Abstracts

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3877 MAJLESSI, F.; SEKHAVATI, A.; SAEEDI, K. Q.; POORREZA, A. **Quality control of sputum smears examination by re-reading in a tuberculosis screening.** *Iranian Journal of Public Health* (2008) **37** (4) 76-81 Tehran, Iran; School of Public Health and Institute of Public Health Research, Tehran University of Medical Sciences [En, 17 ref.] Dept. of Health Promotion and Education, School of Public Health, Institute of Public Health Research, Tehran University of Medical Sciences, Tehran, Iran. Email: Dr_F _majlessi@yahoo.com

Background: Sputum smear examination is the basis of diagnosis of tuberculosis and quality control for the correct diagnosis of tuberculosis is necessary. This study was a method survey and performed with 930 smears with the aim to compare the confidence rate of sputum smear examination reported by one laboratory technician with the findings reported by two technicians in a tuberculosis screening program. Methods: In this method survey study in Qaemshahr, smears collected from one laboratory were sent to another laboratory for re-examination and duplicate reading and the findings were subsequently compared. Cultures were used as a standard control test. Results: Comparison showed that the rate of agreement between positive and negative findings of both laboratories was %73.8 and %99.3, respectively. First laboratory reading and its culture results were similar in 89% of cases. There was no significant decrease in the frequency of false negative results of smears which were read twice as compared to those which had been read once only. Conclusion: The current method of screening patients suspected with tuberculosis, in which all sputum smears are read by a single technician, is accepted as an accurate and reliable method for the diagnosis of tuberculosis.

3878 CHONG, V. H.; LIM, K. S. **Gastrointestinal tuberculosis.** *Singapore Medical Journal* (2009) **50** (6) 638-646 Singapore, Singapore; Singapore Medical Association [En, 11 ref.] Gastroenterology Unit, Department of Medicine, Raja Isteri Pengiran Anak Saleha Hospital, Bandar Seri Begawan, BA 1710, Brunei Darussalam. Email: chongvuih@yahoo.co.uk

Tuberculosis (TB) infection is still common and remains an important cause of morbidity and mortality, particularly in underdeveloped and developing nations. The gastrointestinal (GI) tract is the sixth commonest extrapulmonary site to be affected after lymphatic, genitourinary, bones and joints, miliary and meningeal involvement. Manifestations can be non-specific and mimic many conditions, including malignancies. Findings from endoscopy and radiological imaging are myriad, and depend on the stage of the disease and the time at which investigations are carried out. Hence, diagnosis can be difficult. Endoscopy is now the investigation of choice as it allows for visualisation and the sampling of tissue for histology and culture. This is complemented by radiological imaging. This pictorial essay reviews some of the endoscopic and radiological findings of non-human immunodeficiency virus associated proven GI TB infections that we have encountered in a tertiary referral centre.

3879 SHEN XIN; DERIEMER, K.; YUAN ZHENG'AN; SHEN MEI; XIA ZHEN; GUI XIAOHONG; WANG LILI; MEI JIAN **Deaths among tuberculosis cases in Shanghai, China: who is at risk?** *BMC Infectious Diseases* (2009) **9** (95) (17 June 2009) London, UK; BioMed Central Ltd [En, 24 ref.] Department of TB Control, Shanghai Municipal Center for Disease Control and Prevention, Shanghai, China. Email: shenxinI977@hotmail.com, kderiemer@ucdavis.edu, zayuan@scdc.sh.cn, mshen@scdc.sh.cn, zhen.xia@live.cn, jiehe3@scdc.sh.cn, laura6699@hotmail.com, jiehe2@scdc.sh.cn

Background: Information about the risk factors associated with death caused by tuberculosis (TB) or death with TB would allow improvements in the clinical care of TB patients and save lives. The present study sought to identify characteristics associated with increased risk of death during anti-TB treatment in Shanghai, a city in China with one of the country's highest TB mortality rates. Methods: We evaluated deaths among culture positive pulmonary TB cases that were diagnosed in Shanghai during 2000-2004 and initiated anti-TB therapy. Demographic, clinical, mycobacteriological information and treatment outcomes were routinely collected through a mandatory reporting system. Results: There were 7,999 culture positive pulmonary cases reported during the study period. The overall case fatality rate was 5.5% (440 cases), and approximately half (50.5%) of the deaths were attributed to causes other than TB. Eighty-six percent of the deaths were among TB cases age 60 years. The significant independent risk factors for mortality during anti-TB treatment were advancing age, male sex, sputum smear positivity, and the presencc of a comorbidity. Conclusion: More vigorous clinical management and prevention strategies by both the TB control program and other public health programs are essential to improve TB treatment outcomes. Earlier suspicion, diagnosis and treatment of TB, especially among persons older than 60 years of age and those with a comorbid condition, could reduce deaths among TB patients.

3880 KOH WONJUNG; KWON, O. J.; GWAK HYESUN; CHUNG JOOWON; CHO SANGNAE; KIM WOOSUNG; SHIM TAESUN **Daily 300 mg dose of linezolid for the treatment of intractable multidrug-resistant and extensively drug-resistant tuberculosis.** *Journal of Antimicrobial Chemotherapy* (2009) **64** (2) 388-391 Oxford, UK; Oxford University Press [En, 20 ref.] Division of Pulmonary and Critical Care Medicine, Department of Medicine, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea Republic. Email: shimts@amc.seoui.kr

Background: Although previous studies have suggested that linezolid may be effective for treating multidrug-resislant (MDR) and extensively drug-resistant (XDR) tuberculosis (TB), thc optimal dose of iinezolid for intractable MDR/XDR-TB is nol clear. Methods: Twenty-four patients with intractable MDR/XDR-TB were treated with a daily 300 mg dose of linezolid as part of their anti-TB drug regimen. Results: The patients were treated with linezoiid for a median duration of 359 days [interquartile range (IQR) 268-443 days]. Seventeen (71%) patients received 300 mg of linezolid once daily from the beginning of treatment for a median duration of 289 days (IQR 233-405 days). Of these patients, four developed peripheral neuropathy, one of whom discontinued linezolid. In seven (29%) patients, 600 mg/day linezolid was administered initially for a median duration of 104 days (IQR 26145 days) followed by 300 mg/day linezolid for a median duration of 348 days (IQR 298-427 days). In five of these seven patients, the reason for changing from 600 to 300 mg/day was due to side effects of 600 mg/day linezolid (peripheral neuropathy in four patients and leucopenia in one patient). After reducing the dose to 300 mg/day, linezolid could be continued in six of the seven patients. Negative sputum conversion was achieved in 22 (92%) patients after a median of 89

days from the start of linezolid treatment (IQR 48-160 days). Conclusions: A daily 300 mg dose oflinezolid may be useful for increasing the chances of culture conversion in the treatment of patients with intractable MDR/XDR- TB and might have fewer side effects, especially neurotoxicity, compared with a daily 600 mg dose of linezolid therapy. The present results encourage further research into the use of a 300 mg dose of linezolid for MDR/XDRTB patients.

3881 SONAL SAXENA; MANOJ JAIS; RENU DUTTA; DUTTA, A. K. **Serological immunity to diphtheria and tetanus in healthy adults in Delhi, India.** *Tropical Doctor* (2009) **39** (3) 160-163 London, UK; RSM Press Ltd [En, 11 ref.] Department of Microbiology, Lady Hardinge Medical College, New Delhi, India. Email: sonalsaxena3@rediffmaii.com

Widespread childhood immunization with DPT (diphtheria, pertussis and tetanus) has largely eradicated diphtheria and tetanus from many countries. The reduction in the circulation of toxigenic strains has resulted in less natural boosting of adult immunity. As a result, the adult population in countries with high childhood immunization coverage have become susceptible to the disease. The duration of immunity after primary immunization to diphtheria and tetanus is limited and a reduction in immunity is common in adults. With this perspective, the present study was carried out on a random serum sample of 255 healthy individuals aged 20-50 years. The serum samples were tested for immunoglobulin G levels against diphtheria and tetanus by enzyme immuno assays. Fifty three per cent of adults were unprotected; 22% were seen to have only a basic protection against diphtheria; 25% were protected against both diseases; and 47% were susceptible to tetanus. The susceptibility was seen to increase with age. To avoid epidemics in the future, immunity must be improved. It is important to treat even the most trivial wound with care and tetanus toxoid immunization. Also, it is necessary to monitor the community for immunity to diphtheria using standard techniques in order to undertake epidemiological surveillances of, and prevention from, these dreadful diseases.

3882 AHMAD, R. A.; MAHENDRADHATA, Y.; CUNNINGHAM, J.; UTARINI, A.; VLAS, S. J. DE **How to optimize tuberculosis case finding: explorations for Indonesia with a health system model.** *BMC Infectious Diseases* (2009) **9** (87) (08 June 2009) London, UK; BioMed Central Ltd [En, 43 ref.] Department of Public Health, Faculty of Medicine, Gadjah Mada University, Jogjakarta, Indonesia. Email: risandono.ahmad@gmail.com, yodi_mahendradhata@yahoo.co.uk, cunninghamj@who.int, adi_utarini@yahoo.co.uk, s.devlas@erasmusmc.nl

Background: A mathematical model was designed to explore the impact of three strategies for better tuberculosis case finding. Strategies included: (1) reducing the number of tuberculosis palients who do not seek care; (2) reducing diagnostic delay; and (3) engaging non-DOTS providers in the referral of tuberculosis suspects to DOTS services in the Indonesian health system context. The impact of these strategies on tuberculosis mortality and treatment outcome was estimated using a mathematical model of the Indonesian health system. Methods: The model consists of multiple compartments representing logical movement of a respiratory symptomatic (tuberculosis suspect) through the health system, including patient- and health system delays. Main outputs of the model are tuberculosis death rate and treatment outcome (i.e. full or partial cure). We quantified the model parameters for the Jogia karta province context, using a two round Delphi survey with five Indonesian tuberculosis experts, Results: The model validation shows that four critical model outputs (average duration of symptom onset to treatment, detection rate, cure rate, and death rate) were reasonably close to existing available data, erring towards more optimistic outcomes than are actually reported, The model predicted that an Intervention to reduce the proportion of tuberculosis patients who never seek care would have the biggest impact on

tuberculosis death prevention, while an intervention resulting in more referrals of tuberculosis suspects to DOTS facilities would yield higher cure rates. This finding is similar for situations where the alternative sector is a more important health resource, such as in most other parts of Indonesia. Conclusion: We used mathematical modeling to explore the impact of Indonesian health system interventions on tuberculosis treatment outcome and deaths. Because detailed data were not available regarding the current Indonesian population, we relied on expert opinion to quantify the parameters. The fact that the model output showed similar results to epidemiological data suggests that the experts had an accurate understanding of this subject, thereby reassuring the quality of our predictions. The model highlighted the potential effectiveness of active case finding of tuberculosis patients with limited access to DOTS facilities in the developing country setting.

3883 AKIIBINU, M. O.; ARINOLA, O. G.; OGUNYEMI, E. O. **Plasma neopterin and peroxide levels in pulmonary tuberculosis patents on chemotherapy with or without micronutrient supplementation.** *Pakistan Journal of Medical Sciences* (2009) **25** (3) 380-385 Karachi, Pakistan; Professional Medical Publications [En, 24 ref.] Department of Chemical Pathology and Immunology, College of Health Sciences, Olabisi Onabanjo University, Agolwoye, Ogun State, Nigeria. Email: akiibinumoses@yahoo.com

Objectives: Neopterin and H_20_2 are products of cellular (macrophage) activation. The exact roles of these secretions by activated macrophages in protection against tuberculosis remain unclear, In the present study, the changes in the levels of neopterin and total plasma peroxides (TPP) were assessed in pulmonary tuberculosis (PTB) patients on chemotherapy with (C+M) or without (C-M) micronutrient supplementation. Methodology: Thirty-eight newly diagnosed PTB patients were selected for this study. Twenty patients were treated with anti-tuberculosis drugs and micronutrient (C+M) while 18 PTB-patients were treated with only antituberculosis chemotherapy (C-M). Plasma neopterin and TPP concentrations were measured by enzymes linked immunosorbent assay (ELISA) and colorimetric method respectively. Results: All PTB patients had elevated neopterin (p=0.02) and TPP (p=0.00) levels when compared with the non-PTB controls. Plasma level of neopterin and TPP declined significantly in C+M after 2 weeks of treatment (p=0.00, p=0.01 respectively) and also after 4 weeks of treatment (p=0.01 and p=0.00 respectively) when compared with baseline levels before treatment. No significant change was observed in the levels of neopterin and TPP in C-M after 4 weeks of treatment when compared with baseline value before treatment. Conclusion: Micronutrient supplementation enhanced the decline in the levels of neopterin and TPP after two weeks of treatment. Chemotherapy alone did not produce significant reduction. Therefore, micronutrient supplementation of PTB drugs with synthetic antioxidants or naturally occurring ones (fruits and vegetables) should be attempted.

3884 GEETA PARDESHI **Survival analysis and risk factors for death in tuberculosis patients on directly observed treatmentshort course.** *Indian Journal of Medical Sciences* (2009) **63** (5) 180-186 Mumbai, India; Medknow Publications [En, 17 ref.] Department of PSM, Dr. Shankarrao Chavan Government Medical College, Nanded, India. Email: geetashrikar@yahoo.com

Background: Tuberculosis is a disease with a high case fatality of 4.65%. Objectives: To describe the survival pattern of patients on Directly Observed Treatment-Short course (DOTS) according to categories, age and sex of patients. Settings: Tuberculosis unit (TU) at District Tuberculosis Centre (DTC), Yavatmal, India. Design: Retrospective cohort study. Materials and methods: Data of patients registered for DOTS in the year 2004 were collected from the tuberculosis register. Statistical analysis: Kaplan Meier plots and log rank tests to assess the

survival pattern. Cox proportional hazards model for multivariate analysis. Results: A total of 716 patients were registered at the TU. The survival rates by the end of the intensive phase were 96%, 93% and 99% in categories I, ll and III of DOTS, respectively. The cumulative survival rates were 93%, 88% and 96% in the 3 DOTS categories, respectively. There was a significant difference in the survival curves among the 3 DOTS categories (log rank statistic=7.26, d.f..=2, p=0 0.02) and among the different age groups (log rank statistic=8.78, d.f.=3, P=0.012). There was no difference in the survival curves of male and female patients (log rank statistic=0.05, d.f.=I, P=0.80) and according to type of disease (log rank statistic=5.63, d.f.=2, P=O.05). On Cox proportional hazard analysis, age groups of 40 to 60 years [adjusted hazard ratio=7.81 (1.002-60.87)] and above 60 years [adjusted hazard ratio=21.54 (2.57-180.32)] were identified as significant risk factors for death. Conclusions: Age above 40 years is a significant risk factor for death in patients with tuberculosis. There was a significant difference in survival curves of the three DOTS categories and age groups.

3885 MARCOTTY, T.; MATTHYS, F.; GODFROID, J.; RIGOUTS, L.; AMENI, G.; PITTIUS, N. G. VAN; KAZWALA, R.; MUMA, J.; HELDEN, P. VAN; WALRAVENS, K.; KLERK, L. M. DE; GEOGHEGAN, C.; MBOTHA, D.; OTTE, M.; AMENU, K.; SAMRA, N. A.; BOTHA, C.; EKRON, M.; JENKINS, A.; JORI, F.; KRIEK, N.; MCCRINDLE, C.; MICHEL, A.; MORAR, D.; ROGER, F.; THYS, E. (ET AL) **Zoonotic tuberculosis and brucellosis in Africa: neglected zoonoses or minor public-health issues? The outcomes of a multi-disciplinary workshop.** *Annals of Tropical Medicine and Parasitology* (2009) **103** (5) 401-411 Leeds, UK; Maney Publishing [En, 45 ref.] Department of Animal Health, Institute of Tropical Medicine, Nationalestraat 155, 2000 Antwerp, Belgium. Email: tmarcotty@itg.be

Late in 2007, veterinary, medical and anthropological professionals from Europe and Africa met in a 2-day workshop in Pretoria, South Africa, to evaluate the burden, surveillance and control of zoonotic tuberculosis and brucellosis in sub-Saharan Africa. Keynote presentations reviewed the burden of these diseases on human and livestock health, the existing diagnostic tools, and the available control methods. These presentations were followed by group discussions and the formulation of recommendations. The presence of *Mycobacterium bovis* and *Brucella* spp. in livestock was considered to be a serious threat to public health, since livestock and animal products are the only source of such infections in human beings. The impact of these pathogens on human health appears to be relatively marginal, however, when compared with *Mycobacterium tuberculosis* infections and drug resistance, HIV and malaria. Appropriate diagnostic tools are needed to improve the detection of *M. bovis* and *Brucella* spp. in humans. In livestock, the 'test-and-slaughter' approach and the pasteurization of milk, which have been used successfully in industrialized countries, might not be the optimal control tools in Africa. Control strategies should fit the needs and perceptions of local communities. Improved intersectoral and international collaboration in surveillance, diagnosis and control, and in the education of medical and veterinary personnel, are advocated.

3886 EDDYANI, M.; FRAGA, A. G.; SCHMITT, F.; UWIZEYE, C.; FISSETTE, K.; JOHNSON, C.; AGUIAR, J.; SOPOH, G.; BAROGUI, Y.; MEYERS, W. M.; PEDROSA, J.; PORTAELS, F. **Fine-needle aspiration, an efficient sampling technique for bacteriological diagnosis of nonulcerative Buruli ulcer.** *Journal of Clinical Microbiology* (2009) **47** (6) 1700-1704 Washington, USA; American Society for Microbiology (ASM) [En, 34 ref.] Mycobacteriology Unit, Department of Microbiology, Institute of Tropical Medicine, Nationalestraat 155, B-2088 Antwerp, Belgium. Email: meddyani@itg.be

Invasive punch or incisional skin biopsy specimens are currently employed for the bacteriological confirmation of the clinical diagnosis of Buruli ulcer (BU), a cutaneous

infectious disease caused by *Mycobacterium ulcerans.* The efficacy of fine-needle aspirates (FNA) using fine-gauge needles (23G by 25 mm) for the laboratory confirmation of BU was compared with that of skin tissue fragments obtained in parallel by excision or punch biopsy. In three BU treatment centers in Benin, both types of diagnostic material were obtained from 33 clinically suspected cases of BU and subjected to the same laboratory analyses: i.e., direct smear examination, IS*2404* PCR, and in vitro culture. Twenty-three patients, demonstrating 17 ulcerative and 6 nonulcerative lesions, were positive by at least two tests and were therefore confirmed to have active BU. A total of 68 aspirates and 68 parallel tissue specimens were available from these confirmed patients. When comparing the sensitivities of the three confirmation tests between FNA and tissue specimens, the latter yielded more positive results, but only for PCR was this significant. When only non ulcerative BU lesions were considered, however, the sensitivities of the confirmation tests using FNA and tissue specimens were not significantly different. Our results show that the minimally invasive FNA technique offers enough sensitivity to be used for the diagnosis of BU in nonulcerative lesions.

3887 BABOOLAL, S.; MILLET, J.; AKPAKA, P. E.; RAMOUTAR, D.; RASTOGI, N. **First insight into *Mycobacterium tuberculosis* epidemiology and genetic diversity in Trinidad and Tobago.** *Journal of Clinical Microbiology* (2009) **47** (6) 1911-1914 Washington, USA; American Society for Microbiology (ASM) [En, 14 ref.] Department of Para-Clinical Sciences, Faculty of Medical Sciences, The University of the West Indies, St. Augustine, Trinidad and Tobago. Email: nrastogi@pasteur-guadeloupe.fr

This report is based on a 1-year recruitment of all of the culture-positive *Mycobacterium tuberculosis* cases in Trinidad and Tobago (*n*=132). The study population was characterized by a high male-to-female sex ratio of 4 and a human immunodeficiency virus-tuberculosis (TB) coinfection rate of 30%. It mainly occurred among African descendants, who represent 37.5% of the total population but 69.7% of all TB cases (*P*<0.001). Spoligotyping resulted in 25 different patterns and 12 clusters (2 to 74 strains per cluster), with the predominance of a highly conserved spoligotype international type clone, SIT566.

3888 NGAMLERT, K.; SINTHUWATTANAWIBOOL, C.; MCCARTHY, K. D.; SOHN HOJOON; STARKS, A.; KANJANAMONGKOLSIRI, P.; ANEK-VORAPONG, R.; TASANEEYAPAN, T.; MONKONGDEE, P.; DIEM, L.; VARMA, J. K. **Diagnostic performance and costs of Capilia TB for *Mycobacterium tuberculosis* complex identification from broth-based culture in Bangkok, Thailand.** *Tropical Medicine and International Health* (2009) **14** (7) 748-753 Oxford, UK; Blackwell Publishing [En, fr, es, 20 ref.] Health Laboratory Division (City Lab), Health Department, Bangkok Metropolitan Administration, Bangkok, Thailand. Email: KMccarthy3@cdc.gov

Objectives: Broth-based culture (BBC) systems are increasingly being used to detect *Mycobacterium tuberculosis* complex (MTBC) in resource-limited. We evaluated the performance, time to detection and cost of the Capilia TB identification test from broth cultures positive for acid-fast bacilli (AFB) in Thailand. METHODS: From October-December 2007, broth cultures that grew AFB from specimens submitted by district TB clinics to the Bangkok city laboratory were tested for MTBC using Capilia TB and standard biochemical tests. Isolates that were identified as MTBC by biochemical tests but not by Capilia TB underwent repeat testing using Capilia TB, Accuprobe (Gen-Probe, San Diego, CA, USA) and sequencing. Costs of time, labour, infrastructure and consumables for all procedures were measured. RESULTS: Of 247 isolates evaluated, the sensitivity of Capilia TB was 97% and its true specificity 100% compared with biochemical testing. The median time from specimen receipt to confirmed MTBC identification was 20 days (range 7-53 days) for

Capilia TB and 45 days (range 35-79 days) for biochemical testing (*P*<0.01). Six isolates that were Capilia TB negative but positive by biochemical testing were confirmed as MTBC and mutations in the *mpb64* gene were detected in all. The unit cost of using Capilia TB was 2.67 USD that of biochemical testing was 8.78 USD. CONCLUSIONS: In Thailand, Capilia TB had acceptable sensitivity and specificity, was lower in cost and had shorter turn-around times. Laboratories investing in BBC should consider Capilia TB for identification of MTBC, after validation of performance in their setting.

3889 D'SOUZA, D. T. B.; MISTRY, N. F.; VIRA, T. S.; DHOLAKIA, Y.; HOFFNER, S.; PASVOL, G.; NICOL, M.; WILKINSON, R. J. **High levels of multidrug resistant tuberculosis in new and treatment-failure patients from the Revised National Tuberculosis Control Programme in an urban metropolis (Mumbai) in Western India.** *BMC Public Health* (2009) **9** (211) (29 June 2009) London, UK; BioMed Central Ltd [En, 43 ref.] The Foundation for Medical Research, 84 - A. R, G. Thadani Marg, Worli, Mumbai 400 018, India. Email: desireetb_dsouza@yahoo.co.in. fmr@fmrindia.org, tinavisaria2002@yahoo.com, yatindholakia@gmail.com, sven.hoffner@smi.se, g.pasvol@imperial.ac.uk, Mark.Nicol@uct.ac.za, r.j. wilkinson@imperial.ac.uk

Background: India, China and Russia account for more than 62% of multidrug resistant tuberculosis (MDRTB) globally. Within India, locations like urban metropolitan Mumbai with its burgeoning population and high incidence of TB are suspected to be a focus for MDRTB. However apart from sporadic surveys at watched sites in the country, there has been no systematic attempt by the Revised National Tuberculosis Control Programme (RNTCP) of India to determine the extent of MDRTB in Mumbai that could feed into national estimates, Drug susceptibility testing (DST) is not routinely performed as a part of programme policy and public health laboratory infrastructure, is limited and poorly equipped to cope with large scale testing. Methods: From April 2004 to January 2007 we determined the extent of drug resistance in 724 {493 newly diagnosed, previously untreated and 231 first line treatment failures (sputum-smear positive at the fifth month after commencement of therapy)} cases of pulmonary tuberculosis drawn from the RNTCP in four suboptimally performing municipal wards of Mumbai. The observations were obtained using a modified radiorespirometric Buddemeyer assay and validated by the Swedish Institute for Infectious Disease Control, Stockholm, a supranational reference laboratory. Data was analyzed utilizing SPSS 10.0 and Epi Info 2002. Results: This study undertaken for the first time in RNTCP outpatients in Mumbai reveals a high proportion of MDRTB strains in both previously untreated (24%) and treatment-failure cases (41%). Amongst new cases, resistance to 3 or 4 drug combinations (amplified drug resistance) including isoniazid (H) and rifampicin (R), was greater (20%) than resistance to H and R alone (4%) at any point in time during the study. The trend for monoresistance was similar in both groups remaining highest to H and lowest to R. External quality control revealed good agreement for Hand R resistance (k=0.77 and 0.76 respectively). Conclusion: Levels of MDRTB are much higher in both previously untreated and first line treatment-failure cases in the selected wards in Mumbai than those projected by national estimates. The finding of amplified drug resistance suggests the presence of a well entrenched MDRTB scenario. This study suggests that a wider set of surveillance sites are needed to obtain a more realistic view of the true MDRTB rates throughout the country. This would assist in the planning of an adequate response to the diagnosis and care of MDRTB.

3890 ZENTENO-CUEVAS, R.; ZENTENO, J. C.; CUELLAR, A.; CUEVAS, B.; SAMPIERI, C. L.; RIVIERA, J. E.; PARISSI, A. **Mutations in *rpoB* and *katG* genes in *Mycobacterium* isolates from the**

Southeast of Mexico. *Memorias do Instituto Oswaldo Cruz* (2009) **104** (3) 468-472 Rio de Janeiro, Brazil; Instituto Oswaldo Cruz [En, 28 ref.] Laboratorio de Ecologia y Salud, Instituto de Salud Pública, Universidad Veracruzana, Av. Luis Castelazo Ayala s/n, AP 57, C.P. 91190, Xalapa, Veracruz, Mexico. Email: rzenteno@uv.mx

The most frequent mutations associated with rifampin and isoniazid resistance in *Mycobacterium* are the substitutions at codons 531 and 315 in the rpoB and katG genes, respectively. Hence, the aim of this study was to characterize these mutations in *Mycobacterium* isolates from patients suspected to be infected with drugresistant (DR) pulmonary tuberculosis (TB) in Veracruz, Mexico. Drug susceptibility testing of 25 clinical isolates revealed that five were susceptible while 20 (80%) were DR (15% of the annual prevalence for Veracruz). Of the DR isolates, 15 (75%) were resistant to rifampin, 17 (85%) to isoniazid and 15 (75%) were resistant to both drugs (MDR). Sequencing analysis performed in the isolates showed that 14 (93%) had mutations in the *rpoB* gene; seven of these (47%) exhibited a mutation at 531 (S L). Ten (58%) of the 20 resistant isolates showed mutations in *katG;* nine (52%) of these 10 exhibited a mutation at 315 (S T). In conclusion, the DR profile of the isolates suggests a significant number of different DRTB strains with a low frequency of mutation at codons 531 and 315 in *rpoB* and *katG,* respectively. This result leads us to consider different regions of the same genes, as well as other genes for further analysis, which is important if a genetic-based diagnosis of DR-TB is to be developed for this region.

3891 SCHUNK, M.; THOMPSON, W.; KLUTSE, E.; NITSCHKE, J.; OPARE-ASAMOAH, K.; THOMPSON, R.; FLEISCHMANN, E.; SIEGMUND, V.; HERBINGER, K. H.; ADJEI, O.; FLEISCHER, B.; LOSCHER, T.; BRETZEL, G. **Outcome of patients with buruli ulcer after surgical treatment with or without antimycobacterial treatment in Ghana.** *American Journal of Tropical Medicine and Hygiene* (2009) **81** (1) 75-81 Northbrook, USA; American Society of Tropical Medicine and Hygiene [En, 30 ref.] Department of Infectious Diseases and Tropical Medicine (DITM), Ludwig-Maximilians University of Munich, 80802 Munich, Germany. Email: schunk@lrz.uni-muenchen.de

This study assessed the frequency of recurrences and treatment outcome after surgery of Buruli ulcer disease (BUD) with or without concomitant antimycobacterial treatment. Of 129 laboratory-confirmed BUD patients who underwent surgery in 2 treatment centres in Ghana, 79 (61%) were retrieved for follow-up 4-29 months after the initial treatment. Among 7 (9%) recurrent cases no significant association was found between recurrences and clinical or treatment specific factors including anti mycobacterial treatment. In 21 (27%) patients, a reduced range of motion (ROM) of one or more joints was detected. Lesions other than nodules, joint involvement, and skin grafting were identified as independent risk factors. Functional limitations hampering daily activities were perceived by 22% of the patients. Compared with other studies the recurrence rate was relatively low, functional limitations were, however, frequent. This emphasizes the need for improvement of pre- and posttreatment wound care as well as rehabilitation programmes.

3892 BAROGUI, Y.; JOHNSON, R. C.; WERF, T. S. VAN DER; SOPOH, G.; DOSSOU, A.; DIJKSTRA, P. U.; STIENSTRA, Y. **Functional limitations after surgical or antibiotic treatment for buruli ulcer in Benin.** *American Journal of Tropical Medicine and Hygiene* (2009) **81** (1) 82-87 Northbrook, USA; American Society of Tropical Medicine and Hygiene [En, 30 ref.] Programme National Lutte contre la Lèpre et l'Ulcère de Buruli, Ministère de la Santé, Cotonou, Benin. Email: y.stienstra@amc.uva.nl

Almost half of patients have functional limitations after treatment of Buruli ulcer disease. Antibiotic treatment (along with surgery) was introduced in the National Program for Buruli ulcer in Benin in 2005. The aim of this study was to compare

functional limitations in patients who were treated by antibiotics, surgery, or both, using a validated questionnaire. A total of 179 former patients in Lalo, Benin were retrieved and interviewed in their village. Hospital records were used to gather data about size of lesion at presentation and treatment provided. No significant differences in resulting functional limitations were found between the different treatments. Larger lesions (>15 cm cross-sectional diameter) at presentation; lesions on a joint, muscular atrophy, and amputation were all associated with a higher risk for functional limitations. Advantages of antibiotic treatment may involve other domains, like costs of treatment or a change in help-seeking behaviour.

3893 COUPPIÉ, P.; DOMERGUE, V.; CLYTI, E.; EL-GUEDJ, M.; VAZ, T.; SAINTE-MARIE, D.; MARTY, C.; NACHER, M. **Increased incidence of leprosy following HAART initiation: a manifestation of the immune reconstitution disease.** *AIDS* (2009) **23** (12) 1599-1600 Hagerstown, USA; Lippincott Williams & Wilkins [En, 4 ref.] Service de Dermatologie, Centre Hospitalier de Cayenne, Cayenne, French Guiana.

A retrospective cohort study was conducted to determine whether the incidence of leprosy varied with the duration of antiretroviral therapy (ART). Between 1992 and 2006, seven cases of leprosy were observed. The incidence of leprosy in untreated patients was 0.7 per 1000 person-years, 13 per 1000 person-years in persons receiving HAART for more than 3 months and 0.9 per 1000 person-years for persons receiving HAART fur more than 3 months. The adjusted hazard ratio was 18.5 (95% confidence interval, 1.6-217) with *P*=0.02. In tropical areas where HAART is increasingly available, physicians should be aware of the possibility of incident leprosy shortly after HAART initiation.

3894 BUKHARIE, H. A.; AL-RUBAISH, A. M.; ALHUSSAIN AL-ZAH-RANI; MIR SADAT-ALI **Osteoarticular tuberculosis: how often is it missed?** *Southeast Asian Journal of Tropical Medicine and Public Health* (2009) **40** (4) 770-775 Bangkok, Thailand; SEAMEO TROPMED Network [En, 18 ref.] Department of Internal Medicine, College of Medicine, King Faisal University, Dammam, Saudi Arabia. Email: drsadat@hotmail.com

This study was carried out to analyze the clinical presentations and outcomes of osteoarticular tuberculosis (OAT) at a university hospital in AIKhobar, Saudi Arabia. A prospective observational study was carried out between 1 January 1998 and 31 December 2007. Patients demographic characteristics were recorded, including age, gender, nationality, clinical manifestation, delay in diagnosis, laboratory results, findings on imaging studies, histological and bacteriological studies of biopsy specimens, treatment modalities, surgical interventions and final outcomes. Fifty-two patients were diagnosed with OAT during the study period. The majority were males (64%), about half were below age 30 years. The mean age at diagnosis was 33 years. There were 32 Saudis (64%), and 18 non-Saudis (36%). Pyrexia, loss of appetite and night sweats were the presenting symptoms in 44, 38 and 36%, respectively. The average time from onset of symptoms to diagnosis was 185 days (7-730 days). On admission, the average erythrocyte sedimentation rate (ESR) was 68 mm/h (4-142). A Mantoux test was performed, in 48 patients the results were positive. The vertebral column was the site of infection in 88% of patients. All patients were managed with standard antituberculous therapy. Forty-two patients (84%) had a favorable outcome.

4213 VENDHAN GAJALAKSHMI; PETO, R. **Smoking, drinking and incident tuberculosis in rural India: population-based case-control study.** *International Journal of Epidemiology* (2009) **38** (4) 1018-1025 Oxford, UK; Oxford University Press [En, 10 ref.] Epidemiological Research Center, New No 27, Canal Road, KG Colony, Chennai 600 010, Tamil Nadu, India. Email: gajaerc@gmail.com

Background: To investigate the extent to which smoking and/ or drinking can increase the incidence of pulmonary tuberculosis (TB), a population-based case-control study was conducted in rural south India. Methods: A total of 1839 males and 870 females treated in 2000-03 by state TB clinics were interviewed at home in 2004-05 about their education, smoking and drinking habits before disease onset. As controls, 2134 men and 2119 women without TB were randomly chosen from case villages and interviewed. Incidence rate ratios (RRs) are from logistic regression, adjusted for age and education. Results: No women smoked or drank. The main analyses are of men aged 35-64 years, 949 cases treated for new pulmonary TB and 1963 controls. In the study, 81.5% of the cases and 55.2% of the controls had ever smoked, yielding a standardized ever- vs never-smoker TB incidence RR of 2.7 (95% confidence interval (CI) 2.2-3.3, *P*<0.00001). Among control ever-smokers 96% still smoked, 71% used only bidis (mean 17 per day) and 28% used only cigarettes (mean 7 per day). After additional adjustment for alcohol, this RR was 2.2 (95% CI 1.7-2.7, *P*<0.00001), but even among those who had never drunk alcohol the standardized evervs never-smoker RR was 2.6 (95% CI 2.0-3.6, *P*<0.00001). The corresponding RRs for ever- vs never-drinking were somewhat less extreme: 2.2 (95% CI 1.8-2.6, *P*<0.00001) without adjustment for smoking, 1.5 (95% CI 1.2-1.9, *P*=0.00004) with adjustment for smoking and 2.1 (95% CI 1.4-3.0, 2*P*=0.0001) among those who had never smoked. Among control ever-drinkers, 96% still drank and 99% used only spirits (mean 0.3 1/week). Conclusions: This study of reliably confirmed disease (by the criteria of state TB clinics) demonstrates an increased incidence of pulmonary TB among those who smoke and among those who drink. The effects of smoking after adjustment for drinking were more definite than those of drinking after adjustment for smoking.

4214 JYOTHI BHAT; RAO, V. G.; GOPI, P. G.; RAJIV YADAV; NAGAMIAH SELVAKUMAR; BALKRISHNA TIWARI; VIJAY GADGE; BHONDELEY, M. K.; WARES, F. **Prevalence of pulmonary tuberculosis amongst the tribal population of Madhya Pradesh, central India.** *International Journal of Epidemiology* (2009) **38** (4) 1026-1032 Oxford, UK; Oxford University Press [En, 26 ref.] Regional Medical Research Centre for Tribals (Indian Council of Medical Research), Nagpur Road, P.O. Garha, Jabalpur 482 003 (M.P.), India. Email: drjyothibhat@rediffmail.com

Background: This was a prevalence survey of pulmonary tuberculosis (PTB) disease in the tribal population of Madhya Pradesh state, central India. Methods: A community-based cross-sectional tuberculosis (TB) disease prevalence survey was undertaken among adults aged :2:15 years in the tribal population of Madhya Pradesh. A multistage stratified cluster sampling was adopted. A representative random sample of villages predominated by tribal populations was selected from 11 districts. All eligible individuals were questioned for chest symptoms relating to TB. Sputum samples were collected from all eligible individuals, transported to the laboratory, and examined by Ziehl-Neelsen (ZN) smear microscopy and solid media culture methods. Results: Of the 23 411 individuals eligible for screening, 22 270 (95.1%) were screened for symptoms. The overall proportion of symptomatic individuals was 7.9%. Overall prevalence (culture and/or smear positive) of PTB was 387 [95% confidence interval (CI): 273-502] per 100 000 population. The prevalence increased with age and was also significantly higher among males (554/100 000; 95% CI: 415-693) as compared with females (233/100 000; 95% CI: 101-364) (*P*<0.001). Conclusion: The findings suggest that the TB situation amongst the tribal population is not that different from the situation among the non-tribal population in the country. However, TB remains a major public health problem amongst the tribal population and there is a need to maintain and further strengthen TB control measures on a sustained

and long-term basis.

4215 DUARTE, R. S.; LOURENÇO, M. C. S.; FONSECA, L. DE S.; LEÃO, S. C.; AMORIM, E. DE L. T.; ROCHA, I. L. L.; COELHO, F. S.; VIANA-NIERO, C.; GOMES, K. M.; SILVA, M. G. DA; LORENA, N. S. DE O.; PITOMBO, M. B.; FERREIRA, R. M. C.; GARCIA, M. H. DE O.; OLIVEIRA, G. P. DE; LUPI, O.; VILAÇA, B. R.; SERRADAS, L. R.; CHEBABO, A.; MARQUES, E. A.; TEIXEIRA, L. M.; DALCOLMO, M.; SENNA, S. G.; SAMPAIO, J. L. M. **Epidemic of postsurgical infections caused by *Mycobacterium massiliense.*** *Journal of Clinical Microbiology* (2009) **47** (7) 2149-2155 Washington, USA; American Society for Microbiology (ASM) [En, 46 ref.] Institute de Microbiologia, Universidade Federal do Rio de Janeiro, CCS, Bloco I, Cidade Universitária, Rio de Janeiro, RJ 21941-590, Brazil. Email: rsduarte@ufrj.br

An epidemic of infections after video-assisted surgery (1,051 possible cases) caused by rapidly growing mycobacteria (RGM) and involving 63 hospitals in the state of Rio de Janeiro, Brazil, occurred between August 2006 and July 2007. One hundred ninety seven cases were confirmed by positive acid-fast staining and/or culture techniques. Thirty-eight hospitals had cases confirmed by mycobacterial culture, with a total of 148 available isolates recovered from 146 patients. Most (*n*=144; 97.2%) isolates presented a PRA-*hsp65* restriction pattern suggestive of *Mycobacterium bolletii* or *Mycobacterium massiliense.* Seventy-four of these isolates were further identified by *hsp65* or *rpoB* partial sequencing, confirming the species identification as *M. massiliense.* Epidemic isolates showed susceptibility to amikacin (MIC at which 90% of the tested isolates are inhibited [MIC_{90}], 8 µg/ml) and clarithromycin (MIC_{90}, 0.25 µg/ml) but resistance to ciprofloxacin (MIC_{90}, 32 µg/ml), cefoxitin (MIC_{90}, 128 µg/ml), and doxycycline (MIC_{90}, 64 µg/ml). Representative epidemic *M. massiliense* isolates that were randomly selected, including at least one isolate from each hospital where confirmed cases were detected, belonged to a single clone, as indicated by the analysis of pulsed-field gel electrophoresis (PFGE) patterns. They also had the same PFGE pattern as that previously observed in two outbreaks that occurred in other Brazilian cities; we designated this clone BRA100. All five BRA100 *M. massiliense* isolates tested presented consistent tolerance to 2% glutaraldehyde. This is the largest epidemic of postsurgical infections caused by RGM reported in the literature to date in Brazil.

4216 GIDADO, M.; EJEMBI, C. L. **Tuberculosis case management and treatment outcome: assessment of the effectiveness of public - private mix of tuberculosis programme in Kaduna State, Nigeria.** *Annals of African Medicine* (2009) **8** (1) 25-31 Sokoto, Nigeria; Usmanu Danfodiyo University [En, fr, 16 ref.] National Tuberculosis and Leprosy Training Centre, Zaria, Nigeria. Email: gidadomansu@yahoo.com.au

Background: In an effort to increase tuberculosis (TB) case detection, the Kaduna State TB programme in Nigeria started Public-Private Mix (PPM DOTS) in 2002. This study assessed and compared the TB case management practices and treatment outcomes of the public and private health facilities involved in the TB programme. Methods: A comparative cross-sectional descriptive study was carried out in 5 private and 10 public health facilities providing TB services for at least 2 years in the 4 Local Government Areas in Kaduna State, where both public and private health facilities are involved in the TB programme. The heads of the health facilities were interviewed, and case notes of all the 492 TB patients registered in these facilities between January 2003 and December 2004, were reviewed. Results: Except for the lower use of sputum microscopy for diagnosis, adherence to national TB treatment guidelines was high in both private and public health facilities. The private health facilities significantly saw more TB patients, an average of 51 patients per health facility compared to 23 patients in the public

health facilities. There was better completion of records in the public health facilities while patient contact screening was very low in both public and private health facilities, 13.1% and 12.2% respectively. The treatment success rate was higher among patients managed in the private health facilities (83.7%) compared to 78.6% in the public health facilities. Conclusion: Private health facilities adhere to national guidelines had higher TB patient case load and better treatment outcome than public health facilities in Kaduna State. PPM-DOTS should be scaledup and consolidated.

4217 WU TINGSHU; LEU HSIEHSHONG; CHIU CHENGHSUN; LEE MINGHSUN; CHIANG PINGCHERNG; WU TSULAN; CHIA JUHSIN; SU LINHUI; KUO ANJING; LAI HSINCHIH **Clinical manifestations, antibiotic susceptibility and molecular analysis of *Mycobacterium kansasii* isolates from a university hospital in Taiwan.** *Journal of Antimicrobial Chemotherapy* (2009) **64** (3) 511-514 Oxford, UK; Oxford University Press [En, 13 ref.] Division of Infectious Diseases, Department of Internal Medicine, Chang Gung Memorial Hospital, No. 5 Fusing St, Gueishan Shiang 33305, Taoyuan, Taiwan. Email: hclai@mail.cgu.edu.tw

Objectives: *Mycobacterium kansasii* causes a variety of infections. Although previous reports on the prognosis of antimicrobial therapy have been mostly satisfactory, problems involving treatment failure or relapse have been encountered. The purpose of this study was to establish a relationship between the clinical treatment outcomes of *M. kansasii* infections and bacterial drug susceptibility, and their clonality. Methods: A total of 37 *M. kansasii* clinical isolates and clinical information on 34 patients were retrospectively collected in a tertiary medical centre in Taiwan. Bacterial drug susceptibility was determined by the microdilution method. The phylogenetic relationship was analysed by PFGE analysis. Results: Results of PFGE typing revealed a major cluster (cluster I) and eight other divergent patterns. Two/three strains leading to treatment failure were also multidrug resistant and belonged to cluster I. Conclusions: A relationship between high drug resistance and genetic relatedness of some *M. kansasii* strains was established. This was associated with clinical treatment failure.

4218 YUAN JUN; LIU YUFEI; YANG ZHICONG; CAI YANSHAN; DENG ZHIAI; QIN PENGZHE; LI TIEGANG; DONG ZHIQIANG; YAN ZIQIANG; ZHOU DUANHUA; LUO HUIMING; MA HUILAI; PANG XINGLIN; FONTAINE, R. E. ***Mycobacterium abscessus* post-injection abscesses from extrinsic contamination of multiple-dose bottles of normal saline in a rural clinic.** *International Journal of Infectious Diseases* (2009) **13** (5) 537-542 Oxford, UK; Elsevier [En] Chinese Field Epidemiology Training Program, Beijing, China. Email: yangzc@gzcdc.org.cn

Background: We investigated an outbreak of gluteal abscesses following intramuscular (IM) injections given at a clinic in rural China to identify the causative agent, source, and method of exposure. Methods: We defined a case as an abscess that appeared at the site of an injection given since June 1, 2006. We compared case rates by injection route, medication, and diluents. We reviewed injection practices, and cultured abscesses and environmental sites for mycobacteria. Results: From October through December 2006, 5.8% (*n*=35) of 604 persons who had received injections at the clinic developed a case. All 35 cases occurred in 184 patients (attack rate=19.0%) who had received IM injections with various drugs that had been mixed with normal saline (NS); risk ratio= ; $p<0.0001$. No cases occurred in the absence of NS exposure. We identified *Mycobacterium abscessus* from eight abscesses and from the clinic water supply, and observed the inappropriate reuse of a 16-gauge needle left in the rubber septum of 100 ml multiple-dose bottles of NS in the clinic. Fourteen percent (*n*=527) of the 3887 registered residents of this village had been treated with IM drugs over a three-month period, often for minor illnesses. Conclusions: This outbreak of *M. abscessus*

occurred from exposure to extrinsically contaminated NS through improper injection practices. Frequent treatment of minor illnesses with IM injections of antibiotics was likely an important contributing factor to the size of this outbreak.

4219 PUROHIT, M. R.; MUSTAFA, T.; MØRKVE, O.; SVILAND, L. **Gender differences in the clinical diagnosis of tuberculous lymphadenitis - a hospital-based study from Central India.** *International Journal of Infectious Diseases* (2009) **13** (5) 600-605 Oxford, UK; Elsevier [En] Centre for International Health, University of Bergen, Bergen, Norway. Email: lsvi@helse-bergen.no

Objective: Tuberculous lymphadenitis can be difficult to diagnose clinically, and as it is thought to be more common in females, we describe here the clinical characteristics of cervical tuberculous lymphadenitis in men and women and compare this with cytology to assess their diagnostic value. Methods: Two hundred and nineteen patients with tuberculous lymphadenitis, aged 14 years or more, who presented with a neck mass to the Department of Pathology, Ujjain Hospital, Ujjain, India were included in the study. The presenting clinical symptoms and signs were compared between men and women and with the cytology of fine needle aspirates from the lymph nodes. Results: Seventy-five percent of the patients were aged between 14 and 35 years, with a male to female ratio of 1:2.1. One or more constitutional symptoms were present in 56.6% of patients on presentation. There were more men with clinical symploms than women. Fever was the most common manifestation in both gender groups. Fever for more than 30 days, cough, weight loss, and night sweats were significantly more common in men. On cytology, necrotic granulomas were found to be associated with constitutional symptoms. Conclusions: Constitutional symptoms were more frequently reported by men than by women and showed a correlation with necrotic granulomas on cytology.

4220 RAO, P. N.; SUJAI SUNEETHA; PRATAP, D. V. S. **Comparative study of Uniform-MDT and WHO MDT in Pauci and Multi bacillary leprosy patients over 24 months of observation.** *Leprosy Review* (2009) **80** (2) 143-155 Colchester, UK; LEPRA [En, 23 ref.] Bhaskar Medical College, Hyderabad, India. Email: dermarao@gmail.com

Study design: An open comparative study between WHO MDT and U-MDT regimen in all types of leprosy over 24 months of observation was carried out at Gandhi Hospital, Secunderabad, India. Periodic assessment of clinical and histopathological parameters at 6 monthly intervals was performed in both groups of patients for grading response to the treatment regimens. Patients and methods: One hundred and twenty-seven newly diagnosed, untreated leprosy patients classified into PB (5 skin lesions) and MB leprosy (>5 skin lesions) were alternately allocated into Study (U-MDT for 6 months) and Control groups (WHO MDT) at entry. Out of the 127 patients included, 64 patients (M-44, F-20; PB leprosy 32 & MB leprosy 32) could be followed-up regularly. These 64 patients were clinically assessed and graded into Good, Moderate and Poor response at 6, 12 and 18 months of the study, and 44 of these patients were also assessed at 24 months of the study. Histopathological assessments were also done at the above intervals. Results - PB patients: The control and study groups comprised of 14 and 18 patients respectively. When clinical grades were compared, the numbers of Moderate and Good responses were 78% and 61 % at 6 months, 86% and 94% at 18 months and 82% and 100% at 24 months in the PB Control and Study groups respectively, suggesting better progressive improvement in the Study group compared to Control group, but the differences were not significant (At 6 months P=0.2195, at 18 months 0.7305, at 24 months P=0.3500) Histopathological assessment at 12 months, showed higher percentage of Good responses (100%) in the PB-Study group than in the PB-Control group (86%). MB patients: The MB

Control and Study groups comprised of 22 and 10 patients respectively. In clinical improvement grades, Good responses in the Control group was 36%, 45% and 77% at 12,18 and 24 months of study, whereas the Study group did not have a single Good response at 12 and 18 months with the Poor responses being 50%, 67% and 75% at 12, 18 and 24 months. These differences between the groups were significant at all periods of assessment. (At 12 months *P*=0.0465, at 18 months *P*=0.0014, at 24 months *P*=0.0064). Histopathological assessment showed higher the percentage of Good responses in Control group (100%) compared to Study group (50%) at 18 months. Conclusion: U-MDT of 6 months duration was well tolerated and effective in patients with PB leprosy but was too short a regimen adequately to treat patients with MB leprosy.

4221 SOUZA, V. A.; EMMERICH, A.; COUTINHO, E. M.; FREITAS, M. G.; SILVA, E. H.; MERÇON, F. G.; SOUZA, A. C; BALLA, V. A. C.; ZANDONADI, E.; PEIXOTO, R. R. G.; DEPS, P. D. **Dental and oral condition in leprosy patients from Serra, Brazil.** *Leprosy Review* (2009) **80** (2) 156-163 Colchester, UK; LEPRA [En, 44 ref.] Leprosy Control Programme, US Carapina, Serra-ES, Brazil. Email: pdeps@uol.com.br, patricia.deps@lshtm.ac.uk

Objectives: To describe dental and periodontal diseases and oral lesions in newly diagnosed leprosy patients. Design: Cohort study with 99 leprosy patients carried out at the Leprosy Control Programme Outpatient Clinic, Serra-ES, Brazil. A questionnaire about demographic and clinical data was used. Clinical oral examination was performed through the decayed, missing and filled teeth index (DMFT index), the use and need of prosthesis, periodontal disease and the presence of mucous membrane oral lesions. Skin and oral mucous biopsies were also undertaken. Results: Decayed teeth were present in 73% of the patients, at least one lost tooth was present in 714%, the mean of the number of lost teeth among the patients in this survey was 8.8; and 60.3% of the patients did not have their teeth filled. Periodontal disease was present in 80-8%, and gingival bleeding in 92% of the patients. DMFT index average was 144. Nine out of the 63 patients presented with oral clinical lesions, however, most of them presented with unspecific chronic inflammation and typical epithelial hyperplasia. Conclusions: These newly diagnosed leprosy patients were similar in respect of oral health to the normal Brazilian population. Serious dental loss and edentulism were observed, as were a high DMFT index and frequency of periodontal diseases. These data highlight a lack of oral health prevention and treatment and poor access even when available.

4222 SHEN JIANPING; LIU MUSANG; ZHOU MIN; LI WENGZHONG **Occurrence and management of leprosy reaction in China in 2005.** *Leprosy Review* (2009) **80** (2) 164-169 Colchester, UK; LEPRA [En, 16 ref.] Department of Leprosy Field Control, Institute of Dermatology, Chinese Academy of Medical Sciences, 12 Jiangwangmiao Road, Nanjing, 210042, China. Email: jianping_shen2@yahoo.com.cn

Background: Leprosy reactions are a major cause of disability before, during and after anti-bacterial treatment. Prompt diagnosis and correct management of reaction is a crucial matter for improving the quality of leprosy health services. Objectives: To describe the pattern of leprosy reaction and its management in China during 2005. Methods: A retrospective survey using a questionnaire was carried out in all the provinces of China at the beginning of 2006. Patients included were those presenting with leprosy reaction between 1 January and 31 December 2005. Results: 452 questionnaires from 25 provinces were analysed. There were 313 male and 139 female patients who had 159 Type I reactions, 273 Type II reactions and 20 Type I and II mixed reaction. 724% of reactions occurred in the first year of MDT and 27 -6% of patients during the second year of MDT. The highest frequency of reaction was during the first 6 months of MDT; 57-3% of patients developed new nerve impairment during and after MDT. Conclusions: New nerve

function impairment and disability still occurs among patients during and after MDT. The early detection and management of leprosy reaction remains important.

4223 JING ZHICHUN; ZHANG RENBAO; ZHOU DOAHAI; CHEN JIAKEUN **Twenty five years follow up of MB leprosy patients retreated with a modified MDT regimen after a full course of dapsone mono-therapy.** *Leprosy Review* (2009) **80** (2) 170-176 Colchester, UK; LEPRA [En, 19 ref.] Shanghai Skin Diseases and STD Hospital, Shanghai, 200443, China. Email: jingzhichun@smmail.cn

Background: The relentless emergence of dapsone resistance amongst *M. leprae* threatened leprosy control programmes, and increased the relapse rate of patients cured with dapsone monotherapy. Objective: The study aimed to analyse the effect on the relapse rate of dapsone-cured multibacillary (MB) leprosy patients, of re-treatment, using a multi drug therapy (MDT) regimen which differed from the WHO recommended regimen. Design: 794 MB leprosy patients who had been released from treatment after dapsone monotherapy were selected, amongst them 657 were retreated for 1 year using the modified multi drug therapy regimen (mMDT) including rifampicin, clofazimine and dapsone, and 137 patients were observed as control cases. Results: The regimen was well tolerated with good compliance: 620 patients completed retreatment with mild side effects and a low incidence of leprosy reactions. There was a statistically significant difference between the relapse rates of re-treated and control groups (chi squared=5744, $P<0.001$). Furthermore, the relapses in the retreated group were significantly more likely to be later than those in the control group (t=25-62, $P<0.001$). Conclusions: Re-treatment with this modified regimen is acceptable and can reduce the risk of early relapse in dapsone-cured patients. The problem of persisters causing late relapse is likely to remain.

4224 SHYAMALA ANAND; PRABHU NEETHIODISS; XAVIER, J. W. **Intra and post operative complications and visual outcomes following cataract surgery in leprosy patients.** *Leprosy Review* (2009) **80** (2) 177-186 Colchester, UK; LEPRA [En, 13 ref.] Kothara Community Hospital, The Leprosy Mission Trust India, Amravati District, Maharashtra, India. Email: Shyamala.anand@tomindia.org

Objectives: The occurrence of intra and post operative complications was compared in different groups of leprosy patients. The association between post operative and intra operative complications was studied, and how visual outcomes were affected by these complications. We also share our medical management and surgical techniques that might help minimise intra operative complications and improve visual outcomes. Design: A retrospective analysis of 1024 cataract operations in 786 leprosy patients over an 11 year period from 1995 to 2006 at Kothara Community Hospital, a rural hospital belonging to The Leprosy Mission Trust India, located in the Amravati district of Maharashtra. Results: 35% of eyes had intra operative complications and 22% of eyes had post operative complications, with no appreciable difference in incidence of intra operative complications in the various groups of patients studied. Post operative uveitis was higher in the MB (32%), smear positive (6-5%), UT (6%), eyes with leprosy related ocular disease (64%) and lepra reaction (12%) groups. Overall, eyes with leprosy related complications and eyes operated on during lepra reactions had more post operative complications compared to the group without. Visual outcomes for eyes with intra and post operative complications were poorer than the groups without. Conclusions: Cataract surgery in the hands of a careful and well trained surgeon, who is familiar with ocular leprosy and can modify the surgical technique as necessary, is safe and associated with minimal intra operative and post operative complications.

4225 EBENSO, J.; VELEMA, J. P. **Test-retest reliability of the Screening Activity Limitation and Safety Awareness (SALSA) scale in North-West Nigeria.** *Leprosy Review* (2009) **80** (2) 197-204 Colchester, UK; LEPRA [En, 11 ref.] The Leprosy Mission International, 80 Windmill Road, Brentford, Middlesex TW8 0QH, UK. Email: JannineE@tlmint.org

Introduction: The present study examines the inter-tester and intra-tester reliability of the recently developed scale for Screening of Activity Limitation and Safety Awareness (SALSA) in NorthWest Nigeria. The scale was developed through collaborative research in five countries around the world. Methodology: One hundred and three people affected by leprosy from three states in North-West Nigeria participated in the study. A Hausa translation of the 20-item SALSA questionnaire was used by four trained health staff to interview the participants. Seventy-five paired interviews were conducted where the second interview was administered by a different interviewer from the first at intervals of 4-76 days (median 52). Twenty-eight paired interviews were conducted, both by the same interviewer, at intervals of 52-71 days (median 63). Results: Inter-tester reliability: All 20 items had Kappa's ranging from 0.45-0.8; 15 items had Kappa's >0.6; 8 items had Kappa's >0.7. Intra-tester reliability: All 20 items had Kappa's ranging from 0.51-1; 15 items had Kappa's >0.6; 12 items had Kappa's >0.7. For inter-tester reliability, the first interview had a mean SALSA score of 36.5 (95%CI=34.96-38.05). The second interview had a mean of 35.02 (95%CI=35.01-37.99). For intratester reliability, the mean SALSA scores of first and second interviews were 27.36 (95%CI=24.36-30.36) and 26.68 (95%CI=23.9329.43), respectively. Conclusions: The Hausa translation of SALSA has an acceptable reliability in Nigeria provided the interviewers are well trained.

4226 REIS, F. J. J.; KNACKFUSS, I. G.; VERÇOSA, N.; MENEZES, S. **The functional outcome of posterior tibial tendon transfer for foot drop in leprosy. The results of one to 5 years follow up.** *Leprosy Review* (2009) **80** (2) 219-220 Colchester, UK; LEPRA [En, 16 ref.] Departamento de Cirurgia Geral, Hospital Universitário Clementino Fraga Filho, Faculdade de Medicina da, Universidade Federal do Rio de Janeiro, Av. Rodoloho Paulo Rocco. 255 - Cidade Universitária, Ilha do Fundáo, CEP 21941-913, Rio de Janeiro RJ, Brazil. Email: professorfelipereis@yahoo.com.br

The Stanmore system, a specific scale proposed by Yeap, Sing and Birch, was used for the assessment of the results of tibial tendon transfer for foot drop in 13 leprosy patients. The results are excellent for scores between 85 and 100, good for scores between 70 and 84, fair for scores between 55 and 69, and poor if the score was less than 55. The results of the posterior tibial tendon transfer assessed using the Stanmore system was: 5 (38.4%) patients had excellent results; 5 (38.4%) had good results; 2 (15.3%) fair and one (7.6%) had poor. The average score was 78.6. It is concluded that Stanmore system proved useful in assessing the outcome of posterior tibial tendon transfer in foot drop due to leprosy and should be used to compare different surgical tibial tendon transfer routes or the functional scores before and after surgery.

4227 FAJARDO, T. T.; VILLAHERMOSA, L.; PARDILLO, F. E. F.; ABALOS, R. M.; BURGOS, J.; CRUZ, E. DELA; GELBER, R. H. **A comparative clinical trial in multibacillary leprosy with long-term relapse rates of four different multidrug regimens.** *American Journal of Tropical Medicine and Hygiene* (2009) **81** (2) 330-334 Northbrook, USA; American Society of Tropical Medicine and Hygiene [En, 33 ref.] Leonard Wood Memorial Center for Leprosy Research, Cebu City, Philippines. Email: ikgelber@hotmail.com

As a participant in a multicentre trial, we evaluated the relapse rate in 189 multibacillary (MB) leprosy patients treated with 4 different regimens and followed-up for as many as 12 years after the initiation of treatment (Philippines). Treatment regimens included 1 year of WHO MDT (a regimen including dapsone, clofazimine, and

rifampin), 2 years of WHO MDT, 1 month of daily rifampin and daily ofloxacin, and 1 year of WHO MDT plus an initial 1 month of daily rifampin and daily ofloxacin. Relapse rates after 9 and 12 years from the initiation of therapy in the 3 regimens that included WHO MDT were 0-3%, whereas relapses occurred in those treated with the 1-month regimen alone at a significantly greater rate (P<0.05): 11 % at 9 years and 25% at 12 years. Relapses occurred late, beginning at 5 years after the initiation of therapy, and were confined to those patients histopathologically borderline lepromatous and polar lepromatous having a high bacterial burden. Prospects for an alternative effective short-course therapy of leprosy are presented.

4228 FEUERRIEGEL, S.; COX, H. S.; ZARKUA, N.; KARIMOVICH, H. A.; BRAKER, K.; RÜSCH-GERDES, S.; NIEMANN, S. **Sequence analyses of just four genes to detect extensively drug-resistant *Mycobacterium tuberculosis* strains in multidrug-resislant tuberculosis patients undergoing treatment.** *Antimicrobial Agents and Chemotherapy* (2009) **53** (8) 3353-3356 Washington, USA; American Society for Microbiology (ASM) [En, 28 ref.] Research Center Borstel, National Reference Center for Mycobacteria, Parkallee 18, 23845 Borstel, Germany. Email: sfeuerriegel@fz-borstel.de

The rapid detection of *Mycobacterium tuberculosis* isolates resistant to second-line drugs is crucial for the institution of appropriate treatment regimens as early as possible. Although molecular methods have successfully been used for the rapid detection of resistance to first-line drugs, there are limited data on mutations that confer resistance to second-line drugs. To address this question, we analyzed *Mycobacterium tuberculosis* strains resistant to ofloxacin (n=26) and to capreomycin and/or amikacin (n=48) from Uzbekistan for variations in target genes (*gyrA, gyrB, rrs,* and *tlyA).* Strains susceptible to ofloxacin (n=49) and capreomycin and/ or amikacin (n=39) were included as controls. Mutations in *gyrA* or *gyrB* were found in 96% (25/26 strains) of the ofloxacin-resistant strains, while none of the susceptible strains displayed mutations in those two genes. The most common mutation occurred in *gyrA* at codon 94 (17/26 strains [65.4%)), followed by mutations at codons 90 and 91. Two strains showed a mutation in *gyrB,* at codons 485 and 543, respectively; both mutations have not been reported previously. The most frequent mutation in strains resistant to both amikacin and capreomycin was A1401G in *rrs* (34/40 strains [85.0%]). Three strains had mutations in *tlyA,* of which two (at codons 18 and 118) were associated with resistance to capreomycin alone. Overall, none of the 10 resistant strains (5 amikacin-resistant and capreomycin-susceptible strains) and none of the 39 susceptible control strains had mutations in the genes investigated. Our results clearly demonstrate the potential of sequence analyses of short regions of relatively few target genes for the rapid detection of resistance to second-line drugs among strains isolated from patients undergoing treatment for multidrug-resistant tuberculosis. The mechanisms that confer amikacin resistance in this setting remain unclear.

4229 OOSTERHOUT, J. J. G. VAN; BROWN, L.; WEIGEL, R.; KUMWENDA, J. J.; MZINGANJIRA, D.; SAUKILA, N.; MHANGO, B.; HARTUNG, T.; PHIRI, S.; HOSSEINIPOUR, M. C. **Diagnosis of antiretroviral therapy failure in Malawi: poor performance of clinical and immunological WHO criteria.** *Tropical Medicine and International Health* (2009) **14** (8) 856-861 Oxford, UK; Blackwell Publishing [En, 21 ref.) Department of Medicine, University of Malawi College of Medicine, Blantyre, Malawi. Email: mina_hosseinipour@med.unc.edu

Objectives: In antiretroviral therapy (ART) scale-up programmes in sub-Saharan Africa viral load monitoring is not recommended. We wanted to study the impact of only using clinical and immunological monitoring on the diagnosis of virological ART failure under routine circumstances. METHODS: Clinicians in two urban ART clinics in Malawi used clinical and

immunological monitoring to identify adult patients for switching to secondline ART. If patients met clinical and/or immunological failure criteria of WHO guidelines and had a viral load <400 copies/ml there was misclassification of virological ART failure. RESULTS: Between January 2006 and July 2007, we identified 155 patients with WHO criteria for immunological and/or clinical failure. Virological ART failure had been misclassified in 66 (43%) patients, Misclassification was significantly higher in patients meeting clinical failure criteria (57%) than in those with immunological criteria (30%). On multivariate analysis, misclassification was associated with being on ART <2 years [OR=7.42 (2.63, 20.95)] and CD4 >200 cells/µl [OR=5.03 (2.05, 12.34)]. Active tuberculosis and Kaposi's sarcoma were the most common conditions causing misclassification of virological ART failure. CONCLUSION: Misclassification of virological ART failure occurs frequently using WHO clinical and immunological criteria of ART failure for poor settings. A viral load test confirming virological ART failure is therefore advised to avoid unnecessary switching to second-line regimens.

4230 OTTMANI, S.; ZIGNOL, M.; BENCHEIKH, N.; LAÂSRI, L.; BLANC, L.; MAHJOUR, J. **TB contact investigations: 12 years of experience in the National TB Programme, Morocco 1993-2004.** *Eastern Mediterranean Health Journal* (2009) **15** (3) 494503 Cairo, Egypt; World Health Organization, Regional Office for the Eastern Mediterranean [En, ar, fr, 26 ref.] Stop TB Department, World Health Organization, Geneva, Switzerland. Email: ottmanis@who.int

We reviewed data collected from 1993 to 2004 as part of the routine activities of the national tuberculosis (TB) control programme (NTP) in Morocco. More than 1 million household TB contacts were identified in approximately 200 000 investigations. On average, 77% of identified contacts were screened every year; overall prevalence was 2.5%. The proportion of TB cases identified in household contacts of registered cases was 5.6%. This was significantly higher in children under 10 years and in patients registered and diagnosed with symptomatic primary complex. Performing TB contact investigations as part of the routine activities of NTP services is feasible in low-middle-income countries.

4231 WANG JIANMING; SHEN HONGBING **Review of cigarette smoking and tuberculosis in China: intervention is needed for smoking cessation among tuberculosis patients.** *BMC Public Health* (2009) **9** (292) (12 August 2009) London, UK; BioMed Central Ltd [En, 21 ref.] Department of Epidemiology and Biostatistics, School of Public Health, Nanjing Medical University, Nanjing, China. Email: merry21st@yahoo.com.cn. hbshen@njmu.edu.cn

Background: As a risk factor of tuberculosis (TB), tobacco smoking has increased substantially over the past three decades, especially in developing countries. However, the association between smoking and TB, which has been shown to exist in different studies with different ethnic background, has not yet received sufficient attention in terms of TB care standards and research in China. Methods: An observational study was conducted in two rural areas of China. A total of 613 TB patients frequency matched with 1226 controls were interviewed by using a structured questionnaire. The associations between cigarette smoking and risk of TB were estimated by computing odds ratios (ORs) and 95% confidence intervals (95% CIs) from logistic regression model. Patients' smoking behavior and patterns of smoking cessation were followed after TB diagnosis. Multivariate Cox proportional hazards model was applied to calculate hazard ratios (HRs) and 95% confidence intervals (95% CIs) in analyzing the risk factors for smoking relapse. The Kaplan-Meier estimate was computed to plot the ability of smoking-free after cessation among different groups, with the Log-rank test being used to compare the difference. Results: The proportion of cigarette smoking was 54.6% in TB cases, which was significantly higher than that in controls (45.1 %) with adjusted OR of

1.93 (95% CI: 1.51-2.48). Though 54.9% smokers stopped smoking after being diagnosed with TB, more than 18% relapsed during the follow-up period. The proportion of relapse was higher within 6-9 months (6%) and 12-15 months (11 %) after cessation. In the Cox regression estimates adjusted for age and gender, compared with those highly educated and previously treated patients, the hazard ratios of smoking relapse were 3.48 (95% CI: 1.28-9.47) for less educated (<6 years) and 4.30 (95% CI: 1.01-18.30) for newly treated patients, respectively. Conclusion: Cigarette smoking is associated with TB in the Chinese. Interventions of smoking cessation are recommended to be included in the current TB control practice.

4232 JYOTI ARORA; SINGH, U. B.; NAGA SURESH; TANU RANA; CHHAVI PORWAL; AMIT KAUSHIK; PANDE, J. N. **Characterization of predominant *Mycobacterium tuberculosis* strains from different subpopulations of India.** *Infection, Genetics and Evolution* (2009) **9** (5) 832-839 Amsterdam, Netherlands; Elsevier [En, 48 ref.] Department of Microbiology, All India Institute of Medical Sciences, New Delhi, India. Email: drurvashi@gmail.com

The predominant strains from India belong to Central-Asian (CAS) and the East-African-Indian (EAI) clade of *Mycobacterium tuberculosis.* The two clades have also been shown to be geographically partitioned. The study of such strains may help to understand the characteristics that make *M. tuberculosis* an effective pathogen and its overrepresentation in certain populations. *M. tuberculosis* isolates characterized by spoligotyping under a population based tuberculosis study covering different regions from the North and South India were further analyzed by restriction fragment length polymorphism (RFLP) and by deletion analysis of *M. tuberculosis* specific deletion region 1 (ThD1). The genetic relationship of the two clades inferred using different genetic markers showed good correlation. In the North where the CAS clade predominates the isolates are characterized by presence of high IS*6110* copy number and absence of TbD1 region whereas in the South where the EAI clade predominates the isolates are characterized by low copy number of IS*6110* and presence of TbD1 region. The ancestral EAI strains were found to be less often associated with drug resistance or young age as compared to the CAS clade. The study highlights that the EAI lineage is well established in India and that CAS may be emerging or more recently introduced to India. The results depict a distinction in the lineage of strains from the North versus South India indicating a need to study if the pathogen has adapted to specific human populations.

4233 LAWN, S. D.; MYER, L.; EDWARDS, D.; BEKKER, L. G.; WOOD. R. **Short-term and long-term risk of tuberculosis associated with CD4 cell recovery during antiretroviral therapy in South Africa.** *AIDS* (2009) **23** (13) 1717-1725 Hagerstown, USA; Lippincott Williams & Wilkins [En, 44 ref.] The Desmond Tutu HIV Centre, Institute for Infectious Disease and Molecular Medicine, Faculty of Health Sciences, University of Cape Town, Anzio Road, Observatory 7925, Cape Town, South Africa. Email: stevelawn@yahoo.co.uk

Objective: To determine the short-term and long-term risks of tuberculosis (TB) associated with CD4 cell recovery during antiretroviral therapy (ART). Design: Observational community-based ART cohort in South Africa. Methods: TB incidence was determined among patients (*n*=1480) receiving ART for up to 4.5 years in a South African community-based service. Updated CD4 cell counts were measured 4-monthly. Person-time accrued within a range of CD4 cell count strata (CD4 cell strata) was calculated and used to derive CD4 cell-stratified TB rates. Factors associated with incident TB were identified using Poisson regression models. Results: Two hundred and three cases of TB were diagnosed during 2785 person-years of observation (overall incidence, 7.3 cases/100 person-years). During person-time accrued

within CD4 cell strata 0-100, 101-200, 201-300, 301-400, 401-500 and more than 500 cells/µl unadjusted TB incidence rates were 16.8, 9.3, 5.5, 4.6, 4.2 and 1.5 cases/100 person-years, respectively (P<0.001). During early ART (first 4 months), adjusted TB rates among those with CD4 cell counts 0-200 cells/µl were 1.7-fold higher than during long-term ART (P=0.026). Updated CD4 cell counts were the only patient characteristic independently associated with long-term TB risk. Conclusion: Updated CD4 cell counts were the dominant predictor of TB risk during ART in this low-resource setting. Among those with baseline CD4 cell counts less than 200 cells/µl, the excess adjusted risk of TB during early ART was consistent with 'unmasking' of disease missed at baseline screening. TB incidence rates at CD4 cell counts of 200-500 cells/µl remained high and adjunctive interventions are required. TB prevention would be improved by ART policies that minimized the time patients spend with CD4 cell counts below a threshold of 500 cells/µl.