacy, tolerability and pharmacokinetics of ArtekinTM (Group 1), when compared with other artemisinin-combination regimens (Group 2 & 3) Artesunate (Plasmodium Lactab200 mg; Mepha-Switzerland) plus Mefloquine (250mg; Helm, Germany) given separately and Artesunate plus mefloquine combined (ArtequinTM; Mepha, combi pack {Plasmodium 200mg + Mephaquin 250mg}). A total of 93 uncomplicated *P. falciparum* malaria patients from the DSGH, aged 15-60 years were randomly assigned to the

respective groups and a 28-day clinical trial was done according to WHO recommendations. All drugs used were tested for quality assurance and blood samples from patients were also collected at appropriate intervals for bioavailability and pharmacokinetic analysis. All the above regimens showed excellent efficacy with all patients (100%) showing adequate clinical and parasitological response (ACPR). There was no early treatment failure (ETF) or late treatment failure (LTF) rate cases. Fever clearance times (FCT) were rapid, ranging from 12.4-12.9 hours and parasite clearance time (PCT) ranging from 46.8-51.2 hours. All combinations were well tolerated and no remarkable adverse effects were noted. Quality assurance tests indicated authenticity of the combinations without significant detection of impurities. Pharmacokinetic analysis by HPLC method is in progress.

1.1.2. Study of the utilization pattern of traditional medicine on the management of malaria.

This study was undertaken in 5 townships (Bago, Daik-U, Kyauk-ta-ka, Tharyarwaddy, Oke-Po in Bago Division to determine the use of modern drugs and traditional medicine for malaria. Among 2096 household members, 507 (24.2%) reported history of malaria. Modern drug use (93.3%) was higher than traditional medicine (43.8%) and 78.4% of modern drug use was prescribed by health staff. None of the children under 5 used traditional medicine only. Modern drugs use included artesunate/artemether (64.2%), mefloquine (21.9%), quinine (5.8%), chloroquine (3.3%), sulfadoxine-pyrimethamine (3.3%) and antipyretics only (19.3%). One-fifth of artesunate use was self-treatment. Incorrect use of artesunate was 52%. The use of prepackaged modern drugs from local shops was 12.4% and some contained antimalarials. Some traditional medicine packets contained antipyretics like aspirin. Commonest reasons for traditional medicine use were usual practice (60.6%), perceived curability (57.1%) and unavailability of modern medicine (46.5%). Five hundred and seven respondents with history of malaria fever during the last 3 months were face to face interviewed. Qualitative information was collected through informal conversation with shop owners, interviews with traditional healers, persons with history of malaria fever and focus group discussions with community members. Traditional medicine use for malaria fever was 222 (43.8%) and 182 (82%) of them used it as the first line self-treatment. None of the children under 5 used traditional medicine only for malaria. Traditional drugs use included packets with antipyretics (59%), packets with traditional medicine (22.5%), packets with other contents (8.5%), (*Andrographis paniculata*) (5%) and other traditional herbs (21.6%). The cost of each packet ranges from 10 to 100 kyats. aq;cg;juD; is used by a few respondents only for unavailability, difficult preparation and unpleasant taste. Licensed traditional healers usually refer malaria patients to the health staff. Health education should include emphasis on avoidance of such medicine packets which are not approved by the Traditional Medicine Department.

1.1.3. Authenticity of commercially available Artemisinin Compounds in Myanmar: application of simple, cost-effective methods

WHO report on counterfeit and substandard antimalarial drugs in the Southeast Asia and Asia Pacific Region, including Myanmar and Vietnam has prompted a search for simple field assay methods to differentiate these from genuine drugs especially in the boarder areas where malaria is highly prevalent and the drug legislation laws are weak. Artesunate and dihydroartemisine are the main group of antimalarials, used in these areas as artemisinin-based combinations, because of their effectiveness against multi-drug resistance malaria. The main objective of the study is to find out the likelihood of

counterfeit or substandard artemisinin derivative drugs being imported into the Myanmar market and to establish simple and reliable assay methods for differentiating counterfeit/substandard artemisinin derivatives from genuine ones. A comparative, laboratory-based, analytical study was carried out on artesunate/dihydroartemisinin preparations available in the market, namely Falcinate Tab 50mg (Aurocham-India), Artenmed Tab 50mg (Mediplantex-Vietnam), ArtequinTM 600/ 1500(Mepha) combi pack, Plasmotrim LactabTM 200/50mg (Mepha-Switzerland), Dawnasunate 50 mg (MPF/MOI-1, Myanmar), Artepip 40 mg (Nanjing Pharm, China), Artepinkin 40 mg (Mediplantex-Vietnam), Dihydrodawn 40 mg (MPF/MOI-1, Myanmar) were collected and screened qualitatively and quantitatively by standard methods described in the International Pharmacopoeia, 2002. This was again rechecked by using the WHO standard method. Analytical parameters include uniformity of weight, pH and disintegration rate of tablets. Analysis consists of identification of active substance and/or inert ingredients by Thin Layer Chromatography, FT-IR and UV spectrophotometric methods and further quantification of the content of the active substance by the WHO standard methods. The findings indicated the variability in weight to be <5%, disintegration to be <30 minutes and pH ranging from 6.5 to 7.2. Qualitative analysis confirmed the presence of either artesunate or dihydro-artemisinin in the tablets tested, without significant detection of impurities. Quantitative analysis indicated the content of artesunate and dihydroartemisinin to range from 98% to 115% of the specified content in these tablets. The findings proved the authenticity of the commercially available artemisinin-based antimalarials available in Myanmar and that locally produced artemisinin-based antimalarials are comparable to the ones exported.

1.2. TUBERCULOSIS

1.2.1. Study on factors influencing treatment outcome of Tuberculosis treated by 4-FDC at Thingangyun TB Centre

The WHO, fixed-dose combinations have been used in Myanmar since January 2004 to overcome problems of compliance. Since TB control requires an integrated approach comprising laboratory support, clinical treatment with effective anti-tuberculosis drugs, socio-economic and public health interventions, the present study was conducted with the aim to explore the influence these factors on the response of treatment of tuberculosis patients who were treated with four drug fixed dose combinations (4 FDC). Out of a total of 2299 patients treated with 4FDC at the Thingangyun Tuberculosis Center, Yangon from January 2004 to December 2005, 240 newly-diagnosed, sputum positive, patients were randomly selected for the socio-economic study among which 20 patients were again selected for the pharmacokinetic study. Reference tablets from a selected badge number were also subjected to test of authenticity. Sputum of treatment failure patients were also collected for culture and drug susceptibility testing to the first-line anti-TB drugs, namely Isoniazid, Rifampicin, Streptomycin and Ethambutol at the National Health Laboratory. Blood were collected and analyzed for pharmacokinetic study. The 2-FDC & 4-FDCs used in by the National TB Program were also analyzed for quality assurance. Results showed that resistance to all 4 drugs (poly resistances) was noted in 12 (60%) isolates and 8 (40%) of the isolates was found to be resistant to one or two drugs (Rifampicin & Isoniazid). Mean Rifampicin concentration was $6.02 \pm 2.29 \mu\text{g/mL}$ (1.81-17.89 $\mu\text{g/mL}$) after 2 hours post-dose and $2.02 \pm 1.5 \mu\text{g/mL}$ (range 0.29–10.51 $\mu\text{g/mL}$) at mean steady state. Eight out of 21 patients (38.1%) had 2-hour post-dose concentration of <4 $\mu\text{g/mL}$. Mean INH was $2.83 \pm 1.2 \text{ mg/mL}$ (range 0.31–6.62 mg/mL) at 2-hours post dose and $1.33 \pm 0.54 \mu\text{g/mL}$ (range

1.57- 8.65 µg/mL) at steady state. Wide variation in plasma concentrations may be the result of enzyme induction by rifampicin and the difference in acetylation status of INH. TB patients taking treatment were mainly of working age group, predominantly male, low income class & residing close (<5 miles) to TB clinic. GPs were found to play an effective role in TB referral system. Treatment success rate is between 65-80%. Adverse effects, although common, are well tolerated. Emerging resistance was noted with treatment failure cases resistant to 4 drugs (60%), and 2 major anti-TB drugs (RIF & INH) being 40%. Quality assurance concerning pharmaceutical analysis indicated that 4FDC and 2FDC supplied by WHO are of acceptable quality & pharmaceutical factors are unlikely to be the cause of treatment failure. However, pharmacokinetic analysis indicated that dose of individual drugs in 4FDC are lower than previously used by NTP, further assessment of bioavailability in patients is mandatory to exclude suboptimal drug level as causes of treatment failure.

1.2.2. TB pharmacoeconomics: Cost effectiveness of Treatment Regimes used for Treatment of MDR-TB Patients at Aung San TB Hospital (2000-4)

The rising problem of multi-drug resistance TB, cost of second-line drugs and lack of standard therapy in Myanmar necessitate the search of a cost-effective regime applicable for use by the NTP in Myanmar. A descriptive hospital-based study was done on 80 MDR-TB patients at the Aung San Tuberculosis Hospital (ASTH) from January 2000 to December 2004, and their socio-economic, demographic, clinical and laboratory characteristics in relation to cost (drug cost), incidence of adverse drug reactions, response and relapse was assessed. This aim of the study was to set criteria and technical standards for launching a DOTS-PLUS project for control of MDR-TB in Myanmar in the near future. Socio-demographic characteristics indicated that most MDR-TB patients are from working, productive age group, having exposed to TB from the working environment. Unlike newly-diagnosed patients on DOTS regime, MDR-TB patients face financial problems (drug cost, family resentment/abandonment, lost of jobs); physical burden (traveling to collect drugs, weak & frail); and social stigmatism (depression, loss of faith in themselves, friends, & in treatment). About 46.3% of newly diagnosed patients, in spite of full compliance and successful completion of Cat I Anti-TB treatment, still developed MDR-TB, which may be due to infection with resistant strains of *M tuberculosis*. In addition, resistant to the 4 first-line drugs was high (up to 47.5%) making treatment to rely solely on the second line anti-TB drugs. Identifying these drugs and prevention of the potential misuse of these reserve drugs is of utmost importance. Of the 4 regimes used at ASTH for MDR-TB, Regime I (Roxithromycin, Augmentin, Clofazamine, Ofloxacin and Kanamycin) was the most cost-effective regime and was regarded as dominant therapy, as described by cost model. It has greater potential for cure, less likely of failure & lower cost than other regimes. Regime 4 (Clarithromycin, Keflor, Clofazamine, Gaityfloxacin and Kanamycin) was more costly, showing the highest defaulter rate due to financial problems. Regimes containing Clarithromycin also had high rate of adverse effects and this may also increase the defaulter rate. Cost 1,743,000 kyats, for one course of reserved anti-TB drug in MDR-TB (R-I), however, still impinge substantial burden for a developing country like Myanmar. Thus, supply of needed drugs by WHO DOTS-PLUS program is necessary.

1.3. DIARRHOEA AND DYSENTRY

1.3.1. Pre-clinical sub acute toxicity testing of antidysentric medicinal plants ((MAT/M P 017)

The study was carried out to fulfill the pre-clinical study on dysentric patients. Preliminary experiment on acute toxicity and sub acute toxicity of traditional medicine formulation was mandatory. Medicinal plants used, were collected from various resources and were identified at Botany section, Yangon University Research Centre. The samples collected were air dried and grinded into powder. They were extracted with ethanol for acute and sub- acute toxicity testing. Acute toxicity was done in mice. the median lethal dose was higher than 8g/kg bodyweight which is maximum permissible dose. Two dose levels of watery extracts of Myanmar medicinal plants(MAT/M P 017) were administered orally to (2) groups of rats for (6)weeks and one group served as control group in subacute toxicity test. The study is in progress.

1.3.2 Anti-diarrheal Activity of Leik-Su-Shwe (*Barleria prionitis* L., Acanthaceae) and Nwa-Mye-Yin (*Cyperus scariosus* Br., Cyperaceae) in Mice

In many developing countries like Myanmar, people living in rural areas rely heavily on traditional medicines in treating all sorts of diseases, including non-specific diarrhea. It thus becomes important to identify and evaluate commonly available natural drugs as alternative to currently used anti-diarrheal drugs, in terms of both efficacy and safety profile. The objective of the present study was to determine the antidiarrheal efficacy of Leik-Su-Shwe and Nwa-Mye-Yin which are reputed of having antidiarrheal properties, using experimental mouse model. A further study on antibacterial activity of these plants was carried out on common diarrhea-causing organisms by Agar Disc Diffusion and Agar Well Diffusion Methods. The plants were collected from Yangon and Mandalay areas and the dried powdered plant parts of whole plants were extracted with distilled water. Serial dilutions of 3, 6 and 12 g/kg of the extracts were administered to 3 groups of mice which have been induced by castor oil to produce experimental diarrhea. Other groups of mice include a negative control group receiving normal saline and a positive control group receiving the standard antidiarrheal drug loperamide. The antidiarrheal activity was assessed by 3 main parameters, 1) the effect on castor oil induced diarrhea(number and type of stools passed), 2) the effect on castor oil induced enteropooling (weight and volume of fluid accumulation), and 3) the effect on castor oil induced small intestinal transit (passage of charcoal meal). The results indicated that Nwa-Mye-Yin possess a marked anti-diarrheal effect against castor oil diarrhea comparable to loperamide as seen by a marked reduction in the number of diarrhea stools ($p < 0.02$) and the reduction in the weight and volume of the intestinal fluid accumulation ($p < 0.05$), as well as a modest reduction in intestinal transit. In contrast Leik-Su-Shwe showed less antidiarrheal activity than the former. The antibacterial activity seen in the two plants indicated their potential usefulness in infective diarrheas where non-specific antidiarrheal agents are contraindicated. The present study signified the antidiarrheal effect of the extracts and their potential usefulness in a wide range of diarrheal states, whether due to disorders of transit e.g. functional diarrheas, radiation diarrheas or due to abnormal secretory mechanisms like in cholera or *E. coli* enterotoxin-induced diarrhea.

2. NON COMMUNICABLE DISEASES

2.1. DIABETES

2.1.1. Pre-clinical sub acute toxicity testing of Antihyperglycemic medicinal plants (MAT/M P 014)

The study was carried out to fulfill the pre-clinical study on diabetes patients. Preliminary experiment on acute toxicity and sub acute toxicity of traditional antihyperglycemic medicinal plants was mandatory. The samples collected were air dried and grinded into powder. Acute toxicity was done in mice. the median lethal dose was higher than 16g/kg bodyweight. Two dose levels of medicinal plants((MAT/M P 014) were administered orally to (2) groups of rats for (14)weeks and one group served as control group in subacute toxicity test. At the end of (14)weeks all the rats were sacrificed and blood samples were collected for haematological and biochemical studies. In control groups showed Hb% $13.3 \pm 0.6\%$, WBC count $6000 \pm 0.78/\text{Cu mm}$, AST $54.11 \pm 5.71 \text{mmol/L}$, ALT $83.67 \pm 11.37 \text{mmol/L}$ and blood urea $53 \pm 1.79 \text{mmol/L}$ and test group (low dose) showed Hb% $15 \pm 0.5\%$, WBC count $5640. \pm 134.3/\text{Cu mm}$, AST $49 \pm 23.63 \text{mmol/L}$, ALT $98.13 \pm 27.85 \text{mmol/L}$ and blood urea $29.25 \pm 1.96 \text{mmol/L}$ and Hb% $14.7 \pm 1\%$, WBC count $7666.7 \pm 193.7/\text{Cu mm}$, AST $65.17 \pm 16.41 \text{mmol/L}$, ALT $130.5 \pm 34.97 \text{mmol/L}$ and blood urea $46 \pm 2.5 \text{mmol/L}$ respectively. Haematological parameters and Biochemical data were not significant difference from control group. The internal organs were excised and weighed. Gross examination and histological studies were carried out on internal organs. No significant changes were observed in grossly. Evaluation of organ weight in two groups showed not significant difference from control group. Histopathological results were in progress.

2.1.2. Hypoglycaemic Effect of *Azadirachta indica* A. Juss (Neem) leaves on Rabbit model

This study was carried out to determine the phytochemical constituents, acute toxicity and hypoglycaemic effect of dried leaves of *Azadirachta indica* A.Juss (Neem). Seven adrenaline-induced hyperglycaemic rabbits were used to study the hypoglycaemic effect. Cross over study design was used in hypoglycaemic study. In this study, phytochemical studies of crude powder and 70% ethanolic extract of dried leaves of *Azadirachta indica* A.Juss showed that both contained alkaloid, steroid, flavonoid, saponin, amino acid, resin, tannin, phenol and glycoside. In acute toxicity study in mice, it was observed that crude powder of this plant, was not toxic upto the maximal feasible dose of (4 g/kg) body weight. But, 70% ethanolic extract of this plant possessed mild acute toxic effect and Median lethal dose (LD_{50}) of this plant extract was determined to be (8 g/kg) and its confidence limit was (5.16g/kg-12.4g/kg). It was observed that 70 % ethanolic extract of *Azadirachta indica* A.Juss at the dose level of (1g/kg) had significant hypoglycaemic effect at 3hr ($p < 0.05$) and at 4 hr ($p < 0.01$) after oral administration of the extract when compared with that of the control group. In the comparison between hypoglycaemic effects of 70% ethanolic extract of dried leaves of *Azadirachta indica* A.Juss (1g/kg) and standard drug, glibenclamide (4mg/kg), it was found that hypoglycaemic effects of both were the same. Therefore, 70% ethanolic extract of dried leaves of *Azadirachta indica* A.Juss possessed significant hypoglycaemic effect in adrenaline-induced hyperglycaemic rabbit model.

2.2. HYPERTENSION

2.2.1 A study of the Anti-hypertensive effect of medicinal plant, MHT03 (whole plant) on mild to moderate hypertensive patients

A clinical trial to determine the anti-hypertensive effect of medicinal plant (MHT-03) (Whole plant) tablet was carried out in 10 mild to moderate hypertensive patients attending the medical out patient department (OPD) of Thingangyun Sanpya hospital, Yangon and Traditional Medicine Hospital, Yangon. After washout period of 3 days, patients were treated with MHT-03 whole plant crude powder tablet 3g tds (orally) daily for 12 weeks. On the first day of the trial drug study, blood pressure was monitored at 0hr, 0.5hr, 1hr, 2hr, 3hr after first dose of trial drug. Then, monitorings of blood pressure and vital signs and symptoms were done on day 2, day 3 and weekly upto 12 weeks. Laboratory investigations like blood for complete picture, platelet count, random blood sugar, LFT (liver function test), renal function test and ECG were done before and after the trial study. The results showed that reduction of blood pressure from base line level was seen at (0.5hr-1hr) after the first dose and was maintained upto 3 hr post dose. After 12 weeks of treatment with this trial drug, it was observed that significant reduction of mean blood pressure was from $150 \pm 2.58 / 98 \pm 1.33$ mmHg (baseline blood pressure) to $129 \pm 2.77 / 86 \pm 1.63$ mmHg ($P < 0.001$). So, it was found that mean lying systolic blood pressure and diastolic blood pressure reductions from baseline blood pressure were 21 mmHg ($p < 0.001$) and 13 mmHg ($p < 0.001$) respectively. No untoward effects were seen. At the end of the trial study, laboratory investigations such as blood for complete picture, platelet count, random blood sugar, LFT (liver function test), renal function test and ECG were observed to be normal.

3. TRADITIONAL MEDICINE

3.1. HERBAL MEDICINE

3.1.1. Testing of antioxidant activity of the reputed medicinal plants

The aim of this study is to evaluate the antioxidant active principle isolated from *Thea sinensis* Linn (vufzuf) leaves. The different extracts and isolated compounds were determined their antioxidant activity by the inhibition of linoleic acid autoxidation (Thiocyanate method) to detect lipid oxidation, in comparison with the synthetic antioxidant butylated hydroxyanisole (BHA). The chloroform, ethanol, petroleum ether extract, and BHA were significant lowered the autoxidation of linoleic acid when compared with that of control ($p < 0.01$ to $p < 0.0005$). The percent inhibition of autoxidative activity of the chloroform, ethanol, petroleum ether extract and BHA were 75.97%, 87.06%, 59.10% and 85.34% respectively, after 14th day incubation. Caffeine (3.9%) from chloroform extract and catechin (0.0438%) and epicatechin (0.075%) from ethanol extract were isolated by column chromatography technique. The isolated compounds were identified by melting point, optical rotation, thin layer chromatographic, Ultra violet spectroscopic, Fourier transform infrared spectroscopic, Mass spectroscopic and ¹H Nuclear Magnetic Resonance Spectroscopic methods. The isolated compounds, and BHA were significant lowered the autoxidation of linoleic acid when compared with that of control ($p < 0.01$ to $p < 0.0005$). Percent inhibition of autoxidative activity of caffeine, catechin and epicatechin were 78.42%, 89.41% and 84.14% respectively. Thus, it was concluded that caffeine, catechin and epicatechin were antioxidative active principle and catechin was the most potent natural antioxidant.

3.1.2 Phytochemical Analysis of Myanmar Green Tea: implications to antioxidant properties and health benefits

Many people around the world drink Green Tea for its reputed health benefits, which are believed to be attributed to the presence of polyphenols. Polyphenols contained in tea are classified as catechins, which are chemicals with potent antioxidant properties and thus, act as scavengers of free radicals. This antioxidant property of green tea is dependent on the gentle steaming method which prevents oxidation and thus preserving the polyphenols in its original form. The fermentation and oxidation process used for other kinds of tea destroys the polyphenols with loss of health benefits. The objective of the study is to conduct the phytochemical analysis of Myanmar Green Tea so as to evaluate the contents which can contribute to its health benefits and further compare it with Plain Tea, which was also extensively consumed by the Myanmar people. Myanmar Green Tea (Nara Organic Green Tea; Kachin Special Group) and Plain Tea (Htoo Super Plain Tea), commercially available in the market, were subjected to qualitative and quantitative analysis of its constituents including alkaloids such as caffeine, total phenols, catechin containing polyphenols, and tannins. The results showed that polyphenols present in tea leaves are destroyed (oxidized) to some extent during drying in the sunlight and/or heating in the oven. Thus, Myanmar Green Tea has a higher percentage of polyphenols than Htoo Plain Tea, indicating the preserving anti-oxidant properties and its health benefits. Presence of alkaloids including caffeine and related compounds indicated a stimulant effect of both Plain Tea and Green Tea. Presence of tannins indicated the yellowish color and the refreshing aroma which is unique to the pleasing effect valued by many people. The study supported the importance of the processing methods in making tea if the beneficial effects are to be preserved.

3.1.3. Influence of Cultural Characteristics on the Utilization of Traditional Medicine and its Impact upon Health Care in Myanmar

Culture is defined as characteristics by which an individual/society identify himself/themselves and cultural diversity is defined as specific characteristics co-existence of different groups (ethnic, religious, linguistic), having their own values & beliefs. Generally, indigenous beliefs cannot be verified by pure scientific criteria nor can science can be adequately be assessed by tenets of indigenous knowledge. Although the most commonly reported reasons for using traditional medicine is because it is more affordable, more closely corresponds to patient's culture and ideology, and less paternalistic than modern medicine, Myanmar, with its different ethnic minorities, having unique healing practices, cultural diversity and beliefs, may show different impact and health seeking patterns. Among culturally diverse populations, the Shan State, with many different sub-minorities having different beliefs, culture, language, habits, and most of all, different healing practice was chosen for the study. A community-based, cross-sectional, descriptive study was carried out at the Botataung, Insein and Shwe-Pyi-Thar Township, Yangon Division and compared with Taungyi, Aye-Tha-Ya and surrounding villages in In-Te Township, Shan State. Study areas were stratified depending on availability and accessibility of health services and the sample size from each area was approximately 150. Pre-tested structured questionnaires and semi-structured interview schedules were used. Four cultural models having different impact on health care utilization (cultural deficit model, cultural conflict model, cultural distrust model and mainstream conformity model) and the key domains of self-defined cultural characteristics were identified. Results indicated that majority of respondents feel that cultural characteristics reside

mainly in difference in race, religion & spoken language. Spiritual beliefs are considered important and diseases like depression are viewed by some as spiritual problems rather than diseases needing treatment. Barriers to seeking health care vary between different ethnic groups; and area of residence. Common to many are discrimination, regarding alternative medicine/social class/age (15.2%), family acceptance & trust (11.7%), sensitive to questions and clinical examination (10.2%), conflict in belief (8.7%) and language issues (9.3%). Travel cost (34.3%), practitioner preference (16%), and available time and long waiting (15.7%), remain barriers to health care in Myanmar. For culturally diverse & ethnic minority communities, health care providers need to develop a level of comfort in caring patients and cultural knowledge, skill in trans-cultural care, and research on predominant ethnicity of patients to whom care was indicated must be taken into account in health-care decisions. It was concluded that ethnic variation in “Expected Health Care” exist, and interventions to improve cultural competence of health professionals should be developed.

3.1.3. Comparative studies on morphology of *Swertia* species

Pan Khar (ယေဖင) which is also known as နေဖာ နီ နေဖာ နီ နေဖာ နီ and ယေဖင နီ နေဖာ နီ and which is reputed medicinal plants claimed to be effective for various kind of diseases such as, malaria, diabetes mellitus, hepatitis etc. These are annual or perennial herbs, growing wild in various part of Myanmar, particularly in hilly regions of Shan, Kachin, Chin, Kayah State, Mandalay and Sagaing Division. They were very similar to the botanical name of both Indian and European medicinal plant of *Swertia chirayita* Roxb due to difference in the vernacular name and similarity in the common features and the medicinal value. But they have different degree of pharmacological activity. Therefore, the identification is needed. Ten plants specimen from Shan and Kayah State were identified taxonomically. The morphologies of these 10 plants specimens from various parts were carefully studied. Six species were identified and the remaining two were categorized as varieties. Two specimens of both states were the same category, one is *Swertia tetragona*. Clarke and *Swertia angustifolia* Buch.Ham-D.Don. Remaining specimens from Kayah was *Swertia affinis* and from Shan state were *Swertia pulchella* Ham, *S.purpurescens* and *S.decussata* Nimmo. All belongs to family Gentiaceae.

SERVICES PROVIDED

ACADEMIC

Sr.No.	Name	Course	Responsibility
1.	Dr. May Aye Than	PhD (Botany), PhD (Zoology), PhD (Chemistry), MMed Sc (Pharmacology) MMed Sc (Pharmacology)	Co-supervisor External Examiners
2.	Dr. Khine Khine	PhD (Zoology)	Co-supervisor
3.	Lwin	PhD (Zoology)	Co-supervisor
4.	Daw Mu Mu Sein Myint Dr. May Aye Than	1 st year MMedSc (Pharmacology) students from IM (I), IM (II) and Defence Services Academy	Teaching

LABORATORY

1. Acute toxicity testing for traditional medicine formulations and medicinal plant products <ul style="list-style-type: none"> - Vigo - Kywe phyu u (အုခါ) - Myint zu thaka nat pan (ရေခဲပုလဲ)
2. Phyto-chemical characterization of traditional medicine formulations and medicinal plant products <ul style="list-style-type: none"> - Vigo - Kywe phyu u (အုခါ) - Myint zu thaka nat pan (ရေခဲပုလဲ) - <i>Strychnos nuxvomoca</i> Linn. (ခရမ်းပင်) - <i>Barleria prionitis</i> Linn. (ပုလဲ) - <i>Adhatoda vasica</i> Nees. (ရေခဲပုလဲ) - <i>Vitex trifolia</i> Linn. (အုခါ)
3. Adulteration testing for traditional medicine formulations <ul style="list-style-type: none"> - Vigo
4. Detection of heavy metals from traditional medicine formulations, water, food and medicinal plant products by using Atomic Absorption spectrophotometer <ul style="list-style-type: none"> - Determination of Arsenic in nail samples of 20 patients from Panthanaw township, Irrawaddy division and 20 patients from Phyu township Pago Division - Determination of Arsenic in water samples of Yangon

PHARMACEUTICAL TOXICOLOGY RESEARCH DIVISION

Deputy Director & Head	...	Dr. Thaw Zin MBBS MMedSc (Pharmacology) FACTM PhD (Australia)
Research Scientist	...	Dr. Khin Chit MBBS MMedSc (Pharmacology)
Research Officer	...	Daw Kyi May Htwe BSc (Chemistry)
Research Assistant (2)	...	Daw Moe Moe Aye BSc (Chemistry) DFT
	...	Daw Kyi Kyi Myint BA (Geography)
	...	Daw Myint Thuzar Thant BSc (Chemistry)
Research Assistant (3)	...	Daw Yu Yu Nwe BSc (Botany)
	...	Daw Mya Mya Moe BSc (Chemistry)
	...	U Nyi Nyi Thwin
Research Assistant (4)	...	Daw Zar Zar Lwin BSc (Botany)
	...	Daw Thandar Win BA (Geography)

The Pharmaceutical Toxicology Research Division is established under the National Poison Control Centre, and involves three major areas of activities. The first is to conduct research projects on drug-related poisoning and toxicity, secondly, to provide information and analytical services to the health sector on the prevention, control and management of drug poisoning, and finally, to conduct education and training to health personnel concerning poisoning and toxicology. Major research areas include (1) poison epidemiology, (2) clinical toxicology, (3) experimental toxicology (4) analytical toxicology for methodology development, and finally, (5) therapeutic monitoring and toxicovigilance. Provision of services includes drug screening and identification in cases of unknown poisoning and quantification of drug levels to support treatment in cases of acute poisoning and provision of poison information to doctors and health care professionals in selected major hospitals.

RESEARCH PROJECT

1. HEALTH SYSTEMS

1.1. PROMOTION OF HEALTH DELIVERY SYSTEMS

1.1.1. Availability, accessibility and cost-utilization of antidotes and selected drugs for the emergency management of acute poisoning at the Poison Treatment Centre, NYGH

It is well recognized that antidotes and supportive therapeutic agents play a crucial role in the management of poisoned patients, whether it be acute or chronic. It is mandatory; therefore, that hospital pharmacy, medical wards and poison treatment units should maintain the medical start-approved stock of antidotes and other emergency drugs commonly used for poisoning should it occur. The main objective of the study is to find out the emergency drugs and antidote holdings for acute poisoning at the Poison Treatment Centre and the Hospital Pharmacy at NYGH and also, to determine the availability and accessibility of such drugs from out-of-hospital settings if they are

unavailable in time of emergency need. Methodology involved a situation analysis on the availability of such drugs and to calculate the cost-utilization of antidotes (and emergency drugs) as recommended by WHO/IPCS as the amount adequate to treat one seriously poisoned 70-kg adult patient for 24 hours. Doctor and staff were interviewed by pre-set questionnaires on where emergency drugs were usually procured if they were unavailable within hospital setting. Preliminary cross-sectional study indicated that out of the 33 antidotes and supporting drugs classified by the WHO/IPCS as those needed within 30 minutes of admission, 21 were available, either at the Poison Treatment Center or at the Hospital Pharmacy, NYGH. However, stocks were limited, 7 were inadequate to complete a full course. No paper means of procurement, stock keeping or sharing or pooling of stocks with other Hospitals within the proximity like YGH, YCG, WYGH or with Medical stores like CMSD or importing from abroad (with FDA, manufactures), has yet been done. Longitudinal study concerning cost-utilization will be done in the coming year.

2. ENVIRONMENTAL HEALTH

2.1. PHARMACOLOGICAL HAZARDS

2.1.1. Pharmaco-epidemiology of poisoning: Monitoring of Poisoning Cases at NYGH (January to December, 2006)

Epidemiology studies on poisoning are done with the aim to increase the awareness, understand the potential public health impact, establishing causal links between exposure and disease, and preparedness of laboratory diagnostic methods and clinical management schemes. Registry from the Department of Hospital Records, YGH and NYGH, diagnosed and treated as poison cases, categorized under ICD-10, T36 to T65, basic codes 284 and 285 were collected and analyzed. Out of a total of 6875 admissions, 416 cases (6.53%) were identified as poisoning other than snake bite. Overall increase in the number of poisoning cases (from 372 to 416) was seen. Type of poisoning is largely intentional (self-poisoning; 68.1%), with 28.6% accidental, 1.2% with criminal intention and 2.1% undetermined. Drug overdose stood the highest, 40.9% of all poison cases, in 2005-2006, with sedatives (diazepam, alprazolam), antipsychotics (chlorpromazine, clozapine, olanzapine) and antidepressants (amitriptyline) being the commonest (8.4%, 7.5% and 6.3% of the total poison cases, respectively), followed by paracetamol, muscarinic receptor antagonists (Artane) and chlorpheniramine (3.4%, 2.6%, 1.4% respectively) and analgesics (aspirin) (0.9%). Abuse of illicit drugs constituted 2.6%. Accidental drug overdose with consequent adverse effects were seen mainly with cardiac drugs like propranolol, digoxin, calcium channel blockers and nitrates, and with cough suppressant, dextromethorphan. Pesticide poisoning is the second commonest (17.8%). Increasing trend was seen with food (5.8% to 6.7%) and corrosives (4.4% to 6.3%). Incidence of mixed poisoning, including drugs, alcohol, pesticides and chemicals, has increased from 3.3% in 2005 to 15.6% in 2006, and has caused problems in providing specific treatment and antidotes. In 6.3% of the cases, the cause of poisoning was unknown and treatment was mainly directed towards supportive therapy. Most patients recovered without undue consequences (98.3%), but 1.7% expired in spite of treatment. Main causes of mortality include unknown (0.9%), mixed (0.4%) and pesticide (0.2%) poisoning. The study highlighted the importance of analytical support in unknown and mixed poisoning to prevent unnecessary mortality and the need for continuous monitoring and documentation for emergency preparedness in its management since reports had indicated a changing trend of poisoning each year.

2.1.2. Clinical toxicology: Application of Population Pharmacokinetics in the Treatment of Acute Poisoning: experience with paracetamol and methanol

In many instances of acute poisoning, clinical symptoms rarely reflect the potential seriousness of intoxication. In addition, history may be unreliable or inaccurate, patient may be unconscious or un-cooperative, relatives may be overanxious or difficult to communicate, time may be critical, and laboratory parameters may appear too late. These problems necessitate the decision of management procedures and the need of antidotal therapy to be based on blood levels regardless of severity of symptoms or absence of history. As time and amount of ingestion in acute poisoning is often questionable, interpretations made on single samples are also unreliable. Thus, a population pharmacokinetic approach is used, which also takes into account, the data obtained from sparse samples of many previous incidences of poisoning as well. The main aim is to determine the usefulness of the population approach in the interpretation of acute poisoning cases admitted to NYGH. Analysis was done on samples that had been sent to the NPCC for determination of blood levels and interpretation of data, for support of treatment and for decision on the need of antidote. The study population consists of 2 groups of patients, where Group I consists of patients admitted for acute paracetamol poisoning (n=63) and Group 2 consists of patients admitted for acute methanol poisoning (n=46). The blood samples (1-4 samples) were collected, and analyzed spectrophotometrically using standard methods. The plasma concentration time points were plotted on the semi-logarithmic graph and the best-fit curve for the population studied was drawn using the method of least squares by the population pharmacokinetic software (KINETICA 4.1). Individual parameters for each of the poisoned patient were then predicted from the population parameters using the Posterior Bayesian Estimation. The results showed that paracetamol elimination in acute poison patients follow first order kinetics with the half-life of 1.92 ± 0.22 hours and AUC_{0-24} of 75.9 ± 42.8 mg/L.hr. Whether the disposition curve lies above or below the Ramak-Matthew Curve (1975), indicates the decision for antidotal therapy. Methanol elimination, because of the ethanol treatment, also showed first order kinetics, but with a much prolonged half-life of 47.4 ± 20.2 hours and AUC_{0-24} of 236.1 ± 104.6 mg/L.hr, indicating effective inhibition of alcohol dehydrogenase enzymes by ethanol. Elimination half-life below 30 hours indicated ineffective therapy. Except for 3 patients (from ICU) all patients had methanol concentration less than 200 mg/L ruling out the need for dialysis. The study indicated that population pharmacokinetics gave a good indication for calculating the disposition and elimination of toxins from the body and in deciding the need of antidotes.

2.1.3. Analytical toxicology: Analysis of different analytical methods used for identification and quantification of unknown drugs in acute poisoning

Importance and usefulness of toxicological analyses in their contribution towards diagnosis and decision is well recognized. The NPCC at the DMR (LM) has been developing rapid and reliable analytical methods for screening of unknown drugs in acute poison cases with available resources. However, there is a need to demonstrate the competence of testing, with internal and external quality control procedures, that the tests and calibrations comply with the WHO/IPCS 'International Standard' requirements (ISO/IEC Guidelines, 1999), when a laboratory is engaged in validating standard methods (ISO-9001) or design/ development of new methods and/or develop test programmes combining standard and non-standard methods (ISO-9002). Use of International Standard will facilitate co-operation between Poison Laboratories, assist exchange of information

and experience, and in harmonization of standards and procedures. Internal quality control was conducted on drugs most commonly encountered in acute poisoning (Thaw Zin *et al.*, 2001) and include 42 drugs using spot tests, 10 drugs using spectrophotometric and 3 drugs using fluorometric methods. Sensitivity and reproducibility of spot tests ranged between (0.5-42.5mg/L) and (1.2-9.7%) respectively. Validation of assays showed a recovery of tests ranging from (67.9-82.6%, accuracy, inter-day precision of <10% (range 5.4-8.9%), and linearity of calibration ranging between 0.5-400mg/L. The lower limit of detection ranged between of 0.01mg/L, and sensitivity (limit of quantification) ranged from 0.05mg/L. Some drugs using fluorometric detection like, chloroquine and propranolol, did not show good stability (intra-day precision) in extracted solvents and same-day analysis is essential. Other validation parameters (specificity, selectivity, robustness and cross-sensitivity) has not been done. Although sensitivity was low in some methods, poisoning invariably involves higher than normal drugs levels, and the test methods can still be considered acceptable for emergency analysis and timely intervention in acute poisoning. Further requirements on 'Internal QC', including compliance with regulatory and safety requirements will be done in the coming years.

2.1.4. Pharmacovigilance: Monitoring of adverse effects of second-line anti-TB drugs in MDR-TB patients at the Aung San TB Hospital.

One of the main functions of the NPCC concerning preventive toxicology is to monitor and control the toxic effects of drugs with narrow therapeutic index. Adverse drug events (ADEs) associated with second-line TB drugs have been mentioned by the WHO as obstacles in the management of multidrug-resistant tuberculosis (MDR-TB), due to their negative impact on adherence to the standard regime. WHO Development of DOTS-Plus Project on the Management of MDR-TB, has urged research programmes to evaluate the feasibility and cost-effectiveness of currently recommended regimes used for MDR-TB. With this objective, the data of ADEs were collected from 80 patients treated for MDR-TB at the Aung San Tuberculosis Hospital using the standardized questionnaires and the WHO Common Toxicity Assessment Criteria. ADEs were classified according to the time of occurrence; acute (Day 0-1), subacute (Day 2-6), delayed (Week 1-4) and remote (>Week 4 until completion of treatment), and according to severity; mild (no intervention), moderate (treatment of symptoms, with or without transient treatment interruption), severe (treatment of symptoms, hospitalization, drug discontinued or changed), and life-threatening (hospitalization, intensive care, residual effects). Patients experiencing ADEs were further subjected to in-depth interviews for causality assessment. The results showed that mild adverse effects were extremely common (78.1%) with majority (52.4%) remaining unreported. Moderate ADEs (34.7%) required symptomatic treatment, and only (2.9%) experienced disturbing ADEs requiring total discontinuing of a drug or change in regimen. Most ADEs were acute (77.3%), with patients showing tolerance or adaptation within a few days. No life-threatening effects were encountered. Identifying causality has been difficult due to multiple drugs likely to contribute or augment one another. The most frequently encountered ADEs include dizziness/vertigo (47.9%), nausea/vomiting (34.4%), abdominal pain (24.4%), anorexia (20.2%), headache (16.5%), hearing disturbances/tinnitus (14.8%), insomnia (11.6%), tingling/numbness of extremities (10.7%), allergic reaction /rash (7.2%), visual impairment (5.3%), seizures (3.9%) and hepatitis (2.4%). Regime III/IV containing Clarithromycin were found to encounter most ADEs including hearing disturbances. However, the high defaulter rate (20.5%) encountered with these 2 regimes may result from both the ADEs and the cost of clarithromycin, although other contributing factors

may co-exist. It was concluded that despite the aggressive management strategies adopted for the treatment of MDR-TB, majority (79.5%) of patients were able to avoid complete cessation of therapy. It was recommended that proper patient counseling and initiation of WHO guidelines on management of adverse effects in the treatment of MDR-TB, should be adapted to allow patients to recognize and report the likely ADEs to be encountered during treatment of MDR-TB and proper management initiated by health staff before a patient decides to default.

2.1.5. Therapeutic drug monitoring: Propranolol in Hyperthyroidism, increasing efficacy and safety profile

Beta-blockers like propranolol are frequently prescribed in hyperthyroidism due to their rapid control of sympathetic overactivity by inhibition of adrenergic receptors and also by decreasing the peripheral conversion of T₄ to T₃. However, long-term treatment is necessary and therapeutic monitoring of propranolol levels in conjunction with clinical end-points like heart rate and blood pressure is crucial to ensure adequate control. The main objective of the study is to monitor the drug levels in hyperthyroid patients treated by propranolol so as to make recommendations on individualizing and optimizing dosage regime in patients having problems with side effects or compliance. A total of 14 healthy volunteers (aged 33.8±5.9 years) and 13 newly-diagnosed hyperthyroid patients (aged 32.2±4.1 years), were recruited for the study. The hyperthyroid patients were randomly selected from a total of 5624 hyperthyroid patients attending the OPD of the Nuclear Medicine Department, YGH. Blood samples were collected at appropriate time intervals and analyzed by the double-extraction fluorometric technique of Shand *et al.* 1970. Initial model development on 10 patients (aged 27.9 ± 8.5 years) indicated that a single, oral dose of propranolol 40mg produced a peak concentration of 81.3 ± 30.15 ng/ml in 1.53 ± 0.28 hours followed by a first-order mono-exponential decay in the serum propranolol concentration down to 16.54 ± 3.51 ng/ml in 6 hours. The elimination half-life was short 3.26 ± 0.58 (2.7-3.9) hours, and adequate propranolol levels were found to persist within the therapeutic range only for a short time (4.7-5.4) hours. Further analysis after multiple dosing will be done in the coming year.

SERVICES PROVIDED

ACADEMIC SERVICES

Services include teaching of postgraduate students (Pharmacology, University of Medicine 1, 2 and Mandalay, Defence Services Medical Academy), undergraduate students from University of Pharmacy, and researchers from the Department of Traditional Medicine and DMR (Middle and Upper Myanmar), on research methodology, analytical methods and equipment handling in clinical pharmacology and toxicology. Monthly focus group discussions, journal reading and scientific talks were conducted with clinicians and staff of the YGH, NYGH and DSGH for good liaison and collaboration in the provision of therapeutic drug monitoring, pharmacokinetics and cost-effective toxicological analyses. Lectures and demonstrations were given to new officer recruits from Central Intelligence Department, Ministry of Internal Affairs, on Overview and Principles of Toxicology and Pharmacogenomics.

Sr. No	Name	Course	Responsibility
1.	Dr. Thaw Zin	3 rd MBBS Students (UM-II and Defence Services Medical Academy)	External examiner
		Board of studies in Pharmacology for post-graduate students (MMedSc and PhD)	Member
		1 st year MMedSc (Pharmacology)	Teaching
		4 th year BPharm (University of Pharmacy)	

PATHOLOGY RESEARCH DIVISION

Deputy Director/ Head	...	Dr. Ne Win MBBS, MMedSc, PhD (Pathology)
Research Officer	...	Dr. Aye Aye Lwin MBBS
	...	Dr. San Sanda Khin MBBS, MMedSc (Pathology)
	...	Dr. Min Min Myint Thu MBBS, MMedSc (Pathology)
	...	Daw Wynn Wynn Kyaw MSc (Zoology), RL
Research Assistant (2)	...	Daw Aye Myint Swe BSc (Chemistry)
	...	Daw Myat Mon Oo BSc (Chemistry), D
	...	Daw Khin Myo Set BA (Myanmarsar)
Research Assistant (3)	...	Daw Zin Mar Soe BSc (Chemistry)
	...	Daw Mya Thandar Win BSc (Botany)
Research Assistant (4)	...	Daw Khin Thet Mon BA (Geography)

The Pathology Research Division is actively engaged in research on studies of thalassaemias, haemoglobinopathies, blood and coagulation disorders, genetic diseases, renal diseases, and carcinoma of liver, bladder and cervix. This division collaborates with (1) the Department of Cell Biology and Histology, Nagasaki University School of Medicine, Japan, to study the carcinogenesis of liver and cervix; (2) Kobe University School of Medicine, Japan, to study the epigenetics of bladder cancer; (3) Kawasaki Medical School Hospital, Okayama, Japan, to study the molecular pathology of Myanmar Thalassaemia. In. This division also performs on gender verification on International Myanmar athletes and neonates with ambiguous sex, karyotyping of chromosomal abnormalities of human and animal subjects, special histological stain for soft tissue tumors, immunohistochemical staining of renal biopsies and liver biopsies, apoptosis index of renal biopsy tissues, acute and sub-acute toxicity examination of laboratory animal's tissues and screening of thalassaemias, coagulation disorders and protein abnormalities.

RESEARCH PROJECTS

1. COMMUNICABLE DISEASES

1.1. MALARIA

1.1.1. Prognostic significance of specific hemostatic markers in *Plasmodium falciparum* infection.

Total (88) cases of falciparum malaria patients comprising (46) cases of severe malaria patients and (42) cases of uncomplicated malaria patients were determined the parasite count, antithrombinIII levels and patient's outcome (future recovery, treatment failure and death). The high parasite count (10,000/cumm) was founded 52% of uncomplicated malaria patients and 30% of severe malaria patients. Anti thrombinIII IgG and IgM were also detected in all cases of malaria by ELISA method. Anti thrombinIII level was not different between the complicated conditions and uncomplicated cases of falciparum malaria and anti thrombinIII IgG and IgM level were significantly reduced in severe malaria patients than uncomplicated malaria patients.

1.2. DENGUE HEMORRHAGIC FEVER

1.2.1. Localization and isolation of viral antigen in autopsy tissues of fetal dengue cases

Complete autopsy was done in 13 fatal dengue cases from Yangon Children Hospital. Tissues were taken from various organs and processed for histopathology, immunopathology, immune electron microscopy, molecular pathology, molecular immunogenetics, conventional and electron microscopic insitu hybridization for viral localization, nucleotide sequencing of dengue virus isolated and characterization of target antigen, target cell(s), and target receptor(s). Histopathological examination with H & E stain were carried out on tissues of various organ of various cases. Immune electron microscopy, electron microscopic insitu hybridization (EM ISH), target cells and target receptor studies and nucleotide sequencing will be accomplished.

2. NON-COMMUNICABLE DISEASES

2.1. CANCERS

2.1.1. Liver carcinogenesis: molecular and cell biological aspects

The tissues of 34 cases of hepatocellular carcinoma were determined the iron deposition and association of cell proliferation and apoptosis by Ki-67 staining and by the terminal deoxynucleotidyl transferase (TdT) mediated dUTP- biotin nick end labeling (TUNEL) assay. Iron deposition in formalin fixed liver tissue was detected by Prussian blue staining method. In this study, iron deposition might accelerate hepatocarcinogenesis by promoting cancer cell proliferation and was not affected the Fas/FasL apoptotic system. The expression and mutation of tumor markers and oncogenes like p53, ER alpha and beta, cyclin D1 will also study for next year.

2.1.2. Cervical carcinogenesis: molecular and cell biological aspects

The total 25 cases of carcinoma cervix tissues were studied for apoptosis index and determined the genotypes of common human papilloma virus and intracytoplasmic and intranuclear organelles involvement in DNA strand breaks formation will study in collaboration with Nagasaki University School of Medicine.

2.1.3. Study of associated factors of cervical intraepithelial neoplasia in women of reproductive age

Cervical cancer is the most common cancer of women in many developing countries, including Myanmar and is one of the commonest causes of female deaths from cancer in Myanmar. Cytological screening (Pap smear) is a simple and effective method for detection of an early pre-invasive stage of cervical cancer. In Myanmar, community based study on early detection of cervical cancer is very limited. This study was conducted in Inndaing Township, Bago Division to evaluate community based cervical cytology screening. To date, cytological screening was carried out on (94) married women. The findings showed 71 inflammatory smear (75.5 %), 13 normal smear (13.8 %) 7 mild dyskariosis (7.4 %), 1 koilocytosis (1.1%) and 2 inadequate smear (2.1 %). The study is in progress.

2.1.4. Apoptosis, Estrogen receptor(ER), p53 and Human Papilloma virus (HPV) detection in cervical cancer

Fifty cancer cervix tissues will be studied for cell kinetic assay by using the proliferative marker (Ki-67) by immunohistochemistry and programmed cell death (apoptosis) by using TUNEL method and correlated with clinical staging and histological grading. The expression and mutations of tumour suppressor gene like p53, the hormone receptor status like ER alpha and beta, and the viral oncogene like human papilloma virus (HPV) will also be characterized. The study will continue next year.

2.1.5. Significance of apoptotic index in urinary bladder cancer

Fifty cases of bladder cancer will be examined to determine apoptotic index in bladder cancer of various histological grades. Histological types and grading will be defined and programmed cell death (apoptosis) by using TUNEL method and correlated with clinical staging and histological grading. This study will continue next year.

2.2. HAEMATOLOGICAL DIORDERS

2.2.1. Prevalence of Thalassemia and Hemoglobin E in Kachin indigenous race

Two hundred unrelated natives pregnant women in Myitkyinar were investigated for Thalassemia and abnormal haemoglobins. Haemoglobin E was detected in 11.2 % of cases, alpha thalassemia was detected in 7.0% of cases and 2.6 % had beta thalassemia trait. The prevalence of thalassemia and haemoglobinopathy in Kachin indigenous race was not significantly different from that of general population in Myanmar.

2.2.2. Relationship between pregnancy outcomes and HbA1C level at term in obese or overweight mothers.

HbA1C level was determined in 100 pregnant mothers who are at risk for gestational diabetes during last trimester in antenatal clinic of North Okalapa General Hospital and No(2), Military Hospital. Pregnancy complications (maternal, fetal and neonatal) were observed. In this study, HbA1c level >5.5 % was found in 10 cases and 3 cases had HbA1c level >7%. Determination of HbA1c level was performed by using High Performance Liquid Chromatography (HPLC) at Pathology Research Division of DMR (Lower Myanmar). The adverse outcomes (still birth, neonatal death) were not detected in gestational diabetes women who had HbA1c level > 5.5 % in this study.

2.2.3. Pre-operative lymphocyte cross matching in renal transplant cases.

Lymphocyte cytotoxicity test determines the compatibility of HLA types between donor and recipients (HLA matching). Iso- or allo-antibodies appear invariably in a certain extent whenever there is blood transfusion and any form of infection. These antibodies might cross-react with HLA antigens and lead to development of GVHD, either, hyperacute, acute or chronic. The complement- dependent lymphocytotoxicity technique has two types, direct assay of patient antibodies exert a lymphocytotoxic effect through complement-dependent mechanisms of cell membrane lysis. The indirect technique utilizes an extra step with a goat or rabbit anti-human IgG antibody-mediated augmentation of complement –dependent lymphocytotoxicity. This study will continue in next year.

2.3. RENAL DISEASES

2.3.1. Apoptosis in nephrotic syndrome

Fifty paraffin embedded tissue of renal biopsies are examined for apoptotic expression by using TUNEL method. The programmed cell death (apoptosis) is impaired in nephrotic syndromes, the underlying mechanism of which may be due to immune complex deposition or not. All cases of renal biopsies were performed the histopathological examination with H & E stain and 10 cases were determined IgG, IgM, IgA and C3c, C1q, C4c by IHC method and apoptotic index by TUNEL method. This study will continue next year.

3. HEALTH SYSTEMS

3.1. REPRODUCTIVE HEALTH

3.1.1. Immunostaining of stressed placenta using antiphospholipid antibody and common polyclonal antibodies

This study was carried out to determine the placenta changes in fifty complicated pregnancies from No.2 Military Hospital and Thingan gyan San Pya Hospital. The total 30 cases were collected to determine the histopathological examination with H&E stain and antiphospholipid antibodies by using IHC method. This study will continue to next year.

SERVICES PROVIDED

ACADEMIC

Sr. No.	Name	Course	Responsibility
1.	Dr. Ne Win	MMedSc (Pathology, Internal Medicine, Physiology), PhD (Pathology, Zoology), DrMedSc (Internal Medicine)	Supervisor Co- Supervisor Teaching

LABORATORY

1	Barr body examination / gender verification of Myanmar atheletic women	15
2	Karyotyping	29
3	Serum protein electrophoresis	25
4	Immunostaining of renal biopsies	135
5	Coagulation screening (FDP)	46
6	Thalassaemia / Haemoglobinopathy screening	413
7	Iso-Electric Focusing for haemoglobinopathy	138
8	Serum Ferritin	117
9	Anticardiolipin antibody (ELISA)	41
10	Blood for CP	315
11	Blood ESR	20
12	HbA1C level	20

PHYSIOLOGY RESEARCH DIVISION

Deputy Director & Head	...	Dr. Ye Tint Lwin MBBS M MedSc (physiology)
Research Scientist	...	Dr. Tin Khine Myint MBBS MMedSc (physiology)
Research officer	...	Daw Tin Tin Yee BSc (Mathematics)
	...	Dr. Kyaw Zeya MBBS
	...	Dr. Wah Wah Swe MBBS
Research Assistant(2)	...	Daw Sandar Win BA(Psychology)
	...	Daw Htike Htike Soe BSc(Botany)
	...	Daw Khin San Lwin BA(Psychology)
Research Assistant(3)	...	Daw Wah Wah Win BA (Geography)
	...	Daw Thandar Than
	...	Daw Htet Htet Lwin BA(Myanmar)
	...	Daw YiYi Mon
	...	Daw Ni Ni Than BSc(Chemistry)
Research Assistant(4)	...	Daw Thandar Aung BSc (Mathematics)
	...	Daw Pyone Thuza Nge BSc (Mathematics)
Laboratory Worker	...	Daw Kyi Kyi Htwe

The division had done research projects on Sports Physiology and Growth, Development and Fitness.

RESEARCH PROJECTS

1. HEALTH SYSTEMS

1.1. ADOLESCENT HEALTH

1.1.1. Longitudinal study of changes in size, built and body composition in adolescents

Longitudinal study of changes in growth and body composition of 7 to 10 years old children was conducted on 129 boys and 91 girls from five selected urban State High Schools, Yangon . They were No.1 Dagon , No. 2 Dagon , No.4 Ahlone, No.4 Pazundaung and No.5 Kamayut State High Schools. Standing height, sitting height, body weight, skin fold thickness at biceps, triceps, sub-scapula and supra-iliac sites were measured with anthropometer and skinfold caliper. Measurements were done every year exactly at the month of birth of the children. Mean height and body weight of boys and girls were greater than those of age-matched Myanmar boys and girls from previous studies conducted by various investigators. Mean growth rate in height (cm/year) was significantly ($p < 0.00$) greater in girls (6.05 ± 1.06 cm/year at 8 years old and 6.25 ± 1.55 cm/year at 9 years old) than that of boys (5.45 ± 1.06 cm/ year at 8 years old and 5.2 ± 1.24 cm/year at 9 years old). Mean body fat percentages of the girls were significantly ($p < 0.000$) greater than those of the boys in all age groups. In addition, the mean heights and weights of the boys and the girls were found to be within ± 1 SD of NCHS (National Centre for Health Statistics) standard for their respective ages . This study indirectly pointed out that the growth of our 7 to 10 years old children could attain international standard if they received good nutrition and good care.

1.2 REPRODUCTIVE HEALTH

1.2.1. Outcomes of Adolescent Pregnancy

To determine some physiological changes and outcomes of adolescent pregnancy with the view to make pregnancy safer, 100 adolescent pregnant women aged below 19 years attending prenatal clinic at Out - patient department of Central Women Hospital, Yangon and Out - patient department of Defense Services General Hospital will be recruited for the study. After explaining about the procedure, informed written consent was taken and the subject underwent history taking, measurement of anthropometry, and casual blood sample collection for biochemical analysis. After childbirth, birth weight of the child and complications about the labour were recorded. Now, 60 subjects had participated in the study up to date.

1.3 SPORT

1.3.1. Cardiovascular Responses in Upper and Lower Extremities Exercises

To determine the cardiovascular responses in upper (arm) and lower (leg) extremities exercises, this study was conducted on thirty male soccer players, aged between 16 to 20 years from the Institute of Sports and Physical Education, Yangon. The subjects participated in both arm cranking and leg cycling tests at three different workloads (25 ± 1 , 50 ± 1 and 75 ± 1 watts) with bicycle ergometer on different days in the same environmental conditions. The heart rate and blood pressure of the subjects were determined before, during and after the exercise. The significant increases in heart rate from 61.2 ± 9.1 beats. min^{-1} to 89.3 ± 10 beats. min^{-1} at load I to 108.9 ± 14 beats. min^{-1} at load II and to 136.2 ± 19 beats. min^{-1} at load III ($p=0.000$) in arm exercise and from 62.3 ± 8 beats. min^{-1} to 80.6 ± 8.2 beats min^{-1} at load II and to 105.3 ± 9.3 beats min^{-1} at load III ($p=0.000$) in leg exercise were noted. Systolic blood pressure increased significantly from basal level of 104.3 ± 7.2 mmHg to 112.5 ± 7.2 mmHg at load I, to 127.3 ± 7.4 mmHg at load II and to 135.1 ± 8.3 mmHg at load III ($p=0.000$) in arm exercise and from basal level 103.0 ± 7.5 mmHg to 110.3 ± 8.9 mmHg at load I, to 114.0 ± 21.4 mmHg at load II and to 130.3 ± 11.2 mmHg at load III ($p < 0.01$) in leg exercise. The increment in heart rate due to arm exercise was significantly greater than that due to leg exercise (28.1 ± 8.5 beats. min^{-1} vs 18.3 ± 6 beats min^{-1} at load I, 47.7 ± 12.4 beats min^{-1} vs 29.8 ± 7.0 beats min^{-1} at load II and 75.0 ± 17.3 beats min^{-1} vs 43.0 ± 8.9 beats min^{-1} at load III respectively). The study clearly pointed out that upper extremity exercise elicited greater cardiovascular response than lower extremity exercise. Therefore, exercise regimen prescribed to patients with ischaemic heart diseases should be based on leg exercise rather than arm exercise, and in cases of lower body injuries requiring prolonged rest, arm exercise should be prescribed to maintain cardiovascular fitness of the patients.

2. ENVIRONMENTAL HEALTH

2.1. SAFETY ENVIRONMENT

2.1.1. Impact of environmental contaminants on health of children

To assess health impact of environmental contaminants, this study was conducted in New South Dagon township of Yangon as TSPM (Total Suspended Particulate Matter) measured in November' 2000 in Industrial Zone was 79.85 ug/ cubic meter (coarse

particles =60.3& fine particles =19.55). 56 children of both sexes living within in (or) in immediate vicinity of the Industrial Zone were studied in November and December' 2006. Research consent was taken from one of the parents or a guardian who accompanied their children and they were also interviewed. Children ranged in age from 6 to 12 years, underwent clinical examination, anthropometry, lung function tests and casual blood sample collection for biochemical analysis of Blood Complete Picture, Erythrocyte Sedimentation Rate, Total and Differential Protein, Liver Function Tests and Urea. Casual urine samples were collected and analysed for protein and sugar. All the children were from low socio-economic class, living in houses built with wood or bamboo. Most of the families got their water from artisan wells and used either charcoal or wood stoves. Blood sample analysis and data processing are in progress.

SERVICES PROVIDED

ACADEMIC

Sr No.	Name	Course	Responsibility
1.	Dr Ye Tint Lwin	MMedSc(Physiology) 2 nd MBBS MMedSc(Physiology) Sports Physiology	External Examiner External Examiner Teaching Teaching
		Basic course on Sports Medicine(Yangon) Basic course on Sports Medicine(Mandalay) 2006 Regional Sports Medicine Commission (Myanmar)	Teaching Teaching Teaching
		National, State and Division Boxing Tournament	Ring-side doctor

PARASITOLOGY RESEARCH DIVISION

Deputy Director & Head	...	Dr. Ye Htut MBBS MSc (Medical Parasitology) FRCP (Edin)
Research Scientist	...	Dr. Nwe Nwe Oo MBBS MMedSc (Biochemistry)
	...	Dr. Tin Oo BSc MPH (Bangkok) PhD (Queensland)
Research Officer	...	Dr. Kay Thwe Han MBBS
	...	Daw Aye Than BSc(Zoology)
	...	Dr. Maung Maung Mya BSc MSc PhD (ITT Delhi)
	...	Daw Kyin Hla Aye BSc (Chemistry)
	...	Dr. Khin Myo Aye MBBS
Research Assistant II	...	Daw Ni Ni BSc (Hons) MSc (Chemistry)
	...	Daw Ni Ni Zaw BA (Myanmarsar)
Staff Nurse	...	Daw Tin Tin Sunn
Research Assistant III	...	Daw Soe Soe Han BSc(Biotechnology)
	...	U Phyo Zaw Aung BA (Eco)
	...	Daw Ne Chi Aung San
Research Assistant	...	Daw Cho Cho BSc (Hons) (Zoology)
	...	Daw Naw Ester
Laboratory	...	Daw Nilar Shwe

RESEARCH PROJECTS

1. COMMUNICABLE DISEASE

1.1. MALARIA

1.1.1 Monitoring of *in vitro* sensitivity of *Plasmodium falciparum* to different antimalarials in sentinel sites

The WHO standard *in vitro* drug sensitivity testing of *P. falciparum* parasites to antimalarials (chloroquine, amodiaquine, mefloquine, quinine and artesunate) was conducted in Kawthaung township, Thanintharyi division during the transmission season, between May and July 2006. The WHO precharged plates coated with different antimalarials were used. 40 criteria matched isolates selected out of 233 *P. falciparum* positive cases were subjected to *in vitro* test system. The results are presented in Table 1.

Table 1. *In vitro* drug sensitivity results of Kawthaung

Antimalarial drug	WHO cut-off point picomol per well)	Kawthaung		
		No. tested	No. resistant	Percent resistant
Chloroquine	8	40	37	92.5 %
Amodiaquine	2	40	33	82.5 %
Quinine	256	40	11	27.5 %
Mefloquine	16	40	6	15 %
Artesunate	300	40	2	5%

In vitro chloroquine and amodiaquine resistance were 92.5% and 82.5% respectively which indicated that single use of these antimalarials have no place in treating falciparum malaria. Quinine resistance was found to be 27.5%, a little worse than the 2005 resistance figure 24.48%. Therefore plan to prevent and reduce the emergence of quinine resistance in Thai-Myanmar border should be considered. Mefloquine resistance was 15% which was more or less the same as of 2005, 14.28%. Although clinical studies haven't revealed artesunate resistance yet, the 2006 *in vitro* results again showed 5% resistance where as 2005 had 4.08% resistance in Kawthaung. In conclusion, *in vitro* sensitivity findings of all 5 antimalarial drugs indicated the grave scenario of reducing drug sensitivity levels so that the combination use of antimalarials is strongly recommended in Kawthaung and Myanmar-Thai border areas for better efficacy and delaying the emerging drug resistance of antimalarials.

1.1.2 *In vitro* and *in vivo* sensitivity of *Plasmodium vivax* to chloroquine

The study was conducted in Lashio township on 30 subjects by *in vivo* test and on 12 isolates by *in vitro* test. The cases were screened among 1014 clinically suspected malaria cases during the period between June and August 2006. *In vivo* test results showed that ACPR (Adequate Clinical and Parasitological Response) was 86.66% (26/30) with 13.33% LTF (Late Treatment Failure) (4/30). Twelve isolates were successfully tested *in vitro*, out of 20 samples investigated. The drug concentration of 8 picomol per well was used as cut-off point level for *P. vivax* to be able to distinguish between sensitive and resistant isolates. The results showed that 10 (83.33%) isolates were turned out to be sensitive and remaining 2 (16.67%) were resistant. Both *in vitro* and *in vivo* results indicated that a certain degree of chloroquine resistant vivax malaria prevailed in Lashio township. The findings of *in vitro* and *in vivo* sensitivity tests were found to be well correlated.

1.1.3 Detection of drug resistant malaria by molecular techniques

The objectives of the project are:

- To determine (a) the prevalence of chloroquine resistance transporter gene *pfcr* and *pfmdr1* mutation and (b) the prevalence of sulfadoxine-pyrimethamine resistant genes, *DHFR* and *DHPS* mutation in *Plasmodium falciparum* malaria in Kawthaung, Maungdaw, Tachileik and Patheingyi townships.
- To compare the *in vitro* chloroquine drug sensitivity results of *P. falciparum* parasites and *pfcr* and *pfmdr1* mutant genes.

A total of 269 test samples, collected from the 4 study sites, Kawthaung, Maungdaw, Tachileik and Patheingyi townships were investigated. Mutation specific PCR (polymerase chain reaction) using appropriate pairs of primers was used to amplify the drug resistant loci of the particular genes namely, *Pfcr* and *Pfmdr1* for chloroquine resistance and *dhfr* and *dhps* for sulfadoxine/pyrimethamine resistance respectively.

After amplification of respective genomic DNA by the outer and nested PCR, the successfully amplified PCR products of 269 samples for *pfmdr1* gene, 75 samples for *Pfcr* were made ready to undergo dot-blot hybridization using radiolabeled (³²P).

Correlations of molecular results with the *in-vitro* drug sensitivity findings will be pursued when the dot blots results come out. The PCR products are also being subjected to Restriction Fragment Length Polymorphism (RFLP) for documentation of mutant genes.

1.1.3. Therapeutic efficacy of antimalarials on uncomplicated falciparum malaria in selected areas

Therapeutic efficacy of 3 different antimalarial combinations, namely (1) artesunate-mefloquine, (2) artesunate-amodiaquine, and (3) artemether-lumefantrine (Coartem) on uncomplicated falciparum malaria have been assessed in Kawthaung township, Thanintharyi division by conducting field-based randomized prospective trial during malaria transmission season in 2006. Patients of both sexes with the age between 15 and 50 years and with clinical symptoms of malaria and those with either microscopically or RDT (Paracheck test strip) confirmed positive for asexual forms of *P.falciparum* were recruited after having written informed consent. The treatment regimes were given as recommended by the WHO. The subjects were followed up to 28 days. For the assessment, the WHO criteria for classification of the therapeutic efficacy of each combination was applied as adequate clinical and parasite response (ACPR), early treatment failure (ETF) and late treatment failure (LTF).

Table 2. Therapeutic Efficacy of Artemisinin-based combination Therapy (ACT)

Antimalarial drug	Kawthaung			
	No. tested	ACPR	ETF	LTF
artesunate + mefloquine	34	31 91.18%	1 2.94%	2 5.88%
artesunate + amodiaquine	26	21 80.76 %	1 2.77%	4 15.38 %
artemether + lumefantrine	36	33 91.67 %	1 2.77%	2 5.55 %

Artesunate-mefloquine combination's ACPR was found to be 91.18% (31/34) in Kawthaung with 2.94% (1/34) Early Treatment Failure and 5.88% (2/34) Late Treatment Failure. Artesunate-amodiaquine combination gave 80.76% (21/26) ACPR with 2.77% (1/26) ETF and 15.38% (4/26) LTF. Artemether-lumefantrine (Coartem) drug combination was observed to have 91.67% (33/36) ACPR with 2.77% (1/36) ETF and 5.55% (2/36) LTF. No serious side effects were reported in all three combinations except some nausea and vomiting cases in ACTs with mefloquine treated group.

1.1.4. The use of antimalarials in malaria endemic areas of Myanmar: choices, compliance and patterns of seeking care

The cross sectional survey by structured interviews of 100 adults (65 men and 35 women) and 100 mothers/care-takers of children (≤ 14 years) was carried out in 4 villages under the jurisdiction of Naung Kalar Rural Health Center in Thaton Township. SPSS version 11.5 was used for data entry and analyzing the quantitative data. Differences in choices of antimalarials and care-seeking pattern were tested by using 'Marginal homogeneity' and McNemar's Chi square Test. The majority reported fever, chills and rigor and headache as suspected malaria. They had decided by themselves as being suffered from malaria depending upon past experience and did not attempt to confirm the symptoms within 24 hours. For 82% of children, chloroquine was the first choice for mothers/care-takers at home to alleviate suspected malaria. As for adults, 92% reported the purchase of artesunate tablets and analgesics from nearby small shops in their villages for self-medication within the same day. Differences were marginally significant ($P = 0.07$). Kappa agreement was 0.6 for results between diagnostic microscopy and rapid diagnostic test (RDT). Both for children and adults, over 85% did not comply for full

course of either chloroquine or artesunate. Common reasons cited were no accurate knowledge of correct dose and habit of stopping the drug immediately after the relief of symptoms, and fear of side effects especially for children. Over 72% of respondents knew that high fever, loss of consciousness and vomiting as symptoms indicating severe malaria which required immediate hospitalization. Mostly after 2-3 days if symptoms were not relieved, 16% of sick adults and 24% of mothers/care-takers sought help from injectionists, midwives, health assistant and general practitioners. Promotion of awareness and use of diagnostic facilities is essential. Irrational drug use particularly artesunate for suspected malaria should be considered to prevent drug resistance. Besides, there is a need to provide sufficient numbers of RDT for volunteers and basic health staff in endemic villages to facilitate an access to diagnosis and treatment by trained persons within 24 hours.

1.1.5. Intensifying health promotion in malaria: options for social movements in endemic areas of Myanmar

Options for social movements required to improve early diagnosis and prompt treatment of malaria (EDPT) were identified by 600 structured interviews from 300 rural households in Thaton, Pyin Oo Lwin and Hlegu districts. Altogether 300 men and equal number of women participated. Over 70% were aware of where to seek early diagnosis and prompt treatment for suspected malaria. Barriers to actual practice included weather constraint, travel hours, travel means, and cash difficulty. Bridges were access to trained health staff or volunteers and enthusiastic village leaders. Rural health centres (66%) and general practitioners' clinics (82%) were mostly known by respondents as specific places to acquire EDPT. They were fully aware of diagnostic microscopy but not of 'Rapid diagnostic test'. Villagers defined that social movements implied co-ordination-meetings, cash contribution, voluntary contributions and material contributions. Some 84% provided their opinions that there should be strong links among health staff, volunteers and NGOs in the village to enhance the acceptance of EDPT services. Over 90% thought that people will accept EDPT services more if they get full information, if only diagnostic facilities were available at their village, acceptance of EDPT services might be improved and if only antimalarials were available at reasonable price, people will try appropriate treatment for suspected malaria. Whether the area is high, moderate or low endemicity, enabling factors for community acceptance in strategies related to social movements in EDPT do not differ. Appropriate partners are to be identified for effective planning and implementation. Moreover, ways to collaborate and negotiate among each other is to be strengthened for an integrated works in social movements for EDPT. With limited available resources in the NMCP, there is a demand for new mechanisms in rural areas to prevent weak or lack of co-ordination in social movements. An operations research should be further conducted to select and prioritize cost-effective strategies for social movements in EDPT.

1.1.6. The prevalence of hereditary ovalocytosis and its innate resistance in malaria Infection

Ovalocytosis is a hereditary condition in which majority of the circulating erythrocytes are oval in shape. In normal persons 0-10% of the erythrocytes are ovalocytes. Hereditary ovalocytosis has an innate resistance to malaria infection due to marked increased in membrane rigidity and resistance to invasion by the parasites. In our study we compared the malaria parasite positive rate and *Plasmodium falciparum* antibody IgG among three groups of patients. The patients with 0-10% ovalocyte group as

normal group, 11-20% ovalocyte group and 21-50% ovalocyte group. We recruited 355 malaria suspected cases in Thaton Township and 243 cases in Buthitaung township. Diagnosis of malaria parasite and ovalocytosis was done by Giemsa stained thick and thin blood films. Detection of the anti- *Plasmodium falciparum* antibody IgG by ELISA method. In Thaton township 93.5% (n=332) of the patients had normal erythrocytes, 5.9% (n=21) had 11-20% of ovalocytes and 0.5% (n=2) had 21-50% of ovalocytes. In Buthitaung township 93% (n=226) had normal erythrocytes, 4.5% (n=11) had 11-20% ovalocytes and 2.5% (n=6) had 21-50% ovalocytes. In both areas malaria parasites were seen in normal and 11-20% ovalocyte groups but not in 21-50% ovalocyte group. *Plasmodium falciparum* antibody IgG positive rates were not much different in these three groups. From the above findings there is an indication of preventing the parasite invasion into erythrocytes probably due to the innate resistance conferred by ovalocyte.

1.1.7. Effect of vitamin E on primaquine induced red cell hemolysis in normal and Glucose 6-Phosphate dehydrogenase (G-6-PD) deficient persons.

Plasmodium vivax infection can cause high morbidity to the patients because of the frequent relapse of infection due to its latent exoerythrocytic stage. Primaquine is an only antimalarial drug of highly active against this stage. On the other hand primaquine is an oxidant drug to induce hemolysis in G6PD deficient persons. Vitamin E is an antioxidant drug and it can protect the lysis of red cell membrane induced by oxidant stress. The aim of the study is to detect the role of antioxidant vitamin E in primaquine induced hemolysis in normal and G6PD deficient persons. In this study *Plasmodium vivax* infected persons who attending the Defence Services General Hospital was recruited and detected the G6PD enzyme level and measure the degree of hemolysis before and after the one month therapy of vitamin E. This project was started at November 2006 and up to now we can recruit 15 patients. Out of these patients 2 were G6PD deficient. It is an ongoing study and will recruit up to 30 normal and 30 deficient patients.

1.1.8. Development of immunodiagnostic method for detection of malaria antibody using Glycophospholipid (GPL) antigen

A total of 10 pure *Plasmodium falciparum* infected blood samples was collected from the out patient department of Vector Borne Diseases Control unit, and subjected to *in vitro* culture system. When the parasitemia level reached 20% on round about day 10, the supernatant were separated by centrifugation method and dried in 37°C incubator for about 4 days. Dried supernatant was dissolved in solvent mixture and GPL antigen was isolated by antigen isolation method. Isolated GPL antigen was tested with control *P. f.* positive and negative filter paper blood samples applying ELISA method for antigen antibody reaction. The results showed that isolated GPL antigen reacted with both positive and negative samples. The false positive results might be due to impurity of GPL antigen. The purification of antigen is being attempted.

1.1.9 *Plasmodium falciparum* antsporozoite antibody levels in subjects with malaria from Western border of Myanmar

The anti-sporozoite antibody levels of 74 subjects (1 to 75 years of age; mean age (SD) 27.77 (15.3) yrs) presenting at a malaria clinic in Buthidaung township were determined. Blood film examinations for malaria parasites were also carried out. The mean (SD) antibody levels ranged from 0.24 µL to 14.4 µL. No significant difference in anti-sporozoite antibody levels was found between males and females (5.03 microL vs 4.15 microL). There were no significant differences in anti-sporozoite antibody positive

rates among males and females (38.2 vs 42.1), and among children and adults (54.5 vs 61.9). No correlation between anti-sporozoite antibody levels and age was also found. However, a significantly higher anti-sporozoite antibody levels were observed in those with positive malaria blood film as compared to those without (6.4 μ L vs 4.1 μ L; $p < 0.05$, Student's "t" test). A significant difference in the anti-sporozoite antibody positive rate was also found between those with active malaria infection and those without (72% vs 56%; $p = 0.015$, Z-test for proportions). Among those with positive blood film, higher anti-sporozoite antibody positive rate was observed in adults (84.6%) as compared to children (55.6%). The anti-sporozoite antibody positivity and levels could be of some use in assessing the malaria situation in an area.

2 TRADITIONAL MEDICINE

2.1 CLINICAL TRIALS OF (MARKETED) TRADITIONAL MEDICINES IN TREATING UNCOMPLICATED FALCIPARUM MALARIA.

2.1.1. Plasmogine (*Dichroa febrifuga* root extract, *Coptis teeta* root extract, *Artemisia annua* leaf extract)

The preliminary study of Plasmogine was tested on 4 subjects with uncomplicated falciparum malaria applying the WHO Guidelines for the assessment and monitoring of antimalarial drug efficacy for the treatment of uncomplicated falciparum malaria. The doses were given as recommended by the manufacturer, Fame Pharmaceuticals, a total of 20 caplets to be given orally 2 caplets 8 hourly. The subjects were observed to be well tolerated to the drug and have no side effects. All cases gave adequate clinical and parasitological response (ACPR). The study is in progress.

SERVICES PROVIDED

ACADEMIC

Sr.No	Name	Course	Responsibility
1.	Dr. Ye Htut	3 rd MBBS (Microbiology) MMedSc (Microbiology) MMedSc (Biochemistry) PhD (Microbiology) PhD (Zoology) PhD (Botany) PhD (Chemistry)	Teaching, External examiner, Thesis supervision
2	Dr.Nwe Nwe Oo	MMedSc (Microbiology) MMedSc (Biochemistry)	Teaching, Technical Demonstration
3	Dr.Kay Thwe Han	MMedSc (Microbiology)	Teaching, Technical Demonstration
4.	Daw Aye Than	MMedSc (Microbiology)	Technical Demonstration
5.	Daw Kyin Hla Aye	MMedSc(Microbiology)	Technical Demonstration

LABORATORY

Sr .No	Subject	Tested Samples
1.	Microscopic diagnosis of malaria	1050
2.	Routine and special examination of stools samples	546

RADIATION TOXICOLOGY RESEARCH DIVISION

Deputy Director & Head	...	Dr. Khin Maung Maung MBBS MMedSc Biochemistry) PhD (Biochemistry)
Research Officer	...	U Htain Win BSc (Chemistry), DCSc Daw Kay Khine Soe MSc (Zoology)
Research Assistant (2)	...	Daw Htet Nandar Aung BA (H.Eco) Daw Su Mon BA (Eco.) Daw Ni Ni Than BSc (Chemistry)
Research Assistant (3)	...	U Si Thu Soe Naing BA (History) Daw Ni Ni Maw BSc (Physics) Daw Ni Ni Win BA (History)
Research Assistant (4)	...	Daw Dam Lian Pau Daw Win Phyu Phyu Zaw

The division has been mainly involved in radiation safety measures with the aim of preventing radiation related accidents and promotion of a high standard of protection. The division has been engaged in monitoring services such as monitoring for safety of personnel, working with radioisotopes, area monitoring for safety of work places and proper radioactive waste storage and disposal.

RESEARCH ACTIVITIES

1. HEALTH SYSTEMS

1.1. QUALITY OF HEALTH CARE IN HOSPITALS

1.1.1. Reliability and Safety of X-ray machines in Yangon

Reliability and safety of fifteen X-ray machines from 10 hospitals had been studied. Exposures of X-ray tube leakage, scattered radiation, patient skin entrance doses etc., were measured. Out of 15 machines, two X-ray machines were found to have tube leakage and another two machines had scattered radiations more than 1000 μ Sv per hour. (i.e more than permissible limit). X-ray machines of private clinic will also be studied as continuation of this project.

SERVICES PROVIDED**ACADEMIC**

Sr.No	Name	Title	Responsibility
1.	Dr. Khin Maung Maung	2 nd MB, PhD (Chemistry)	External Examiner
2.	U Htain Win	Scientific Talk on Radiation safety in laboratories	Speaker

RADIATION SAFETY PRACTICES

1. Safety of personnel

It is essential that personnel concerned with radiation be continuously monitored so as to record any dose that they receive during their work. Thus, monitoring of personnel, using TLD badge was carried out regularly at bimonthly intervals throughout the year. The mean exposure dose to all individuals was less than 500 μ Sv/month. This dose rate is within the permissible dose of 1660 μ Sv/month. (i.e 1.66 mSv, maximum permissible dose to whole body in one month.)

2. Safety of work places

As for the safety of work places area monitoring was done regularly at monthly intervals throughout the year and was found to be well within the prescribed safety limits. (i.e < 1 mR/hr) The mean overall dose rate was found to be < 0.2 mR/hr that is as much as the background levels. The significant contamination level is more than 1 mR/hr.

1. Waste storage and disposal

Effective waste management is essential to ensure that ionizing radiation which it may present to mankind should be kept as low as reasonable achievable (ALARA) and to minimize the impact on an environment as well. So the disposal of different types of radioactive waste used by all the research divisions within DMR during 2006 was carried out under the supervision of the division. Radioactive wastes are stored in separate concrete tanks for some time to decay before being disposed off. Near surface disposal was carried out when the exposure levels reach within the safety limit. The amount of liquid wastes released into the drains within a week was also restricted to safety limits as prescribed by IAEA.

VACCINE PLANT QUALITY ASSURANCE AND RESEARCH DIVISION

Deputy Director and Head	....	Dr. Win Aung MBBS MMedSc (Biochemistry) FACTM
Research Officer	....	Dr. Mya Mya Aye MBBS MMedSc (Microbiology) U Than Htay Dip: in Technology (Electrical)
Research Assistant (2)	....	Daw Tin Tin Aye BSc (Zoology) DFT Daw Aye Aye Moe BSc (Botany)
Research Assistant (3)	....	Daw Khaing Khaing Moe Daw Min Thida Oo BSc (Botany)
Research Assistant (4)	....	Daw May Cho Aung BSc(Botany) MSc(Environmental Studies) MRes Daw Mya Mya Htwe BSc(Zoology) MSc (Biotechnology)
Laboratory attendant	....	Daw Htay Yi

The major work of QA and Research Division is to carry out the quality management system of the vaccine plant and research on Hepatitis B viral infection and related vaccines. However, during the year under report, the division was primarily engaged in quality assurance (QA) of the newly developed products; recombinant HB vaccine and plasma derived HB vaccine. Therefore, our division is responsible for controlling the quality management system of the plant and vaccines, starting from the receipt of raw material to the release of finished products. For the time being, our division has been trying to establish the Good Manufacturing Practice (GMP) in the Hepatitis B Vaccine Plant which ensures that vaccines are consistently produced and controlled to the quality standards appropriate to their intended use and as required by the marketing authorization. The major functions of the QA Division are: documentation, GMP audit, GMP training, calibration; validation, preventive maintenance of equipment and systems, environmental monitoring, material and product control, in process control, change control, investigation of deviation, customer complaints and annual product review . For effective management of quality management system, our division includes the following sections; GMP, Validation and In-process Control.

RESEARCH PROJECTS

1. RESEARCH CAPACITY STRENGTHENING

1. 1. IMPROVING RESEARCH SUPPORTING SERVICES

1.1.1. Evaluation of safe and effective heating, ventilation and Air-conditioning system (HVAC) in the HB Vaccine Plant

Safe and clean environment is needed in production areas for manufacturing of a quality vaccine product in accordance with WHO GMP. If the environmental factors are not properly controlled, it can lead to product contamination, degradation and Lot failure. Some environmental factors, handled by HVAC system, which directly influence on vaccine products were checked and validated. The findings were as follows. Temperature

(20-24°C), Humidity (35-65%), Air velocity (0.3-0.45 m/sec), Air direction (Unidirectional and parallel), Air change rate (20-400 times/hr), particle count (100-100,000/cuft), Microbial count (0-50 CFU/ plate) and Pressure differential (1.2-1.5 mmAq). The results are in accordance with GMP specifications and satisfactory indicating the safe and efficiency of HVAC system in the HB Vaccine Plant. Validation of HVAC system in HB vaccine plant will be performed once a year.

1.1.2. Evaluation of effective treatment and safe disposal of waste water in the HB Vaccine Plant

Waste water, treated and disposed into environment by waste water treatment system in the plant, should not be harmful to the environment in accordance with GMP recommendation. This system installed by CJ Corporation since 2003 needs to be checked for efficiency of treatment system. On studying the waste water disposed by the plant, the following results were observed; pH (9.3), Chemical Oxygen demand (32 mg/L), Biochemical Oxygen demand (24.8 mg/L), Dissolved Oxygen (8 mg/L), Total solids (516 mg/L), Suspended solid (Nil), Ammonium Nitrogen (N)(0.9 mg/L), Ammonia nitrogen (NH₃) (1.08 mg/L) and Ammonium Nitrogen (NH₄) (1.15 mg/L). It indicated that in the HB vaccine plant, waste water treatment system was found to be effective and waste water disposed were safe for environment. Validation of the waste water treatment system is going to be performed twice a year.

SERVICES PROVIDED

1. DOCUMENTATION

The objectives of documentation system are to establish, to monitor and record “quality of vaccine” for all aspects of the production and quality control. Several documents are needed to accomplish it. Batch processing records for Recombinant, Plasma and Finished Product Sections, Certificate of analysis for Quality Control Division were prepared and sent to respective sections as working procedure. Besides, protocols for validation, stability and safety studies, data sheets, data record forms, report, laboratory note books, log books, equipment record, master formulae were established for all sections in the plant. In addition, preparation, checking and approval of standard operating procedures (SOPs) from all Divisions and sections in our plant were performed. To date, a total of 249 SOPs have already been completed. All above documents were kept in the documentation room and reviewed on yearly basis.

2. TRAINING AND EVALUATION TEST OF GMP AND RELATED TOPICS FOR STAFF

Regular training of staff in pharmaceutical plant, followed by evaluation test is essential for compliance with GMP. During the year under report, the below mentioned-GMP training lectures were given to the staff of the plant, followed by evaluation tests for assessment.

Sr. No.	Title
1.	GMP organization and Job Description
2.	GMP Building and Facilities
3.	Safe Laboratory Practices
4.	HVAC System

3. INTERNAL GMP AUDIT OF PERSONNEL AND FACILITIES OF THE PLANT

Inspection followed by taking corrective action of personnel and facilities are needed in WHO GMP standard plant. During the year under report, internal GMP audit of personnel, materials, methods, machinery, building, premise, facilities, documentation, records and labels in the plant were carried out for ensuring compliance with WHO GMP guidelines. Corrective actions were taken for observation found during plant audit.

4. CALIBRATION

During the year under report, calibration (i.e establishment of the relationship between values indicated by and instruments and the corresponding known values of an reference standard) of all displays, gauges and indicators of all equipment in the plant were performed by engineers from SEOHO Corporation, Republic of Korea, staff from maintenance and QA Division . Only (7) pressure gauges were found to be failed for calibration. Reinstallation of new pressure gauges was performed

5. ENVIRONMENTAL MONITORING

The manufacturing environment is critical for product quality. Some environmental factors directly influencing the vaccine quality are; temperature, humidity, pressure differential, air velocity, air direction, air changes, particle counts, microbial counts, noise and light. During the year under report, environmental monitoring of the clean rooms in production areas were performed according to the following schedule.

Class	Situation	Interval of Monitoring	Items Monitored
100	Routine	Weekly	All Items
	In Operation	Daily	Particle Count and Microbial Count
10,000	Routine	Monthly	All Items
	In Operation	Weekly	Particle Count and Microbial Count
100,000	Routine	Every three month	All Items
	In Operation	Monthly	Particle Count

ACADEMIC

Sr. No.	Name	Course	Responsibility
1.	Dr. Win Aung	Vaccine production	Technical Advisor, HB Vaccine Plant
2.	Dr. Mya Mya Aye	Vaccine production	Technical Advisor, HB vaccine Plant, Ministry of Industry (1)

VACCINE PRODUCTION DIVISION

Research Scientist	... Dr. Moh Moh Htun MBBS MMedsc (Pathology)
	... Dr. Zaw Myint MBBS PhD (Japan)
Research Officer	... Daw Khin Khin Aye BSc (Chemistry)
	... Dr. Ti Kyi Win MBBS MMedSc (Microbiology)
	... Dr. Aung Zaw Latt MBBS MMedSc (Microbiology)
	... Daw Sandar Nyunt BSc (Zoology)
Research Assistant (2)	... U Tin Ohn BSc (Zoology)
	... Daw Lwin Lwin Maw BSc (Mathematics)
	... Daw Thit Thit Win BSc (Zoology) DS
	... Daw Khin Win Oo BSc (Zoology)
	... Daw Khine Sandar Oo BSc (Zoology)
	... Daw Kay Thi Win BSc (Zoology)
	... Daw Nay Chi Soe Han BSc (Chemistry)
	... Daw Myo Myo Wai BSc (Chemistry)
Research Assistant (3)	... Daw Swe Yin Latt BSc (Chemistry)
	... Daw Sandar Myint
	... U Kyaw Kyaw Khine BA (History)
	... U Aung Naing Tun BSc (Botany)
	... Daw Khin Muya Than BSc (Chemistry)
	... Daw Tin Tin Aye BSc (Zoology)
	... Daw Khin Mar Win (2)
Research Assistant (4)	... Daw Kay Thi Hla ing BSc (Biotechnology)
	... Daw Win Win Aye BSc (Botany)
	... Daw Aye Myint Kyi BA (Geograohy)
	... U Thet Lwin Aung
	... U Chan Myint Aung BSc (Industrial Chemistry)
	... Daw Thawt Sone BSc (Chemistry)
Laboratory Worker	... Daw Aye Thein
	... Daw New Ni Khine
	... Daw Ni Ni Lwin
	... Daw Ei Mon Khin
	... Daw Khine Wai Oo
Peon	... U Soe Min

RESEARCH PROJECTS

During 2006, the Vaccine Production continued the purification of recombinant HBsAg R-05 and R-06 from the cell cake of recombinant yeast (*Hansenula Polymorpha*), and purification of HBsAg from high titered HBsAg positive plasma and filling, vialing, packaging of plasma-derived Hepatitis B vaccine according to the New York Blood Centre Method.

1. ACADEMIC AND TECHNOLOGY DEVELOPMENT

1.1. DEVELOPMENT OF VACCINE

1.1.1. Large-scale production of yeast-derived hepatitis B vaccine (DMR HBR VAC)

Two lots (8 batches) of recombinant HBsAg were purified by homogenization (cell disruption), concentration and diafiltration, pH precipitation, KBr loading, ultracentrifugation and Sephacryl S-300 Index gel column chromatography techniques. Monitoring system was also carried out such as optical density by UV spectrophotometry according to the standard operating procedure (SOP) and the samples of main process were sent to Quality Control Division for quality control tests. Total 14gram of purified bulk of recombinant HBsAg was produced for 2.5 million paediatric doses of recombinant HBsAg expressed *Hansenula polymorpha* strain of master cell bank (MCB).

1.1.2. Large-scale production of plasma-derived hepatitis B vaccine (DMR HBPVAC)

HBsAg positive blood collection was stepped up during 2005-2006. HIV and anti-HCV negative blood was collected from ten hospitals around Yangon area. During this year; (1596) blood bottles/ bags were collected, Each blood sample was tested for high titre of HBsAg (1/10) by CEP (counter electrophoresis) method in the Quality Control Division of vaccine plant. Approximately 30% of the blood collected met the requirements for plasma-derived hepatitis B vaccine production. The selected plasma (98) Liters was separated and stored at -20c until required for vaccine production. Purified HBsAg protein was produced using large-scale equipment such as Sartocor concentrator, Ti 70 zonal rotors in Beckman Coulter Optima LE-80 K ultracentrifuge. A total 10 batches of vaccine production and vialing were carried out resulting in approximately 121334 paediatric doses of plasma-derived hepatitis B vaccine (DMR) for this year 2006.

VACCINE PLANT QUALITY CONTROL DIVISION

Deputy Director and Head	...	Dr. Khin May Oo MBBS DBact MMedSc (Microbiology) PhD (Microbiology)
Research Scientist	...	Dr. Win Maw Tun MBBS MMedSc (Microbiology)
Research Officer	...	Daw Kyin Kyin San BSc (Chemistry)
Research Assistant (2)	...	Daw Kay Khine Soe BSc MSc (Zoology)
	...	Daw Nyein Nyein BSc (Botany) DS
	...	Daw Phyu Phyu Khine BSc MSc (Zoology)
Research Assistant (3)	...	Daw Tin Tin Myint BA (Myanmarsar)
	...	Daw Mar Mar Kyu BSc (Chemistry)
	...	Daw Soe Soe Khine BSc (Chemistry)
	...	Daw Ohnmar Kyaw
	...	U Naing Naing BA (Eco)
Laboratory Attendant	...	Daw Khin Myo Shwe

The Quality Control Division is responsible for the in-process quality control of plasma-derived and recombinant hepatitis B vaccines produced at the Hepatitis B Vaccine Plant, Department of Medical Research (Lower Myanmar). The QC Division is also responsible for the environmental monitoring of the production facilities, monitoring of water for injection (WFI), deionized water (DI water) and clean steam used at the Vaccine Plant, preparation of Standard Operating Procedures (SOP) for the quality control tests carried out at the division.

RESEARCH PROJECTS

1. ACADEMIC AND TECHNOLOGY DEVELOPMENT

1.1. DEVELOPMENT OF VACCINE

1.1.1. Characterization of Plasma-derived and Recombinant hepatitis B vaccines produced in Myanmar

The quality of biological products is usually measured by physical, chemical or biological methods. The physical, chemical, biochemical and biological properties of the purified bulks (plasma-derived and recombinant), final bulks (plasma-derived and recombinant) and plasma-derived and recombinant hepatitis B vaccines produced at the Vaccine Plant are being studied. The parameters of the plasma-derived purified bulk, P 01, included the following: protein content (2.32mg/mL) and bromide content (0.06µg/dose) and antigen content (0.723mg/mL), while those of the recombinant purified bulk, R 01 P1, were protein content (1.28 mg/mL), polysaccharide content (1.23µg/100µg of protein), lipid content (30.6µg/100µg of protein), Tween 20 content (11.89µg/100µg of protein), bromide content (1.94µg/100µg of protein) and the antigen content of (0.324 mg/mL). The parameters of the final bulk (batch number 4101) for plasma-derived vaccine included the following: protein content (18.4µg/mL), thimerosal content (0.008w/v%), sodium chloride content (0.92%), aluminium content (0.186mg/mL) and antigen content (3.686µg/mL). The parameters of the final bulk batch number 4201 for recombinant vaccine were protein content (23.1µg/mL), thimerosal content (0.007w/v%), aluminium content (0.155mg/mL) and antigen content (4.761µg/mL) while that of the final bulk batch number 4202 for recombinant vaccine were protein content (20.2µg/mL), thimerosal content (0.007w/v%), aluminium content (0.217mg/mL) and antigen content (4.059µg/mL).

SERVICES PROVIDED

1. IN-PROCESS QUALITY CONTROL TESTS FOR HEPATITIS B VACCINES

1.1. IN-PROCESS QUALITY CONTROL TESTS FOR PLASMA-DERIVED HEPATITIS B VACCINES

In-process Quality control tests carried out on each batch of plasma-derived hepatitis B vaccine includes the following stages: (1) single donor plasma, (2) plasma pool, (3) isopycnic banding, (4) post-dialysis, (5) purified bulk (6) final product (plasma-derived vaccine).

1.1.1. Tests on Single donor plasma

All single-donor plasma units were tested for HBsAg titer, VDRL, anti-HCV, HIV 1 & 2 and sterility.

1.1.2. HBsAg titer

1011 single donor plasma units, obtained from the hospitals in the Yangon Municipal area and the Hepatitis Carrier Clinic of the Department of Medical Research (Lower Myanmar) were tested for HBsAg titer by counter-immunoelectrophoresis (CEP) method. 36.5% (369 of 1011) were of CEP titer 1:10.

1.1.3. Test for syphilis

369 single donor plasma units (CEP titer 1:10) were tested for syphilis. From the total of 369 samples, 73 (19.8%) were reactive.

1.1.4. Test for HIV 1 & 2

309 single donor plasma samples (CEP titer 1:10) and negative for syphilis test were tested for HIV 1 & 2 out of which 1 samples (0.3%) was positive for HIV 1 & 2.

1.1.5. Test for Sterility

Single donor plasma samples for P05 and P06 batches with CEP titer 1:10, negative for syphilis test and HIV 1&2 test were tested for sterility. Six randomly selected samples were tested and four passed for sterility test.

1.2. TESTS ON PLASMA POOL

Plasma pool samples (P 05 and P06) were tested for bacteria, fungi and mycoplasma. Both plasma pools did not pass the sterility test.

1.3. TESTS ON ISOPYCNIC BANDING SAMPLES

Two isopycnic banding samples (P 05 and P 06) were tested for the protein content and purity (SDS-PAGE).

1.4. TESTS ON POST-DIALYSIS SAMPLES

Post-dialysis samples (P 05 and P 06) were tested for sterility, purity by SDS-PAGE, and protein content.

1.5. TESTS ON PURIFIED BULKS

The purified bulk (P05 and P06) was tested for protein content, bromide content, antigen content, sterility, pyrogenicity, abnormal toxicity, adventitious viruses (suckling mice, adult mice, fertilized egg inoculation) and ABO blood group materials.

1.6. QUALITY CONTROL TESTS FOR PLASMA-DERIVED DMR-HB VACCINE

Quality control tests were carried out on 5 batches of plasma-derived DMR-HB vaccine (A304S062-1, A304S062-2, A506S065, A506S066-1, A506S066-2). All batches passed the sterility tests for bacteria and fungi, test for pyrogen, test for abnormal toxicity. The protein contents ranged from 5.9 to 12.2 μ g/ml, thimerosal content from 0.009 to 0.012 w/v% and aluminium content from 0.212 to 0.298 mg/ml.

2. IN-PROCESS QUALITY CONTROL OF RECOMBINANT HEPATITIS B VACCINE

The in-process quality control tests for recombinant hepatitis B vaccine carried out on the following production stages (1) Master cell bank, seed culture and fermentation broth, (2) pH precipitation, (3) gel filtration, (4) diafiltration and concentration and (5) purified bulk.

2.1 TESTS ON MASTER CELL BANK, SEED CULTURE AND FERMENTATION BROTH

Contamination tests were done on seed I culture, seed fermentation broth and cell harvest from main fermenter using the Brain Heart infusion agar, Sabouraud dextrose agar, Tryptic Soy agar, Lactose and Nutrient agars. All samples for R05 passed the contamination test.

2.2 PH PRECIPITATION

Endotoxin test was done on pH precipitation samples for R05-1, R05-2, R05-3. The specification of endotoxin content for pH precipitation samples is 2.5 Endotoxin Unit/ml, and all samples were within the specified range.

2.3 GEL FILTRATION

Endotoxin test was done on three gel filtration samples (R05-1, R05-2, R05-3). The specification of endotoxin content for gel filtration samples is 2.5EU/ml, and all samples were within the specified range.

2.4 DIAFILTRATION AND CONCENTRATION

Buffer A (with and without urea) were tested for endotoxin content. The specification of endotoxin content for buffer A is 2.5EU/ml, and all samples were within the specified range.

2.5 PURIFIED BULK

Quality control tests were done on 3 batches (R05-1, R05-2, R05-3) of purified bulk. All batches passed the pyrogen tests and sterility tests for bacteria and fungi. The protein, lipid, bromide, Tween 20, polysaccharide and antigen contents were within the specified ranges. All batches passed the test for sterility, test for pyrogen and tests for identity (SDS PAGE and Western Blot).

2.6. TESTS FOR WATER FOR INJECTION (WFI), DEIONIZED WATER AND PURE STEAM

Water for injection (WFI) samples from 6 points (5 use points in the production area and 1 sampling point in WFI preparation room) were tested for pH and conductivity and Total Organic Carbon daily. Sterility test and test for endotoxin content were also done on one point per day schedule. All samples passed the sterility test. All samples had endotoxin contents lower than specification of 0.25EU/mL. Deionized water at WFI preparation room and at finished product section were tested weekly. Clean steam from production area (at five points) was tested monthly.

2.7. ENVIRONMENTAL CONTROL OF PRODUCTION FACILITIES

The following tests were conducted in the production facilities before starting and during the operation of the plasma-derived and recombinant vaccine production.

2.8. TEST FOR FLOATING VIABLE PARTICLES

Active air sampling was performed with Air Sampler MAS 100 and tryptic soy agar plates were incubated for three days at 37°C before reading the results. Air sampling was performed in 103 rooms for floating viable particles in clean rooms, clean booths and clean benches in the production area.

2.9. SURFACE MICROBIOLOGY TEST FOR CLEAN BENCHES, CLEAN ROOMS AND CLEAN BOOTHS

Total 44 swabs from working surfaces of the clean benches, clean rooms and clean booths were taken and tested for microbiology.

2.10. CONTAMINATION TEST FOR OPERATORS IN CLEAN ROOMS

Tryptic soy agar plates were used for the contamination test for operators working in clean rooms. Personal microbiology tests were performed on 87 operators.

2.11. PREPARATION OF STANDARD OPERATING PROCEDURES (SOP)

The total 42 SOPs for quality control tests were prepared by the Quality Control Division.

VIROLOGY RESEARCH DIVISION

Deputy Director & Head	... Dr. Hlaing Myat Thu MBBS, MMedSc (Microbiology) PhD (Molecular Virology)
Research Officer	... Dr. Win Mar Oo MBBS MMedSc (Microbiology) Dr Mu Mu Shwe MBBS MMedSc (Pathology) Daw Kay Thi Aye BSc(Botany) DPMS, (Medical Technology) Daw Khin Mar Aye MSc (Zoology)
Research Assistant (2)	Daw Than Mya BSc (Hons) MSc (Zoology) Daw Thin Thin Shwe BA (Myanmarsar)
Research Assistant (3)	Daw Win Mar BSc (Mathematics) Daw Khin Sandar Aye BA (History) Daw Khin Khin Oo Bsc (Zoology) Daw Hla Myo Thu
Research Assistant (4)	Daw Haymar Win BA (History)
Laboratory Worker	U Myint Shwe

During the current year, the Virology Research Division was involved in two main research areas, namely, arbovirology and viral diarrhoea. The research projects were mostly involved in disease surveillance of viral infections for timely prevention of disease outbreaks. Also, some of the studies were aimed to monitor the emergence of new viral strains or subtypes to provide base-line data for the formulation of effective candidate vaccines and for elucidating the contribution of viral genetics to the changing patterns of disease.

RESEARCH PROJECTS

1. COMMUNICABLE DISEASES

1.1. HIV/AIDS

1.1.1. Determination of HIV-1 subtypes in Myanmar by peptide immunoassay (PEIA)

This project is a collaborative study between National Health Laboratory, National AIDS Program and DMR (Lower Myanmar). The aim of this project is to determine the prevalence of various HIV-1 subtypes among different risk groups in Myanmar. Peptide enzyme immunoassay (PEIA) is an easy, rapid, inexpensive subtyping methodology which makes use of 14 amino acids from the tip of the V3-loops (a principle neutralizing domain) to construct peptides specific for various HIV-1 subtypes.

Serum samples have been collected at the various NAP sentinel sites in Myanmar from subjects belonging to different risk groups namely, injecting drug users (IDUs), male and female sexually transmitted disease patients (STDs), commercial sex workers (CSWs), pregnant women who come for antenatal care and military recruits. A total of 100 HIV-1 positive samples comprising of 43 male and female sexually transmitted

disease patients, 36 commercial sex workers (CSWs), 18 pregnant women from antenatal clinics and 3 military recruits have been obtained.

Peptide antigens were prepared by diluting the lyophilized peptide antigens with DMSO (Dimethylsulphoxide). Flat bottom 96-well EIA plates will be coated with peptide solution and incubated at 4°C overnight. The plates will be washed and non-specific binding will be blocked by adding a non-fat milk powder buffer (pH 7.2) and then incubated at 37°C. The milk buffer is poured off, the plates dried at 37°C, and sealed individually and then frozen at -70°C. For the next step, HIV positive serum will be incubated in these wells. The conjugate (anti-human IgG-peroxidase) will be added, incubated, then the substrate (TMB) will be added. If the specific E, B' or C antibodies are present they will react with the corresponding antigen.

1.2. DENGUE

1.2.1 Dengue serotypes among dengue haemorrhagic fever patients in Yangon Children's Hospital

Paired sera samples were collected from clinically diagnosed dengue patients admitted to the medical wards of Yangon Children's Hospital from January to December 2006. These were titrated for dengue haemagglutination inhibition antibody titres by the method of Clarke and Casals. Out of 1234 pairs tested, 931 (75.4 %) were serologically diagnosed as dengue infection of which 197 (21.2 %) had primary and 734 (78.8 %) had secondary infections. The acute sera samples with an HI antibody titre of <1:80 will be passaged in C6/36 mosquito cell line for 7 days for further virus isolation. The cell culture supernatant will be harvested and typed by the immunofluorescent method using serotype-specific monoclonal antibodies.

1.2.2 Sentinel surveillance of dengue in endemic regions of Myanmar

This project is funded by WHO/TDR. At the beginning of the project, a dengue surveillance workshop was conducted at the Department of Medical Research (Lower Myanmar) in Yangon for project collaborators from Lashio, Mandalay, Mawlamyaing and from the North Okkalapa Hospital. The Workshop participants included one clinician and one laboratory person (either a Microbiologist or a Pathologist) from each sentinel site. The three-day workshop consisted of lectures and hands -on training in the performance of ELISA and immunochromatographic (rapid) tests for the serodiagnosis of dengue. Prior to return to their various hospitals and laboratories, the participants were given dengue rapid test kits, sample collection materials and proformas for patient information. After the collaborators reached the study sites, sera samples were collected and tested with immunochromatographic tests and the results were sent to DMR (LM).

Serum from forty-six children under the age of 12 years who presented at the North Okkalapa Hospital with symptoms for dengue were tested using rapid tests. Thirty-Eight were tested positive for dengue (83%), of which 2 were experiencing primary infections and 36 were experiencing secondary infections.

Sera from forty-two children under the age of 12 years who presented at the Mawlamyaing Hospital with symptoms of dengue were tested using dengue "rapid" tests (PanBio). Seventeen were negative (60% positive). Among the positive, 3 contained anti-DENV IgM (primary infection), 12 contained IgM and high titre IgG (secondary) and 10 contained only high titre anti-DENV IgG (secondary).

The situation in Sittwe was quite different to that seen in Mawlamyaing and at North Okkalapa. Of 17 suspected dengue patients, nine did not have dengue. Of the 8

positive cases (47%), half were experiencing a primary infection and the other half, secondary infections.

There were no patients satisfying a case definition for dengue at the Lashio Hospital. Data has not been obtained yet from Mandalay Hospital because at the time after the workshop, the dengue season had tailed-off in Mandalay. We expect this study to proceed as planned in 2007.

1.3. DIARRHOEA AND DYSENTRY

1.3.1. Surveillance of rotavirus diarrhoea in Yangon Children's Hospital

A reverse transcription polymerase chain reaction (RT-PCR) for G and P genotyping of rotavirus isolates was done to determine the distribution of human rotavirus genotypes in Yangon. This was done in stool samples collected in 2005 from under five year-old children admitted to the Yangon Children's Hospital for diarrhoea. After screening for rotavirus by enzyme immunoassay (EIA), RNA was extracted from 279 stool samples, from which 134 stool samples were genotyped by employing multiplex RT-PCR using G and P specific primers. Genotype G3 was the most common type identified (91.83% of samples) followed by G4 (6.12%) and G1 (2.04%). P genotyping of these samples is still in process. The distribution of G and P genotype provides important and valuable formation for the development and production of rotavirus vaccines, the most effective strategy for the prevention of severe rotavirus diarrhoea.

Stool samples were also collected and clinical features were recorded among under 5 year old children admitted to the three medical wards for diarrhoea at the Yangon Children's Hospital from January to December 2006. The stool samples were tested for the presence of rotavirus by a commercial ELISA kit. In 2006, rotavirus was detected in 639(52.59%) of 1215 stool samples tested . Rotavirus diarrhoea was most prevalent in the 3-14 month age group and during the cooler, drier months of the year (November to January). G and P genotyping of these samples will also be done.

1.3.2. Hospital-based surveillance of intussusception among children in Yangon

A surveillance for intussusception among children less than 2 years of age admitted to the Yangon Children's Hospital was conducted in the aim to provide data for investigators and programmers in making decisions concerning future use of rotavirus vaccines. A total of 18cases (10 males and 8 females), ages ranging from 2 to 21 months were studied in 2006. The types of intussusception were mostly ileo-colic and ileocolo-colic. The majority of patients presented with blood and mucus diarrhea (83.3%), vomiting (94.4%) and fever (55.5%).

1.4. RESPIRATORY VIRUSES

1.4.1 Surveillance of influenza in children in Yangon

This study aims to detect the prevalence of influenza infection in Yangon and identify the currently circulating subtypes of influenza A virus. Influenza surveillance plays an important role in the early detection of new emerging subtypes of virus, evaluating strategies for controlling epidemics and forecasting the spreading of an epidemic. It also has important applications for the designing of effective influenza vaccines. This study is a hospital-based, descriptive study and the study population comprises of children 6 months to under 10 years of age attending the Yangon Children's Hospital with clinical symptoms of acute respiratory infection. Nasopharyngeal swabs are taken and isolation of virus will be by MDCK (Madin-Darby Canine Kidney) cells.

Typing and subtyping of the isolates are determined by the haemagglutination inhibition test (HAI) or immunofluorescent antibody test (IFAT). Any doubtful results will be confirmed by reverse transcriptase polymerase chain reaction (RT-PCR). In 2006, the protocol was finalized with co-investigators from the Yangon Children's Hospital and ethical clearance was obtained. After this, the principal investigator went for 5 weeks training to Siriraj Hospital in Bangkok, Thailand and currently sample collections have begun at the Yangon Children's Hospital.

1.5. JAPANESE ENCEPHALITIS

1.5.1 Hospital-based surveillance of Japanese encephalitis virus infections in Yangon

Paired and single serum samples were obtained from encephalitis cases from the Yangon Children's Hospital. The samples were tested for JE IgM antibodies by IgM capture ELISA. All 8 encephalitis cases were negative for JE IgM antibodies.

1.6. AVIAN INFLUENZA

1.6.1. Diagnosis of clinically suspected Avian influenza infections in humans in March 2006

In March 2006, Avian Influenza (H5N1) was diagnosed in Poultry in Mandalay and Sagaing Divisions. Eight clinically suspected human samples (Nasal swabs) were tested with the rapid influenza test kits and were negative for influenza A. These samples were sent to the Department of medical Research (Lower Myanmar) for PCR confirmation. These samples were tested with RT-PCR using the primers and positive controls from the Vere-avf H5N1 test kit developed by Veredus laboratories, Singapore. All the samples were confirmed by RT-PCR to be negative and which was later re-confirmed by the WHO collaborating centres in Japan and Australia to be negative for H5N1.

2. HEALTH SYSTEMS

2.1. REPRODUCTIVE HEALTH

2.1.1. Prevalence of Reproductive Tract Infections at the Family Planning Clinic at Central Women's Hospital, Yangon.

This study is a collaborative effort between Virology, Bacteriology and Epidemiology Research Divisions. The objectives of the study are to determine the prevalence of reproductive tract infections in family planning clinic attendees at Central Women's Hospital, to identify their demographic and behavioral characteristics and to document the women's perception on the importance of reproductive tract infections. Blood samples have been obtained from 520 clinic attendees and the blood was screened for herpes simplex virus type 2 antibodies by an IgG ELISA test. From a total of 445 samples, 37 (8.3%) was positive for herpes simplex virus type 2.

SERVICES PROVIDED

ACADEMIC

Sr. No.	Name	Course	Responsibility
1	Dr. Hlaing Myat Thu	MMedSc(Microbiology)	Teaching
2	Dr. Win Mar Oo	MMedSc(Microbiology)	Teaching
3	Dr. Mu Mu Shwe	MMedSc(Microbiology)	Teaching
4	Daw Kay Thi Aye	MMedSc(Microbiology)	Teaching
5	Daw Khin Mar Aye	MMedSc(Microbiology)	Teaching

LABORATORY

1	Testing of 1234 serum pairs for Dengue Haemagglutination Inhibition for diagnosis of DHF from Yangon Children's Hospital.
2	Testing of 8 sera samples for Japanese encephalitis virus IgM antibodies for the diagnosis of encephalitis cases from Yangon Children's Hospital.
3	Performing 4136 platelet counts for patients admitted to YCH with suspected DHF and other bleeding disorders.

COMPUTER DIVISION

Research Scientist & Head	...	U Aung Myo Min BSc(Physics) DipLibSc RL
Research Officer	...	U Tin Maung Maung BEcon(Statistics)
...		Daw Nilar Khin BSc(Chemistry) DAC
Research Assistant (2)	...	Daw Phyu Phyu Tun BSc(Chemistry)
	...	Daw Win Win Mar BA(Economics)
Research Assistant (3)		Daw Nwe Nwe Khine BA(Myanmarsar)
Laboratory Worker	...	Daw Khine Khine Win

Computer Division provides the following computer services to the following requisition: planning and designing of the research questionnaire forms; coding structure formulation and making databases; data entry and processing; data analysis and interpretation and statistical analysis; graphical presentation; preparation of the computer powerpoint presentation; word processing, reporting and documentation; desk-top publications; training on software applications and giving technical advices; computer hardware and software installations and troubleshooting; webpage designing; CD writing and image recording at DMR(LM). The staff of the division also take part in research activities in collaboration with other research divisions and research units.

SERVICES PROVIDED

1. ROUTINE SERVICES

1.1. DATA ENTRY, PROCESSING AND STATISTICAL ANALYSIS

Services such as data entry, processing and statistical analysis were provided to research projects taking 348 machine hours.

1.2. GRAPHIC DESIGN AND SLIDE PREPARATION

Graphic design were made for research papers, reports and decoration of the posters. The computer division also assisted in making slide preparation by using powerpoint software at meetings, workshops, seminars, symposia and conferences. 242 machine and man hours were used for projector shows.

1.3. SECRETARIAL SERVICES AND WORD PROCESSING SERVICES

Word processing were done for jobs requested. Reports of the research projects and *ad hoc* reports were processed and produced by this division. 502 machine and man hours were used for these services.

2. SPECIAL SERVICES

2.1. DESKTOP PUBLISHING

Abstracts of the papers and posters presented at the Myanmar Health Research Congress 2006. The staff of the division were also involved at the editing job of abstracts of 86 research papers and 15 research posters.

2.2. WORKSHOPS AND SYMPOSIA

2.2.1. Informed consent form for clinical studies workshop

2.2.2. Dengue surveillance workshop

2.2.3. Workshop on communication for scientific & researchers

2.2.4. Research Methodology workshop

2.2.5. Symposia of Technology Week (8-1-2007 to 11-1-2007)

(a) Symposium on Health Related MDGs: The Way Forward

(b) Symposium on Knowledge Management: To Narrow the Know-do Gap

(c) Symposium on Health Living: A Vital Investment

(d) Symposium on Role of Vaccines in Preventive Medicine

(e) Symposium on Modern Advances in Molecular Medicine

(f) Symposium on Nephrology (1)

(g) Symposium on Nephrology (2)

2.3. FORMATTING OF PUBLICATIONS

2.3.1. Annual Report 2003, 2004

2.3.2. Myanmar Health Sciences Research Journal 17(2), 17(3), 2005

2.3.3. DMR Bulletins

2.4. NETWORKING

System maintenance of DMR (LM) local area network and internet server, integration of the existing DMR (LM) network system in collaboration with KOICA volunteers were done. Officers from the division participated as members of IT Group DMR (LM).

2.5. COMPUTER TRAINING COURSES

The training courses were conducted in collaboration with the (KOICA) volunteer taking 330 hours.

2.5.1. Intranet training course

The course was from 7-4-2006 to 26-5-2006 and was attended by 10 IT Group members.

2.5.2. Cyber security for PC users

The course was from 5-7-2006 to 7-7-2006 and was attended by 58 staffs of DMR(LM).

2.5.3. Providing Computer Training Room for other courses conducted by KOICA volunteer

CENTRAL BIOMEDICAL LIBRARY

Research Scientist & Head ...	Daw Nyunt Nyunt Swe MA(Myanmar) DipLibSc RL
...	
Research Officer	... U Khin Soe BSc(Maths)
	... Daw Cho Mar Oo BA(Economics) DipLibSc
	... Daw Aye Aye Maw BSc(Maths) DCSc
	... Daw Wah Wah Hla Phyu MSc(Zoology) DCSc
Library Assistant (2)	... Daw Mu Mu Myint BSc(Botany)
	... Daw Nilar Soe BA(Myanmar) Dip in Japanese
	... Daw Cho Cho Aung BA(Myanmar)
Library Assistant (3)	... Daw Pwint Phyu Khine BSc(Zoology)
	... Daw Wai Wai Hlaing Thu BSc(Physics)
	... Daw Naw Than Than BA (Myanmar)
Library Assistant (4)	... Daw Phyto Phyto Ei BSc (Zoology)
	... Daw Khin Nan Pyone
Library Worker	... Daw Aye Aye Mu
	... Daw Aye Aye Moe

Central Biomedical Library (CBL) is the major research library in the field of health and biomedical sciences. The library primarily serves the staff of the Department of Medical Research (DMR) (Lower Myanmar); but it also caters the needs of health information to the researchers, scientists, postgraduate students and health personnel under the Ministry of Health. It provides health literature and related information with online access to local as well as global. Central Biomedical Library is National Focal Point Library of HELLIS (Health Literature Library Services) Network established by WHO/SEARO.

SERVICES PROVIDED

1. ROUTINE SERVICE

1.1. ACQUISITION SERVICE

The library collection consists mainly of materials on Health and Biomedical Sciences. It emphasizes the collection of current medical literature in the form of periodicals and journals and bibliographic sources in printed, microforms and CD-ROM materials. Journals and other periodicals acquire through subscription and as gifts. During the year, CBL subscribed 2 journals and 4 magazines in hard copy and received 177 copies and 9 CD-ROMs. During 2006, 449 books and 706 journals in loose issues were collected and the total collection of books is 16190 and the total collection of bound journals is 17,196.

1.2. CIRCULATION SERVICE

In 2006, 41 new members registered out of which 28 are non-DMR staff. During the reported year 2538 books and 3938 journals were loaned out, out of which 1421 books and 1420 journals were borrowed by non-DMR staff. A total of 1938 readers used the library, out of which 1354 readers were non-DMR staff. Interlibrary loan facility was also provided with other medical libraries.

1.3. LITERATURE SEARCH SERVICE

Internet, CD-ROMs and online bibliographic search services are available in CBL/DMR-LM. Library users are allowed to use computer for self searching. Library databases (holding list of books, periodical, theses, index of medical journals articles etc.) are provided through CBL Webpage. CD-ROMs bibliographic search services such as; MEDLINE, POPLINE & PROQUEST are also provided. HINARI Website can be access from internet and it provides to access the full text of medical journals around 2500 titles. Total number of searches were 620 internet, 48 Proquest and 68 HINARI.

1.4. REPROGRAPHIC SERVICE

Photocopy and computer printout services were provided. Articles from journals and books can be copied at a charge of 15 kyats per page. Computer printout from CDs, searches from Medline & internet at a charge of 50 kyats per page.

2. SPECIAL SERVICES

2.1. HELLIS NETWORK SERVICE

CBL is the National Focal Point (NFP) of the Health Literature, Library and Information Services (HELLIS) Network in Myanmar. The following activities and services were undertaken during the reported year.

2.1.1. Reprint request service and document delivery

Reprint request for full text journal articles not available in Myanmar was made to HELLIS Resource Centre of the WHO / SEARO Library. During 2004 CBL sent (8) requests and receives (6) by e-mail attached.

2.1.2. Producing index articles for Myanmar Index Medicus and IMSEAR

Indexing of articles from Health Sciences Journals published in Myanmar for the Myanmar Index Medicus (MMRIM) also Index Medicus for WHO South-East Asia Region (IMSEAR) was in progress and on-going. IMSEAR can be access from HELLIS website through internet.

2.1.3. Collection of fugitive literature in Myanmar

Fugitive literature such as theses and dissertations, documents and reports of departments and institutions, etc. were also collected and the collection was 82 in 2006.

2.1.4 Periodicals Database

Updating the Database on Periodicals holding list of CBL was on going and access provided through the library web page.

2.1.5 Theses Database

Updating of Database on Theses and Dissertations of Health and allied sciences in Myanmar was on-going and access provided through the library web page.

2.1.6 Selected Subject Bibliography Database

During the reported year CBL established a in-house Subject Bibliographic Database namely "Annotated Bibliography of Research Findings in Reproductive Health Research in Myanmar".

2.1.7 Network Activities

During the reported year, DMR has been rebuilt a new line network connection. Establishment of DMR Website, LAN development and Library Database is underway. Library users are allowed to use computer for self searching. Internet and on-line bibliographic search services are available.

2.1.8 Training and workshop

The two-month practical training course has been given to the three internships from library and Information Department, University of Yangon, during July to August 2006.

3. WHO DEPOSITORY LIBRARY SERVICE

CBL served as the WHO Depository Library for Myanmar since 1995. During 2005, the library received as gift 37 non-serials and 68 serials copies of WHO publications. Loan and also Bibliographic search of WHO publications (manual and web page access to WHOLIS; SEALIS. etc) was also provided

4. OTHERS

4.1. INDEXING

Daw Nyunt Nyunt Swe served for Author and subject indexes of the Myanmar Health Sciences Research Journals.

SERVICES PROVIDED

ACADEMIC

Sr.	Name	Course	Responsibility
1.	Daw Nyunt Nyunt Swe	Workshop on Research Methodology Diploma in Library Science	Teaching External Examiner

INSTRUMENTATION DIVISION

Research Scientist & Head	...	U Hla Shein (AGTI)
Research Officer	...	U Maung Maung Gyi B.Sc (Physics), D.A.P (Electronic)
	...	U Than Win B.Sc (Physics), D.A.P(Electronic)
	...	U Aung Myo B.Sc (Physics), ETEC (Electrical)
	...	Daw Win Thaw Tar Lwin M.Sc (Physics) Dip RP (Kualalumpur)
	...	U Po Htwe B.Sc (Mathematics), ETEC (Electrical)
Elect.&Mech Technician(2)	...	U Khin Maung Ohn ETEC (Mechanical)
	...	U Htay Aung B.Sc (Physics)
	...	U Kyaw Min Oo B.Sc (Chemistry)
	...	Daw Le Le Win B.Sc (Physics)
	...	U Htain Linn B.A (History)
	...	Daw Khine Sabai Lwin B.Sc (Physics) AGTI (EC)
Elect. & Mech Technician(3)	...	U Kyaw Moe Swe B.A (History)
	...	U Mying Zaw AGTI (Electrical)
	...	U Zaw Moe Lwin THS (Welding)
Elect. & Mech Technician(4)	...	U Thet Myint Oo
	...	U Sint Than
	...	U Htet Ne Lin
Elect. & Mech Worker	...	U Phyto Wai Kyaw

The responsibility of the Instrumentation division is to technically support D.M.R in its research activities. It has four subdivisions such as,(1) Electrics, (2) Electrical, (3) Mechanical,and (4) Optical sections with specialized expertise in each respective field to provide effective and reliable service in installation, repair and maintenance of various types of laboratory equipment and utility equipment for the whole department.

SERVICES PROVIDED

1. ROUTINE SERVICES

A total of (272) work requests were received in the year 2006, and the services provided were classified as follow;

Electrical	114
Electronic	34
Mechanical	81
Optics	3
Conference audio system	40
<hr/>	
Total	272

2. SPECIAL SERVICES

The outstanding achievements by the Instrumentation division accomplished in the previous year are ;

Design and development of multi-channel stimulator equipment for physiotherapy treatment was done together with K.O.I.C.A volunteers who financially support for the whole project. It was donated to the Yangon General Hospital afterwards.

Modification of the electronic circuit for photomultiplier tube of a spectrophotometer from Experimental medicine division. The original component was obsolete and no more available for replacement. Design modification was made by using electronic components from the local market and after successful completion it was returned back to the user.

CONSULTANTS/ EXPERTS & VISITORS

The technical exchange and development programme between K.O.I.C.A and Instrumentation division is going well on course. The three K.O.I.C.A volunteers are working together with the staff of Instrumentation and had donated tools and spare-parts for the division.

LABORATORY ANIMAL SERVICES DIVISION

Head	... Dr Ye Tint Lwin MBBS MMedSc (Physiology)
Research Officer	... U Sein Win BSc (Chemistry)
	... U Nay Win BSc (Zoology)
Research Assistant (2)	... Daw Mu Mu Win BSc (Zoology)
	... U Aye Win Oo BVS
	... Daw Than Myat Htay BA (Philosophy)
Research Assistant (3)	... U Sein Aye
	... Daw Mya Mya Sein
	... Daw Khin Hnin Yi BSc (Zoology)
Research Assistant (4)	... Daw Theingi Khin
	... Daw Yu Yu Maw
	... U Aung Kyaw Zaw
Laboratory Worker	... U Myint Oo
	... U Mahazan
	... U Myat Htun Aung
	... Daw Hla Hla Win
	... Daw San San Myint
	... Daw San
	... Daw Myint Myint Oo
	... Daw Kay Thwe Win BSc (Zoology)

The responsibilities of the Laboratory Animal Services Division are (1) to breed and maintain good quality laboratory animals, (2) to build up research facilities for experimental animal models, and (3) to provide various strains of laboratory animals to scientists from Department of Medical Research (Lower Myanmar) and various Institutes for their research programs and purposes.

SERVICES PROVIDED

1. ROUTINE SUPPLY AND MAINTENANCE OF LABORATORY ANIMAL DURING 2007

No	Name of Research Divisions in DMR(LM) and Institutions	Type of animal & supply amount of animals			
		Mice	Rats	Rabbits	Guinea Pigs
1.	Biochemistry	85	31		
2.	Experimental Medicine	35			
3.	Immunology	20			
4.	Medical entomology	30			
5.	Parasitology	886			
6.	Pharmacology	680	179	18	8
7.	National Poison Center	213			
8.	Vaccine Factory (MOI-1)	540		3	
9.	Virology	1447			
10.	DMR (Upper Myanmr)	80			2
11.	University of Medicine (1)	40	41		3
12.	Dagon University			3	
	Total	4091	251	24	13

In this year, the demand of the rats was found to be about one and half times greater than those in last year but that of the rabbits were two and half times less. Virology Research Division made the greatest demands of mice and Pharmacology Research Division contributed the greatest demand of rats and guinea pigs.

2. CARE OF EXPERIMENTAL ANIMALS

2.1. Feeding and caring of experimental animals (Goats and Geese) from Research Division of DMR (LM)

Laboratory animal services division is taking care of two goats from Experimental Medicine Research division and one goat from DVRC and seven geese from Virology Research Division.

3. OTHERS

3.1 BREEDING AND MAINTENANCE OF BALB/C STRAIN

BALB/c strain inbred mice (2 males and 3 females) were imported from Nation Laboratory Animal Centre, Mahidol University, Thailand on 1.8.1999 and bred in special mouse house. At present, 45th generation has been reached and it has been provided to Hepatitis B Vaccine Factory (MOI-1) for vaccine quality control as well as other research projects.

3.2 BREEDING AND MAINTENANCE OF BALB/C STRAIN

BALB/c strain inbred mice (2 males and 3 females) were imported from National Laboratory Animal Center, Mahidol University, Thailand on 1.8.1999 and bred in special room. Now 29th generation has been reached and total number are 146 mice.

PUBLICATION DIVISION

Research Officer & Head	...	Dr. Ni Thet Oo BVS HGP Dip ELTM
Research Officer	...	U Ye Thway BSc (Physics)
	...	U Tin Myint (LLB)
Printing Technician (2)	...	U Htun Htun BA (History)
	...	Daw Win Win San BA (History) Dip Lib Sc
Printing Technician (3)	...	Daw Cho Cho Lwin BA (History)
Printing Technician (4)	...	Daw Win Shwe Aye BA (Geography)
	...	Daw Ei Zin Mar
Printing Worker	...	Daw Htoo Htoo Aung

The Publications Division provides the following services: publications, press printing service, computer service, medical photographic service and other special services.

SERVICES PROVIDED

1. ROUTINE SERVICES

1.1. PUBLICATIONS

1.1.1. Myanmar Health Sciences Research Journal

The MHSR Journal publishes long articles and short report in the field of biomedical and health sciences. The Journal printed in 500 copies is published every 4 months in a year (i.e. April, August and December). In 2006, Myanmar Health Sciences Research Journal Vol. 17 No. 1(April 2005), and Vol. 18 No.1(April 2006) were published. Myanmar Health Sciences Research Journal, Vol.17 No.2 (August 2005), and Vol. 17 No.3 (December 2005) have been processed for publishing. Now, they are ready to be printed. Myanmar Health Sciences Research Journal, Vol.18 No. 2 (August 2006), and Vol. 18 No. 3 (December 2006) are still being formatted.

1.1.2. DMR (LM) Bulletin

The format of publishing the Bulletin was changed in 2006. Due to lack of review articles, the Editorial Committee decided to stop publishing the Bulletin, printed quarterly for the period of between November, 2004 and August, 2006. The Committee gave the guidance to publish the DMR (LM) Bulletin (monthly) in new style starting from September, 2006. It covers international and local news about medicine & health, highlighting the research findings applicable to health and news related to medical research activities in Department of Medical Research (LM). The Bulletin is printed in 660 copies. In 2006, DMR Bulletin (quarterly) -Vol.18/1(January, 2004), Vol.18/2(April, 2004), Vol. 18/3 (July 2004) and Vol. 18/4 (October, 2004) and DMR (LM) Bulletin (monthly)- September, October, November, December 2006 were published.

1.1.3. The delivery program

The mailing list of the MHSR Journal and the DMR (LM) Bulletin was reviewed under the guidance of the Editorial Committee so as to be delivered all over the country (i.e. up to township hospitals) by postal services.

1.2. PRESS PRINTING SERVICE

Press printing was done for regular publications of MHSR Journals, DMR Bulletins and other special publications such as Lecture Guide on Research Methodology.

1.3. COMPUTER SERVICE

Computer service was provided for formatting of MHSR Journals, DMR Bulletins, special publications and divisional works.

1.4. MEDICAL PHOTOGRAPHIC SERVICE

Medical photographic work was given for documentations of various activities held in DMR (LM) including Myanmar Health Research Congress, workshops, seminars, symposia, meetings and etc. Moreover, documentation of laboratory specimens, electrophoresis gel plates, antibiotic sensitivity gel plates and enlargement of old documentaries (black and white and color prints) were also carried out.

2. SPECIAL SERVICES

Special services included the followings: binding works, wax-printing and printing patient registration cards, label sheets, information pamphlets, record sheets and booklets for Hepatitis 'B' carrier Clinic.

ADMINISTRATIVE DEPARTMENT

DIRECTOR (ADMIN)	- DR. YE` HTUT M.B.B.S(Medical)PRCD(Edin)Ph.D
DEPUTY DIRECTOR (ADMIN)	- DR. YE` TINT LWIN M.B.B.S MMed.Sc(Physio)Ph.D
ASSISTANT DIRECTOR (ADMIN)	- U NAY WIN B.Sc (Phy)

PERSONAL ADMINISTRATION SECTION

STAFF OFFICER	- DAW AYE AYE SHEIN B.A(History)
OFFICE SUPERINTENDENT	- DAW KHIN MAW B.A(Philosophy)
BRANCH CLERK	- DAW THI THI AYE B.Sc (Zoo)
SENIOR CLERK	- DAW AYE MYAT KO B.Sc (Maths) - U AUNG KYAW HTOO(10 th Passed)
JUNIOR CLERK	- DAW SAW SADNDAR PA PA WIN (10 th Passed) VACANT - 1
STENO	- DAW KHIN MAR AYE (HSF) - DAW AYE AYE KHING (9 th Passed)
JUNIOR TYPIST	- U TUN TUN WIN (9 th Passed) - DAW SAN SAN HTAY (9 th Passed) - DAW KHIN HTAY NWE (9 th Passed) - DAW THAN THAN AYE (9 th Passed) - DAW THAN THAN MYINT (9 th Passed) - U THET KHINE (9 th Passed) - DAW HLAING MAR (9 th Passed) - DAW TIN TIN HTIKE (9 th Passed) VACANT - 3
PEON	- U KYI LWIN

GENERAL ADMINISTRATION SECTION

STAFF OFFICER	- U AYE KYAW B.A(Geo)
OFFICE SUPERINTENDENT	- DAW THEIN THEIN YIN B.A(History)
BRANCH CLERK	- U KYI NYUNT B.Sc (Phy)
SENIOR CLERK	- DAW TIN AYE MU B.A(Philosophy) - DAW KHIN THANDA SOE (10 th Passed) - DAW AYE AYE MAR B.A(Geo)
JUNIOR CLERK	- DAW HNIN SHWE B.A(LAW) - DAW AMI KYAW (10 th Passed) - DAW ZIN THAW THAW TUN (10 th Passed) - DAW ZIN MAR KHIN NYO B.A (Eco) VACANT - 1

TELEPHONE OPERATOR (4)	- U HTAY AUNG (9 th Passed) - DAW SOE SOE AUNG (9 th Passed)
RECORT SUPPLIER	- U KO KO GYI (8 th Passed)
GESTETNER MAN	- U MYINT OO (9 th Passed)
SECURITY - 3	- U KHIN MAUNG AYE (8 th Passed)
JEMADER	- U MYINT AUNG (9 th Passed) VACANT – 2
PEON	- U KYAW SOE MOE (9 th Passed) - DAW NEW KATHI WIN (9 th Passed) - DAW NYEIN NYEIN EI (9 th Passed) - U AUNG MYAT OO (9 th Passed) - DAW TIN SANDAR TUN (9 th Passed) - DAW LWIN LWIN MOE (9 th Passed) - DAW MAY THAT AUNG (9 th Passed) VACANT – 5
SECURITY STAFFS	- U MYINT WAI - U SOE NAING - U SOE THAN OO - U SAN LWIN - U PAW MYINT - U SAN TUN AUNG - U PHONE KYAW - U WIN KO KO - DAW YI YI WIN VACANT – 11
SWEEPER STAFFS	- DAW NAW ZIN BAR - DAW HIA MYAING - DAW TIN TIN NWE - DAW TIN OO - DAW AYE AYE NGWE - DAW THAN YEE - DAW THAN SEIN - DAW THAN THAN SHEIN - DAW THAN AYE - 1 - DAW THAN AYE - 2 - DAW YIN HTWE - U SAW KHAING ZAL - DAW KHIN MYINT MAW - DAW LU LU HTWE - DAW AYE AYE PO - DAW KHIN MAR SAN VACANT – 4

WOEKER(GARDEN)STAFFS	- U KYAW MIN-2 - DAW SANDAR WIN - U SAN MAUNG - DAW TIN MYINT - DAW KHIN MAR LAY VACANT – 5
DRIVER - 3	- U THEIN HAN
DRIVER – 4	- U HTAY WIN VACANT – 1
DRIVER – 5	- U KHIN MAUNG NAING - U NOE - U AUNG AUNG - U TUN TUN - U AUNG MIN - U TIN HTAY - U YAN AUNG - U TUN WAI - U THET NAING - U TUN SHWE - U AUNG MYO OO - U MAN KO KO - U MYAT KO KO VACANT – 9

INTERNATIONAL HEALTH SECTION

STAFF OFFICER	- DAW KHIN MYAT MON BS.C(Phy)
OFFICE SUPERINTENDENT	- U MYINT SWE BS.c(Chem)
BRANCH CLERK	- DAW TIN LATT LATT B.A(Myanmar)
SENIOR CLERK	- DAW MYINT KAY THWE B.A(Myanmar)
JUNIOR CLERK	- DAW MI MI THAW (10 th Passed)
PEON	- DAW THAN THAN SOE (9 th Passed)

BUTGET AND ACCOUNT DIVISION

STAFF OFFICER Head	- U SEIN THAUNG B.A(Geo)
STAFF OFFICER	- U TIN MAUNG TUN (LL.B)
ACCOUNTANT GRAD - 1	- DAW KHIN KHIN MYINT BS.c (Phy)
ACCOUNTANT GRAD – 2	- U TIN SHEIN BS.c (Phy) - DAW MAR LAR SWE (10 th Passed)
SENIOR CLERK	- DAW HLA MYAT MON (10 th B Passed) - DAW NWET NWET YEE B.Sc(Zoo) - DAW AYE AYE LWIN (10 th B Passed)

JUNIOR CLERK	- DAW SAW TANDAR AYE (10 th Passed)
	- DAW YIN YIN NU (10 th Passed)
	- DAW KHIN WIN MON (10 th Passed)
	- DAW HTAY HTAT WIN B.A(B.M)
	- DAW NGU WAR (10 th Passed)

PROCUREMENT STORE & DISTRIBUTION DIVISION

STAFF OFFICER Head	- DAW MYINT SEIN BS.c (Phy)
STAFF OFFICER	- U THEIN MYINT B.A(Eco)

PROCUREMENT SECTION

OFFICE SUPERINTENDENT	- U AUNG TUN (10 th Passed)
BRANCH CLERK	- U YE` MOE AUNG B.A(Myanmar)
SENIOR CLERK	- DAW AYE AYE MAW B.A(Myanmar)
	- DAW CHO CHO WIN B.A(History)
	- DAW MOE MOE KHINE B.A(Geo)

JUNIOR CLERK	- U PYAE SONE HTOO (10 th Passed)
	- DAW LE` LE` MYINT (10 th Passed)

PEON	- VACANT – 1
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STORE & DISTRIBUTION SECTION

STORE KEEPER - 1	- -
STORE KEEPER - 2	- DAW THI DAR MOE BS.c (Phy)
SENIOR CLERK	- DAW AYE AYE MON B.A(History)
JUNIOR CLERK	- DAW KYI KYI TUN (10 th Passed)
	- DAW NAN THIN THIN HTWE (10 th Passed)
	VACANT – 1
PEON	- U NAY TUN

DIRECTOR- GENERAL	- 1
DEPUTY DIRECTOR-GENERAL	- 1
TOTAL	<u>- 2</u>

RESEARCH STAFF

1. DIRECTOR (RESEARCH)	- 5
2. DEPUTY DIRECTOR (RESEARCH)	- 17
3. RESEARCH SCIENTIST	- 28
4. RESEARCH OFFICER	- 87
TOTAL	<u>- 137</u>

TECHNICAL STAFF

1. MEDICAL TECHNICIAN - 1	- 5
2. RESEARCH ASSISTANT - 2	- 70
3. RESEARCH ASSISTANT - 3	- 67
4. RESEARCH ASSISTANT - 4	- 51
5. NURSE - 3	- 8
6. WORKER (LABORATORY)	- 23
TOTAL	<u>224</u>

ADMINISTRATIVE STAFF

7. DIRECTOR (ADMIN)	- 1
8. DEPUTY DIRECTOR (ADMIN)	- 1
9. ASSISTANT DIRECTOR (ADMIN)	- 1
10. STAFF OFFICER	- 7
11. STAFF	- 111
TOTAL	<u>- 121</u>
TOTAL	<u>- 484</u>

RESEARCH STUDENTS**AH MAR YI**

Degree: PhD (Zoology)
 Host: Pathology Research Division & Yangon University
 Title: Hemoglobin A1c level in Malaria infection
 Co-Supervisor: Dr. Ne Win

AYE AYE TUN

Degree: PhD (Zoology)
 Host: Bacteriology Research Division
 Title: Serotyping, antibiotic sensitivity and plasmid profile
 of bacteria isolated from children with diarrhea
 Supervisor: Dr. Mar Mar Nyein

AYE MI MI HTWE

Degree: PhD (Chemistry)
 Host: Medical Entomology Research Division and Yangon
 University
 Title: Screening of natural insecticides from tropical plants
 against termites
 Supervisor: Dr Aye Aye Tun
 Co-supervisor: U Pe Than Htun, U Sein Min

AYE MYINT SEIN

Degree: PhD (Chemistry)
 Host: Pharmaceutical toxicology RD, DMR (LM) & Dept.
 of Chemistry, Yangon University.
 Thesis : Isolation and Identification of Antidiarrheic
 Active Principles of Seik-Phoo (*Barleria prionitis*
L., Acanthaceae)
 Supervisor: Prof. Mg Mg Htay
 Co-supervisor: Dr. Thaw Zin

AYE THIDA

Degree: PhD (Zoology)
 Host: Pathology Research Division & Dagon University
 Title: Histopathological study of pig liver
 Co-supervisor: Dr. Ne Win

AYE WIN SET

Degree: DrMedSc (Internal Medicine)
 Host: Pathology Research Division & Yangon General
 Hospital
 Title: To measure bronchoalveolar lavage fluid ferritin
 level
 Co-Supervisor: Dr. Ne Win

AUNG AUNG MAW

Degree: PhD (Zoology)
 Host: Pharmacology Research Division
 Title: Anti- diarrhoeal effect of *Cuminum cyminum* Linn.
 (Ziya seed) extracts on Albino mice
 Co-Supervisor: Dr. Ne Win

BO BO WIN

Degree: M.Med.Sc (Pathology)
 Host: Pathology Research Division & Defense Services
 General Hospital
 Title: The study of cell cycle inhibitor p16
 immunoexpression in Invasive breast cancer
 Co-supervisor: Dr. Ne Win

CHERRY

Degree: PhD (Zoology)
 Host: Pathology Research Division and Yangon
 University
 Title: Haemoglobin A1 C level in pregnant mothers at
 risk for gestational diabetes
 Co-supervisor: Dr. Ne Win

CHO LWIN AUNG

Degree: M.Med.Sc (Physiology)
 Host: Pathology Research Division & University of
 Medicine (1)
 Title: The cardiovascular reflex activity in iron
 overloaded b thalassaemia patients
 Co-supervisor: Dr. Ne Win

HEIN ZAW

Degree: M.Med.Sc (Pathology)
 Host: Pathology Research Division & Defense Services
 General Hospital
 Title: Determination of Urinary protein in Nephrotic
 Syndrome by Electrophoresis
 Co-supervisor: Dr. Ne Win

HLA HLA WIN

Host: Biochemistry Research Division
 Degree: Ph D (Chemistry)
 Title :Studies on tyrosinase enzyme from straw
 mushroom (*volvanella volacea*)
 Co-supervisor :Dr. Theingi Thwin

HTAY HTAY KHINE

Degree: PhD (Chemistry)
 Host: Medical Entomology Research Division and
 Yangon University
 Title: Studies on the larvicidal activity of natural products
 against the vector mosquitoes
 Supervisor: Dr Aye Aye Tun
 Co-supervisor: U Pe Than Htun, U Sein Min

HTAY HTAY TIN

Degree: PhD (Pathology)
 Host: Pathology Research Division and Yangon Children
 Hospital
 Title: Protective effect of Thalassemia / Hemoglo-
 binopathy in Plasmodium falciparum malaria

K KHINE THU

Degree: MMedSc (Pharmacology)
 Host Pharmacology Research Division, DMR (LM)
 Thesis : Diuretic effect of *Alycarpus viganalis*
 (oHrEdkifausmufrEdkif) on albino rats
 Co- supervisors: Dr. May Aye Than

KHI PYONE KYI

Degree: PhD (Zoology)
 Host: Pathology Research Division & Yangon University
 Title: Karyotyping on Buffalos in Myanmar
 Co-supervisor: Dr. Ne Win

KHIN AYE

Degree: PhD (Zoology)
 Host: Pathology Research Division & Pyay University
 Title: Prevalence of Thalassaemia and Hemoglobin E in
 Chin Indigenous Race (Bago – West Region)
 Co-Supervisor: Dr. Ne Win

KHIN CHIT

Degree Ph.D (Pharmacology)
 Host Pharmaceutical Toxicology Research Division,
 DMR (L.M) & Dept. of Pharmacology, University
 of Medicine 2 (Ygn).
 Thesis Pharmacological and Bacteriological Factors that
 can Affect the Outcome of Fixed-dose
 Combination Therapy in the Treatment of
 Pulmonary Tuberculosis
 Supervisor Prof. Dr. Kyaw,
 Co-supervisor - Dr. Thaw Zin

KHIN CHO MYINT

Degree: Ph D(Zoology)
 Host: Physiology Research Division
 Title: Biological and behavioral profile of Angora rabbit
 bred at the Department of Medical Research (Lower Myanmar).
 Co-Supervisor Dr Ye Tint Lwin

KHIN CHO CHO OO

Degree: Ph D(Botany)
 Host: Pharmacology Research Division
 Title: Comparative morphology anatomy and
 pharmcognosy studies on some species of genus
 Hedychium
 Co-Supervisor: Dr May Aye Than

KHIN MAY OO

Degree: Ph D (Microbiology)
 Host: Quality Control Division, Hepatitis B Vaccine
 Plant, DMR (LM)
 Title: Characterization of Plasma-derived and Recombinant
 hepatitis B vaccines produced in Myanmar
 Supervisor: Professor Kyi Kyi Thinn

KHIN MOE KYWE

Degree: PhD (Pathology)
 Host: Pathology Research Division & Defense service
 Medical Academy
 Title: Detection of Philadelphia chromosome by PCR
 based method in Chronic myeloid leukemia
 Supervisor: Dr. Ne Win

KHIN MOE MOE NWE

Degree Ph D (Chemistry)
 Host Biochemistry Research Division
 Title Enzymic studies on Bromelain Enzyme from
 pineapple stem
 Co-supervisor Dr. Theingi Thwin

KHIN NAN MYINT

Degree: Ph.D (Zoology)
 Host: Parasitology Research Division
 Title: Microscopic and serological diagnosis of malaria in
 two malaria Endemic areas of Kachin state
 Co-supervisor ; Dr. Ye Htut

KHIN SABAI HTUT

Degree: PhD (Zoology)
 Host: Pathology Research Division & Pathein University
 Title: Haematological profiles of Goat (*Capra hius*)
 Co-supervisor: Dr. Ne Win

KHIN SAN TUN

Degree: PhD (Zoology)
 Host: Pathology Research Division and Yangon
 University
 Title: Apoptosis Expression in childhood soft tumors.
 Co-supervisor: Dr. Ne Win

KHIN SAN NU

Degree: PhD (Zoology)
 Host: Pathology Research Division and Yangon
 University
 Title: Pharmacognostic study on *Lawsonia intermis* Linn:
 antiamoebic activity of *Lawsonia intermis* Linn on
 amoebic dysentery
 Co-supervisor: Dr. Ye Htut

KHIN SAN YU

Degree Ph.D (Chemistry)
 Host Pharmaceutical Toxicology Research Division,
 DMR (LM) & Dept. of Chemistry, Yangon
 University
 Thesis Investigation of Toxicity, Antimicrobial Activity
 and Organic Compounds of Leik-Su-Shwe
 (*Barleria prionitis* L., Acanthaceae) and Nwa-
 Mye-Yin (*Cyperus scariosus* Br., Cyperaceae)
 Supervisor Prof. Mg Mg Htay,
 Co-supervisor - Dr. Thaw Zin.

KHIN SWE OO

Degree: Ph.D (Zoology)
 Host: Parasitology Research Division
 Title: In vitro and in vivo drug sensitivity of
Plasmodium vivax to chloroquine
 Co-Supervisor: Dr. Ye Htut

KHIN TARYAR MYINT

Degree: PhD (Chemistry)
 Host: Pharmacology Research Division
 Title: Isolation and Structural Identification of Some
 Hypoglycemic Activity Compounds from Selected
 Mnyanmar Medicinal Plant, *Clerodendrum*
Phlomide Linn
 Co-supervisor: Dr. May Aye Than

KHIN THAN AYE

Degree: PhD (Zoology)
 Host: Medical Entomology Research Division and
 Yangon University
 Title: Seasonal abundance and larvivorous potential of
Aplochelus panchex in Yangon Division
 Supervisor: Professor Daw Tin Nwe
 Co-supervisor: U Pe Than Htun, Dr. Maung Maung Mya

KHIN THUZAR

Degree: PhD (Botany)
 Host: Pharmacology Research Division
 Title: Pharmacogonostic study on *Canna indica* Linn
 Co-supervisor: Dr. May Aye Than

KHINE WAI OO

Degree: PhD (Zoology)
 Host: Pathology Research Division, Yangon University
 Title: Chromosome studies in Cows, Myanmar
 Co-supervisor: Dr. Ne Win

KYAW ZAY YA

Degree : M Med Sc. (Int. M ed.).
 Host : CRU(Malaria) D.S.G.H. Mingaladon
 Title: A study of relationship between ABO blood group
 types and *Plasmodium falciparum* malaria
 Supervisor: Lt Col Win Win Myint

KYI KYI SAN

Degree: PhD (Zoology)
 Host: Pathology Research Division Yangon University
 Title: Determination of Total and differential cholesterol
 levels in pig.
 Co-supervisor: Dr. Ne Win

KYI KYI THAN

Degree: PhD (Zoology)
 Host: Pathology Research Division Yangon University
 Title: Screening of unstable haemoglobin in transfusion
 taking from Thalassaemia and leukemia
 Co-supervisor: Dr. Ne Win

LEI LEI OO

Degree: PhD (Zoology)
 Host: Pathology Research Division & Yangon University
 Title: Hemoglobin Profile in uncomplicated Malaria
 Patients
 Co-Supervisor: Dr. Ne Win

LWIN LWIN OO

Degree: PhD (Zoology)
 Host: Pathology Research Division Yangon University
 Title: Anemic condition in teenage pregnancy(18-19)
 Co-supervisor: Dr. Ne Win

MAW MAW OO

Host: Biochemistry Research Division
 Degree: Ph D (Chemistry)
 Title: Studies on enzymic activity of polyphenol oxidase
 from Taro
 Co-supervisor Dr. Theingi Thwin

MAY THI OO

Host: Pharmacology Research Division
 Degree: Ph D (Chemistry)
 Title Chemical and bioactivity investigation of Natha-
 ni (*Pterocarpus santalinus* Linn.) wood and Thit-
 Kado (toona ciliata M.Roemer) roots
 Co-supervisor Dr. May Aye Than

MIN AUNG ZAW

Degree: MMedSc(Physiology)
 Host: Physiology Research Division
 Title: Relationship between maternal weight changes
 with pregnancy outcome in growing and non-
 growing adolescents.
 Supervisor Dr Ye Tint Lwin

MOH MOH HTUN

Degree: Ph.D.(Pathology)
 Host: Pathology Research Division
 Title: A study of molecular detection of hepatitis B and C
 viral genome in the liver tissues of primary
 hepatocellular carcinoma cases.
 Supervisor Prof.Aye Aye Myint , Department of
 Pathology, University of Medicine(1)

MU MU MYINT

Degree: PhD (Zoology)
 Host: Pathology Research Division & East Yangon
 University
 Title: Local production of fetal calf serum
 Co-Supervisor: Dr. Ne Win

MYAT MON THUZAR

Degree MMedSc (Pharmacology)
 Host Department. of Pharmacology, University of
 Medicine 1 (Ygn)
 Thesis Influence of hyperthyroidism on the
 pharmacokinetic of propranolol in Myanmar
 subjects
 Supervisor Prof. Dr. Nan Hla Hla Win
 Co-supervisor - Dr. Thaw Zin

MYO THANDAR HTUT

Degree MMedSc (Pharmacology)
 Host Pharmacology Research Division
 Thesis Comparative morphology anatomy and The
 Hypoglycemic effects of some medicinal plants
 on animal model
 Co-supervisor. Dr. May Aye Than

NI NI SOE

Degree: PhD (Zoology)
 Host: Pathology Research Division & Dagon University
 Title Application of staphylococcal clumping test for the
 determination of urinary FDP in pregnancy
 associated hypertension
 Co-supervisor: Dr. Ne Win

NI NI TUN

Degree PhD (Botany)
 Host Pharmacology Research Division
 Thesis Comparative morphology anatomy and
 pharmcognosy studies on some species of family
 genus Zingiber
 Co-supervisor. Dr. May Aye Than

NWE NI WIN

Degree MMedSc (Pharmacology)
 Host Dept. of Pharmacology, University of Medicine 1
 (Ygn)
 Thesis Pharmacokinetics of Methotrexate in
 Choriocarcinoma
 Supervisor Prof. Dr. Nan Hla Hla Win
 Co-supervisor- Dr.Thaw Zin

OHN MAR

Degree: M.Med.Sc (Medicine)
 Host: Pathology Research Division & Yangon General Hospital
 Title: Clinical Significance of serum FDP in patient with rheumatoid arthritis
 Co-supervisor: Dr. Ne Win

OHNMAR AYE

Host Biochemistry Research Division
 Degree Ph D (Botany)
 Title Characteristic and properties of a-amylase enzyme from mung beans
 Co-supervisor Dr. Theingi Thwin

OHN MAR KO

Degree: PhD (Chemistry)
 Host: Pharmacology Research Division
 Title: Investigation of biological activity and some organic compound of Mango seed
 Co-supervisor: Dr. May Aye Than

SAN SAN HTAY

Degree: PhD (Zoology)
 Host: Pathology Research Division & Dagon University
 Title: Haematological profiles of Avian (Chickens)
 Co-supervisor: Dr. Ne Win

SANDAR CHO

Degree: PhD (Botany)
 Host: Pharmacology Research Division
 Title: Comparative morphology anatomy and pharmacognosystudies on some species of family Musaceae
 Co-supervisor: Dr. May Aye Than

SANDAR AUNG

Degree: PhD (Zoology)
 Host: Pharmacology Research Division
 Title: Blood sugar lowering effects of the Rhizomes of *Curcuma longa* Linn (Nanwin) and the leaves of *Azadirachta indica* A.Juss (Tama) in rabbit model
 Co-supervisor: Dr. May Aye Than

SANDAR WIN

Degree: PhD (Zoology)
 Host: Pathology Research Division Yangon University
 Title: The comparative study of the blood sugar level in different animal
 Co-supervisor: Dr. Ne Win

SAO KHON TUN

Degree: MMedSc(Physiology)
 Host: Physiology Research Division
 Title: Energy cost of common activities in medical cadets
 of Defense Services Medical Academy
 Supervisor Dr Ye Tint Lwin

SWE LWIN HTIKE

Host Biochemistry Research Division
 Degree Ph D (Chemistry)
 Title Enzymic studies on Papain Enzyme and some
 possible application
 Co-supervisor Dr. Theingi Thwin

THANDAR OO

Degree: PhD (Botany)
 Host: Pharmacology Research Division, DMR (LM)
 Thesis: Study on the Economic of legumes in Hinthada
 District
 Co-supervisor: Dr. May Aye Than

THAZIN HLAING

Degree: PhD (Zoology)
 Host: Pathology Research Division & East Yangon
 University
 Title: Mass production of Bovine serum albumin
 Co-Supervisor: Dr. Ne Win

THEIN THEIN HLAING

Host Biochemistry Research Division
 Degree Ph D (Chemistry)
 Title Enzymatic studies on lipase from rice bran
 Co-supervisor Dr. Theingi Thwin

THIDA

Degree: PhD (Zoology)
 Host: Pathology Research Division and Yangon University
 Title: Cytogenetic studies in some Domestic Pigs in
 Myanmar.
 Co-supervisor: Dr. Ne Win

THIDA HNIN

Degree: Ph D(Zoology)
 Host: Physiology Research Division
 Title: Effect of breeding diet on reproductive performance
 of laboratory mice (DDY train) of the Department
 of Medical Research (Lower Myanmar)
 Co-Supervisor Dr Ye Tint Lwin

THET THET AUNG

Degree: Ph D(Chemistry)
 Host: Pharmacology Research Division
 Title: Investigation of antimicrobial activity and some organic compound of *Cissus quadrangularis* and *Acacia arabica*
 Co-Supervisor Dr May Aye Than

THIDA MYINT

Degree: Ph D(Botany)
 Host: Pharmacology Research Division
 Title: Morphological and Histological Characters of *Morinda citrifolia* (Noni) and it's hypoglycemic activity
 Co-Supervisor Dr May Aye Than

TIN MAR YI HTUN

Degree: PhD (Zoology)
 Host: Medical Entomology Research Division and Dagon University
 Supervisor: Associate Professor U Win Maung
 Title: Studies on biology and ecology of *Aedes aegypti* (Diptera: Culicidae), the vector of Dengue Haemorrhagic Fever (DHF) in some high risk areas of Yangon City
 Co-supervisor: Dr Thaug-Hlaing, Dr. Maung Maung Mya

TIN TIN HTAY

Degree: MMedSc (Microbiology)
 Host: Parasitology Research Division
 Supervisor: Dr Ye Htut
 Title: Parasite clearance of Herbal antimalarial Plasmogine for uncomplicated falciparum malaria.
 Supervisor: Dr Ye Htut

TIN TIN MYO

Host Biochemistry Research Division
 Degree Ph D (Chemistry)
 Title Studies on enzymic activity of polyphenol oxidase from avocado fruits
 Co-supervisor Dr. Theingi Thwin

TUN TUN ZAW

Degree: M.Med.Sc (Pathology)
 Host: Pathology Research Division & Defense Services General Hospital
 Title: Neonatal Screening of Haemoglobinopathies and alpha thalassaemia
 Co-supervisor: Dr. Ne Win

U MAUNG MAUNG TAR

Degree: PhD (Zoology)
 Host: Pathology Research Division Yangon University
 Title: A study on prevalence of thalassaemia and HbE in some malaria endemic village, Pyay district, Bago division.
 Co-supervisor: Dr. Ne Win

YEE HTWE

Degree: PhD (Zoology)
 Host: Pathology Research Division
 Title: Parasitological indices of malaria infection in some villages of Thaton township.
 Co-supervisor: Dr. Ne Win

YIN HTWAY SI

Degree: PhD (Zoology)
 Host: Pharmacology Research Division
 Title: Hypoglycemic effect of *Scoparia dulcis* on adrenaline induced hyperglycemic rabbit model
 Co-supervisor: Dr. May Aye Than

U SA SOE SHWE

Degree: PhD (Zoology)
 Host: Pathology Research Division Yangon University
 Title: Haematological Profile in sheep of Myanmar
 Co-supervisor: Dr. Ne Win

WAH WAH AUNG

Degree: PhD (Microbiology)
 Host: Bacteriology Research Division
 Title: Phenotypic and genotypic characteristics of gonococcal isolates from patients attending STD clinics in Yangon
 Supervisor: Prof. Kyi Kyi Thinn

WAI LIN OO

Host Biochemistry Research Division
 Degree Ph D (Chemistry)
 Title Studies on enzymic activity of Frcin from fig latex
 Co-supervisor Dr. Theingi Thwin

WAI WAI OO

Degree: DrMedSc (Internal Medicine)
 Host: Pathology Research Division & Thingangyun Sanpya Hospital
 Title: Anti Thrombin three level in complicated P.f malaria
 Co-Supervisor: Dr. Ne Win

WIN WIN MAW

Degree: PhD (Zoology)
Host: Bacteriology Research Division
Title: Identification, serotyping, and plasmid extraction of
bacteria isolates from soft drinks
Supervisor: Dr. Mar Mar Nyein

WIN WIN MAY

Degree Ph.D (Pharmacology)
Host Dept. of Pharmacology, University of Dental
Medicine, (Ygn).
Thesis Role of Propranolol Blood Levels in the Control of
GI Bleeding in Liver Cirrhotic Patients.
Supervisor Prof. Dr. Nan Hla Hla Win,
Co-supervisor - Dr. Thaw Zin.

WUT HMONE

Degree: MMedSc (Pharmacology)
Host: Bacteriology Research Division
Supervisor: Prof. Dr. Marlar Myint
Title: In-vitro antibacterial activity of Morinda citrifolia linn
(Ye Yo)
Co-supervisor: Dr. Khin Nwe Oo

YI YI MAR

Degree: PhD (Zoology)
Host: Pathology Research Division Yangon University
Title: Study on anaemia in Malaria infection
Co-supervisor: Dr. Ne Win

YIN THEINT THEINT THWIN

Degree: PhD (Zoology)
Host: Pathology Research Division Yangon University
Title: A study on hemostatic system in Avians
Co-supervisor: Dr. Ne Win

YU YU AUNG

Degree: PhD (Zoology)
Host: Pathology Research Division & North Okalapa
General Hospital
Title: Unstable haemoglobin studies in pregnant mother in
North Okalapa General Hospital
Co-supervisor: Dr. Ne Win

**CONSULTANTS/ADVISORS TO DEPARTMENT OF MEDICAL
RESEARCH DURING 2006**

Sr No.	Name/Inst.	Description	Duration
1.	Associate Professor K. Yokota	<i>Helicobacter pylori</i> urine ELISA assay	4 days
2.	Dr Catherine Walton	Lecturer, Faculty of Life Science, University of Manchester (UK)	9 days
3.	Dr Katherine Ba Thike, Area Manager for Asia and Pacific, WHO/RHR, Geneva	Meeting on reproductive health research activities in Department of Medical Research (Lower Myanmar), 28-8-06 at DMR(LM)	1 day
4.	Dr Toshiyuki Shinji	Collaborative Research studies between Okayama University , DMR (LM) and DMS	5 days
5.	Dr Toshiyuki Shinji	Collaborative Research studies between Okayama University , DMR (LM) and DMS	5 days
6.	Dr. Eizo Takahashi	Enteropathogenic <i>E. coli</i> pathogenic gene assay	5 days
7.	Dr. Jaspal Sokhey	WHO (SEARO)	1 days
8.	Dr. John Aaskov	Dengue Surveillance Workshop	5 days
9.	Dr. K. Ba Thike	Review and Evaluate Resource Maintenance Capacity Grant (2005)	1 day
10.	Dr. Y. Maeda	New serological test for diagnosis of leprosy	3 days
11.	Dr.Kwang-Soon Shin	Advisor, CJ	1 day
12.	Mr. Arvind Kukvety	Central Drugs Standard and Control Organization, New Zealand	1 day
13.	Mr. B.S.Bang	Project Manager, Myanmar T/F Team CJ corporation , ROK	10 days
14.	Mr. Jitondra Khanna	Facilitator on Workshop for Communication of Scientists and Researchers	1 day
15.	Mr. Lahauari Belgharbi	WHO (Head quarter)	1 days
16.	Mr. S.C.Jeong	General Manager, FAC Co, Ltd	5 days
17.	Mr. Sam S Lee	Manager, CJ Corporation, Republic of Korea	1 day
18.	Mr. Tomoaki Onda	Description of Hepatitis B Test Kits	5 days
19.	Dr. Kesrat Sukasum	Country Officer (Myanmar) from IAEA	1 day

20.	Dr.Sujit Khan	Country Radiation Protection Officer	1 day
21.	Dr.David Bell	Scientist, WHO Western Pacific Region, Manila	1 day
22.	Dr.Abdel Musin	IAEA project expert on drug resistant malaria.	14 days
23.	Mr.H.B.Lee	Engineer, Maintenance Section, CJ corporation , ROK	14 days
24.	Mr.Jeong & Mr.HB Lee	CJ	4 days
25.	Mr.JW Jun & Mr. LD Kwon	CHUNG-A H.V.A.C.	4 days
26.	Mr.Lee & Mr.HB Lee	Jinyong	1 day
27.	Mr.Mausa Linda Sitangga	WHO Inspector	1 day
28.	Mrs. S.Y. Baek	Food and Drug Administration, ROK	5 days
29.	Ms.Y.L.Kim	Food and Drug Administration, ROK	5 days
30.	Prof. C. K.S .Lee	Food and Drug Administration, ROK	5 days
31.	Prof. C.K.Lee	Advisor,Korea FDA	1 day
32.	Prof. Emeritus Shigeru Okada	Collaborative Research studies between Okayama University , DMR (LM) and DMS	3 days
33.	Prof. K.S. Shin	Chungnam National University ROK	4 days
34.	Prof. Norio Koide	Collaborative Research studies between Okayama University , DMR (LM) and DMS	5 days
35.	Prof. Shigeru Okada	Collaborative Research studies between Okayama University , DMR (LM) and DMS	5 days
36.	Prof. Shigeru Okada	Collaborative Research studies between Okayama University , DMR (LM) and DMS	5 days
37.	Professor Chung Keel Lee	Advisor, Korea FDA, Republic of Korea	3 days
38.	Professor K. Okamoto	Enteropathogenic <i>E. coli</i> pathogenic gene assay	4 days
39.	Professor Kwang-Soon Shin	Advisor, CJ Corporation, Republic of Korea	1 day
40.	Professor Kwang-Soon Shin	Advisor, CJ Corporation, Republic of Korea	1 day
41.	Professor M. Kai	New serological test for diagnosis of leprosy	3 days
42.	Validation Team	Validation Company, Republic of Korea	4 days

**INTERNATIONAL SEMINERS, WORKSHOPS AND SHORT
TRAINING COURSES**

Sr. No.	Name	Designation	Seminar/Workshop/Training
1	Dr. Hlaing Myat Thu	Deputy Director/ Head	WHO Training Course on Laboratory Diagnosis of Avian Influenza for SEAR countries, (20-24 February 2006)
2	Dr. Khin Thet Wai	Research Scientist	Proposal Development Workshop on Eco-Bio-Social Research on Dengue in Asia
3	Dr. Mo Mo Win	Research Scientist	Talk on prevention and crisis management of Bioterrorism
4	Dr. Mu Mu Shwe	Research Officer	Advanced Training Course on Cervical Cytology, (16 October – 22 December 2006)
5	Dr. San Aye	Deputy Director	Chemical Risk Assessment Workshop in strengthening ASEAN Risk Assessment Capability to support Food Safety Measures.
6	Dr. San Hla Mu	Deputy Director	Asia Pacific Academic Consortium for Public Conference
7	Dr. Win Mar Oo	Research Officer	WHO/TDR Advanced Course on Vaccinology, Immunology and Biotechnology, (6 September -21 October 2006)
8	Dr. Zin Zin Thu ,	Research Officer	Diagnosis of Haematological Disorders (WHO)

INTERNATIONAL FELLOWSHIP AND TRAINING COURSES

Sr.No.	Name	Fellowship	Duration	Country
1	Dr. Aye Aye Lwin	PhD course	2 years	Japan
2	Dr. Han Win	Training on Pulmonary Function Tests and Research on ARI	8 weeks	Thailand
3	Dr. Kyaw Soe	PhD course	2 years	Japan
4	Dr. Sann Sanda Khin	PhD course	2 years	Japan
5	Dr. Saw Saw	PhD	3.5 years	Australia
6	Dr. Thaung Hlaing	PhD (Molecular Entomology)	4 years	UK
7	Dr. Ohnmar May Tin Hlaing	Post graduate training on Environmental Toxicology, Technology and Management (AIT)	2 years	Thailand
8	Daw Khine Thin Naing	International Training course on Air Pollution Management	8 weeks	Thailand
9	U Aye Win Oo	Training on Veterinary (Healthy Liver Project)	One year	Korea

LOCAL SEMINERS, WORKSHOPS AND SHORT TRAINING COURSES

Sr No.	Name	Designation	Seminar/Workshop/Training
1.	Daw Kay Thi Aye	Research Officer	Dengue Surveillance Workshop (1-3 August 2006)
2.	Daw Khin Khin Aye	Research Officer	Advanced Good Manufacturing Practice course for Biological products.(Myanmar Food and Drug Administration)
3.	Daw Khin Mar Aye	Research Officer	Dengue Surveillance Workshop (1-3 August 2006)
4.	Daw Sandar Nyunt	Research Officer	Advanced Good Manufacturing Practice course for Biological products.(Myanmar Food and Drug Administration)
5.	Daw Than Than Lwin	Research Officer	Workshop on Research Methodology
6.	Daw Thin Thin Wah	Research Assistant(II)	Drug and Poison Information Services at the National Poison Control Centre. (DMR, NHL)
7.	Daw Tin Tin Htwe	Research Assistant(II)	Drug and Poison Information Services at the National Poison Control Centre. (DMR, NHL)
8.	Dr Yin Thet Nu Oo	Research Officer	Seminar on “Informed consent writing” (8-6-06)
9.	Dr. Mo Mo Win	Research Scientist	Seminar on prevention and crisis management of Biological Terrorism (Tokyo, Japan)
10.	Dr. Aung Zaw Latt	Research Officer	Advanced Good Manufacturing Practice course for Biological products.(Myanmar Food and Drug Administration)
11.	Dr. Hlaing Myat Thu	Deputy Director	Dengue Surveillance Workshop (1-3 August 2006)
12.	Dr. Hlaing Myat Thu	Deputy Director	SRRT Module Adaptation Workshop for Avian Influenza (11-12 September 2006)
13.	Dr. Hlaing Myat Thu	Deputy Director	Rapid Response Team Workshop on Avian and Pandemic Influenza (21-24 November 2006)

14.	Dr. Khin Chit	Research Scientist	Training on Quality Assurance System and Methods in the development of Traditional Medicine (DTM, Nay-Pyi-Daw)
15.	Dr. Khin Chit	Research Scientist	Workshop on Research Methodology, DMR(LM)
16.	Dr. Khin Chit	Research Scientist	Immunology specialties Group Meeting for Developing Immunology (MAMS)
17.	Dr. Khin May Oo	Deputy Director	Advanced GMP Training, FDA,
18.	Dr. Khin Myo Aye	Research Officer	Workshop on Research Methodology (18.10.06-20.10.06)
19.	Dr. Kyaw Oo	Head/Research Scientist	Workshop on Planning for Master of Public Health Programme (17-1-06 to 18-1-06), DMS
20.	Dr. Kyaw Oo	Head/Research Scientist	Leprosy Research Core group meeting at Central Special Skin Clinic, Yangon (7-2-06)
21.	Dr. Kyaw Oo	Head/Research Scientist	Workshop on preliminary findings of Family and Youth Survey, at Department of Population (17-6-06)
22.	Dr. Kyaw Oo	Head/Research Scientist	Workshop on questionnaire development of 2006 Fertility and Reproductive Health Survey at Department of Population (27-10-06)
23.	Dr. Kyaw Oo	Head/Research Scientist	Meeting on “Development of curriculum of biostatistics core course to be used in University of Public Health”, (22-8-06) at PSM, University of Medicine 1, Yangon
24.	Dr. Kyu Kyu Than	Research Scientist	Training of trainers on Gender mainstreaming and application of gender analysis tools as a resource person
25.	Dr. Kyu Kyu Than	Research Scientist	Training of trainers on Adolescent Reproductive Health (MMCWA)
26.	Dr. Kyu Kyu Than	Research Scientist	Workshop on Fertility and Reproductive Health Survey 2006
27.	Dr. Kyu Kyu Than	Research Scientist	Dissemination of Research Findings on Gender research activities
28.	Dr. Moh Moh Htun	Deputy Director	PhD (Pathology), UM (1)

29.	Dr. Moh Moh Htun	Research Scientist	Advanced Good Manufacturing Practice course for Biological products.(Myanmar Food and Drug Administration)
30.	Dr. Mon Mon Aung	Research Officer	Research Methodology Workshop
31.	Dr. Myat Phone Kyaw	Deputy Director	Research Methodology Workshop (Facilitator)
32.	Dr. Myat Phone Kyaw	Deputy Director	Cyber Security Training Course
33.	Dr. Myat Tin Htwe Kyaw	Research Officer	Cyber Security Training Course
34.	Dr. Ngu Wah Hlaing	Research Officer	Research Methodology Work shop, DMR (LM)
35.	Dr. Phyu Phyu Aung	Deputy Director	Workshop on Implementation of WHO collaborative activities, Traders Hotel Yangon,
36.	Dr. Phyu Phyu Aung	Deputy Director	WHO workshop on Resource mobilization-project proposal writing and communication, Yangon,
37.	Dr. Phyu Phyu Aung	Deputy Director	Workshop on Communication for scientists and researchers DMR(LM)
38.	Dr. Phyu Phyu Aung	Deputy Director	Symposium on Strengthening the competencies of nursing and midwifery personnel for emergencies (MAMS, WHO, WHO-CC, UON, Yangon)
39.	Dr. Phyu Phyu Aung	Deputy Director	Temporary advisor in regional consultative meeting on Implementing global strategy on diet, physical activity and health in SEAR countries, Yangon
40.	Dr. Phyu Phyu Aung	Deputy Director	Symposium on Knowledge management: to narrow the know – do gap, Myanmar health research congress, DMR (LM)
41.	Dr. Phyu Phyu Aung	Deputy Director	Symposium on Healthy living: A vital invesmnt, Myanmar health research congress, DMR (LM)
42.	Dr. Phyu Phyu Aung	Deputy Director	Research Activities of DMR (LM) related to thiamine. Presentation made in Seminar on Infantile Beri Beri. Naypyidaw, January, 2007. UNICEF & MOH

43.	Dr. Phyu Phyu Aung	Deputy Director	Workshop on National Plan of Action on Implementing Global Strategy Diet, Physical Activity, and Health. Naypyitaw; Resource Person.
44.	Dr. Poe Poe Aung	Research Officer	Research Methodology Workshop
45.	Dr. San Shwe	Deputy Director	Workshop on Fertility and Reproductive Health Survey 2006
46.	Dr. San Shwe	Deputy Director	Workshop on Communications for scientists researchers
47.	Dr. Thaw Zin	Deputy Director	Research Methodology Workshop
48.	Dr. Thaw Zin	Deputy Director	The Seventh Conference of Myanmar Traditional Medicine Practitioners, Department of Traditional Medicine.
49.	Dr. Thaw Zin	Deputy Director	The 15 th Myanmar Military Medical Conference, Ministry of Defence.
50.	Dr. Thaw Zin	Deputy Director	Workshop on Communications for Scientists and Researchers (DMR-LM/WHO)
51.	Dr. Thaw Zin	Deputy Director	Short Training Course on Methodologies applied in Traditional Medicine Research(DMR-UM)
52.	Dr. Thaw Zin	Deputy Director	Training Workshop on Methodologies applied in Traditional Medicine Research(DMR-MM/WHO)
53.	Dr. Thaw Zin	Participants	Training on Quality Assurance System and Methods in the development of Traditional Medicine (DTM, Nay-Pyi-Daw)
54.	Dr. The Mg Mg	Research Officer	Research Methodology Workshop as a participant
55.	Dr. Theingi Win Myat	Research Officer	Drug and Poison Information Services at the National Poison Control Centre. (DMR, NHL)
56.	Dr. Tint Khine Myint	Research Scientist	Research Methodology, 2006
57.	Dr. Win Aung	Deputy Director	Advanced GMP for Biological products Myanmar FDA, Yangon
58.	Dr. Win Mar Oo	Research Officer	Dengue Surveillance Worksho (1-3 August 2006)
59.	Dr. Yae Chan	Research Officer	Research Methodology

60.	Dr. Ye Tint Lwin	Deputy Director	Research Methodology, 2006
61.	Dr. Ye Tint Lwin	Deputy Director	Workshop on training of trainers in development of physical health and fitness of adolescents
62.	Dr. Ye Tint Lwin	Deputy Director	A Satellite Symposium on Diabetes Mellitus
63.	Dr. Ye Htut	Deputy Director	Meeting of the Malaria Technical Working Group (31.5.06) one day WHO
64.	Dr. Ye Htut	Deputy Director	Training Workshop on Proposal development for Monitoring Therapeutic Efficacy of Antimalarial Drugs in Myanmar (1.6.06-3.6.06) Three days
65.	Dr. Ye Htut	Deputy Director	Workshop on Communications for Scientists and Researchers (14.8.06)WHO
66.	Dr. Ye Htut	Director Admin/ Research)	VBDC Annual Meeting (15.11.06)one day DOH
67.	Dr. Yin Yin Win	Research Officer	Research Methodology Workshop (Participant)
68.	Dr. Zaw Myint	Research Scientist	Advanced Good Manufacturing Practice course for Biological products.(Myanmar Food and Drug Administration)
69.	Dr. Ti Kyi Win	Research Officer	Advanced Good Manufacturing Practice course for Biological products.(Myanmar Food and Drug Administration)
70.	Pathology RD all	All staff	Laboratory Safety Guidelines
71.	Dr San Aye	Deputy Director	Workshop on Identification of key components of National Biosafety Framework, UNEP/GEF/MOAI
72.	Dr. San Aye Dr. Ohnmar May Tin Hlaing	Deputy Director Research Officer	Symposium on Arsenic Issues in Myanmar, MOH, UNICEF
73.	Dr San Aye	Deputy Director	Chemical Risk Assessment Case Studies Result Workshops in strengthening ASEAN Risk Assessment capability to support Food Safety measure. MOH/AADCP
74.	Dr San Aye	Deputy Director	Workshop on Final Draft of National Biosafety Framework, UNEP/GEF/MOAI

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|-----|------------------------------|------------------------|-----------------------------------|
| 75. | Dr. San Aye | Deputy Director | Air Quality Control Project |
| | Dr. Ohnmar May Tin
Hlaing | Research Officer | Meeting UNEP/NCEA |
| 76. | Dr San Aye | Deputy Director | Workshop on Air Quality |
| | Dr Ohnmar May Tin
Hlaing | Research Officer | Monitoring Project in
Myanmar, |
| | Daw Than Than Swe | Research Assistant (2) | UNEP, NCEA |

LIST OF PUBLICATIONS

1. AASKOV, J.G., BUZACOTT, K., HLAING MYAT THU, LOWRY, K and HOLMES, E.C. Long term transmission of defective RNA viruses in humans and mosquitoes. *Science* 2006; 311, 236-238.
2. AYE AYE MYINT AND TUN PE EXPERIMENTAL PRODUCTION OF GOAT RUSSELL'S VIPER ANTIVENOM. *Myanmar Health Sciences Research Journal* 2006; 18 (1): PP.17-20.
3. HAN WIN, AUNG THU, KHIN MYAT TUN, KHIN KHIN SWE MYAT, THAN THAN LWIN, SANDAR KYI, MYAT MYAT THU, TIN HTAR LWIN, AYE HNIN PHYU. Prevalence, awareness, correlates, treatment and control of hypertension in rural community of Waw Township, Bago Division. *Myanmar Health Sciences Research Journal*, 2006;18 (1): pp 41-47
4. HAN WIN, KHIN MYAT TUN, MAUNG MAUNG TOE, SAN HLA MU, WAH WAH AUNG, MO MO WIN and TOE TOE Prevalence of hypertension in Pardagyi village, Kyauktan Township *Myanmar Health Sciences Research Journal* 2005; 17(1): 22-26
5. HAN WIN, KHIN MYAT TUN, MAUNG MAUNG TOE, SAN HLA MU, WAH WAH AUNG, MO MO WIN, TOE TOE. Prevalence of Hypertension in Pardagyi village, Kyauktan Township. *Myanmar Health Sciences Research Journal*, 2005;17 (1): pp 22-26
6. HAN WIN, WIN MAUGN, KHIN MYAT TUN, KYU KYU THAN, AUNG THU, SANDAR KYI, THU ZAR MYINT. Gender differences and tuberculosis: health care seeking behaviors and perceptions of patients. *Myanmar Medical Journal*, 2005; 49 (1-4): pp 14-18.
7. KHIN MAUNG LAY, LE LE WIN, SAN SHWE, KO KO ZAW, PETER NE WIN, YE WIN THAN, TUN AUNG KYI, TIN MAUNG TSOH and KHINE SU WIN. Factors Influencing Compliance with Home Based Self-care Practices among People Affected by Leprosy with Disability in prevention of disability pilot project areas. (*Accepted For Publication In The Myanmar Health Science Research Journal.*)
8. KHIN NWE OO, NWE NWE YIN and TIN TIN HAN Prospective study of seroepidemiology: persistent seropositives developed leprosy *Myanmar Health Sciences Research Journal* 2005; 17 (3):
9. KHIN NWE OO, NWE NWE YIN, TIN TIN HAN and KYAW MYINT Seroepidemiology on extended contacts of new leprosy cases in Nyaungdon Township *Myanmar Health Sciences Research Journal* 2005; 17 (3):
10. KHIN SAW AYE, AYE AYE WIN, TIN ZAR MAW, KYAW KYAW AND KHINE SAN YIN COMPARISON OF POLYMERASE CHAIN REACTION, IMMUNOHISTOCHEMISTRY AND CONVENTIONAL HISTOPATHOLOGY IN THE DIAGNOSIS OF LEPROSY IN MYANMAR *Myanmar Health Sciences Research Journal* 2006; 18 (1): PP. 34-40.
11. KHIN SAW AYE, YIN MIN HTUN, AYE AYE WIN, TIN ZAR MAW AND KYAW KYAW. Evaluation Of Polymerase Chain Reaction (Pcr) Amplification Of *Mycobacterium Leprae* In Biopsy Specimens From Leprosy Patients *Myanmar Health Sciences Research Journal* 2006; 18 (1): PP. 21-25.

12. KHIN SAW AYE. The role of Immuno-Histopathology and Polymerase Chain Reaction in the diagnosis of leprosy. *The thesis submitted in the degree of Ph.D. (Pathology)*. University of Medicine I, Yangon. September 2006.
13. KYAW KYAW AND KHIN SAW AYE. A Case Of Multi-Drug Resistant Leprosy – Relapse Or Re-Infection? *Myanmar Journal Of Current Medical Practice* 2006; 10 (4): PP. 41-43.
14. KYAW OO, SAN SHWE, LE LE WIN, KYAW NYUNT SEIN, KYAW MYINT AND YE WIN THAN. Stigmatization among disabled persons affected by leprosy. (*Sent for publication in The Myanmar Health Science Research Journal.*)
15. KYAW OO, SAN SHWE, LE' LE' WIN, KYAW NYUNT SEIN, KYAW MYINT YE WIN THAN. Stigmatization among disabled persons affected by leprosy. *Myanmar Health Science Research Journal (To be published)*
16. MAY AYE THAN. Fake Artesunate Antimalarials in Myanmar. *DMR(Lower Myanmar) Bulletin, October 2006 , p-3*
17. MAY AYE THAN. Interaction of Herbs and Drugs. *DMR(Lower Myanmar) Bulletin, December 2006, p-3*
18. MYO MYO MON, MON MON, KYU KYU THAN, KHIN SANDAR OO, SAN SAN AYE, KYAW OO and SOE AUNG. Women's awareness of common female cancers in selected peri-urban townships. *Myanmar Health Science Research Journal (To be published)*
19. O P SINGH, D CHANDRA, N NANDA, S K SHARMA, PE THAN HTUN, T ADAK, S K SUBBARAO AND A P DASH. On the conspecificity of Anopheles fluviatilis species S with Anopheles minimus species C. *J Biosci* 31(5) December 2006.
20. PAING SOE, THAN LWIN, KHIN CHIT, THAW ZIN & TI TI. The Role of Traditional Medicine in the Treatment of Multidrug-resistant Pulmonary Tuberculosis, Myanmar. *WHO Southeast Asia Region, Regional Health Forum* 2006; 10(2): 1-10.
21. PODDER, G., BREIMAN, R., AZIM, T., HLAING MYAT THU, VELATHANTHIRI, N., LOWRY, K and AASKOV, J.G. Origin of dengue type 3 viruses associated with the dengue outbreak in Dhaka, Bangladesh, in 2000 and 2001. *American Journal of Tropical Medicine and Hygiene* 2006; 74, 263-265.
22. SAN SHWE, KYAW OO, LE LE WIN, YE WIN THAN, KYAW NYUNT SEIN, MOE THIDA AND KYAW MYINT. Assessment of social acceptance and self image among persons affected by leprosy in a community. (*Sent for publication in The Myanmar Health Science Research Journal.*)
23. SABAI, SAN SAN AYE, HTIN AUNG KYAW, MAY AYE THAN. Physicochemical and Pharmacological Characters of *Gloriosa superba* L. grown in Zalun, Laymyethna and Bago Township. *The Journal of the Myanmar Academy of Arts and Science, Vol IV , No.4 , June 2006 Botany , P-177.*
24. SEIN MIN, THAN MYAT HTAY, THAN THAN SWE, W TUN LIN, SEIN THAUNG, PE THAN HTUN, WIN WIN MAW AND SEIN HLA BO. The efficacy of Artemisia annua crude extracts on Anopheles dirus in the laboratory and shole plants on other mosquitoes in the field. *The Mya Health Sci Res J*, 17 (1) 2005, pg 15 – 21.

25. TETSUYA INAZU, ZAW MYINT, ASATO KUROIWA, YOICHI MATSUDA AND TAMIO NOGUCHI. Molecular cloning, expression and chromosomal localization of mouse MM-1. *Molecular Biology Reports* (2005), Vol.32, pp 273-279.
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