Abstracts

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2843 JEMIKALAJAH, J. D.; OKOGUN, G. R. A. **Health point prevalence of human immunodeficiency virus and pulmonary tuberculosis among patients in various parts of Delta State, Nigeria.** *Saudi Medical Journal* (2009) **30** (3) 387-391 Riyadh, Saudi Arabia; Saudi Medical Journal Armed Forces Hospital [En, ar, 19 ref.] Medical Laboratory Department, Central Hospital, Kwale, Nigeria. Email: graokogun@ yahoo.com

Objectives: To assess the prevalence of human immunodeficiency virus (HIV) and pulmonary tuberculosis (PTB) in the study population in Delta State of Nigeria. Methods: Two hundred and five patients suspected of HIV and TB were prospectively studied in Kwale, Agbor and Eku in Delta State of Nigeria from February 2006 to February 2008. Human immunodeficiency virus status was determined using World Health Organization systems II, and Zeihl Nelson staining technique was used for TB screening. Results: A health point prevalence rate of 53.2%, was obtained for HIV, 49.3% for TB, and 16.6% for HIV/TB. The population of HIV positive (p=0.890, p=0.011, p=0.006) and TB positive (p=0.135, p=0.0003, p=0.0001) subjects were statistically significant among the suspected subjects while the HIV/TB positive cases were not statistically significant (p=0.987, p=0.685, p=0.731). Conclusion. Our study showed that HIV and PTB infections remains high in parts of Delta State in Nigeria.

2844 GHOLAMALI, G.; JAFAR, A. **Tuberculin skin test size after prolong time of Bacille Calmette Guérin vaccination.** *Journal of Medical Sciences (Pakistan)* (2009) **9** (1) 46-50 Faisalabad, Pakistan; ANSInet, Asian Network for Scientific Information [En, 22 ref.] Health Research Center, Department of Infectious Diseases, Baqiyatallah Medical Sciences University, Mollasadra Ave., Vanak Square, Tehran, Iran.

A cross-sectional study was conducted to evaluate the effect of neonatal Bacille Calmette Guérin (BCG) vaccination on tuberculin skin test results in adulthood. 464 randomly selected male on-duty soldiers (aged 20-31 years) in Tehran, Iran, were recruited into the study during February-March 2008. Data on age, educational level, marital status, residence, familial tuberculosis, BCG vaccination scar, smoking history, and presence of chronic cough and night fever were collected. Tuberculin skin test was performed and an induration size of more than 10 mm after 48-72 h was regarded as positive reaction. Data were analysed using SPSS version 13 software. Chi-square test, Fisher exact test and multivariate analysis were used with logistic regression for confounding factors. All participants had BCG vaccination at neonatal age. The highest education level attained was a diploma (60.3%), 91.8% were single, and 93.1% lived in Tehran City. 51 (10.9%) had chronic cough and 35 (7.5%) had a history of smoking. About 31 (6.7%) had positive tuberculin skin test. Eight (1.7%) of them had an induration size of 20-30 mm. One subject had subclinical pulmonary tuberculosis. Positive tuberculin skin test was significantly associated with smoking (P<0.0001), chronic cough (P=0.04) and night fever (P=0.0001). Logistic regression analysis showcd that smoking (OR, 12; 95% CI: 4.6-31.3; P<0.0001)

and fever (OR, 20.96; 95% CI: 2.7-162.51; *P*<0.004) had significant associations with tuberculin skin test and these factors could have confounding effect on tuberculin skin test. It is concluded that a positive tuberculin test in adults with history of neonatal BCG vaccination should be considered as new tuberculosis infection.

2845 AMEEN, M. **Managing mycetomas.** *Tropical Doctor* (2009) **39** (2) 66-68 London. UK; RSM Press Ltd [En, 17 ref.] St John's Institute of Dermatology, Guy's and St Thomas' Hospital, Westminister Bridge Road, London, SEI 7EH, UK. Email: mahreenameen@hotmail.com

Mycetomas are chronic, granulomatous, subcutaneous infections caused by traumatic inoculation into the skin of either the actinomycetes bacteria or the eumycetes fungi, giving rise to actinomycetomas and eumycetomas, respectively. They are endemic in the tropics afflicting mainly those of low socio-economic status and men working in agriculture. The disease is slowly progressive and can cause bone involvemcnt, which can result in considerable disability. Late presentation is not uncommon making them notoriously difficult to manage. This article highlights the important aspects of their management and developments in drug therapy.

2846 PINTO JÚNIOR, V. L.; LIMA, M. A.; ROLLA, V. C; REBELO, M. C.; BÓIA. M. N. **Atypical cerebrospinal fluid profile in tuberculous meningitis.** *Tropical Doctor* (2009) **39** (2) 76-78 London, UK; RSM Press Ltd [En, 11 ref.] Evandro Chagas Clinical Research Institute, Oswaldo Cruz Foundation, Av. Brasil 4365, Manguinhos 21040-360, Rio de Janeiro, Brazil. Email: vitor.laerte@ipec.fiocruz.br

The aim of this study was to describe atypical cerebrospinal fluid (CSF) alterations in tuberculous meningitis (TBM) and to analyse the differences in outcome between patients with typical and atypical profiles. We did a retrospective study during the period of 2000 to 2005 including the cases of TBM assisted in a referral centre for infectious diseases in Rio de Janeiro State, Brazil. Neutrophilic pleocytosis at the first spinal tap was found in 32.4% of TBM patients, who had a worse outcome when compared with those patients with typical CSF profiles. One factor that might have a major impact was the delay in starting empirical treatment (27.5 versus 11.6 days). We conclude that, in cases with clinical and epidemiological data compatible with TBM but with an atypical CSF profile, empirical treatment should be considered if CSF culture and direct examination for bacteria are negative.

2847 MANSOER, J.; SCHEELE, S.; FLOYD, K.; DYE, C.; SITIENEI, J.; WILLIAMS, B. **New methods for estimating the tuberculosis case detection rate in high-HIV prevalence countries: the example of Kenya.** *Bulletin of the World Health Organization* (2009) **87** (3) 186-192 Geneva, Switzerland; World Health Organization [En, fr, es, ar, 32 ref.] US Department of Health and Human Services, Centers for Disease Control and Prevention, Nairobi, Kenya. Email: williamsbg@ who.int

Objective: To develop new methods for estimating the sputum smear-positive tuberculosis case detection rate (CDR) in a country where infection with HIV is prevalent. Methods: We estimated the smear-positive tuberculosis CDR in HIV-negative and HIV-positive adults, and in all adults in Kenya. Data on time trends in tuberculosis case notification rates and on HIV infection prevalence in adults and in tuberculosis patients were used, along with data on tuberculosis control programme performance. Findings: In 2006, the estimated smear-positive tuberculosis CDR in HIV-negative adults was 79% (95% confidence interval, CI: 64-94) and in HIV-positive adults, 57% (95% CI: 26-88), giving a weighted mean of 68% (95% CI: 49-87). The separate estimate for all smearpositive tuberculosis cases was 72% (95% CI: 53-91), giving an overall average for the three estimates of 70% (95% CI: 58-82). As the tuberculosis CDR in 1996 was 57% (95% CI: 47-67), the estimated increase by 2006 was 13 percentage points (95% CI: 6-20),

or 23%. This increase was accompanied by a more than doubling of the resources devoted to tuberculosis control in Kenya, including facilities and staff. Conclusion: Using three approaches to estimate the tuberculosis CDR in a country where HIV infection is prevalent, we showed that expansion of the tubcrculosis control programme in Kenya led to an increase of 23% in the CDR between 1996 and 2006. While the methods developed here can be applied in other countries with a high prevalence of HIV infection, they rely on precise data on trends in such prevalence in the general population and among tuberculosis patients.

2848 LEE, S. S. J.; CHOU, K. J.; SU, I.J.; CHEN, Y. S.; FANG, H. C; HUANG, T. S.; TSAI, H. C; WANN, S. R.; LIN, H. H.; LIU, Y. C. **High prevalence of latent tuberculosis infection in patients in endstage renal disease on hemodialysis: comparison of QuantiFERON-TB GOLD, ELlSPOT, and tuberculin skin test.** *Infection* (2009) **37** (2) 96-102 Munich, Germany; Urban & Vogel GmbH [En, 38 ref.] Section of Infectious Diseases, Dept. of Medicine, Kaohsiung Veterans General Hospital, 386, Ta-chung 1st Rd., Kaohsiung, 813, Taiwan. Email: ssjlee28@yahoo.com.tw

Background: Individuals with end-stage renal disease (ESRD) are 10- to 25-fold more likely than immunocompetent people to develop active tuberculosis (TB) and are candidates for being treated for latent TB infection (LTBI). However, diagnosis using the tuberculin skin test (TST) is doubly difficult due to cutaneous anergy and cross-reactions with Bacille-Calmette-Guérin (BCG) vaccination. Materials and Methods: This was a prospective, double-matched. cohort study in which 32 ESRD patients and 32 age-matched, healthy controls were enrolled. The TST and two new interferon- blood tests, QuantiFERON-TB Gold (QFT-G) and TSPOT.TB (ELISPOT), were performed. The subjects were followed up 2 years for active TB disease. ELISPOT was done in ESRD patients only. Results: Compared to the healthy controls, a high prevalence of LTBI was found in the ESRD patients by TST (62.5%,95% confidence interval [CI] 43.7-78.9), QFT-G (40.0%, 95% CI 22.7-59.4), and ELlSPOT (46.9%, 95% CI 29.1-65.3). Agreement was moderate (kappa [ ]=0.53) for QFT-G and ELISPOT but only slight between TST and QFT-G (=0.25) and fair between TST and ELlSPOT (=0.32). ESRD (p=0.03) and diabetes mellitus (p=0.04) were significant risk factors for QFT-G positivity on the multivariable analysis. The overall rate of active TB was 1.66 cases per 100 person-years (pys), with the rate higher in patients with ESRD (3.53 per 100 pys) and those with positive (3.40 per 100 pys) and indeterminate QFT results (30.16 per 100 pys), although the difference was not statistically significant. Sensitivity, specificity, and positive and negative predictive values of QFT-G for active TB was 100%,62.1 %,8.3% and 100%. Conclusion: This pilot study is the first to compare QFT-G, ELlS-POT, and TST in ESRD patients on hemodialysis and demonstrates a high prevalence of LTBI in this population. In our study, the QFT-G was the more accurate method for identifying those truly infected with *Mycobacterium tuberculosis,* even in BCG-vaccinated individuals.

2849 WEBER, E.; GÜNTHARD, H. F.; SCHERTLER, T.; SEEBACH, J. D. **Spontaneous splenic rupture as manifestation of the immune reconstitution inflammatory syndrome in an HIV type 1 infected patient with tuberculosis.** *Infection* (2009) **37** (2) 163-165 Munich, Germany; Urban & Vogel GmbH [En, 20 ref.] Dept. of Medicine, University Hospital Zurich, Zurich, Switzerland. Email: joerg.seebach@hcuge.ch

A 36-year-old native of Thailand presented to the emergency room with shortness of breath and fever lasting for 14 days. HIV infection with a CD4 count of 102 cells/µl had been diagnosed 3 years earlier. Antiretroviral treatment consisting of lopinavir/ritonavir, zidovudine and lamivudine was initiated at that time, and within 6 months the viraemia was suppressed and the CD4 count increased. One year later, he interrupted antiretroviral treatment and was lost to follow up. Physical examination of the transsexual man with silicon-breast implants showed normal clinical

findings. Laboratory tests revealed an elevated level of C-reactive protein (CRP) of 167 mg/litre, and normocytic anaemia with a haemoglobin count of 5.4 g/dl; the plasma HIV RNA level was 469000 copies/ml and the CD4 count 9 cells/µl. A chest CT scan showed diffuse bilateral infiltrates, and a bronchoalveolar lavage (BAL) specimen revealed *Pneumocystis jiroveci* infection. Treatment with trimethoprim-sulfamethoxazole was started without steroids. One week later, cultures for MTB from sputum and BAL samples were reported to be positive. Histological examination of a fine needle aspirate obtained from a mediastinal lymph node showed necrotizing, caseating granuloma with a high load of Ziehl-Neelsen-stained acid-fast bacilli, antituberculous treatment "with isoniazid, rifampicin, ethambutol, and pyrazinamide was started (day 7 after admission). The patient recovered rapidly and became afebrile. HAART with lamivudine, zidovudine, and nevirapine was initiated.

2850 WANG JIANMING; SHEN HONGBING **Direct observation and completion of treatment of tuberculosis in rural areas of China.** *Scandinavian Journal of Public Health* (2009) **37** (3) 304-309 London, UK; Sage Publications Ltd (En, 17 ref.) Department of Epidemiology and Biostatistics, School of Public Health, Nanjing Medical University, Nanjing, China. Email: hbshen@njmu.edu.cn

Aims: To analyse the current status of directly observed therapy (DOT) and completion of treatment of tuberculosis (TB) in two rural areas of China. Methods: Two rural counties with low DOT rates were deliberately selected as study sites. Face-to-face interviews were conducted by trained investigators with a structured questionnaire to investigate the characteristics of patients and the TB service that they had received. The associations between treatment completion and potential factors were estimated by computing odds ratios (ORs), as well as their 95% confidence intervals (CIs), from an unconditional logistic regression model. Results: Among 601 patients, 2.2% were treated with direct observation by health workers, 6.2% were supervised by family members, and 91.7% were treated with self-administered therapy. The treatment completion rate was found to be significantly associated with sputum smear test and adverse reaction to antituberculosis drugs, but not with direct observation by health workers (OR 1.81,95% CI 0.23-14.38) or by family members (OR 1.14, 95% CI 0.38-3.41). Frequent home visiting by health workers (1 visit/month) could help to increase the completion rate (OR 3.15, 95% CI 1.30-7.63). Conclusions: No significant difference was found in the rate of completion of TB treatment between direct observation and self-supervision groups in two rural areas with lower DOT coverage. How to build a feasible DOT strategy that is accepted by both patients and healthcare providers needs to be considered by policy-makers. Other elements apart from DOT are necessary to ensure a successful TB programme.

2851 COSTA, P. A. DA; TRAJMAN, A.; MELLO, F. C. DE Q.; GOUDINHO, S.; SILVA, M. A. M. V.; GARRET, D.; RUFFINO-NETTO, A.; KRITSKI, A. L. **Administrative measures for preventing *Mycobacterium tuberculosis* infection among healthcare workers in a teaching hospital in Rio de Janeiro, Brazil.** *Journal of Hospital Infection* (2009) **72** (1) 57-64 Amsterdam, Netherlands; Elsevier (En, 20 ref) Tuberculosis Academic Program, Federal University of Rio de Janeiro, UFRJ, Rua Prof. Rodolpho Paulo Rocco, 255/4 andar Ilha do Fundão, Rio de Janeiro, CEP 21941-913, Brazil. Email: kritskia@gmail.com

Tuberculosis (TB) is an occupational disease of healthcare workers (HCWs). Administrative and engineering interventions simultaneously implemented in hospitals of developed countries have reduced the risk of nosocomial transmission of *M. tuberculosis.* We studied the impact of administrative infection control measures on the risk for latent TB infection (LTBI) among HCWs in a resource-limited, high-burden country. An intervention study was undertaken in a university-affiliated, inner-city hospital in Rio de

Janeiro, where routine serial tuberculin skin testing (TST) is offered to all HCWs. From October 1998 to February 2001, the following infection control measures were progressively implemented: isolation of TB suspects and confirmed TB inpatients, quick turnaround for acid·fast bacilli sputum tests and HCW education in use of protective respirators. Among 1336 initially tested HCWs, 599 were retested. The number of TST conversions per 1000 person-months during and after the implementation of these measures was reduced from 5.8/1000 to 3.7/1000 person-months (*P*=0.006). The most significant reductions were observed in the intensive care unit (from 20.2 to 4.5, *P*<0.001) and clinical wards (from 10.3 to 6.0, *P*<0.001). Physicians and nurses had the highest reductions (from 7.6 to 0, *P*<0.001; from 9.9 to 5.8, *P*=0.001, respectively). We conclude that administrative measures for infection control can significantly reduce LTBI among HCWs in high-burden countries and should be implemented even when resources are not available for engineering infection control measures.

2852 MESFIN, M. M.; NEWELL, J. N.; WALLEY, J. D.; GESSESSEW, A.; MADELEY, R. J. **Delayed consultation among pulmonary tuberculosis patients: a cross sectional study of 10 DOTS districts of Ethiopia.** *BMC Public Health* (2009) **9** (53) (9 February 2009) London, UK; BioMed Central Ltd (En, 31 ref.) Nuffield Centre for International Health and Development, Institute of Health Sciences, University of Leeds, Leeds, UK. Email: M.melese@leeds.ac.uk, J.N.Newell@leeds.ac.uk, J.D.Walley@leeds.ac.uk, kalkidus@yahoo.com, richardmadeley@btinternet.com

Background: Delays seeking care increase transmission of pulmonary tuberculosis and hence the burden of tuberculosis, which remains high in developing countries. This study investigates patterns of health seeking behavior and determines risk factors for delayed patient consultation at public health facilities in 10 districts of Ethiopia. Methods: New pulmonary TB patients 15 years old were recruited at 18 diagnostic centres. Patients were asked about their health care seeking behaviour and the time from onset of symptoms to first consultation at a public health facility. First consultation at a public health facility 30 days or longer after onset of symptoms was regarded as prolonged patient delay. Results: Interviews were held with 924 pulmonary patients. Of these, 537 (58%) were smear positive and 387 (42%) were smear negative; 413 (45%) were female; 451 (49%) were rural residents; and the median age was 34 years. Prior to their first consultation at a public health facility, patients received treatment from a variety of informal sources: the Orthodox Church, where they were treated with holy water (24%); private practitioners (13%); rural drug vendors (7%); and traditional healers (3%). The overall median patient delay was 30 days (mean=60 days). Fifty three percent [95% Confidence Intervals (CI) (50%, 56%)] of patients had delayed their first consultation for 30 days. Patient delay for women was 54%; 95% CI (54%, 58%) and men 51 %; 95% CI (47%,55%). The delay was higher for patients who used informal treatment (median 31 days) than those who did not (15 days). Prolonged patient delay (30 days) was significantly associated with both patient-related and treatment-related factors. Significant patient-related factors were smear positive pulmonary disease [Adjusted Odds Ratio (AOR) 1.4; 95% CI (1.1 to 1.9)], rural residence [AOR 1.4; 95% CI (1.1 to 1.9)], illiteracy [AOR 1.7; 95% CI (1.2 to 2.4)], and lack of awareness/misperceptions of causes of pulmonary TB. Significant informal treatment-related factors were prior treatment with holy water [AOR 3.5; 95% CI (2.4 to 5)], treatment by private practitioners [AOR 1.7; 95% CI (1.1 to 2.6)] and treatment by drug vendors [AOR 1.9; 95% CI (1.1 to 3.5)]. Conclusion: Nearly half of pulmonary tuberculosis patients delayed seeking health care at a public health facility while getting treatment from informal sources. The involvement of religious institutions and private practitioners in early referral of patients with pulmonary symptoms and creating public awareness about tuberculosis could help reduce delays in starting modem treatment.

2853 LIN HUIPING; DENG CHUNGYEH; CHOU PESUS **Diagnosis and treatment delay among pulmonary tuberculosis patients identified using the Taiwan reporting enquiry system, 2002-2006.** *BMC Public Health* (2009) **9** (55) (12 February 2009) London, UK; BioMed Central Ltd [En, 34 ref.] Community Medicine Research Center, Institute of Public Health, National Yang-Ming University, Taipei, Taiwan. Email: pink@mail.ntshb.gov.tw, cydeng@ym.edu.tw, pschou@ym.edu.tw

Background: The tuberculosis reporting enquiry system was launched in Taiwan in 2001. Tuberculosis has been categorized as the third most important notifiable disease in Taiwan and the time required for reporting has been shortened to 7 days. Methods: A total of 114,827 cases were reported using the Taiwan enquiry system between 2002 and 2006; of these, 26,027 (22.7%) were finally diagnosed as not being tuberculosis, 7,005 (8.2%) were diagnosed as extra-pulmonary tuberculosis and 3,677 (3.2%) were not a first-time diagnosis of tuberculosis, and these cases were hence excluded. Diagnosis time was defined as the length of time between the first medical examination (including chest radiography, sputum smear or sputum culture) to the diagnosis of PTB; treatment time was defined as the period from the diagnosis of PTB to the initiation of treatment. Using the cut-off at the 75th percentile, a period of longer than 9 days was defined as a *diagnosis delay* and a period of longer than 2 days as a *treatment delay.* Multiple logistic regression analysis was applied to analyze the risk factors associated with these delays. Results: During the five-year study period, among the 78,118 new PTB patients reported in Taiwan, the mean diagnosis and treatment times were 12 and 5 days and the median times 1 day and 0 days, respectively. In total, 24.9% of the new PTB patients' diagnosis time delays were longer than 9 days and 20.3% of the patients' treatment time delays were longer than 2 days. The main factors associated with diagnosis delay included age, reporting year, living with family and a positive sputum culture (p<0.0001); the risk factors significantly associated with treatment delay were increased age, an aboriginal ethnic background, a positive sputum culture and diagnosis at a non-medical center (p<0.0001). Conclusion: The Taiwan TB reporting enquiry system has successfully increased the confirmed PTB reporting rate from 64.4% to 71.5%. Greater age and a positive sputum culture were both found to significantly increase both diagnosis and treatment delays; treatment delay is also significantly affected by the patient having an aboriginal ethnic background and being diagnosed at a non-medical center.

2854 OBI, R. K.; AMADI, A. N.; IDIKA, I. M.; NWANEBU, F. C. **Studies on the distribution of clinically diagnosed pulmonary tuberculosis in Ebonyi State, Nigeria.** *African Journal of Clinical and Experimental Microbiology* (2009) **10** (2) 80-87 Kwara State, Nigeria; African Journal of Clinical and Experimental Microbiology [En]

A study was conducted between January, 2005 to December, 2006 to ascertain the prevalence of pulmonary tuberculosis among patients who attended chest clinics in some randomly selected hospitals, Clinics and Health Centers in Ebonyi State, Nigeria. Investigations were carried out using the two popular diagnostic criteria for pulmonary tuberculosis namely the specific Ziehl Neelsen (ZN) methods and chest X-ray. A total of 962 patients with clinical signs and symptoms of tuberculosis were studied. Out of this figure, 559 (58.1 %) had pulmonary tuberculosis with 1:1 male/female ratio. There was no significant difference between ZN sputum smear positive and chest X-ray in the diagnosis of pulmonary tuberculosis in the studied population at 95% confidence level. The possible reasons for the high prevalence of pulmonary tuberculosis may be attributed to increase in the incidence of HIV/AIDS, high rate of poverty, emergence of drug-resistant strains of Mycobacteria and to a lesser extent, smoking and diabetes.

2855 RANDREMANANA, R. V.; SABATIER, P.; RAKOTOMANANA, F.; RANDRIAMANANTENA, A; RICHARD, V. **Spatial clustering of pulmonary tuberculosis and impact of the care factors in Antananarivo City.** *Tropical Medicine and International Health* (2009) **14** (4) 429-437 Oxford, UK; Blackwell Publishing [En, fr, es, 30 ref.] Unité Epidémiologie, Institut Pasteur de Madagascar, BP 1274, Antananarivo 101, Madagascar. Email: rrandrem@pasteur.mg

OBJECTIVE: To analyse the spatial distribution of TB in Antananarivo and investigate risk factors. METHODS: Pulmonary TB data were collected through passive case detection in 16 Tuberculosis Diagnostic and Treatment Centers (DTC). New cases listed in the DTC registers from 2004 to 2006 and resident in Antananarivo were included in the study. Field workers of the national control program conducted household surveys of all cases to collect complementary information on socio-economic status. TB spatial organization and risk factors were analysed over two successive periods (August 2004-July 2005, August 2005-July 2006); analysis was done at the neighbourhood level, by searching for spatial clusters with the spatial scan test. RESULTS: 3075 pulmonary tuberculosis new cases were reported in Antananarivo from 2004 to 2006. The average incidence during the study period was 74/100000 inhabitants (95% CI: 64.9-84.5). Spatial clusters occurred in three of the six *arrondissements* (districts) of the city (192 neighbourhoods). A decrease in clustering was observed with movement towards the southern neighbourhood. CONCLUSION: The change in risk of a TB cluster was linked to socio-economic (e.g. household amount of ownership of tap water) and patient care factors (e.g. patients lost to follow-up).

2856 JASPE, R. C.; ROJAS, Y. M.; FLORES, L. A.; TORO, E. S.; TAKIFF, H.; WAARD, J. H. DE **Evaluation of the Kudoh swab method for the culturing of *Mycobacterium tuberculosis* in rural areas.** *Tropical Medicine and International Health* (2009) **14** (4) 468·471 Oxford, UK; Blackwell Publishing [En, fr, es, 3 ref.] Laboratorio de Tuberculosis, Universidad Central de Venezuela, Hospital Vargas, San Jose, Caracas, Venezuela. Email: jacobusdeward@gmail.com

OBJECTIVE: To compare the simple, swab 'Kudoh method' for culturing *Myobacterium tuberculosis* from sputum samples, to the standard Petroff digestion-decontamination procedure. The Kudoh method, which requires no centrifugation and takes only 4-5 min per sample, was also evaluated for its performance in a rural setting. METHODS: Two hospital laboratories in Caracas, Venezuela processed 314 sputum samples, in parallel, with both methods. Separately, sputum specimens were cultured with the Kudoh swab method in a field environment with minimal laboratory facilities. RESULTS: In the hospital laboratories, the sensitivity ofthe Kudoh swab method was comparable to that of the standard Petroff culture procedure. The swab method also performed satisfactorily in the field, improving the diagnostic sensitivity by 21% over microscopic examination alone. CONCLUSION: The Kudoh swab method is an acceptable alternative for culturing mycobacteria that is particularly suitable for rural laboratories lacking adequate infrastructure for the Petroff method.

2857 LAHEY, T.; MATEE, M.; MTEI, L.; BAKARI, M.; PALLANGYO, K.; REYN, C. F. VON **Lymphocyte proliferation to mycobacterial antigens is detectable across a spectrum of HIV-associated tuberculosis.** *BMC Infectious Diseases* (2009) **9** (21) (23 February 2009) London, UK; BioMed Central Ltd [En, 35 ref.] Dartmouth Medical School, Lebanon, New Hampshire, USA. Email: Timothy.Lahey@Dartmouth.edu, mmatee@muhas.ac.tz, Indefomiro@yahoo.com, mbakari@muhas.ac.tz, kpallangyo@muhas.ac.tz, C. Fordham. von .Reyn@Dartmouth.edu

Background: Identifying novel TB diagnostics is a major public health priority. We explored the diagnostic characteristics of antimycobacterial lymphocyte proliferation assays (LPA) in HIV-infected subjects with latent or active TB.

Methods: HIV-infected subjects with bacille Calmette Guérin (BCG) scars and CD4 counts 200 cells/mm^3 entering a TB booster vaccine trial in Tanzania had baseline in vivo and in vitro immune tests performed: tuberculin skin tests (TST), LPA and five day assays of interferon gamma (IFN-) release. Assay antigens were early secreted antigenic target 6 (ESAT-6), antigen 85 (Ag85), and *Mycobacterium tuberculosis* whole cell lysate (WCL). Subjects were screened for active TB at enrollment by history, exam, sputum smear and culture. We compared anti mycobacterial immune responses between subjects with and without latent or active TB at enrollment. Results: Among 1885 subjects screened, 635 had latent TB and 13 had active TB. Subjects with latent TB were more likely than subjects without TB to have LPA responses to ESAT-6 (13.2% vs. 5.5%, P<0.0001), Ag85 (18.7% vs. 3.1%, P<0.0001), and WCL (45.7% vs. 17.1%, P<0.0001). Subjects with active TB also were more likely than those without active TB to have detectable LPA responses to ESAT-6 (38.5% vs. 8.1%, P=0.0001), Ag85 (46.2% vs. 8.5%, P<0.0001), and WCL (61.5% vs. 27.0%, P=0.0053). In subjects with a positive TST, LPA responses to ESAT-6, Ag85 and WCL were more common during active TB (p<0.0001 for all tests). In diagnosing active TB, in vivo and in vitro tests of mycobacterial immune responses had sensitivity and specificity as follows: TST 84.6% and 65.5%, ESAT-6 LPA 38.5% and 92.0%, Ag85 LPA 46.2% and 91.5%, and WCL LPA 61.5% and 73.0%. Detectable LPA responses were more common in patients with higher CD4 counts, and higher HIV viral loads. Conclusion: Lymphoproliferative responses to mycobacteria are detectable during HIV-associated active TB, and are less sensitive but more specific than TST.

2858 WORLD HEALTH ORGANIZATION **Integrated control of neglected zoonotic diseases in Africa.** *Weekly Epidemiological Record* (2009) **84** (17) 147-148 Geneva, Switzerland; World Health Organization [En, Fr] Avenue Appia 20, 1211 Geneva 27, Switzerland.

This paper summarizes the important points discussed in a meeting on the integrated control of neglected zoonotic diseases in Africa, held in Nairobi, Kenya, during November 2007. In the meeting, neglected zoonotic diseases were defined as endemic zoonoses, and sometimes epidemic-prone zoonoses, such as anthrax, brucellosis, bovine tuberculosis, taeniasis and cysticercosis, echinococcosis (hydatidosis) and rabies. The meeting concludes that in order to successfully combat neglected zoonotic diseases in the continent, effective leadership and concerted efforts, as well as varied technical, financial and political support, will be required.

2859 WAMISHO, B. L.; MENORE, L. H. **Begging on the streets of Addis Ababa: an impact of musculoskeletal disability.** *East and Central African Journal of Surgery* (2009) **14** (1) 103-108 Lusaka, Zambia; Association of Surgeons of East Africa [En, II ref.] Department of Orthopedics, Faculty of Medicine, Addis Ababa University, Addis Ababa, Ethiopia. Email: Ibiruklw@yahoo.com

Background: This was a 2-year interventional prospective study aimed at determining the frequency and pattern of musculoskeletal disability among beggars of the streets of Addis Ababa. It was part of a continuous multidisciplinary study that was trying to assess causes of street begging and looked for ways to stop it or at least bring it to 'tolerable' proportions. This part of the study mainly focused on treatable/correctable musculoskeletal disabilities leading to begging on streets in the city. It also assessed the degree, duration and reasons for street begging and determined whether correcting treatable musculoskeletal disabilities stopped beggars from begging or not. The study setting was in Addis Ababa city, in collaboration with C.A.R.D.O.S. Ethiopia. Methods: This was an interventional prospective follow-up study on beggars of the streets of Addis Ababa who claimed musculoskeletal disability as their main cause for begging. A location in a sub city was selected for a reason of hosting the

largest number of beggars. In collaboration with the local administrator a clinic was opened amidst the busy street and volunteer street beggars with musculoskeletal disability were recruited for the study. Surgical procedures were performed in 61 'patients' and were followed for two years, from April 2007-April 2009. Some beggars refused a clearly beneficial surgery. Results: Our survey revealed there are 1,237 street beggars including the outskirts of 'Entoto' mountain. Nearly two-third of the street beggars were males and age ranged from a week to 90. Of the 204 beggars with musculoskeletal disability, 118 were evaluated to clearly benefit from a successful surgical procedure. The commonest diagnosis was leprosy with its complications recorded in 47 of the 204, followed by bone and joint infections, 13.2% (27/204) and complex, unclear congenital anomalies ranked third. Neglected dislocations, mal-united of nonunited fractures were observed in twenty (9.8%) of the street beggars. Iatrogenic cause was discovered as a cause of disability in six beggars. Sixty one beggars were operated. The ages for operated cases ranged from 12 to 78 years. The duration of begging in beggars selected for surgery was from 4.5 to 56 years. Corrective amputation, Bone grafting and Sequestrectomy were the commonest procedures in respected order. One patient died due to concomitant cardiac illness. From the whole group 68 patients went back to begging while from the operated group only a single patient recently was found begging in one of the streets in Addis. Conclusion: Musculoskeletal disability may lead to begging. Well-funded, multi-sectoral long-term campaign on begging will possibly reduce it to a 'tolerable' level.

2860 PHILLIPS, R. O.; SARFO, F. S.; OSEI-SARPONG, F.; BOATENG, A.; TETTEH, I.; LARTEY, A.; ADENTWE, E.; OPARE, W.; ASIEDU, K. B.; WANSBROUGH-JONES, M. **Sensitivity of PCR targeting *Mycobacterium ulcerans* by use of fine-needle aspirates for diagnosis of Buruli ulcer.** *Journal of Clinical Microbiology* (2009) **47** (4) 924-926 Washington, USA; American Society for Microbiology (ASM) [En, 16 ref.] Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. Email: wansbrou@sghms.ac.uk

In a previous study, we reported that the sensitivity of PCR targeting the IS*2404* insertion sequence of *Mycobacterium ulcerans* was 98% when it was applied to 4-mm punch biopsy samples of Buruli lesions. Fine-needle aspiration (FNA) is a less traumatic sampling technique for nonulcerated lesions, and we have studied the sensitivity of PCR using FNA samples. Fine-needle aspirates were taken with a 21-gauge needle from 43 patients diagnosed c1inicaijy with *M. ulcerans* disease. Four-millimeter punch biopsies were obtained for microscopy, culture, and PCR targeting the IS*2404* insertion sequence. The sensitivity of PCR using samples obtained by FNA was 86% (95% confidence interval [95% CI, 72 to 94%) compared with that for PCR using punch biopsy samples. In this study, the sensitivities of culture and microscopy for punch biopsy samples were 44% (95% CI, 29 to 60%) and 26% (95% CI, 14 to 41%), respectively. This demonstrates that PCR on an FNA sample is a viable minimally invasive technique to diagnose *M. ulcerans* lesions.

2861 JONG, B. C. DE; ANTONIO, M.; AWINE, T.; OGUNGBEMI, K.; JONG, Y. P. DE; GAGNEUX, S.; DERIEMER, K.; ZOZIO, T.; RASTOGI, N.; BORGDORFF, M.; HILL, P. C.; ADEGBOLA, R. A. **Use of spoligotyping and large sequence polymorphisms to study the population structure of the *Mycobacterium tuberculosis* complex in a cohort study of consecutive smear-positive tuberculosis cases in the Gambia.** *Journal of Clinical Microbiology* (2009) **47** (4) 994-1001 Washington, USA; American Society for Microbiology (ASM) [En, 28 ref.] Bacterial Diseases Programme, MRC Laboratories, P.O. Box 273, Banjul, Gambia. Email: bdejong@mrc.gm

Mycobacterium africanum, first described in Senegal in 1968, causes up to half of the smear-positive pulmonary tuberculosis cases in West Africa, but it has not been found in other geographical areas except among recent West African migrants. The reasons for the geographic

restriction of *M. africanum* are unknown. We used molecular tools to determine the population structure of the *Mycobacterium tuberculosis* complex in a cohort study of consecutive smear-positive tuberculosis cases in the Gambia. We collected and genotyped 386 clinical isolates using spoligotype analysis and PCRs for large sequence polymorphisms (LSPs) and compared the genotype patterns to the patterns in an international database. The results of spoligotyping and LSP analysis for the study population were also compared to determine the correlation between them. The main lineages within the *Mycobacterium tuberculosis* complex identified in The Gambia included *M. africanum* type I (38.4%), characterized by an LSP in region of difference 702 (RD702; West African type 2). Among the *M. tuberculosis* sensu stricto isolates, lineages characterized by RD182 and by RDl74 were the most common. We also detected a gradient in the prevalence of *M. africanum* that extended from neighboring Guinea-Bissau. The genotypic diversity of the spoligotype patterns was greater among the isolates of *M. africanum* than among the isolates of *M. tuberculosis.* We postulate that *M. africanum* became endemic in West Africa first, before the introduction of different lineages within *M. tuberculosis* sensu stricto.

2862 TSENG SHUHUI; JIANG DAHSHYONG [JIANG, D. S. D.]; HOI HAOSEONG; YANG SHIANGLIN; HWANG KAOPIN **Impact of HAART therapy on co-infection of tuberculosis and HIV cases for 9 years in Taiwan.** *American Journal of Tropical Medicine and Hygiene* (2009) **80** (4) 675-677 Northbrook, USA; American Society of Tropical Medicine and Hygiene [En, 24 ref.] Graduate Institute of Clinical Medical Sciences, College of Medicine, Chang Gung University, Kaohsiung, Taiwan. Email: kapihw@adm.cgmh.org.tw

Free highly active antiretroviral therapy (HAART) was made available by The Department of Health since April 1997. As a result. the incidence rate of tuberculosis (TB)/human immunodeficiency virus (HIV) co-infection among HIV cases rose from 1.90% to 3.82% during 1993 to 1998 and decreased from 3.82% to 0.94% during 1998 to 2006. The incidence rate of TB/HIV co-infection among HIV cases reached its peak in 1998 and then started to reverse, although the next year the TB disease burden (incidence rate: 62.7 cases per 100,000 persons) remained consistently high, and this continued in the following years. The survival rate of TB/HIV co-infection cases was 62.16% during the period 1993-1996 (pre-free HAART era) and increased to 86.60% during the period 1998-2006 (P<0.0001) (post-free HAART era). Highly active antiretroviral therapy decreased the incidence rate of new TB/HIV co-infection cases among HIV cases and increased the survival rate of TB/HIV co-infection cases.

3160 BAJAJ, D. R.; MATLANI, B. L.; SOOMRO, F. R.; IQBAL, M. P. **Knowledge, attitude and practices regarding leprosy among general practitioners at Hyderabad.** *JCPSP, Journal of the College of Physicians and Surgeons Pakistan* (2009) **19** (4) 215-218 Karachi, Pakistan; College of Physicians and Surgeons Pakistan [En, 19 ref.] Department of Dermatology, Liaquat University of Medical and Health Sciences, Jamshoro, Pakistan. Email: doulat01@yahoo.com

Objective: To assess the level of knowledge, social attitude towards patients, and diagnostic and management capabilities of general practitioners (KAP) regarding leprosy, practicing at Hyderabad, Pakistan. Study Design: Cross-sectional study. Place and Duration of Study: Hyderabad, Sindh, Pakistan, during October to December 2007. Methodology: A pre-tested and well-structured questionnaire consisting of 54 questions was administered to general practitioners working at various areas in Hyderabad. The questions were grouped under different headings and covered clinical features, common and uncommon presentations, complications, referral practices and stigma. The sum of correct answers marked by doctors was taken to classify the respondents. The doctors who responded correctly for up to 10 questions were assigned level 1 (poor), from 11 to

25: level 2 (average), from 26 to 40: level 3 (good), while those who marked correct answers for more than 40 questions were assigned level 4 (excellent). Chi-square test was used to determine significance at p <0.05. Results: A total of 200 doctors were surveyed. Fourteen doctors (7%) had poor knowledge of disease (number of correct answers less than 10), 32 (16%) had average (number of correct answers between 11 and 25), 140 (70%) doctors good (number of correct answers between 26 and 40) while 14 (7%) had excellent (number of correct answers more than 40) knowledge of the disease. Conclusion: There is inconsistency and deficiencies in the knowledge, referral pattern and treatment of leprosy among general practitioners, which needs to be improved by conducting awareness activities.

3161 SESHADRI, C.; UISO, L. O.; OSTERMANN, J.; DIEFENTHAL, H.; SHAO, H. J.; CHU, H. Y.; ASMUTH, D. M.; THIELMAN, N. M.; BARTLETT, J. A.; CRUMP, J. A. **Low sensitivity of T-cell based detection of tuberculosis among HIV co-infected Tanzanian in-patients.** *East African Medical Journal* (2008) **85** (9) 442-449 Nairobi, Kenya; Kenya Medical Association [En, 20 ref.] Massachusetts General Hospital, Gray/Jackson 504, 55 Fruit Street, Boston, MA 02114, USA.

The performance of QuantiFERON-TB GOLD (QFTG) was evaluated in a resource-poor setting among patients with and without HIV infection. This cross-sectional study was conducted in 2 hospitals in Northern Tanzania. 83 adult male and female inpatients were enrolled. All patients were screened for HIV infection and underwent tuberculin skin test (TST) and QFTG. 29 (35%) of 83 were HIV-infected. QFTG yielded indeterminate results in 12 (22%; 95%CI 12%-34%) of 54 HIV-uninfected and 13 (45%; 95%CI 26%-64%) of 29 HIV-infected subjects (*P*=0.0323). Among those with smear-positive pulmonary tuberculosis, TST was positive in 40 (100%; 95%CI 91%-100%) of 40 HIV-uninfected subjects compared with seven (54%; 95%CI 25%·81%) of 13 HIV-infected subjects (*P*<0.0001), and QFTG was positive in 28 (70%; 95%CI 53%-83%) of 40 HIV-uninfected subjects compared with three (23%; 95%CI 5%-54%) of 13 HIV-infected subjects (*P*=0.0029). Among medical inpatients at risk for latent tuberculosis infection, TST was positive in seven (50%) of 14 HIV-uninfected patients and three (19%) of 16 HIV-infected patients (*P*=0.0701) and QFTG was positive among two (14%) of 14 HIV-uninfected patients and three (19%) of 16 HIV-infected patients (*P*=0.7437). The presence of HIV co-infection was associated with a significant reduction in sensitivity of both the TST (P<0.0001) and QFTG (*P*=0.0029) for the diagnosis of active *Mycobacterium tuberculosis* infection. The high proportion of indeterminate QFTG and lack of sensitivity, particularly among HIV-infected patients, may limit its applicability in settings like Tanzania. Larger studies in resource-poor settings are required.

3162 KUREMU, R. T.; TENGE. C. N.; WAKULOBA, G. G.; WAMBATI, A. **Patient transfer practices by hospitals in Western Kenya.** *East African Medical Journal* (2008) **85** (9) 450-454 Nairobi, Kenya; Kenya Medical Association [En, 7 ref.] Department of Surgery and Anaesthesiology, Moi University, School of Medicine, P. O. Box 4606 - 30100, Eldoret, Kenya.

Patients who are critically ill and those requiring emergency care are transported within and between hospitals on a regular basis seeking diagnostic or therapeutic services not available at the bed side or within the referring institution. The emergency of specialty systems often determines the ultimate destination of patients rather than proximity of facility and this has heightened the need for patient transfer. To achieve a favourable outcome, it is necessary to ensure that any transfer is carried out safely and effectively with minimum disruption of the continuum of care. A cross-sectional descriptive study was carried out to determine the gap between existing knowledge of patient transfer principles and the practice by hospitals in Western Kenya referring patients to Moi Teaching and Referral Hospital (MTRH).

Patients transferred in over a period of six months for critical/emergency care were included. Evaluation was done for 97 transfers during the six months period. Age ranged from four days old to 70 years with a median of 28 years. A wide spectrum of diseases were seen. However, in order of frequency the leading five were; trauma and accidents, vascular disorders, infections; anaemia and malignancies. Of the infections, respiratory infections topped the list with pulmonary tuberculosis as the leading disease entity. Majority of patients 43 (44%) were referred within 24 hours of being seen at the primary hospital. Only 56% were transported by ambulance; appropriate escort (nurse) was provided in 60%; documentation was provided in 85%; monitoring enroute was done in 24%; warmth was provided in 62%, 27% were dehydrated requiring resuscitation; respiratory support was inadequate as only 14% (of those who required) had airway and 32% had oxygen provided; intravenous fluids were provided in 34% of those who required; nasogastric intubation was provided in 30% of those who required; urethral catheterisation was provided in 23% of those who required; 50% of those with long bone fractures were splinted and only 3% of those who required cervical spine stabilisation had cervical collar. There was a significant failure by hospitals in Western Kenya in the application of principles of patient transfer while referring patients to MTRH.

3163 GODOY, M. J.; OROZCO, L.; HERNÁNDEZ, C.; DAMATA, O.; WAARD, J. DE; GONZÁLEZ RICO, S. **[Identification of non-tuberculosis mycobacteria: comparison between bio-chemical and molecular methods.]** Identificación de micobacterias no tuberculosas: comparación de métodos bioquímicos y moleculares. *Revista de la Sociedad Venezolana de Microbiologia* (2008) **28** (2) 96-104 Caracas, Venezuela; Organo Oficial de la Sociedad Venezolana de Microbiologia [Es, en, 33 ref.] Escuela de Bioanálisis, Facultad de Medicina, Universidad Central de Venezuela, Caracas, Venezuela. Email: susana.gonzalez@ucv.ve

Infections caused by atypical mycobacteria constitute a serious health problem at present, especially in immunocompromised patients. These mycobacteria manifest particular susceptibility patterns, different from *M. tuberculosis,* due to which the administration of an adequate treatment requires a fast, simple and sensitive identification method. The PRA technique (PCR Restriction), based on the enzymatic digestion of the amplification product of the hsp65 gene has shown to be an adequate method for the identification of mycobacteria. In this study, the PRA technique was compared with the standard mycobacterial identification method, represented by biochemical tests, in 30 isolates from the Tuberculosis Laboratory of the Instituto de Biomedicina. The PRA technique allowed the identification of 96% of the strains analysed, as compared with 92% of strains identified through the biochemical methods. The results obtained were identical in 18 of 22 strains, corresponding to 82% of the results. It is concluded that the PRA technique is a fast, simple and economical method that produces results in concordance with the traditional techniques, with a lesser degree of error. Based on these results, the use of PRA as routine identification technique for mycobacteria is recommended for clinical laboratories.

3164 VARKEVISSER, C. M.; LEVER. P.; ALUBO, O.; BURATHOKI, K.; IDAWANI, C. U. T.; MOREIRA. T. M. A.; PATROBAS, P.; YULIZAR, M. **Gender and leprosy: case studies in Indonesia, Nigeria, Nepal and Brazil.** *Leprosy Review* (2009) **80** (1) 65-76 Colchester, UK; LEPRA [En, 22 ref.] Royal Tropical Institute, Amsterdam, Netherlands. Email: corlienv@tiscali.nl

There appear to be regional differences in gender ratios of leprosy patients being diagnosed and treated. In Asian countries, more men than women are registered whilst in Africa female patients outnumber males. The Netherlands Leprosy Relief (NLR) therefore initiated research into factors underlying these regional gender differences. Between 1997 and 1999, leprosy

control teams in Indonesia, Nigeria, Nepal and Brazil supported by social/public health scientists, conducted comparative exploratory research. They looked at three groups of potential explanatory factors: biological, socio-cultural/economic and service-related. The studies were partially quantitative (analysis of the records of patients who according to prescription could have completed treatment) and partially qualitative (interviews/focus group discussions with patients, their relatives, community members and health staff on perceptions of leprosy, its socio-economic consequences, treatment and cure). Biological factors appeared similar in the four countries: irrespective of the M/F ratio, more men than women were registered with multibacillary (MB) leprosy. Strong traditions, the low status of women, their limited mobility, illiteracy and poor knowledge of leprosy appeared to be important sociocultural factors explaining why women were under reporting. Yet, accessible, well reputed services augmented female participation and helped to diminish stigma, which in three out of the four societies seemed greater for women than for men. These positive effects could still be higher if the services would enhance community and patient education with active participation of patients and ex-patients themselves.

3165 SOLOMON, S. S.; CELENTANO, D. D.; SRIKRISHNAN, A. K.; VASUDEVAN, C. K.; ANAND, S.; KUMAR, M. S.; SOLOMON, S.; LUCAS, G. M.; MEHTA. S. H. **Mortality among injection drug users in Chennai, India (2005-2008).** *AIDS* (2009) **23** (8) 997-1004 Hagerstown, USA; Lippincott Williams & Wilkins [En, 32 ref.] YR Gaitonde Centre for AIDS Research and Education, Chennai, India. Email: shmehta@jhsph.edu

Background: Injection drug users (IDUs) have estimated mortality rates over 10 times higher than the general population; much of this excess mortality is HIV-associated. Few mortality estimates among IDUs from developing countries, including India, exist. Methods: IDUs (1158) were recruited in Chennai from April 2005 to May 2006; 293 were HIV positive. Information on deaths and causes was obtained through outreach workers and family/network members. Mortality rates and standardized mortality ratios were calculated; multivariate Poisson regression was used to identify predictors of mortality. Results: We observed 85 deaths over 1998 person-years (p-y) of follow-up [mortality rate (MR) 4.25 per 100 p-y; 95% confidence interval (CI)=3.41-5.23]. The overall standardized mortality ratio was 11.1; for HIV -positive IDUs, the standardized mortality ratio was 23.9. Mortality risk among HIV-positive IDUs (MR: 8.88 per 100 p-y) was nearly three times that of negative IDUs (MR: 3.03 per 100 p-y) and increased with declining immune status (CD4 cells >350: 5.44 per 100 p-y vs. CD4 cells 200: 34.5 per 100 p-y). This association persisted after adjustment for confounders. The leading causes of mortality in both HIV negative and positive IDUs were overdose (*n*=22), AIDS (*n*=14), tuberculosis (*n*=8) and accident/trauma (*n*=9). Conclusion: Substantial mortality was observed in this cohort with the highest rates among HIV-positive IDUs with CD4 counts of less than 350 cells/µl. Although, in these 2 years, non-AIDS deaths outnumbered 0002030-related deaths, the relative contribution of 0002030-associated mortality is likely to increase with advancing HIV disease progression. These data reinforce the need for interventions to reduce the harms associated with drug use and increase HAART access among IDUs in Chennai.

3166 CICERO, R.; OLIVERA, H.; HERNÁNDEZ-SOLIS. A; RAMÍREZ-CASANOVA, E.; ESCOBAR-GUTIÉRREZ, A. **Frequency of *Mycobacterium bovis* as an etiologic agent in extrapulmonary tuberculosis in HIV-positive and-negative Mexican patients.** *European Journal of Clinical Microbiology & Infectious Diseases* (2009) **28** (5) 455-460 Berlin, Germany; Springer-Verlag GmbH [En, 38 ref.] Pneumonology Service, Hospital General de México and Facultad de Medicina, UNAM, Mexico City, Mexico. Email: aescobargutierrez@yahoo.com

Mycobacterium bovis can be an important etiological agent for extrapulmonary (EP) manifestations of tuberculosis, especially in HIV-infected persons. From January 2000 to December 2003, *M. bovis* as a cause of EP tuberculosis was investigated at the Pneumonology Service, Hospital General de Mexico, Mexico City. Eighty HIV-positive (HIV+) patients and 83 HIV-negative (HIV-) with EP involvement (ganglionar, genitourinary, meningeal, cutaneous, peritoneal, and pericardial) were analyzed using clinical, immunological, bacteriological, histopathological, and molecular biology methods. *Mycobacterium* species were identified by *hsp*65-RFLP analysis and species of *M. tuberculosis* complex isolates by spoligotyping. *M. bovis* was present in 6 HIV- cases (7.2%; 3 with lymphadenitis and 3 genitourinary) vs 11 in HIV+ cases (13.75%; 7 with lymphadenitis, 3 genitourinary, and 1 meningeal). Favorable response to retroviral and specific *M. bovis* chemotherapy was observed. Spoligotyping showed a unique profile in each isolate, 16 belonging to BOV1 lineage and 1 to BOV2 lineage. *M. bovis* is an significant re-emerging cause of EPTB in Mexico. Consumption of unpasteurized dairy products is the most likely source of transmission. Successful treatment depends on the adequate and opportune identification of the agent responsible.

3167 MAHNAZ TANVEER; ZAHRA HASAN; AKBAR KANJI; RABIA HUSSAIN; RUMINA HASAN **Reduced TNF- and IFN- responses to Central Asian strain 1 and Beijing isolates of *Mycobacterium tuberculosis* in comparison with H37Rv strain.** *Transactions of the Royal Society of Tropical Medicine and Hygiene* (2009) **103** (6) 581-587 Oxford, UK; Elsevier [En, 45 ref.] Department of Pathology and Microbiology, The Aga Khan University, Stadium Road, P.O. Box 3500, Karachi 74800, Pakistan. Email: rumina.hasan@aku.edu

Pakistan ranks eighth in terms of tuberculosis burden worldwide, with an incidence of 181/100 000. The predominant genotypes of *Mycobacterium tuberculosis* are reported to be the Central Asian strain 1 (CAS 1) and Beijing families. *Mycobacterium tuberculosis* down-regulates host pro-inflammatory cytokines, which are essential for protection against infection. There is currently little information regarding the interaction of the CASI genotype with host cells. We studied the growth rates of CASI and Beijing clinical isolates, and their ability to induce cytokines compared with the laboratory reference strain H37Rv. Host responses were studied using a THP-1 monocytic cell line model and an ex vivo whole blood assay. Growth rates of CAS 1 and Beijing isolates were significantly lower (P=0.011) compared with H37Rv. All clinical isolates induced significantly lower levels of TNF- secretion (P=0.003) than H37Rv in THP-1 cells and in the whole blood assay of healthy donors (n=8). They also induced lower IFN- secretion in the whole blood assay (P<0.001). A positive correlation was observed between the growth indices (GI) of H37Rv, Beijing and CAS 1 strains and the TNF- responses they induced [Pearson's correlation coefficient (R^2): 0.936, 0.775 and 0.55, respectively], and also between GI and IFN- production (R2: 0.422, 0.946, 0.674). These findings suggest that reduced growth rate, together with down-modulation of pro-inflammatory cytokines, is a contributory mechanism for the predominance of the CAS genotype.

3168 ZIMIC, M.; CORONEL, J.; GILMAN, R. H.; LUNA, C. G.; CURIOSO, W. H.; MOORE, D. A. J. **Can the power of mobile phones be used to improve tuberculosis diagnosis in developing countries?** *Transactions of the Royal Society of Tropical Medicine and Hygiene* (2009) **103** (6) 638-640 Oxford, UK; Elsevier [En, 7 ref.] Laboratorios de Investigación y Desarrollo, Facultad de Ciencias y Filosofía, Universidad Peruana Cayetano Heredia, Av. Honorio Delgado 430, San Martin de Porras, Lima 31, Peru. Email: mzimic@jhsph.edu

The low-cost Microscopic Observation Drug Susceptibility (MODS) assay is a non-proprietary test that delivers rapid and accurate diagnosis of

tuberculosis (TB) and multidrug-resistant TB. Although methodologically straightforward, implementation is challenging in isolated settings where personnel trained in plate reading are lacking. One affordable strategy to address this shortfall is the use of mobile phones, first to transmit images captured by an inverted microscope to a remote site where pattern recognition is performed by trained personnel, and second to receive the resulting output of this analysis. Such a system could be used for training of laboratory personnel through distance learning, resolution of equivocal appearances and quality assurance.

3169 KHAN, M. S.; DAR, O.; SABIRA TAHSEEN; GODFREY-FAUSSETT, P. **Judging respiratory specimen acceptability for AFB microscopy: visual *vs.* microscopic screening.** *Tropical Medicine and International Health* (2009) **14** (5) 571-575 Oxford, UK; Blackwell Publishing [En, 13 ref.] London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, UK. Email: Mishalk@cantab.net

OBJECTIVES: To investigate whether visual assessment or microscopic grading of the cellular composition of specimens is a better strategy to screen specimen quality for tuberculosis (TB) diagnosis. METHODS: About 2643 specimens were collected from TB suspects at the Federal TB centre in Pakistan. Specimens were classified as sputum or saliva visually and microscopically using the criteria proposed by McCarter and Robinson, Van Scoy, Geckler *et al.,* Murray and Washington and Bartlett. The acid-fast bacilli (AFB)-positivity of specimens was also assessed. RESULTS: Despite being the least 'technical' and time consuming, visual assessment rejected the lowest proportion of AFB-positive specimens (0.3%). Most microscopic grading criteria, particularly those that considered the squamous epithelial cell count, rejected a large proportion of specimens (30-66%), of which a sizeable fraction contained AFB (6-12%). CONCLUSIONS: Our results indicate that visual assessment by trained technicians is more effective and suitable than microscopic grading for screening specimens for TB diagnosis. TB control resources could be better allocated to optimizing visual screening than investing in more 'strict' microscopic grading tools.

3170 MUHAMMAD RADZI; NIK RIHAN; NATESAN VIJAYALAKSHMI; SUBHADA PRASAD PANI **Diagnostic challenge of gastrointestinal tuberculosis: a report of 34 cases and an overview of the literature.** *Southeast Asian Journal of Tropical Medicine and Public Health* (2009) **40** (3) 505-510 Bangkok, Thailand; SEAMEO TROPMED Network [En, 34 ref.] Clinical Research Center, Hospital Sultanah Bahiyah, Alor Setar, Kedah Darul Aman, Malaysia. Email: pani.sp@gmail.com

We report 34 cases of gastrointestinal TB from Malaysia and present an overview of the diagnostic challenges. A concerted effort is necessary to improve the existing diagnostic methods, and develop and evaluate newer diagnostic tools through well designed multicenter studies.

3171 HARLING, G.; EHRLICH, R.; MYER, L. **The social epidemiology of tuberculosis in South Africa: a multilevel analysis.** *Social Science & Medicine* (2008) **66** (3) 492-505 Oxford, UK; Elsevier [En, many ref.] School of Public Health & Family Medicine, University of Cape Town, Anzio Road, Observatory 7925, Cape Town, South Africa. Email: guy.harling@gmail.com. rodney .ehrlich@uct.ac.za, landon.myer@uct.ac.za

Increased risk of tuberculosis is widely recognized to be associated with increased poverty, yet there have been few analyses of the social determinants of tuberculosis, particularly in high-burden settings. We conducted a multilevel analysis of self-reported tuberculosis disease in a nationally representative sample of South Africans based on the 1998 Demographic and Health Survey (DHS). Individual and household-level demographic, behavioral and socioeconomic risk factors were taken from the DHS; data on community-level socioeconomic status (including measures of absolute wealth

and income inequality) were derived from the 1996 national census. Of the 13,043 DHS respondents, 0.5% reported having been diagnosed with tuberculosis disease in the past l2 months and 2.8% reported having been diagnosed with tuberculosis disease in their lifetime. In a multivariate model adjusting for demographic and behavioral risk factors, tuberculosis diagnosis was associated with cigarette smoking, alcohol consumption and low body mass index, as well as a lower level of personal education, unemployment and lower household wealth. In a model including individual- and household-level risk factors, high levels of community income inequality were independently associated with increased prevalence of tuberculosis (adjusted odds ratio for lifetime tuberculosis comparing the most unequal quintile to the middle quintile of inequality: 2.37, 95% confidence interval: 1.59-3.53). These results provide novel insights into the socioeconomic determinants of tuberculosis in developing country settings, although the mechanisms through which income inequality may affect tuberculosis disease require further investigation.

3172 JITTIMANEE, S.; VORASINGHA, J.; MADASIN, W.; NATENIYOM, S.; RIENTHONG, S.; VARMA, J. K. **Tuberculosis in Thailand: epidemiology and program performance, 2001-2005.** *International Journal of Infectious Diseases* (2009) **13** (4) 436-442 Oxford, UK; Elsevier [En] Thailand Ministry of Public Health, Nonthaburi, Thailand. Email: jvarma@cdc.gov

Background: The World Health Organization (WHO) recommends a package of services branded 'DOTS' (directly observed treatment, short course) to help countries detect at least 70% of all infectious tuberculosis (TB) cases and cure 85% of detected cases. We analyzed the epidemiology of TB and the national TB program (NTP) performance for the first 5 years of DOTS implementation in Thailand. Methods: We reviewed data routinely collected through the NTP from 2001 to 2005 and data from special projects conducted by the NTP from 2001 to 2006. Results: In 2005, the TB notification rate was 94 per 100 000 persons. Using the WHO estimated incidence as the denominator, the case detection rate was 76% for smear-positive cases in 2005. From 2002 to 2005, the notification rate declined 2% for smear-positive cases. In 2005, 68% of smear-positive patients were successfully treated; from 2001 to 2005, treatment success never exceeded 75%. Separate surveys conducted from 2002 to 2006 found that 13-17% of TB cases were HIV-infected. The estimated prevalence of multidrug-resistant TB in new patients increased from 1% in 2002 to 1.7% in 2006. Conclusions: Since DOTS implementation, Thailand has exceeded the international TB case detection target, but has remained well below the treatment success target. The large discrepancy between case finding and treatment success rates indicates that actions are urgently needed to reduce TB morbidity and prevent drug-resistant TB.

3455 RENIERS, G.; TESFAI, R. **Health services utilization during terminal illness in Addis Ababa, Ethiopia.** *Health Policy and Planning* (2009) **24** (4) 312-319 Oxford, UK; Oxford University Press [En, 41 ref.) Population Program, Institute of Behavioral Science, University of Colorado at Boulder, 484 UCB, Boulder, CO 80309. USA. Email: georges.reniers@colorado.edu

Objectives: We describe modern and alternative health services use in terminal illness of adults, and assess whether utilization patterns of TB/AIDS patients are distinct from those of patients suffering from other illnesses. Methods: Data are from post-mortem interviews with close relatives or caretakers of the deceased. We provide descriptive statistics of health care utilization in adults and discuss their covariates in multivariate analyses. Results: Over 85% of terminally sick patients visited a modern medical facility, but less than 40% spent more than 24 hours in a medical facility and only 25% died in one. Traditional healer (11%) and holy water (46%) visits offer a common treatment and

healing alternative, but these visits do not co-vary in any consistent manner with the utilization of modern medical services. In terms of the cause of death, we find a higher contact rate with both modern and alternative medical service providers among TB/AIDS patients compared with those suffering from other medical conditions. The duration of illness seems to account for a good share of that variability. Other covariates of health services utilization are socio-economic status, education and age. Conclusions: The contact rate of adults with modern medical facilities in terminal illness is almost universal, but their usage intensity is rather low. Alternative curative options are less commonly used, and do not exclude modern health services use. This suggests that both types of services are considered complements rather than alternatives for each other. Because the contact rate with health service providers is greatest for TB/AIDS patients, it is unlikely that HIV/AIDS-related stigma is an impediment to seeking care. We cannot exclude, however, that it delays health-seeking behaviour.

3456 RINTISWATI, N.; MAHENDRADHATA, Y.; SUHARNA; SUSILAWATI; PURWANTA; SUBRONTO, Y.; VARKEVISSER, C. M.; WERF, M. J. VAN DER **Journeys to tuberculosis treatment: a qualitative study of patients, families and communities in Jogjakarta, Indonesia.** *BMC Public Health* (2009) **9** (158) (27 May 2009) London, UK; BioMed Central Ltd [En, 19 ref.] Microbiology Department, Faculty of Medicine, Gadjah Mada University, Jogjakarta, Indonesia. Email: rintiswati@yahoo.com. yodi_mahendradhata@yahoo.co.uk, tbc_harna@yahoo.com, susidotsyk@yahoo.co.id, purwanta@gmail.com, ysubronto@yahoo.com, corlienv@tiscali.nl, vanderwerfm@kncvtbc.nl

Background: Many tuberculosis (TB) patients in Indonesia are diagnosed late. We seek to document patient journeys toward TB diagnosis and treatment and factors that influence health care seeking behavior. Methods: TB patients in Jogjakarta municipality (urban) and Kulon Progo district (rural) were recruited from health care facilities participating in the DOTS strategy and health care facilities not participating in the DOTS strategy, using purposive sampling methods. Data were collected through in-depth interviews with TB patients and members of their family and through Focus Group Discussions (FGD) with community members. Results: In total, 67 TB patients and 22 family members were interviewed and 6 FGDs were performed. According to their care seeking behavior patients were categorized into National TB program's (NTP) dream cases (18%), 'slow-but-sure patients' (34%), 'shopaholics' (45%), and the NTP's nightmare case (3%). Care seeking behavior patterns did not seem to be influenced by gender, place of residence and educational level. Factors that influenced care seeking behavior include income and advice from household members or friends. Family members based their recommendation on previous experience and affordability. FGD results suggest that the majority of people in the urban area preferred the hospital or chest clinic for diagnosis and treatment of TB whereas in the rural area private practitioners were preferred. Knowledge about TB treatment being free of charge was better in the urban area. Many community members from the rural area doubted whether TB treatment would be available free of charge. Conclusion: Most TB patients took over a month to reach a DOTS facility after symptoms appeared and had consulted a number of providers. Their income and advice from household members and friends were factors that influenced their care seeking behavior most.

3457 CATTAMANCHI, A.; DOWDY, D. W.; DAVIS, J. L.; WORODRIA, W.; YOO, S.; JOLOBA, M.; MATOVU, J.; HOPEWELL, P. C.; HUANG, L. **Sensitivity of direct versus concentrated sputum -smear microscopy in HIV-infected patients suspected of having pulmonary tuberculosis.** *BMC Infectious Diseases* (2009) **9** (53) (06 May 2009) London, UK; BioMed Central Ltd [En, 44 ref.] Division of Pulmonary and Critical Care Medicine,

University of California, San Francisco, CA, USA. Email: acattamanchi@medsfgh.ucsf.edu, david.w.dowdy@gmail.com, lucian.davis@ucsf.edu, worodria@yahoo.com, yoouga@yahoo.com, moses.joloba@case.edu, johnbaptist.matovu@yahoo.ca, phopewell@mcdsfgh.ucsf.edu, lhuang@php.ucsf.edu

Background: Sputum concentration increases the sensitivity of smear microscopy for the diagnosis of tuberculosis (TB), but few studies have investigated this method in human immunodeficiency virus (HIV)-infected individuals. Methods: We performed a prospective, blinded evaluation of direct and concentrated Ziehl-Neelsen smear microscopy on a single early-morning sputum sample in HIV-infected patients with >2 weeks of cough hospitalized in Kampala, Uganda. Direct and concentrated smear results were compared with results of Lowenstein-Jensen culture. Results: Of 279 participants, 170 (61 %) had culture-confirmed TB. The sensitivity of direct and concentrated smear microscopy was not significantly different (51 % vs. 52%, difference 1 %, 95% confidence interval (CI): [-7%, 10%], p=0.88). However, when results of both direct and concentrated smears were considered together, sensitivity was significantly increased compared with either method alone (64%, 95% CI: [56%, 72%], P <0.01 for both comparisons) and was similar to that of direct smear results from consecutive (spot and early-morning) specimens (64% vs. 63%, difference 1%,95% CI: [-6%,8%], p=0.85). Among 109 patients with negative cultures, one had a positive direct smear and 12 had positive concentrated smears (specificity 99% vs. 89%, difference 10%,95% CI: [2%, 18%], p=0.003). Of these 13 patients, 5 (38%) had improved on TB therapy after two months. Conclusion: Sputum concentration did not increase the sensitivity of light microscopy for TB diagnosis in this HIV-infected population. Given the resource requirements for sputum concentration, additional studies using maximal blinding, high-quality direct microscopy, and a rigorous gold standard should be conducted before universally recommending this technique.

3458 SAW SAW; LE LE WIN; THAN TUN SEIN; KYAW NYUNT SEIN; KYAW MYINT; ZAW WIN; KYAW THU; SAN SAN AYE; TIN KO KYI **Lights and shadows of people affected with leprosy in Sittaung Area, Myanmar.** *Myanmar Health Sciences Research Journal* (2008) **20** (3) 125-132 Yangon, Myanmar; Department of Medical Research, Ministry of Health [En, 12 ref.]

A multiple case study was conducted to determine the effect of leprosy on the social lives of people affected by leprosy (PALs) so as to socially integrate them into local society in Sittaung Area, Myanmar. The social group differences among PALs and how they cope and adjust their social lives in the community were investigated. The analysis focused on how the PALs told their stories about their social lives in their community. 38 PALs aged 18 years were included in the study. Among PALs of lower social group, economic difficulties were their concerns more than social problems emanating from their disability. The study highlighted that improvement in the economic status of PAL could bring the person out of shadow. It was also found that allowing PALs, especially of lower social group, to participate in local social organizations by the community would discard away their feelings of being in shadows. The resilient spirit of each PAL was the key factor that could pull a PAL out of shadow. It is recommended that, especially for PALs of low social group, empowerment education complimented with socioeconomic strategies could bring their lives out of shadows.

3459 MYINT NAING; SAW SAW; KO KO ZAW **Economic burden of TB patients attending Township TB Centre in Myanmar.** *Myanmar Health Sciences Research Journal* (2008) **20** (3) 171-177 Yangon, Myanmar; Department of Medical Research, Ministry of Health [En, 13 ref.]

A cross-sectional, descriptive study was conducted to explore the economic burden of tuberculosis (TB) patients receiving treatment at

the Township TB Centre in North Okkalapa, Myanmar, by estimating the direct and indirect costs incurred by the patients. A face-to-face interview with 101 TB patients using semi-structured questionnaires was conducted during July-September 2008. About 47 respondents (46.6%) were in the 35-54 years age group. The male and female ratio was 3: 1. Seventy-four respondents (73.3%) belonged in the low socioeconomic status group. The total cost (direct and indirect costs) before taking anti-TB treatment at the TB Centre ranged from 0 to 697300 kyats (mean, 104000 kyats; median, 66500 kyats). During anti-TB treatment, the total cost ranged from 0 to 357900 kyats (mean, 55600 kyats; median, 23000 kyats). Before taking anti-TB treatment, 68 patients (67.6%) had economic burden, majority of which belonged to the low family income group and low socioeconomic status group. During anti-TB treatment, 40 patients (39.6%) had economic burden. Wage loss due to illness and low family income were major factors for economic burden. 27 TB patients (26.7%) incurred cost before anti-TB treatment as more than 10% of annual household income. Treatment delay increased the cost and may lead to economic burden for TB patients and their families. Transportation cost and daily wage loss due to attending the TB Centre to get free drugs were possible factors for the economic burden of TB patients. It is suggested that effective strategy to reduce delay in seeking care of TB suspects should be developed.

3460 OCA, E. P. M. DE; VELARDE-FÉLIX, J. S.; RÍOS-TOSTADO, J. J.; PICOS-CÁRDENAS, V. J.; FIGUERA, L. E. **SNP 668C (-44) alters a NF- B1 putative binding site in non-coding strand of human pdefensin 1 *(DEFB1)* and is associated with lepromatous leprosy.** *Infection, Genetics and Evolution* (2009) **9** (4) 617-625 Amsterdam, Netherlands; Elsevier [En, many ref.] Doctorate Program in Human Genetics, Health Sciences Campus, Guadalajara University, Guadalajara, Jalisco, Mexico. Email: eprado @ciatej.net.mx, jsvelfe@yahoo.com.mx, bio_juanjose@yahoo.com.mx, veronica06735@yahoo.com.mx, lef@koch.mb.udg.mx

Leprosy is an infectious disease caused by *Mycobacterium leprae.* The peptide human -defensin 1 is an antimicrobial effector of innate epithelial immunity. A study was done on the association of three single nucleotide polymorphisms (SNPs) in the -defensin 1 gene *(DEFB1)* - 668 C/G (-44 C/G or rs1800972; in 5' UTR), 692 *A*/*G* (-20 *A*/*G* or rs11362; in 5' UTR) and A1836G (rs1800971; in 3' UTR) - with leprosy susceptibility *per se* and clinical leprosy variants. The SNPs were genotyped by real-time polymerase chain reaction (rt-PCR) and PCR-restriction fragment length polymorphisms. Subjects were of Mexican mestizo ethnicity from Sinaloa state, Mexico. Analysis was done on borderline leprosy, lepromatous leprosy (L-lep) and indeterminate leprosy subgroups compared with healthy controls. Results: The genotypes associated with L-lep and no other leprosy subgroup after Bonferroni correction were those that contain 668C in a dominant model (OR=3.06, 95% CI 1.47-6.4, *p*=0.024). Estimated haplotype CGA is over-represented in L-lep (*p*=0.009; OR=2.25, 1.23-4.03). Five NF- B 1 putative binding sites (NPBSs) were identified with JASPAR software in non-coding strand spanning the 5' UTR and intron 1 of *DEFB1,* including one which is altered when SNP 668C is present. SNP 668C probably abrogates NF-kB-dependent *DEFB1* upregulation leading to L-lep variant.

3461 LEWIS, C. P.; NEWELL, J. N. **Improving tuberculosis care in low income countries - a qualitative study of patients' understanding of "patient support" in Nepal.** *BMC Public Health* (2009) **9** (190) (17 June 2009) London, UK; BioMed Central Ltd [En, 15 ref.] Faculty of Medicine and Health, University of Leeds, Worsley Building, Leeds LS2 9JT, UK. Email: um06cpl@leeds.ac.uk, j .n.newell@leeds.ac.uk

Background: In the new Stop TB Strategy for Tuberculosis (TB) Care, direct observation of treatment has been replaced by "supervision and

patient support". However, it is still unclear what patient support means and how it is to be best implemented. The objective of this study was to accurately document patients' support needs during TB treatment from their own perspectives, to inform development of appropriate support and supervision strategies that meet patients' needs. Methods: In-depth individual interviews and focus group discussions were conducted in three districts in Nepal. Analysis took place concurrently with data collection to allow emerging issues to guide selection of subsequent interviewees. In total 23 patients, 15 male and 8 female, were interviewed and six focus group discussions were held. Issues from these interviews were grouped into emergent themes. Results: Respondents reported that the burden of treatment for TB was high, particularly in terms of difficulties with social and psychological aspects of undergoing treatment. They saw three main areas for support during their treatment: relevant information for them and their families about their disease, its treatment, potential side-effects and what they should do if side-effects arise; approachable and supportive healthcare staff with whom patients feel comfortable discussing (often nonmedical) problems that arise during treatment; and some flexibility in treatment to allow essential elements of patients' lives (such as income generation, food-growing and childcare) to continue. They were anxious to ensure that family support did not absolve healthcare workers from their own support responsibilities. Conclusion: In order to support people with TB more during their treatment, health policy and practice must appreciate that TB affects all aspects of TB patients' lives. A focus on caring for each patient as an individual should underlie all aspects of treatment. Improved communication between healthcare providers and patients and increased patient knowledge and understanding of the treatment programme would give those receiving treatment a sense of individual empowerment and raise their confidence in treatment.

3462 HANG, N. T L.; ISHIZUKA, N.; KEICHO, N.; HONG, L. T; TAM, D. B.; THU, V. T. X.; MATSUSHITA, I.; HARADA. N.; HIGUCHI, K.; SAKURADA, S.; LIEN, L. T **Quality assessment of an interferon-gamma release assay for tuberculosis infection in a resource-limited setting.** *BMC Infectious Diseases* (2009) **9** (66) (18 May 2009) London, UK; BioMed Central Ltd [En, 20 ref.] IMCJ-BMH Medical Collaboration Center, Bach Mai Hospital, Hanoi, Vietnam. Email: lehang031O@gmail.com, naishi@ri.imcj.go.jp, nkeicho-tky@umin.ac.jp, lethihong.hth@gmail.com, dobangtam.hth @gmail.com, vuthixuanthu.hth@gmail.com, ikumi-tky@umin.ac.jp, harada@jata.or.jp, higuchi@jata.or.jp, ssakura@mti.biglobe.ne.jp, luuthilien.hth@gmail.com

Background: When a test for diagnosis of infectious diseases is introduced in a resource-limited setting, monitoring quality is a major concern. An optimized design of experiment and statistical models are required for this assessment. Methods: Interferon-gamma release assay to detect tuberculosis (TB) infection from whole blood was tested in Hanoi, Viet Nam. Balanced incomplete block design (BIBD) was planned and fixed-effect models with heterogeneous error variance were used for analysis. In the first trial, the whole blood from 12 donors was incubated with nil, TB-specific antigens or mitogen. In 72 measurements, two laboratory members exchanged their roles in harvesting plasma and testing for interferon-gamma release using enzyme linked immunosorbent assay (ELISA) technique. After intervention including checkup of all steps and standard operation procedures, the second trial was implemented in a similar manner. Results: The lack of precision in the first trial was clearly demonstrated. Large within-individual error was significantly affected by both harvester and ELISA operator, indicating that both of the steps had problems. After the intervention, overall within-individual error was significantly reduced (P<0.0001) and error variance was no longer affected by laboratory personnel in charge,

indicating that a marked improvement could be objectively observed. Conclusion: BIBD and analysis of fixed-effect models with heterogeneous variance are suitable and useful for objective and individualized assessment of proficiency in a multistep diagnostic test for infectious diseases in a resource-constrained laboratory. The action plan based on our findings would be worth considering when monitoring for internal quality control is difficult on site.

3463 AHOUA, L.; GUENTHER, G.; PINOGES, L.; ANGUZU, P.; CHAIX, M. L.; TIEC, C. LE; BALKAN, S.; OLSON, D.; OLARO, C.; PUJADES-RODRÍGUEZ, M. **Risk factors for virological failure and subtherapeutic antiretroviral drug concentrations in HIV-positive adults treated in rural northwestern Uganda.** *BMC Infectious Diseases* (2009) **9** (81) (03 June 2009) London, UK; BioMed Central Ltd [En, 47 ref.] HIV/AIDS Department, Epicentre, Paris, France. Email: laurence.ahoua@epicentre.msf.org, gunarguenther@gmx.de, loretxu.pinoges@paris.msf.org, msffarua@paris.msf.org, marie-Iaure.chaix@nck.ap-hop-paris.fr, clotilde.le-tiec@bct.ap-hop-paris.fr, suna.balkan@paris.msf.org, david.olson@newyork.msf.org, olarocharles@yahoo.com, mar.pujades@epicentre.msf.org

Background: Little is known about immuno-virological treatment outcomes and adherence in HIV/AIDS patients on antiretroviral therapy (ART) treated using a simplified management approach in rural areas of developing countries, or about the main factors influencing those outcomes in clinical practice. Methods: Cross-sectional immunovirological, pharmacological, and adherence outcomes were evaluated in all patients alive and on fixed-dose ART combinations for 24 months, and in a random sample of those treated for 12 months. Risk factors for virological failure (> 1,000 copies/ml) and subtherapeutic antiretroviral (ARV) concentrations were investigated with multiple logistic regression. Results: At 12 and 24 months of ART, 72% (n=701) and 70% (n=369) of patients, respectively, were alive and in care. About 8% and 38% of patients, respectively, were diagnosed with immunological failure; and 75% and 72% of patients, respectively, had undetectable HIV RNA (<400 copies/ml). Risk factors for virological failure (>1,000 copies/ml) were poor adherence, tuberculosis diagnosed after ART initiation, subtherapeutic NNRTI concentrations, general clinical symptoms, and lower weight than at baseline. About 14% of patients had low ARV plasma concentrations. Digestive symptoms and poor adherence to ART were risk factors for low ARV plasma concentrations. Conclusion: Efforts to improve both access to care and patient management to achieve better immunological and virological outcomes on ART are necessary to maximize the duration of first-line therapy.

3464 BOCCIA, D.; HARGREAVES, J.; AYLES, H.; FIELDING, K.; SIMWINGA, M.; GODFREY-FAUSSETT, P. **Tuberculosis infection in Zambia: the association with relative wealth.** *American Journal of Tropical Medicine and Hygiene* (2009) **80** (6) 1004-1011 Northbrook, USA; American Society of Tropical Medicine and Hygiene [En, 56 ref.] Department of Infectious and Tropical Diseases, London School of Hygiene and Tropical Medicine, Keppel Street, London, WC1E 7HT, UK. Email: delia.boccia@lshtm.ac.uk, james.hargreaves@lshtm.ac.uk, helen@zambart.org.zm, katherine.fielding@lshtm.ac.uk, musonda@zambart.org.zm, peter.godfrey-faussett@lshtm.ac.uk

This study aims to assess the association between household socioeconomic position and tuberculosis (TB) infection in two communities of Zambia. For this purpose, we implemented a cross-sectional investigation, nested within a larger case control study conducted between June 2005 and March 2006. Infection was assessed using Quantiferon-TB Gold. A socioeconomic position index was constructed through principal component analysis combining data on human resources, food availability, housing quality, and access to services and infrastructures. In tills study, higher soci-

oeconomic position, rather than lower, was associated with significantly higher risk of TB infection. None of the traditional risk factors for TB infection mediated this association, suggesting that in these two communities TB transmission may occur through exposure to as yet undefined risk factors that are associated with higher socioeconomic position. Although further studies are needed, these results suggest emerging new patterns of TB transmission and a role of socioeconomic position on the risk of TB infection opposite to that expected.

3465 NUCCIA, M. C.; LEACH, P. G. L. **Singularity and symmetry analyses of mathematical models of epidemics.** *South African Journal of Science* (2009) **105** (3/4) 136-146 Lynnwood Ridge, South Africa; Academy of Science of South Africa (ASSAf) [En, 69 ref.] Dipartimento di Matematica e Informatica, Universitá di Perugia, 06123 Perugia, Italy. Email: leachp@ukzn.ac.za

This article presents a summary of the Lie symmetry and PainIeve singularity analytical methods and apply them to a number of well-known epidemiological models to demonstrate their utility in the analysis of dynamic systems during investigations of the evolution of diseases (e.g., plague, HIV/AIDS, tuberculosis).

3466 BÜHRER-SÉKULA, S.; ILLARRAMENDI, X.; TELES, R. B.; PENNA, M. L. F.; NERY, J. A. C.; SALES, A. M.; OSKAM, L.; SAMPAIO, E. P.; SARNO, E. N. **The additional benefit of the ML flow test to classify leprosy patients.** *Acta Tropica* (2009) **111** (2) 172-176 Amsterdam, Netherlands; Elsevier [En, 19 ref.] KIT Biomedical Research, Royal Tropical Institute, Amsterdam, Netherlands. Email: samira@buhrer.net.buhrersekula @iptsp.ufg.br

The use of the skin lesion counting classification leads to both under and over diagnosis of leprosy in many instances. Thus, there is a need to complement this classification with another simple and robust test for use in the field. Data of 202 untreated leprosy patients diagnosed at FIOCRUZ, Rio de Janeiro, Brazil, was analyzed. There were 90 patients classified as PB and 112 classified as MB according to the reference standard. The BI was positive in 111 (55%) patients and the ML Flow test in 116 (57.4%) patients. The ML Flow test was positive in 95 (86%) of the patients with a positive BI. The lesion counting classification was confirmed by both BI and ML Flow tests in 65% of the 92 patients with 5 or fewer lesions, and in 76% of the 110 patients with 6 or more lesions. The combination of skin lesion counting and the ML Flow test results yielded a sensitivity of 85% and a specificity of 87% for MB classification, and correctly classified 86% of the patients when compared to the standard reference. A considerable proportion of the patients (43.5%) with discordant test results in relation to standard classification was in reaction. The use of any classification system has limitations, especially those that oversimplify a complex disease such as leprosy. In the absence of an experienced dermatologist and slit skin smear, the ML Flow test could be used to improve treatment decisions in field conditions.