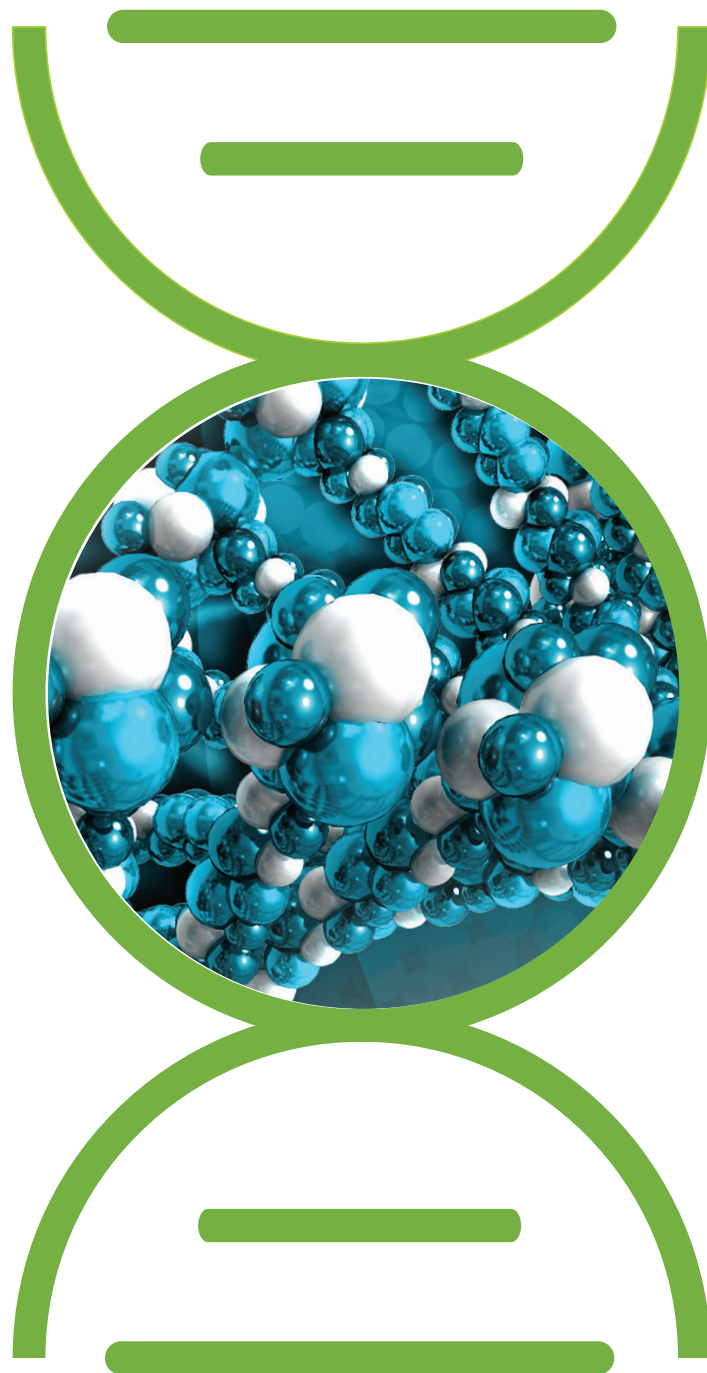




NATIONAL HEALTH  
LABORATORY SERVICE

NATIONAL INSTITUTE FOR OCCUPATIONAL HEALTH



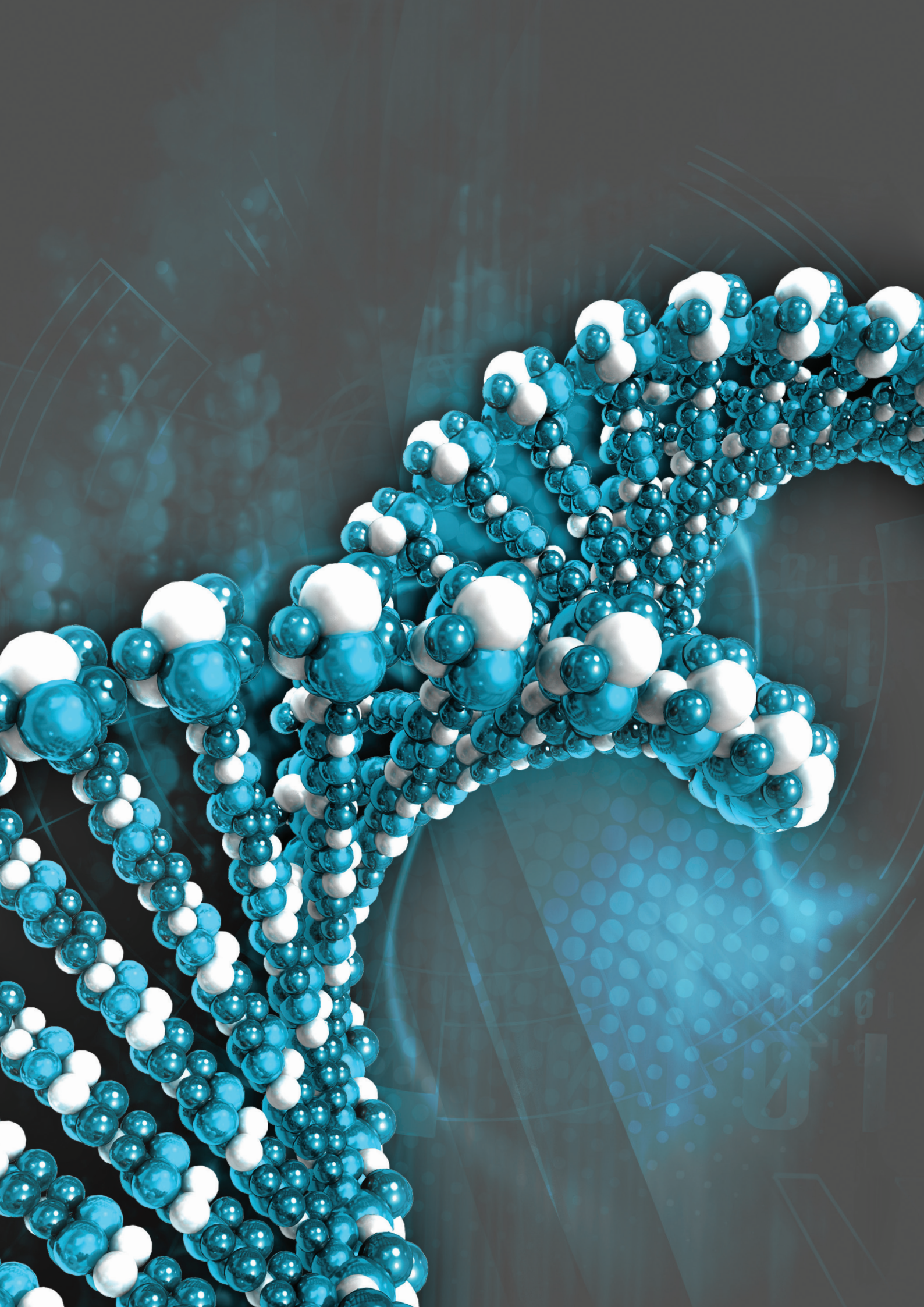
# NIOH ANNUAL REVIEW 2013-14

# National Institute for Occupational Health

The National Institute for Occupational Health (NIOH) investigates occupational diseases and provides a range of services to support occupational health, including:

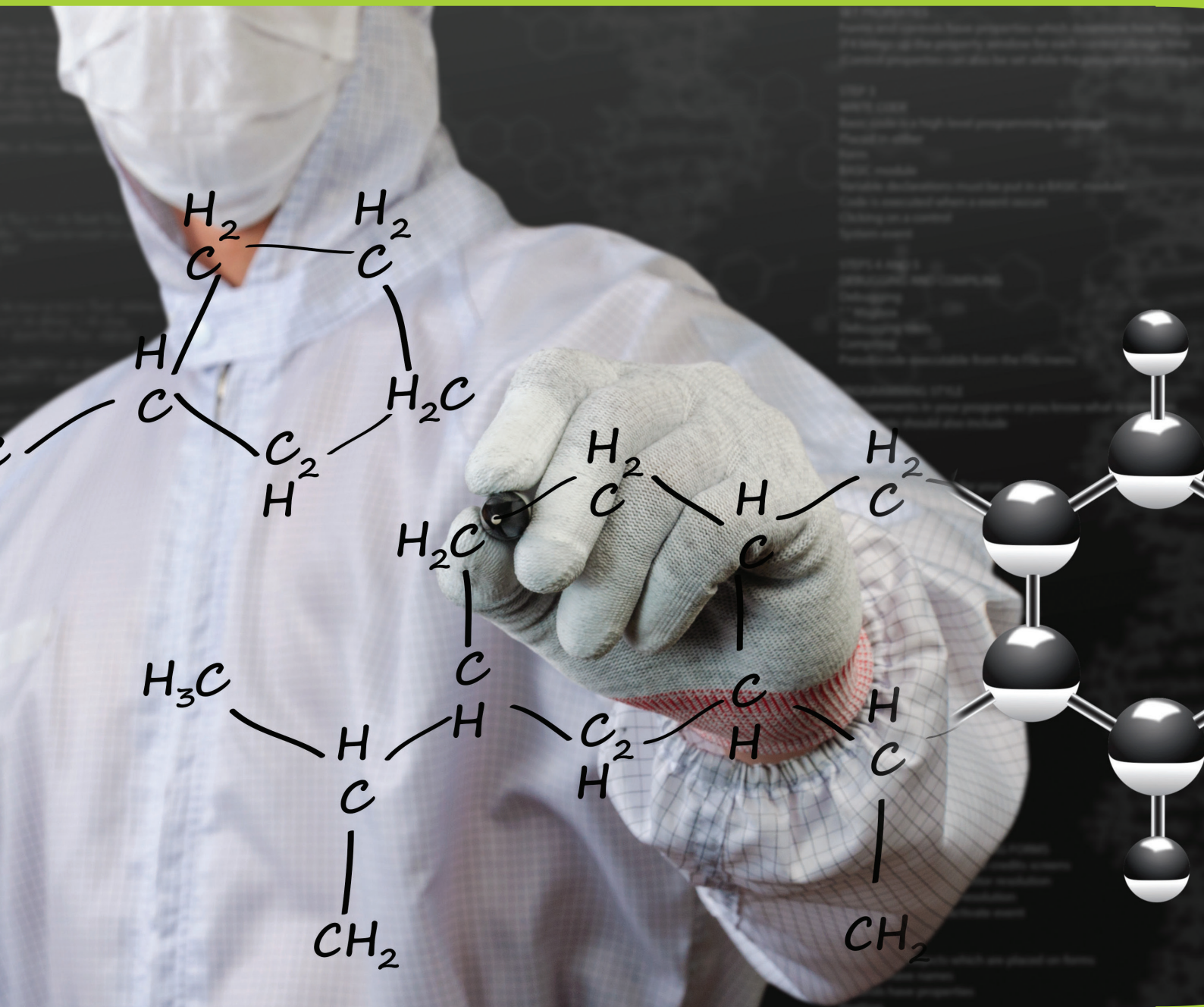
- Statutory autopsy services
- Advisory services
- Information services
- Specialised laboratory services
- Occupational environment analysis
- Health hazard evaluations







# CONTENTS



DIRECTOR'S OVERVIEW	4
PATHOLOGY DIVISION	6
OCCUPATIONAL MEDICINE DIVISION	10
OCCUPATIONAL MEDICINE	12
IMMUNOLOGY AND MICROBIOLOGY	22
QUALITY ASSURANCE	28
NHLS BIOBANK	30
OCCUPATIONAL HEALTH, SAFETY AND ENVIRONMENT SERVICES	32
HIV TB IN THE WORKPLACE UNIT	36
EPIDEMIOLOGY AND SURVEILLANCE	40
OCCUPATIONAL HYGIENE	44
ANALYTICAL SERVICES	46
TOXICOLOGY DIVISION	50
INFORMATION SERVICES	54
GRAPHICS, MARKETING AND COMMUNICATION	56
INTERNATIONAL LIAISON	62
OHS TRAINING UNIT	66
NATIONAL CANCER REGISTRY AND RESEARCH	70
PUBLICATIONS (2013/14)	73



# DIRECTOR'S OVERVIEW



*Shutterstock: 3D render of cancer cells*

*Dr Barry Kistnasamy  
Executive Director*

## OVERVIEW

The National Institute for Occupational Health (NIOH) and the National Cancer Registry (NCR) continued to provide services, training and research to enhance workers' health in Southern Africa and surveillance for cancers. This was done within the resource constraints that the National Health Laboratory Service (NHLS) faced during the year under review. Virtually all sections exceeded their performance targets despite the increased service workload through support for National Department of Health activities in Occupational Health and Cancer Surveillance. Preliminary work has begun on the establishment of the National Public Health Institutes of South Africa (NAPHISA) which will incorporate the work of the NIOH, the NCR and the National Institute for Communicable Diseases (NICD) alongside the development of units dealing with Non-Communicable Diseases and Injury and Violence Prevention. The NIOH has also provided significant support to the Departments of Mineral Resources and Labour. This included policy advice and technical support to the government departments, public agencies, trade unions and employer groups. A highlight was the hosting of the side event at the Sixty-Sixth World Health Assembly in May 2013 in Geneva on Occupational Health. The theme was "Serving all workers – universal health coverage and productivity" and the event was addressed by the Minister of Health, Dr Aaron Motsoaledi, and senior officials of the World Health Organisation and NIOH.

The NIOH continued to provide management support to the Compensation Commissioner for Occupational Diseases (CCOD) and the Medical Bureau for Occupational Diseases (MBOD). The aim was to enhance management and improve service delivery for workers and ex-workers under the Occupational Diseases in Mines and Works Act, 1973. A strategic plan and annual performance plan was drawn up for the CCOD and MBOD and approved by the Minister of Health and the Portfolio Committee on Health in the National Assembly. The NIOH assisted with the conceptualisation of One Stop Services for workers and ex-workers in the mining sector, and preparations for the opening of these One Stop Facilities in Mthatha and Carletonville in April 2014 are well underway. Management also participated in the Deputy President's initiative for payments of compensation and unemployment benefits to ex-mine workers in the Eastern Cape province.

The core reference laboratories (Pathology, Analytic Chemistry, Immunology and Microbiology) and the Occupational Hygiene Section maintained their accreditation status nationally and internationally. This continues to enhance the NIOH's ability to deliver quality services in line with good laboratory practice.

The NIOH and NCR contributed significantly to training and capacity development through links with various academic institutions, professional societies and national and provincial government departments. Many staff members teach on both the undergraduate and post-graduate programmes at universities across South Africa. The Executive Director was part of the Joint Ministerial Task Team on the Establishment of a New University incorporating the Medunsa campus.

Staff members received recognition for their contribution to occupational health by receiving awards and being invited to serve as members of national and international committees.

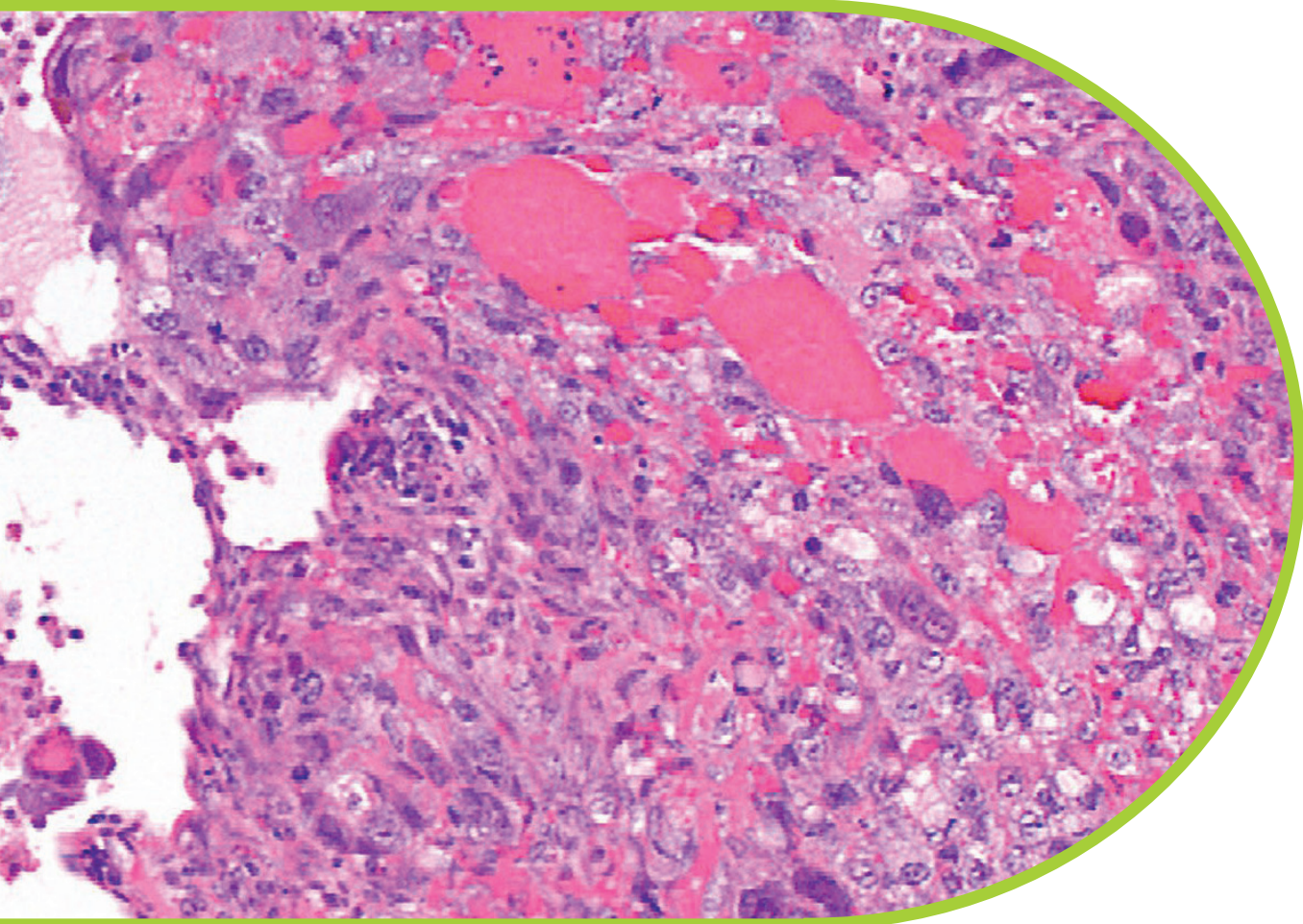
The NIOH played a major role in the SADC Declaration on TB in Mining. The TB interventions in the mining sector have been conceptualised and culminated in the Minister's Summit on the Harmonised Response to TB in the Mining Sector in March 2014. The NIOH is also assisting the Government of Namibia with the establishment of the Namibia Institute for Occupational Safety and Health.

Research continues to be a strong focus with a number of articles in accredited journals, chapters in books and presentations at conferences showcasing the research outputs of the NIOH and the NCR. The establishment of the bio-repository for human tissue specimens was a significant milestone towards the preservation of specimens for molecular research as well as deepening the governance, ethical considerations and management of storage and use of human tissue specimens.

There is ongoing research collaboration across the NHLS and other local and international organisations. Links with various multilateral and bilateral agencies have continued with further links being made with institutes in Brazil, India, Mozambique and China.



# PATHOLOGY DIVISION



*Shutterstock: Squamous cell carcinoma of lung (left half of image) replacing normal healthy lung tissue (right side) with many tumor cell undergoing mitotic cell division*

## INTRODUCTION

The Pathology Division is involved in teaching, training, research and service work. The origins of the Division lie in the Pneumoconiosis Research Unit that was founded in 1956. The focus remains on lung disease and the service provides data and materials for surveillance, teaching and research. In addition to the post mortem services offered, the Division is a referral centre for lung biopsies. Analytical electron microscopy services are also offered. In 2013, all the laboratories within the Pathology Division maintained their accreditation status with the South African National Accreditation System (SANAS), in accordance with the recognised International Standard ISO 15189:2007. The Division is rendering support to the Medical Bureau for Occupational Diseases (MBOD) and leading an initiative to create a new database to register and track the service and medical histories of mine workers. These data will add to the surveillance system being set up for mine workers. The Division is also writing the annual reports for the MBOD.



*Dr Naseema Vorajee  
Acting Head*

## DIAGNOSTIC SERVICES

### Autopsies

In terms of the Occupational Diseases in Mines & Works Act, 78 of 1973, the Pathology Division continues to carry out the statutory requirement of examining the hearts and lungs of deceased miners. The pathology examination forms part of the compensation process for miners and involves the MBOD and the Compensation Commissioner for Occupational Diseases.

Information from the autopsy service is made accessible by the Pathology Division database (PATHAUT). The PATHAUT database is a national resource and contains unique information about disease trends in miners. It is an important tool for disease surveillance and has been utilised in various collaborative studies. Detailed disease surveillance reports compiled from the PATHAUT database, giving demographic data and disease rates, are produced annually. These have been made available in the public domain through the NIOH website.

In 2013, 1 190 autopsies were carried out as part of the compensation process. This is a slight increase on the 1 166 autopsies performed in 2012. Due to financial and human resource constraints, the promotion of the outreach programme's autopsy service was scaled down. During the year, presentations and workshops were presented to stakeholders that specifically requested them.

An improvement in the documenting and recording of the lungs that are examined, was introduced with the installation of a new camera system. Macroscopic photographs of the lungs are taken and stored in an electronic archive. This system is more efficient than the previous system and can be used as a quality control tool, especially in the assessment of the degree of emphysema.

### Surgical Pathology

The Pathology Division has vast experience in lung pathology and is recognised as a centre of excellence. A diagnostic service is offered for lung biopsies, fine needle aspirates and bronchial washings. Diagnostic requests are received from Clinicians at academic hospitals served by the NHLS, as well as from the private sector. The demand for this service is increasing and in 2013, 680 surgical specimens were received. To improve this service to Clinicians, the quality of the pathology report was enhanced by incorporating colour photographs. Important diagnostic features are graphically highlighted to the referring Clinicians. To improve the turnaround time of the service, reports are emailed to referring Clinicians.

### Electron Microscopy

The Electron Microscopy Section functions within the Pathology Division and is headed by Prof J I Phillips, a National Research Foundation (NRF) rated scientist. The Electron Microscopy Section supplements the service work of the Pathology Division by determining the asbestos fibre concentrations in lung tissue to assist with diagnoses and the compensation process at the MBOD.

The pathology examination of hearts and lungs forms part of the compensation process for miners and involves the Medical Bureau for Occupational Diseases and the Compensation Commissioner for Occupational Diseases.

The Section carries out qualitative and quantitative analyses for the presence of asbestos fibres. Analyses are performed on bulk materials or air samples obtained on filters. These analyses are performed for other divisions of the NIOH and external clients including national, provincial and local government, non-governmental organisations, universities and the private sector. The Section participates in an external quality assurance scheme and has maintained its satisfactory rating in the Asbestos in Materials (AIMS) international quality assurance scheme coordinated by the Health and Safety Laboratory (HSL) in the United Kingdom (UK).

The service to analyse samples for asbestos was first offered in 2003. Since then, data generated from the samples submitted for analysis has been stored and entered into a database. This database is unique in South Africa and its interrogation provides information about the legacy of asbestos in the country. In 2013, an analysis of this routinely collected data was published in the journal, Occupational Health Southern Africa.

## RESEARCH

Research relevant regarding the health of South African workers is carried out by members of the Pathology Division staff. Material and data from the service work of the Division provides a good deal of information for research projects. Current areas of interest centre on diseases of the lung, particularly with respect to dust, especially silica and asbestos. Tuberculosis is a particular problem in the mining industry and is a focus area of research. During the course of the year, Prof Murray and Prof Phillips were asked by editors of scientific journals to be peer reviewers for research articles. Staff in the Division co-authored six articles in peer reviewed journals and a peer reviewed chapter in a book. Prof Phillips is a member of both the NHLS Research Development Committee as well as the NHLS Research Committee.

The Pathology Division collaborates with other divisions within the NIOH, and assists with projects that involve the enumeration and identification of asbestos. Links are fostered with local and international institutions which currently include: The Centre for Scientific and Industrial Research (CSIR); University of the Witwatersrand: Schools of Pathology, Public Health, Clinical Medicine and Archaeology; University of Johannesburg: Faculty of Health Sciences; Health and Safety Laboratory, UK; Occupational and Environmental Lung Injury Centre, Sheffield University, UK; University of Wales, UK; Harlan Laboratories, Switzerland; Dokkyo University School of Medicine, Japan; London School of Hygiene and Tropical Medicine, University College, London, UK; and Brooklyn College, City University of New York, USA.

The Division also receives visitors from these local and international institutions. In this reporting year, international visitors included: Prof K Honma (Dokkyo University, Japan), Prof B Racette (University of Washington in St Louis, MO, USA), and Prof F Pooley (University of Wales, UK).

## TEACHING AND TRAINING

The Pathology Division plays a role in teaching and training through formal lecturing to professional bodies, universities and teaching hospitals. Staff members participate in the mentoring, teaching and supervision of PhD and Masters students at the University of the Witwatersrand and the University of Johannesburg. Teaching is also given to Diploma in Occupational Health (DoH) students from the University of the Witwatersrand. Prof Phillips moderates examinations and chairs the Faculty of Health Sciences Academic Advisory Committee of the University of Johannesburg. Dr Vorajee actively participates in and presents cases at the weekly clinical pathology meetings with doctors from the Johannesburg teaching hospitals. Registrars in Pathology rotate through the Division as part of their specialist training. Specialised small group training is given to healthcare professionals, organised labour, and mortuary and funeral parlour staff. In collaboration with the National Union of Mineworkers (NUM), members of the Pathology Division have conducted outreach workshops focusing on lung disease and compensation. Prof Murray is an Associate Professor in the School of Public Health while Prof Phillips is an Associate Visiting Professor in the Faculty of Health Sciences at the University of Johannesburg.



## HONOURS

Prof JI Phillips received a NRF gold medal from the Vice Chancellor of the University of the Witwatersrand as a token of appreciation at a celebration of NRF rated scientists in November 2013.

The Pathology Laboratory is an accredited training laboratory for HPCSA Intern Medical Scientists.

Both Mrs N Ndlovu and Mr S Milne were registered as PhD students in the School of Pathology at the University of the Witwatersrand.

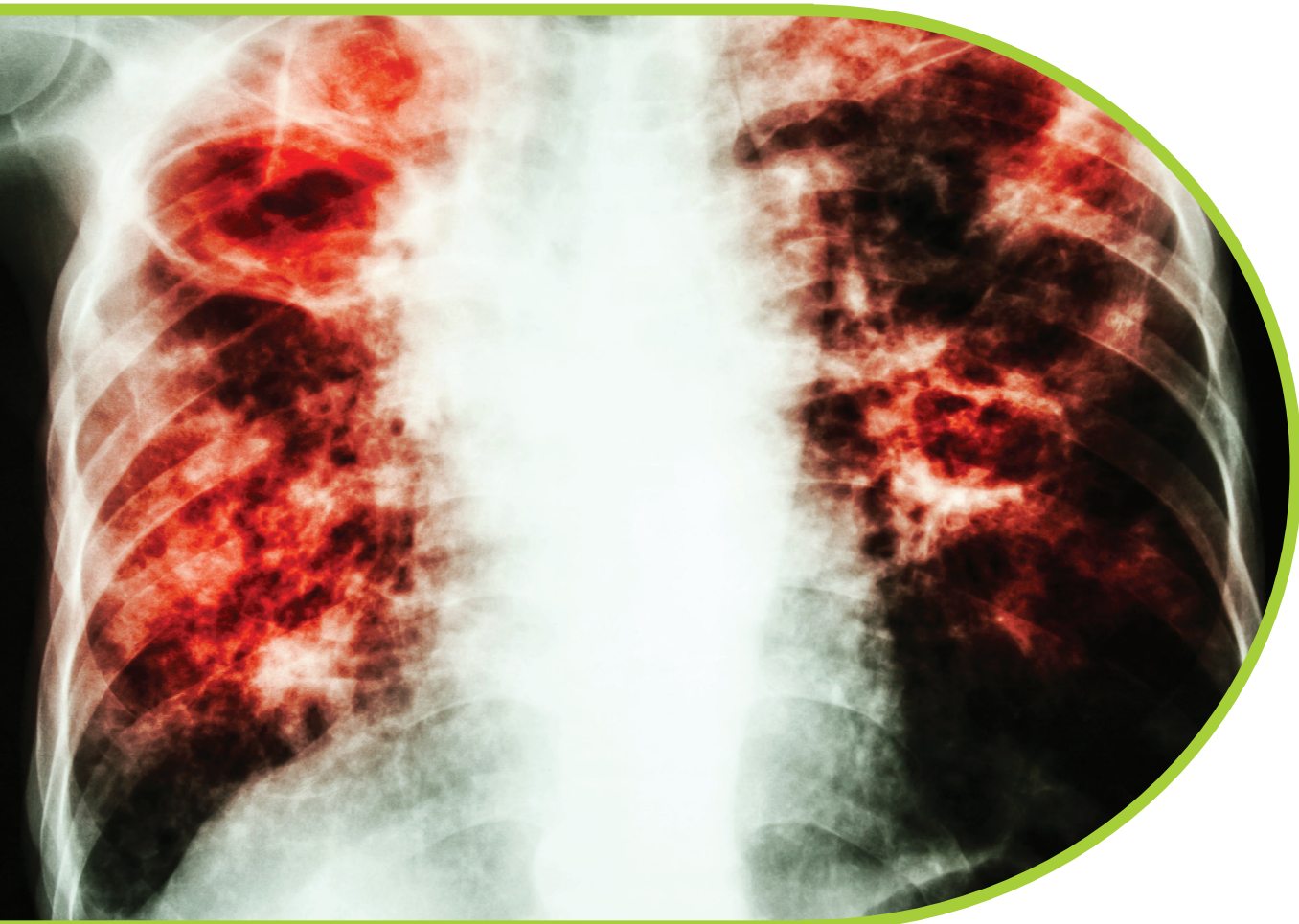


World TB Day celebrations and outreach campaign in Kokosi, Fochville for Lung Autopsy Service provided by the NIOH, March 2014  
Back row L-R: Juliet Buthelezi, Sam Rikhotso and Imitatia Nokwanda Ngcakaza  
Front row L-R: Rosina Soko and Palesa Mothei



Outreach activities in Welkom, March 2014  
Back row L-R: Imitatia Nokwanda Ngcakaza, Palesa Mothei  
Front row L-R: Juliet Buthelezi and Goodman Rani

# OCCUPATIONAL MEDICINE DIVISION



*Shutterstock: film chest x-ray show cavity at right lung, fibrosis & interstitial & patchy infiltrate at both lung due to Mycobacterium tuberculosis infection (Pulmonary Tuberculosis)*

## OVERVIEW

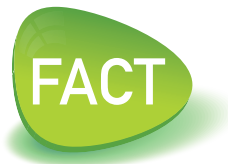
This Division comprises two sections: Occupational Medicine, as well as Immunology and Microbiology.

A major achievement by Occupational Medicine was the completion of a large health survey evaluating current and former employees of a major commercial smelter in Southern Africa. Over 1 500 subjects were comprehensively evaluated and a report with findings and recommendations was written for the commissioning agency. Occupational Medicine staff acted as the Occupational Medicine Practitioner for the NHLS Occupational Health Services and provided occupational medicine, technical support and advice on occupational health matters to the NHLS. This function increased in importance over the year following the appointment of occupational health Nurse Managers in the NHLS, which has resulted in the identification of many more Occupational Health issues requiring attention.



*Prof David Rees  
Head*

The study on occupational stress, conducted by Dr Heinrich Volmink and supervised by Occupational Medicine, is significant because it showed that a widely used tool to measure occupational stress and to identify stressors is reliable in a South African setting. The diagnostic services of the Occupational Medicine Referral Clinic continue to be important given the paucity of these clinics in South Africa. The training platform, together with the clinic, provides for Registrars and Practitioners from a number of medical schools and agencies.



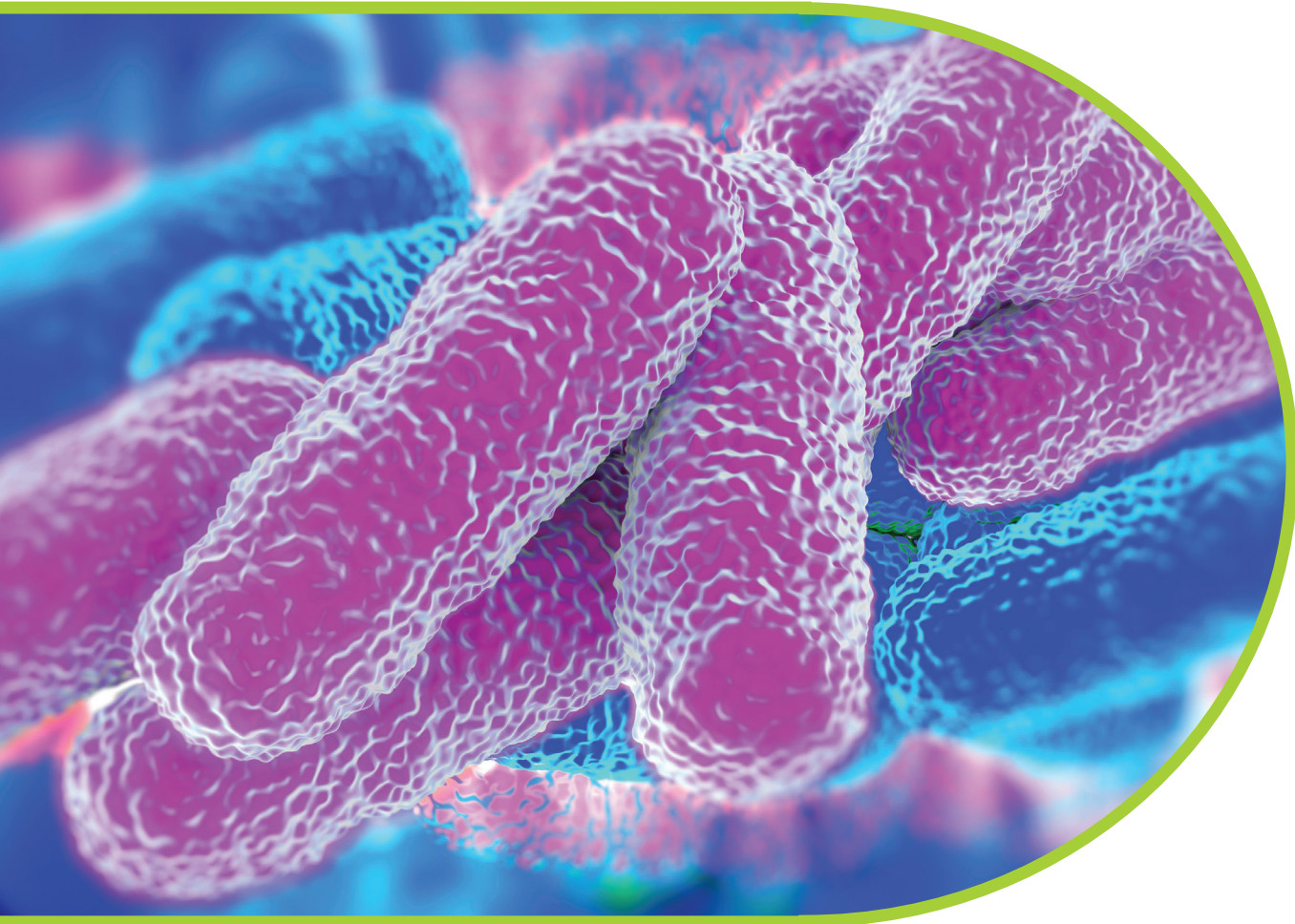
Over **1500 subjects** were  
evaluated, both **current and**  
**former employees** of a major  
smelter in **Southern Africa**

Immunology and Microbiology's contribution to activities on work-related infection is notable. Infections continue to be one of the top five causes of Occupational Disease, including the increasing number of TB infections amongst healthcare workers. The section has focused on testing the efficacy of intervention and preventive strategies in TB control. The section provided expert technical support to committees and programmes such as the UVGI Technical team, Legionella Action Group and the National Research Foundation. In particular, the section is assessing the efficacy of ultraviolet germicidal irradiation (UVGI) fixtures in the prevention of TB and led two investigations on suspected TB outbreaks among healthcare workers in two public sector health facilities in KwaZulu-Natal.

The section continued to build its extensive research agenda and international collaboration. Seven important self-initiated research projects are described in the section's report. International collaborators include the University of British Columbia (UBC), Centers for Disease Prevention and Control-TB Unit, and Brigham's and Women's Hospital in the USA. A major research project is the UVGI special project, which is conducted in collaboration with the Council for Scientific and Industrial Research (CSIR), University of Pretoria (UP), University of Cape Town (UCT) and the Medical Research Council of South Africa (MRC). The section is supervising seven students studying for higher degrees, thereby making a substantial contribution to the development of capacity in under-resourced disciplines.



# OCCUPATIONAL MEDICINE



*Shutterstock: Legionella Pneumophila Bacteria*

## INTRODUCTION

The Occupational Medicine Section, headed by Dr S Kgalamono, consists of two units: namely, Occupational Medicine Services (including a Referral Clinic) and the Ergonomics Unit headed by Ms Busisiwe Nyantumbu-Mkhize. The Clinic, being the largest of the three specialist referral clinics in the country, gets referrals from a wide range of industries both within South Africa and from neighbouring countries.

The section currently consists of eight staff members: two Occupational Medicine Specialists, two Registrars, one Scientist (Ergonomics Unit), one Personal Assistant, a Clerk and a Nursing Sister.



*Dr Spo Kgalamono*  
Head

### Highlights of the year

The past year has been an active one for the Occupational Medicine Section. A large health survey, evaluating current and former employees of a major commercial smelter in Southern Africa, was completed. This was commissioned by the Government of Namibia as a response to complaints received from concerned community members and employees. Air and urine concentrations of arsenic, above generally accepted occupational exposure limits, have been recorded at the smelter for decades. The survey described symptoms and clinical features of the surveyed employees to determine whether current or previous over-exposure to a variety of hazards was associated with abnormal tests and/or disease.

Mental health in the workplace was identified as one of the key areas in occupational health where a gap exists in addressing the growing burden of mental illness in South African workers. The section completed a study in a healthcare setting that assessed prevalence of occupational stress in administrative workers, described risk factors for occupational stress and tested reliability of a tool to measure occupational stress as to its utility within the South African context. It was found that occupational stress levels in the study sample as a whole were high (compared to reference values) and specific harmful risk factors were also identified.

In the year under review, Ms B Nyantumbu-Mkhize, the head of the Ergonomics Unit, accepted a nomination for membership of the Ergonomics Technical Committee from the Chief Inspector of the Department of Labour. The mandate of the Ergonomics Technical Committee is to develop Ergonomics Regulations for South Africa. The Committee has successfully reached its first milestone of determining the scope of the regulations, which was accepted by the Advisory Council of Occupational Health and Safety, formed under the Occupational Health and Safety Act of 1993. The Ergonomics Regulations will fill a gap in the legislative framework of South Africa, which will contribute to improved performance and well-being of the South African workforce.

Ergonomics is considered a scarce skill in South Africa. In order to change this status, there needs to be a concerted effort to promote and raise awareness about the field. In this pursuit, for the first time, the Ergonomics Unit collaborated with the Indian Institute of Technology, Industrial Design Centre in India, through the assistance of Prof G Ray, to stage a workshop on "Applied Ergonomics and Manual Material Handling: A Participatory Approach". Delegates from the public and private sectors, as well as the NHLS, attended the workshop. The delegates appreciated the unique opportunity and the participatory approach, and recommended it for future workshops.

Another highlight was the successful completion of the Diploma in Occupational Health course by 27 doctors. A 100% pass rate was achieved with three students obtaining distinctions, including one of the section's Registrars.

**Mental illness in the workplace is a growing burden in South Africa. The NIOH found that occupational stress levels as a whole were high and identified specific harmful risk factors.**

#### Did You Know?

A 100% pass rate was achieved for the Diploma in occupational Health course that was attended by 27 doctors with three students obtaining distinctions.

## DIAGNOSTIC SERVICES

The medical staff travelled extensively in the year under review, conducting clinical examinations, providing advisory services, teaching and training, and participating in research activities nationwide and in neighbouring countries. Within the NHLS, Occupational Medicine staff acted as the Occupational Medicine Practitioner for the NHLS Occupational Health Services and provided occupational medicine technical support and advice on Occupational Health matters to the NHLS. Extra support was offered to the Medical Bureau for Occupational Diseases (MBOD) in various activities including benefit medical examinations, setting up of one-stop-service sites, as well as participation in the Medical Reviewing Authority and the Joint Committee for the certification of cases of Occupational Diseases and administrative support.

Apart from conducting clinical assessments of workers referred for suspected Occupational Diseases and possible compensation, the Section also provided professional consultation and advisory services on Occupational Health to the national and provincial Departments of Health, Correctional Services and Labour and the Gauteng Forensic Pathology Services.

In the year under review, trade union members sought medical assistance for their members, including the review of compensation decisions and appeals. Doctors within the section provided them with relevant information and made suggestions to conduct workshops for shop stewards and other union members on issues such as compensation processes and health effects of exposures that directly affect workers.

Clinical services remain a major focus for the sub-section. Two hundred and eighteen new workers were assessed during the reporting year (Table 1), the majority of whom were suffering from occupational respiratory diseases. Of the rest, a small proportion had musculo-skeletal and occupational skin allergies. All workers assessed were seen as sentinel events, provoking a thorough investigation at the workplace to assess the possible causes of diseases and offer advice on workplace modification to prevent further exposure to all workers. Workers with compensable diseases were assisted with applications for compensation.

Table 1: Cases assessed at the Clinic in the current financial year

Occupational Diseases	Total
Chronic Obstructive Pulmonary Disease (COPD)	46
Occupational Asthma, Irritant Induced Asthma, Work Aggravated Asthma	99
Musculo-skeletal	5
Silicosis	23
TB in Silica exposed workers	9
Hand Arm Vibration Syndrome	2
Renal Failure	1
Cystic Bronchiectasis	1
Asbestos Related Pleural Disease, Malignant Mesothelioma	4
Allergic Rhinitis	3
Latex Allergy	1
Non-occupational cases	9
NHLS Medical Surveillance	15
SUB-TOTAL	218

### Special projects

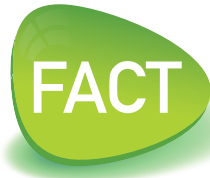
This Section has recognised a gap in two strategic service areas in South Africa, namely mental health in the workplace focusing on occupational stress, and the Disability Management Referral Service which focuses on disability prevention strategies and rehabilitation services.

### Mental health in the workplace

Mental disorders have a high prevalence and are a leading cause of disability in many countries, including South Africa. The burden of these disorders is underestimated, despite strong evidence regarding their social impact. South Africa lacks capacity to deal with work-related mental health issues, and public health services are overburdened and unable to respond to current demands.



A study looking at occupational stress in the South African workforce has been completed by the Section. This was an opportunity to test a tool used worldwide as to its utility within South African workplaces. Risk factors for occupational stress were identified, and the prevalence of stress in administrative workers employed in a large hospital was determined.



## Mental Disorders have a High prevalence and are a Leading Cause of Disability in many countries, including South Africa.

Recruitment of a Social Worker, a Psychologist and an Occupational Therapist with experience in mental health issues is underway. The team is expected to start with policy formulation, needs analysis and intervention within the NHLS and the broader South African workforce. The staff will also help to strengthen human resource capacity in dealing with mental ill-health within the NHLS in terms of assessments, management and accommodation in the workplace.

### Disability Management Referral Service

People of working age that have disabilities, whether attributable to their work or non-occupational conditions, have less work opportunities than the general population. However, despite the numerous barriers that they face, people living with disabilities throughout the world are participating in and contributing to the workplace at all levels. It is becoming increasingly apparent that disabled people not only have a valuable contribution to make to the national economy, but that their employment reduces the cost to the State (e.g. disability grants) in addition to reducing poverty for the disabled individual and their family. Furthermore, within South African legislation there is an obligation and an incentive for employers to ensure that people living with disabilities remain in employment.

The activities completed to date by the Occupational Medicine Section have been around the conceptual models for vocational rehabilitation services in the one-stop service for ex-miners. This service will allow ex-miners using the service to be assessed on their eligibility for vocational rehabilitation. Those who may be able to work will then go on to have a functional capabilities evaluation, as well as limitations and a rehabilitation programme started to promote early return to work. Networks have been set up with various stakeholders for collaborative work with practitioners and trainers in the field. The list and costing of infrastructure, personnel and equipment needs have been compiled.

Training on disability concepts and common practices in South Africa was conducted by the Occupational Medicine Section in the Diploma in Occupational Health course at the University of Witwatersrand.



*Shutterstock: Lung cancer cells - 3d rendered illustration*

## RESEARCH

A number of staff within the Occupational Health Section have contributed to research. Dr Kgalamono is an editorial member of the Occupational Health Southern Africa Journal and was also involved in supervising a Master's research project (MMed on Occupational Stress) for the University of the Witwatersrand.

The current research projects include:

### Occupations and breast cancer in women treated at a tertiary hospital in Johannesburg

Breast cancer is now the second most common cancer in Black women in South Africa. There are numerous established risk factors for breast cancer, which include age (age at menarche and menopause; age at first pregnancy), a family history of breast cancer, a history of benign breast disease, diet, obesity and alcohol intake, oral contraceptives and hormone replacement use. More recently occupational risk factors have become prominent, in particular, shift work that disrupts the circadian rhythm, which has been identified as a group 2A carcinogen – a probable human carcinogen – by the International Agency for Research on Cancer (IARC).

Looking at the current available information concerning industries that favour women in South Africa, it is assumed that shift work is a common exposure, although there is very little information available on the prevalence of shift work together with the carcinogenic effects of this exposure in our context. This study plans to identify whether certain industries have higher risks for breast cancer and if there is an association between shift work and breast cancer in Black women in South Africa.

### Compensable occupational lung diseases in current miners and ex-miners in South Africa, 2003-2012

This study seeks to determine the extent and trends in compensable occupational lung diseases in miners; determine certification trends in terms of time from certification to compensation payment; clarify specific issues like proportion of women certified with pneumoconiosis; and identify the number of miners within exclusive diamond mining who were certified with mesothelioma. It is hoped that this information will assist in identifying interventions to improve the certification process at the MBOD.

Completed projects include:



# Health Survey of 1 759 current and ex-workers found that a number of medical conditions were common among smelter employees. High urinary arsenic concentrations indicating over-exposure was most prevalent.

## Health evaluation of smelter employees

The smelter is a major commercial smelter in Southern Africa. It has been operational from the 1960's, and primarily serves to process copper. It is unique in that it is one of the few smelters with the ability to treat complex arsenic and lead bearing copper concentrates. Air concentrations of arsenic, above generally accepted occupational exposure limits, have been recorded at this smelter for decades. This Health Survey of 1 759 current and ex-workers found that a number of lifestyle risk factors and medical conditions were common. Of concern were the high urinary arsenic concentrations indicating over-exposure. There were a large proportion of subjects reporting recent or past skin rashes consistent with arsenic-induced dermatitis. Arsenic was found to be the main irritant. There were a large number of workers with hearing loss, both noise-induced and from other causes. Occupational cancers that could be attributed to arsenic exposure were rare, possibly because a large proportion of participants had served a duration of service that was too short to result in the diseases associated with chronic exposure. The smelter has subsequently instituted remedial measures to control exposure and has developed policies, systems and services to prevent the adverse health effects from exposures.

## Occupational stress in a South African workforce

Occupational stress represents a substantial public health challenge. Although there has been an extensive focus on this form of stress internationally, there is a paucity of relevant evidence within South Africa. Within the local context there are relatively few studies looking at: (1) reliability testing of screening and assessment instruments, (2) prevalence analyses of occupational stress, and (3) work-related stress management intervention designs. This study focused on stress experienced in the workplace. It tested the reliability of an established occupational stress instrument (the COPSOQ), measured the prevalence of stress, and described risk (and protective) factors in the workplace that could be associated with stress.

The prevalence of occupational stress in the study sample as a whole was high (as compared to the reference value), and there was a significant variance in terms of job category. Moreover, the manager's group appeared to be particularly vulnerable. Occupational stress was also found to correlate positively with burnout and sleeping troubles, and negatively with self-rated health.

An analysis of risk factors was undertaken using logistic modelling. Variables identified as being significantly harmful were: *offensive behaviour, emotional demands and quantitative demands*, while *perceived quality of leadership* was significantly protective. Analysis by *gender* showed that *work-family conflict* and *emotional demands* were risk factors for occupational stress in females, while *rewards (recognition)* and *social support from supervisors* were protective. In males, *offensive behaviour* was a risk, while the *social community* at work afforded significant protection against stress.

Finally, it was found that all of the significant variables could be grouped into three main categories: (1) job characteristics; (2) organisational relationships; and (3) home-work interactions. After exploring each of the significant risk factors in considerable detail, the contextual importance of resource constraints and HIV/AIDS was briefly discussed.

## TEACHING AND TRAINING

Formal and informal training activities have been used to strengthen capacity development and create awareness of occupational health amongst employers, workers and trade unions, health professionals, government and other stakeholders.

### Undergraduate training

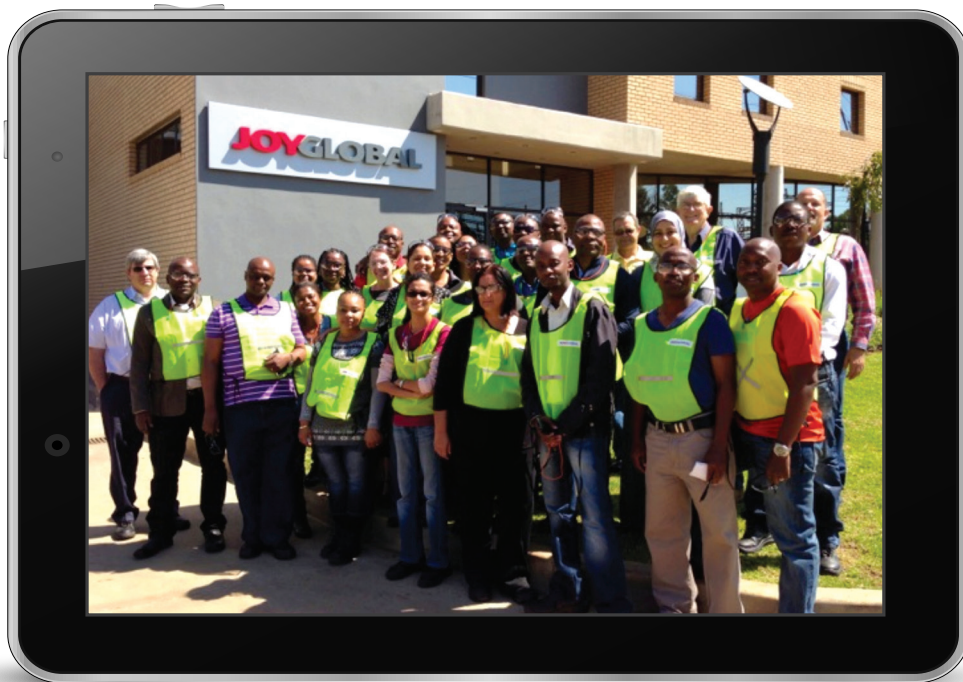
Staff in the Occupational Medicine Section contributed to the Graduate Entry Medical Programme (GEMP) at the University of the Witwatersrand. Informal training was also conducted for small groups of workers, union members, Occupational Health Nurses and Occupational Medicine Practitioners on specific topics.

A training programme has been developed for training Primary Healthcare Nurses in the recognition of Occupational Diseases and related issues, and appropriate referral to the next level of care.

### Postgraduate training

The Occupational Medicine Sub-Section offers opportunities for practical training of Public Health and Occupational Medicine Registrars and clinical skills refinement for other healthcare workers. Every year, Public Health Registrars from the Universities of Pretoria, Witwatersrand and Limpopo rotate through the clinical services for experiential learning in occupational health. Some staff members accepted invitations as moderators and external examiners for university programmes.

Other postgraduate teaching activities were the formal Diploma and Master's courses in the Schools of Public Health at the Universities of the Free State, Pretoria and the Witwatersrand. Teaching commitments include planning of specific courses, lecturing, marking assignments, setting examinations and general support to students. Staff provided oversight and teaching on the MPH in the field of Occupational Hygiene. Staff within the section supervised three PhDs, three MMeds and two MPH Research reports.



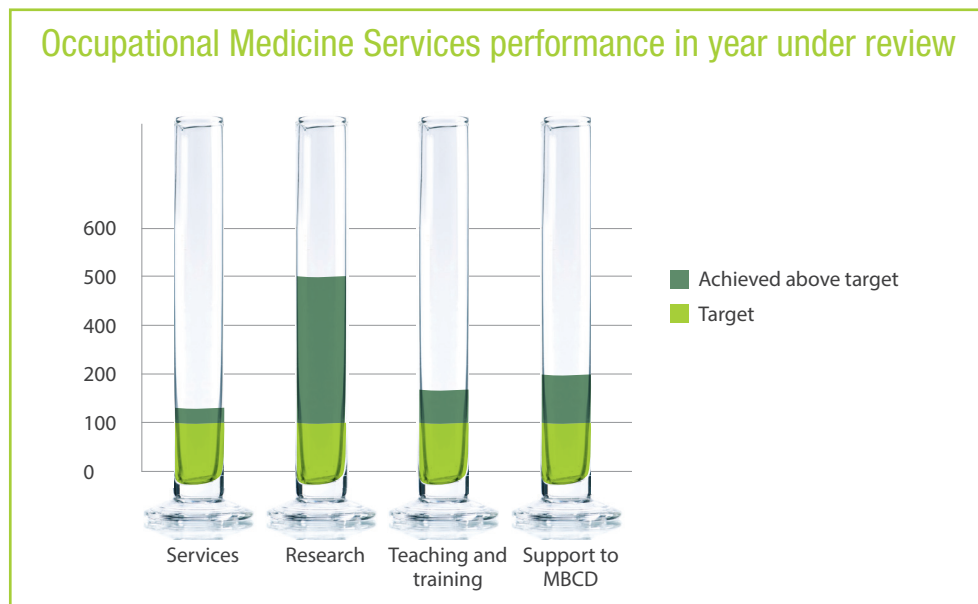
*Diploma in Occupational Health Students from the University of the Witwatersrand, graduate class of 2013.*

## PERFORMANCE TARGETS

The section's annual performance targets were met, and in some instances exceeded, during the year under review. Contribution to overall NIOH targets were met in the following areas: four governmental departments supported, five Medical Reviewing Authority meetings held and two Joint Committee meetings held.

The target of 175 clinical assessments of workers conducted was exceeded by 20%; 218 workers were assessed.

Support for post-graduate training was increased to three universities, and 27 medical doctors completed a Diploma in Occupational Health (DoH) course. A target of two activities was expected in support of MBOD. Four activities (two committees, benefit medical examinations and a rapid situational analysis and costing of MBOD services) were completed. Four, instead of two, meetings were held with trade unions providing advice and technical support. One research activity was expected, one research project was completed, two journal articles published and three in press and two research activities were initiated.



## HONOURS

Dr O. Abrahams passed the Diploma in Occupational Health with distinction.

## PROFESSIONAL DEVELOPMENT

Currently, four Registrars (MMed) are being trained in Occupational Medicine. Two are full-time employed at NHLS in their final year of training, and two are Supernumerary Registrars in second and final year respectively. The resident Professional Nurse completed the Diploma in Occupational Health Nursing from the University of the Witwatersrand.

### Human resources constraints

Mental health and disability services have been limited by the availability of a Psychologist, Social Worker and an Occupational Therapist who are integral components of the multi-disciplinary team essential to develop and maintain such services.

The Ergonomics Unit currently has only one staff member who heads the Unit. It has been particularly difficult to recruit and retain appropriately qualified health professionals as this is a scarce skill in South Africa.

### Future plans

Other than aiming to run an effective and efficient service, the future plan is to concentrate on two strategic areas. Firstly, expansion of the mental health unit is high on the list. Newly recruited staff members will do a needs-analysis at the NHLS and work closely with the Human Resource Division to develop policies and plans for the service. Secondly, networks with Psychologist and Psychiatrist organisations will be established for collaborative work within the public health system.

Vocational rehabilitation as a one-stop service for ex-miners will continue to be supported. A disability management service within the NIOH will be started, focusing particularly on mental health. The NIOH will look at the available NHLS data to develop a plan for this service within the NHLS Occupational Health Service, with a view to providing comprehensive occupational medical services that not only include preventive, diagnostic and treatment of Occupational Diseases, but also provide rehabilitation back into the workplace. The section has been limited by the availability of other allied health professionals that are an integral part in developing the multi-disciplinary team for vocational rehabilitation.

## ERGONOMICS UNIT

The functions of the Unit include the provision of ergonomic services to industry; generation of new ergonomics knowledge; and the ergonomics teaching and training of occupational health professionals and workers. The main ergonomic service provided by the Unit is ergonomic risk assessment.

In the year under review, more than 60% of the ergonomic risk assessments were carried out within the NHLS. Of these, 80% involved computerised workstations, while the rest were laboratory-based. Again, 80% involved affected workers while the rest were proactive. The remainder of assessments were conducted in companies in the manufacturing sector. Two thirds of these companies were South African, while a third was international. A third of the assessments in these companies involved affected workers. Finally, two thirds of the assessments in these companies included computerised work stations.

## RESEARCH

The Unit continued to participate in research activities conducted in universities. These activities involved assessing and marking Master of Science students' protocols and dissertations. The Unit's contribution to the Curationis Journal is ongoing. The Unit facilitated a "Research Methods Course" with the NIOH Epidemiology Section to provide nurses affiliated to the Democratic Nurses Organisation of South Africa with research skills.

The ongoing research projects in the Unit are:

- WHO Workplan 2012-2017: Good practice methods to prevent musculoskeletal disorders in South African healthcare workers.
- Musculoskeletal disorders and associated factors in nurses and bank workers in South Africa: Cultural and Psychological Influences on Disability (CUPID) study.

Collaboration between the Ergonomics Unit and the Cultural and Psychological Influences on Disability (CUPID) Team based in the United Kingdom is ongoing and produced two articles in the year under review.

## TEACHING AND TRAINING

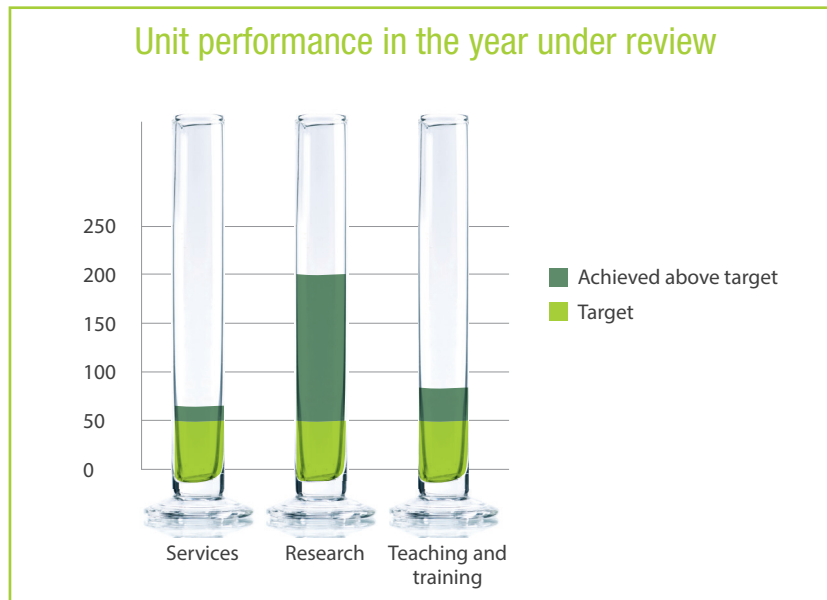
Teaching and training was the biggest activity performed by the Unit, with 300 attendees during the year under review. This was conducted through formal and informal methods. Formal teaching and training included the Masters in Public Health; Masters in Science; Diploma in Occupational Health; Diploma in Public Health and Bachelor of Science in Environmental Health. The informal methods included a seminar and workshops. The recipients of the teaching and training consisted of different groups which included Occupational Health professionals, Public Health Registrars, Department of Labour Inspectors, post graduate and undergraduate students and workers. One of the workshops "Applied Ergonomics and Manual Materials Handling: A Participatory Approach", was done in collaboration with Prof Gaur Ray from the Industrial Design Centre at the Indian Institute of Technology, Powai, India.



*Ergonomics Workshop team, led by Prof Gaur Ray from India. L-R Mrs Inakshi Naik, Mrs Shanaz Hampson, Prof Gaur Ray, Ms Busisiwe Nyantumbu-Mkhize and Dr Moresheee Govender.*

### Performance targets

The Unit managed to reach and surpass the targets in the three areas constituting its functions. The target for services was six ergonomic risk assessments in public and private sector companies. Eight ergonomic risk assessments were done, five in the public sector and three in the private sector; 33% above the target. Research and teaching and training had a two-fold increase. One article was expected to be published, but two articles were published. The target for teaching and training was five activities comprising four presentations and one seminar or workshop. Ten teaching and training activities, comprising six presentations and four seminars or workshops, were conducted.



### Plans for the future

The development of Ergonomics Regulations in South Africa creates a need for more teaching and training of different groups involved in Occupational Health and Safety. One such group is the Department of Labour Inspectors who are the custodians of the regulations. They will require intensive training to be able to carry out their duties. The Ergonomics Regulations present an opportunity for the Ergonomics Unit to be involved in the teaching and training of these inspectors. This will require the development of training materials as this will be the first time such training is offered to the inspectors in South Africa.

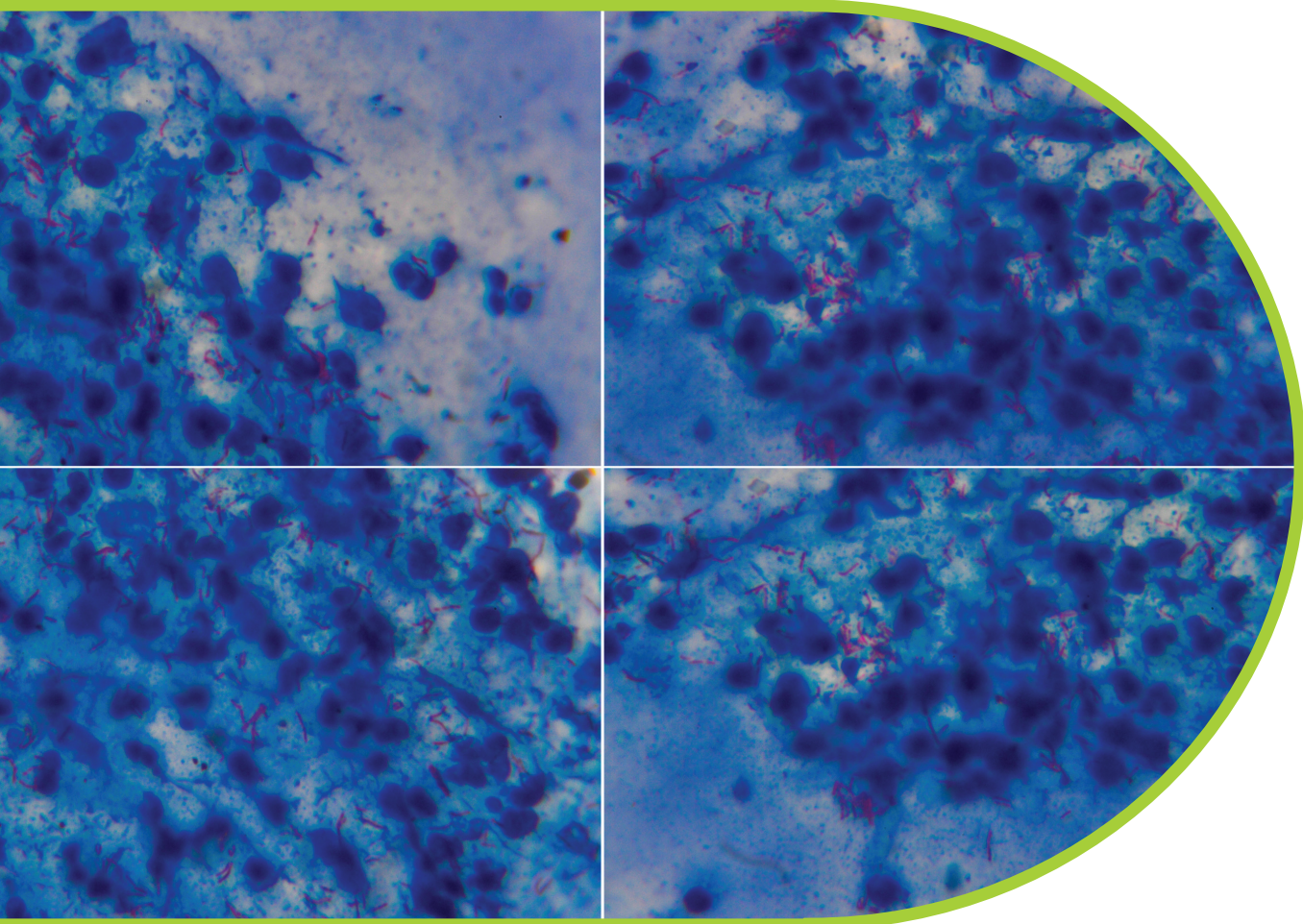
### Professional development

Post graduate candidates enrolled: 1 PhD at the University of the Witwatersrand.

**8 ergonomic risk assessments were done, 5 in the public sector and 3 in the private sector; 33% above the target.**



# IMMUNOLOGY AND MICROBIOLOGY



*Shutterstock: AFP stain showing Microbacterium tuberculosis*

## INTRODUCTION

The Immunology and Microbiology Section is headed by Dr T Singh and consists of three specialised units: Bioaerosol Monitoring, Occupational Allergy and Waterborne Pathogens.

Work-related infection continues to be one of the top five causes of Occupational Disease as the workplace provides an ideal place for the proliferation of microorganisms and the spread of diseases among vulnerable employees who spend an average of eight hours per day at work. The increasing number of TB infections among healthcare workers is indicative of the exposure to hazardous biological agents. The section focuses on testing the efficacy of intervention and preventive strategies in TB control. Other biological agents that pose a risk to workers include allergens. Although not debilitating, allergies affect the quality of life of the worker and also affects productivity.

*Dr Tanusha Singh*  
Head



The Immunology and Microbiology Section continued to support initiatives to prevent and reduce occupational infectious diseases through intervention models, as well as occupational allergies through tailored diagnostics to improve the clinical management of the worker. The section provided expert technical support to committees and programmes such as the UVGI Technical Team, Legionella Action Group and National Research Foundation.

## DIAGNOSTIC SERVICES

The Section met its diagnostic service targets for occupationally-related respiratory and skin diseases. The mobile skin allergy service, which was launched in the Gauteng region in 2013, has continued to grow. More Dermatologists are requesting skin testing. Apart from the Hyde Park satellite dermatology room, progress has been made in getting a room at the Charlotte Maxeke Dermatology Department. A patch test reading pilot study was conducted to ascertain agreement between live versus photographic interpretation of test results in the event of decentralising the patch test service in other districts. Sentinel cases were followed up through health hazard evaluations of the workplace. The skin prick testing data from 2002-2013 was captured onto a database so that trend analysis can be conducted.

The Section also conducted several indoor air quality assessments for hazardous biological agents of various workplaces to establish risk profiles, which provide evidence for recommendation of appropriate prevention and control strategies. The workplaces included offices, laboratories and museum archives. The section expanded its diagnostic capacity by conducting specialised tests for several workplace allergens that are not commercially available.

Renovations of the Bioaerosol Laboratory Revitalisation Plan were completed. The Laboratory provides a specialised airborne mycology testing service with the capability of identifying several mould species as opposed to only total counts. This is important to be able to clinically manage the affected worker. The section continued to offer the amoebal resistant bacteria (ARB) test, coupled with assessments of water distribution systems and associated risks to workers and communities.

The need to test the efficacy of ultra violet germicidal irradiation (UVGI) units in reducing the TB bacilli load in the work environment was identified. The Section is assessing the efficacy of UVGI fixtures in the prevention of TB. These activities include testing the efficacy of the fixtures, setting minimum standards for UVGI fixtures and drafting a guideline for South Africa on effective and sustainable maintenance of UVGI fixtures. The Bioaerosol Team assisted the National Institute for Communicable Diseases (NICD) Outbreak Response Unit with an investigation of TB outbreak in a long-term care facility in KwaZulu-Natal (KZN). The Bioaerosol Team also led two investigations on suspected TB outbreaks among healthcare workers in two public sector health facilities in KZN.



*Outstanding results from the proficiency testing for advanced mycology with an increase from 67% to 100%*

# The Bioaerosol Team assisted the (NICD) with an investigation of TB outbreak in a long-term care facility in KZN.

The clinical tests conducted within the section have been accredited by the South African National Accreditation System (SANAS) under ISO15189:2007 for seven consecutive years. The section also obtained outstanding results from the proficiency testing for advanced mycology organised by the NICD, with an increase from 67% to 100%. All feedback forms from patients were positive and reinforced the quality of the testing service to clients. The section also met 99% of its turn-around-times. The section's Health and Safety Programme was strengthened through the coordination of several activities by the Section's nominated health and safety representative such as respiratory mask fit testing, hepatitis vaccination, TB screening questionnaire and chemical waste removal. The section was instrumental in also addressing chemical waste management at the NIOH.

## RESEARCH

The Immunology and Microbiology Section boasts an extensive research agenda. During the year under review, this included seven self-initiated research projects and collaborative projects in the areas of occupational allergies, bioaerosols and waterborne pathogens. The collaboration with international partners included the University of British Columbia (UBC), and the Centers for Disease Prevention and Control - TB unit, and the Brigham's and Women's Hospital, USA. The priority research project is the UVGI Special Project, which is conducted in collaboration with the CSIR, University of Pretoria (UP), University of Cape Town (UCT) and the Medical Research Council of South Africa (MRC). This project is aligned to the Department of Health's priority area of TB prevention and control.

The projects involving post-graduate students and are being written up include:

**The occurrence of free living amoeba and amoeba resistant bacteria in water storage tanks and taps of households in five areas of Johannesburg, Gauteng Province, South Africa:** D Bartie, TJ Barnard, P Malaka (Mtech student)

**The occurrence of amoeba resistant bacteria (ARB) in samples from a wastewater treatment plant and surrounding areas in Johannesburg, South Africa:** D Bartie, TJ Barnard, O Mwamba (Dtech student).

Other research-related activities included reviewing proposals for funders (NHLS Research Trust and National Research Forum), examining dissertations, and staff attendance at various scientific forums.

The research projects that are in progress include:

### **Effect of hand washing and scrubbing on bacterial flora and skin irritation in Health Care Workers**

**Study team:** A Fourie<sup>1</sup>, O Matuka<sup>1</sup>, B Binta<sup>1</sup>, Z Kirsten<sup>1</sup>, H Carman<sup>2</sup>, A Mayekiso<sup>2</sup>, C Nattey<sup>1</sup>, T Singh<sup>1</sup>

<sup>1</sup>National Institute for Occupational Health, <sup>2</sup>Private Dermatology consultant

Considerable progress has been made on this project. Sampling commenced at the Charlotte Maxeke Johannesburg Academic Hospital. Permission to conduct the study at the Chris Hani Baragwanath Academic Hospital has been obtained and sampling is planned for August 2014. The two specialist Dermatologists conducted the clinical assessment of Theatre Nurses and Surgeons' hands, whilst the microbiology team collected microbial samples from



hand washes and nail plates. The allergy team administered the health questionnaires to consenting participants. A total of 210 samples were analysed by the microbiology lab for identification of gram positive and gram negative bacteria.

#### **Allergic sensitisation and work-related asthma among poultry workers in South Africa**

**Study team:** T Singh<sup>1</sup>, DO Matuka<sup>1</sup>, E Ratshikhopho<sup>1</sup>, C Nattey<sup>1</sup>, P Dayal<sup>2</sup>, M Jeebhay<sup>3</sup>, R Baatjes<sup>3</sup>, A Lopata<sup>4</sup>, K Renton<sup>1</sup>

<sup>1</sup>NIOH, <sup>2</sup>University of the Witwatersrand, <sup>3</sup>University of Cape Town, <sup>4</sup>Royal Melbourne Institute of Technology

One hundred and thirty two poultry samples for sIgE to sunflower seed (K84), 88 samples for Chicken feathers (E85) and 124 for Mould mix 2 (Mx2). Z. Kirsten captured 67 respiratory questionnaires. Inter laboratory comparisons were done with NHLS Tshwane Academic Immunology laboratories for specific IgE of poultry farm workers using the UniCAP machine. The results showed a 97.48% agreement between the two laboratories using the 1x weighted Kappa score. The 232 health questionnaires were captured and are currently being validated. Data analysis is planned for 2014.

#### **Tuberculosis research in health care workers in a hospital setting in South Africa – Kalafong**

**Collaborative Study team:** M Zungu<sup>1</sup>, K Kyaw<sup>1</sup>, M Malotle<sup>1</sup>, A Yassi<sup>2</sup>, E Bryce<sup>2</sup>, L O'Hara<sup>2</sup>, O Matuka<sup>1</sup>, O Kgasha<sup>1</sup>, T.Singh<sup>1</sup>, K Renton<sup>1</sup>.

<sup>1</sup>National Institute for Occupational Health, University of Pretoria, <sup>2</sup>University of British Columbia

The Bioaerosol Team assisted the project leader by addressing comments received by the Ethics Committee. Members attended the Kalafong Hospital walk-through meeting as well as several other meetings to discuss sampling logistics. The laboratory analysed 30 filter samples for airborne TB for the first round of sampling. A further 61 samples were analysed for the second round of sampling. The results were communicated with the study team. The Bioaerosol Team is currently drafting a manuscript of the findings from the sampling session to date.

#### **Ultraviolet germicidal irradiation (UVGI) in controlling transmission of Mycobacterium tuberculosis (TB) in healthcare settings**

**Collaborative study team:** T Singh<sup>1</sup>, O Matuka<sup>1</sup>, P de Jager<sup>2</sup>, T van Rensburg<sup>2</sup>, W Leuschner<sup>3</sup>, M Poluta<sup>4</sup>, M Mphathele<sup>5</sup>, O Kgasha<sup>1</sup>, B Binta<sup>1</sup>, R Stolper<sup>2</sup>, D Meyer<sup>6</sup>, M Zungu<sup>1</sup>, B Kistnasamy<sup>1</sup>, G Sekobe<sup>1</sup>

National Institute for Occupational Health, CSIR, University of Pretoria, University of Cape Town, Medical Research Council, Private consultant on UVGI

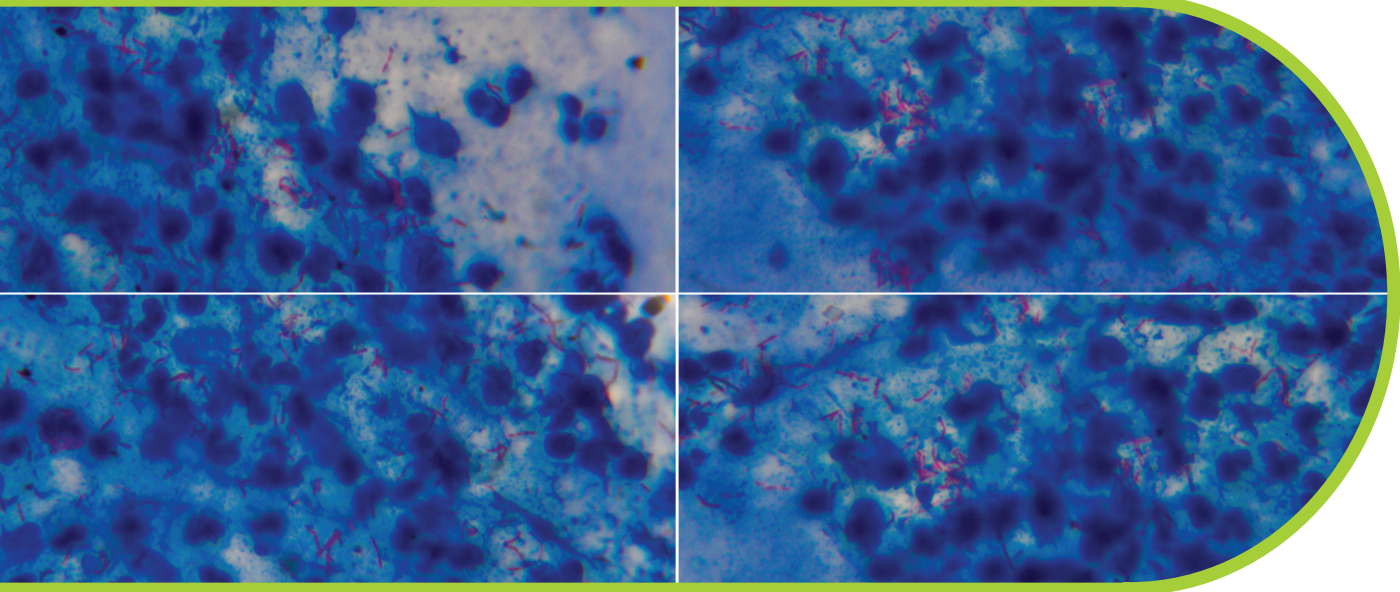
The Bioaerosol Team started obtaining information on the UVGI fixtures installation in various facilities. Several UVGI fixtures were tested, and the findings will also be used to draft specifications for UVGI fixtures to be used in healthcare facilities. The University of Pretoria conducted testing on the irradiance of the fixtures to be used for drafting specifications. Several novel interventions for the prevention of airborne TB will also be tested, for example the electrokinetic device which samples air and traps particles on a silk membrane. This device is portable and has the potential to be used as a sampling tool in public transport. The viability of airborne samples will also be assessed in this project.

#### **Airborne viable TB detection**

**Collaborative Study team:** O Kgasha<sup>1</sup>, B Binta, O Matuka, T.Singh<sup>1</sup>

<sup>1</sup>National Institute for Occupational Health

Several samples were processed for the viability study by treating MTB bacilli suspension with Ethidium Monoamidebromide (EMA). The positive effect of EMA for determining viable MTB cells was noted by the reduced number of DNA copies per millilitre which represent only the viable cells. Air samples were collected and similar experiments were repeated. The method needs to be optimised in 2014 and validated. Once validated, the method will be valuable in determining risk profiles for TB among different job categories in various workplaces.



AFP stain show *Mycobacterium tuberculosis* (TB)

### **Investigating the occurrence and impact of amoeba resistant bacteria in farming communities in the Gauteng Province, South Africa**

**Study team:** C Bartie<sup>1</sup>, C Kruger<sup>1</sup> (DTech student)

<sup>1</sup>NIOH, <sup>2</sup>University of Johannesburg

This study intends to identify free living amoebae (FLA) and amoeba resistant bacteria (ARB) of the genera *Legionella*, *Mycobacteria*, *Vibrio*, *Salmonella*, *Shigella* and *E coli* 0157 from container water and biofilms of 81 houses of farm workers in the Heidelberg area. To date, 49 samples from borehole water were processed for FLA and ARB, and a further 75 samples were re-processed and microscopic results obtained. Polymerase chain reaction (PCR) testing was done as well as transmission electron microscopy. The results were analysed and the student is finalising the write-up of her thesis.

Funding: Water Research Commission

### **An investigation into the presence and impact of free-living amoebae and amoebae resistant bacteria on drinking water production, storage and distribution to healthcare institutions in Gauteng province, South Africa**

**Study team:** C Bartie<sup>1</sup>, TG Barnard<sup>2</sup>, P Muchesa<sup>2</sup> (Dtech student)

<sup>1</sup>NIOH, <sup>2</sup>University of Johannesburg

Permission was obtained to sample at Chris Hani Baragwanath Academic Hospital (CHBAH), Rahima Moosa Mother and Child Hospital on the East Rand (RMMCH) and Helen Joseph Hospital. A report for the first five deliverables was submitted to the Water Research Commission and accepted without changes. The sampling and testing phase was mapped and began in February 2014, and 41 samples were collected from the theatre complex. A walk through of the approved sites was done and sampling has started. The study team attended the Water Research Commission (WRC) reference group meeting. The bulk of the sampling at the other sites will be conducted in 2014.

Funding: Water Research Commission

## TEACHING AND TRAINING

The Section contributed to several teaching and training programmes, including formal workshops and ad hoc training or presentations. Dr T Singh and Ms A Fourie reviewed the teaching activities for the Immunology syllabus of second and third year medical students of the University of the Witwatersrand. Ms A Fourie, Ms E Ratshikhopha and Ms O Matuka facilitated the Graduate Entry Medical Programme (GEMP) 1 for both problem-based sessions of the respiratory block and haematology block. Staff also trained elective students and experiential training students. Ms Z Kirsten lectured 1st year biomedical students at the University of Johannesburg. Dr D Bartie continued supervising postgraduate students at the University of Johannesburg. Ms O Matuka gave a presentation to the Diploma in Occupational Health students on hazardous biological agents.

The Section's medical intern scientist microbiology training module was audited by the HPCSA, and was accredited without any conditions for the period 2013-2018. Ms B Binta is currently training under this programme and Mr P Malaka successfully completed his internship. The Immunology & Microbiology section co-hosted the Occupational Allergy Workshop for the Diploma in Clinical Health nursing students on 17 April 2012 at Lillian Ngoyi Health Centre. The second day of the workshop, organised by the training department, was entitled "TB/HIV and Silicosis in the Workplace Workshop" and the Hazardous Biological Agents Regulation was presented with particular emphasis on TB exposure in the workplace. The section also hosted the Occupational Cancer Seminar. This Seminar provided an overview of occupational cancers, its main causes, principles of screening and prevention and attribution in individual cases. The role of carcinogenic chemicals, including diesel emission fumes and UV light exposure, in cancer was discussed. The role of the National Cancer Registry (NCR) in providing information on cancers in South Africa was highlighted. The workshop was well attended and requests were received to host similar workshops in KwaZulu-Natal and the Western Cape.

The Immunology and Microbiology Section's pride is its people, and therefore the section invested in skilling several staff on various topics, which had a ripple effect on the quality of services rendered. Topics included various instrument training; bio-monitoring; risk assessment; ethics; biorisk management; DNA diagnostics; quality assurance; first aid; liquid handling; water treatment; infection control; biomimicry; health and safety and laboratory logistic management Information System (LIMS).

## HONOURS

Ms O Kgasha graduated with her MScMed at the University of Limpopo.  
Mr P Muchesa graduated with his MTech Water Care (Microbiology) at the Tshwane University of Technology.

## PROFESSIONAL DEVELOPMENT

Postgraduates enrolled: seven (three MSc at the University of the Witwatersrand and University of Limpopo, one MTech at the University of Johannesburg and three DTech at the University of Johannesburg).

### Did You Know?

*The medical intern scientist microbiology training module was audited by the HPCSA, and was accredited without any conditions for the period 2013-2018.*

Providing skills  
to staff has a  
ripple effect on  
the quality of  
service rendered.



# QUALITY ASSURANCE



## INTRODUCTION

Quality remains a priority at the NIOH with three laboratories (Analytical Services, Immunology and Microbiology and Pathology) maintaining their quality and competency standards (ISO 15189). The Section conducted internal systems audits to prepare the laboratories for the annual external South African National Accreditation System (SANAS) audit. All laboratories received favourable reports, and Environmental Microbiology was advised to participate in the EQA suitable for its environmental test.

All the laboratories that process and test non-biological samples viz., the Occupational Hygiene X-Ray Diffraction (XRD) laboratory, Analytical Services (water testing) and Electron Microscopy (bulk air and filter testing), ISO 17025, are awaiting assessment by the SANAS.



*Mr Bonginkosi Duma  
Manager*

The SANAS has also launched the new ISO 17020 for Approved Inspection Authority (AIA) laboratories and the Occupational Hygiene Section has made application to the SANAS for ISO 17020 assessment.

The Toxicology Laboratory is also in the final stages of preparation of their research to fall within the Good Laboratory Practice (GLP) standards of the Organisation for Economic Cooperation and Development (OECD).

All laboratories conduct monthly accreditation meetings, and internal audits are conducted at scheduled intervals throughout the year. Routine internal audits continued at the NIOH for ISO 15189, ISO 17025 and ISO 17020. The NIOH plans to have 17025 GLP (OECD) and 17020 (AIA Laboratory) accreditation added to the current ISO 15189 by the end of the next financial year.

## PROFESSIONAL DEVELOPMENT

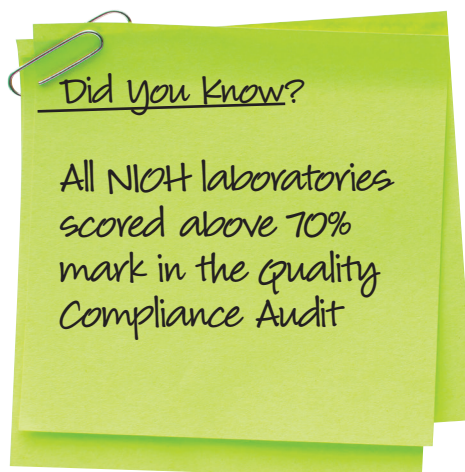
NIOH Quality Assurance (QA) attended the second QA National Workshop in Durban, August 2013. The workshop aimed to strengthen the understanding of ISO standard clauses, which will improve quality within the NHLS. Seven NIOH employees went for training regarding the updated ISO 15189:2012 at the SANAS, Pretoria. The ISO 15189:2012 standard will replace the current ISO 15189:2007 standard. The NIOH QA department conducted training on Non-Conformance Reporting and Root Cause Analysis.

The NHLS QA Department sent two auditors to conduct quality compliance audits at NIOH laboratories during the period under review. This served as the first quality compliance audit for NIOH laboratories, and ensured that the NIOH complied with the required standards and company policies. All NIOH laboratories scored above the 75% mark. This proves that compliance and quality systems are in tact.

Mr B Duma, on behalf of the NHLS, attended Risk Management training at the Milpark Business School as part of the NHLS Risk Committee Training. All NIOH departments went through the Risk Analysis training, which was part of Business Continuity Process for the NHLS.

The new NIOH QA Officer started work in December 2013 to help the NIOH QA Department with documents, forms and quality-related enquiries. This will help to reduce the unnecessary non-conformances that relates to documents that are not updated on time.

QA National Workshop strengthens the understanding of ISO standard clauses, improving quality within the NHLS.





# NHLS BIOBANK



## SERVICES

The NHLS is a member of the International Society of Biobanking and Biorepositories (ISBER) and is represented by Mr Bonginkosi Duma. It is also part of the two working groups of ISBER. The NHLS is also part of the European, Middle East and Africa Society for Biorepository and Biobanks (ESBB), as part of the African Working Group.

The NHLS is a member of the World Regions Forum (WRF) which is based within the Gauteng Premier's office. The WRF works on different projects, including Biobanking, with the Gauteng Premier. Mr Duma represented the NHLS on these projects. Several Biobank projects have been identified and they are due to start in the new financial year, pending approval from the WRF coordinator.

The NHLS Biobank is based at the NIOH and has been furnished with state-of-the-art, fully functional equipment, as well as high security measures. It has five freezers which have a capacity of 160 000 specimens, including a walk-in freezer.

*Mr Bonginkosi Duma*  
Head



The Section continues to store (in freezers) Biobank specimens for researchers and laboratories, both within the NHLS and for external clients. The facility also maintains a high level of security, and constantly monitors ultra-freezing temperatures as well as environmental conditions to ensure specimens remain preserved optimally and in line with international standards/practices. The National Biobank has future plans to renovate identified buildings within the NHLS premises to cater for the growing request for Biobank services in the country.

## PROFESSIONAL DEVELOPMENT

The NHLS was invited to the World Health Organization (WHO) Global Biobank meeting, called BCNet, which took place in Lyon, France in September 2013. The meeting brought together low and middle income country representatives. Mr B Duma, the National Biobank Projects Manager, attended as the South African representative. The NHLS is also part of the South African Biobank Network Steering Committee. This network established itself in 2012. The Steering Committee is made up of representatives from the Department of Science and Technology, National Zoological Gardens, the NHLS and the Agriculture Research Council. The highlight of the year was the National Biobank Convention held in Sandringham in October 2013. This was the first successful initiative that brought together experts and stakeholders from diverse institutions nationally, where the aim was to develop a uniform governance and monitoring framework for Biobanks. During the period under review the National Zoological Gardens (NZG), the body that controls the Pretoria Zoo and Mokopane Nature Reserve, appointed Mr B Duma to the Animal Biobank Advisory Committee. In February 2014, Mr Duma was also elected Vice Chairperson for the WHO Biobank Network Committee (BCNet). The International Agency for Research on Cancer (IARC) emphasized their commitment to BCNet initiatives, and will partner with other national Biobanks. This committee's objectives are to ensure Biobanking best practice, be a catalyst for collaboration and cooperation, and assist with training and infrastructure for Biobanks in low and middle income countries.



*Mr Bonginkosi Duma with the BCNet International Working Group in Lyon, France*

Mr B Duma presented on the National Biobank Initiative at the National Biobank Seminar that was held in Sandton and Cape Town in February 2014. Both seminars were well attended by both research and medical personnel.

## NEW PROJECTS

The NHLS Biobank has established a relationship with the South African Military Health Services (SAMHS) of the South African National Defence Force (SANDF) to develop mutual links and cooperation with respect to Biobanking.



The **NHLS Biobank** has a capacity  
for **160 000 specimens**





# OCCUPATIONAL HEALTH, SAFETY AND ENVIRONMENT SERVICES (SHE)



## INTRODUCTION

The NHLS Occupational Health, Safety and Environment Services (SHE) Section continued to strengthen the Occupational Health Services for all employees within NHLS. The advantage of being placed within the NIOH structure has been the availability of specialist support from the various sections within NIOH; notably the Occupational Hygiene, Occupational Medicine and Immunology and Microbiology Sections.

The year under review saw the final four Occupational Health Nurse Managers appointed. All five posts for nurses have now been filled. It also saw the movement of one Safety Health and Environment (SHE) Officer internally from this section to the Occupational Hygiene section.

The Occupational Medicine Practitioner position has not been filled, and various models are being looked at to cover this critical position. In the interim, Prof David Rees of the NIOH Occupational Medicine Section has taken on this role and assisted with policy, processes and all medical inputs.



*Mr David Jones  
Manager*



## CLINICAL

The Occupational Medicine Clinic and Ergonomists at the NIOH continued to provide guidance and expert medical support to specific cases, as well as policy development.

With the appointment of all of the Occupational Health Nurses, a project is underway under the guidance of Prof Rees to check the levels of compliance with regards to hepatitis B immunisation and surveillance for tuberculosis. The information collected is being captured onto the Occupational Health and Safety Information System (OHASIS) Workforce Health (WH) module.

## WASTE GENERATORS

The process of registering facilities which are deemed to be major generators of healthcare risk waste (HCRW) has continued, and 49 sites have been identified across the NHLS and have been registered in order to ensure compliance with the National Waste Information Regulations, 2012, promulgated under the National Environmental Management Waste Act (Act 59 of 2008). A new module in OHASIS on HCRW Management was piloted and is in the process of being rolled out to facilities. This module is used to record and track hazardous waste generated within NHLS laboratories.

## SPECIAL INVESTIGATIONS AND NIOH SUPPORT

There was continued expert support from the various departments within the NIOH, including Occupational Hygiene, Occupational Medicine and Immunology. Examples of expert opinion and guidance related to:

- The fit testing of N95 respirators for staff
- Compliance with legal requirements regarding medical surveillance
- Noise surveillance
- Indoor air monitoring
- Ergonomic assessments

## AUDITS AND RISK ASSESSMENTS

During the period under review the SHE Officers, under the guidance of Ms Michelle Morgan, continued with the process of auditing facilities. The audits continued to be based on the type of information that would be looked at by the Department of Labour and the requirements of the Occupational Health and Safety Act (OHSA).

During the 2013/14 financial year, 320 Safety Audits were conducted and for the first time one of the facilities achieved a 100% score. Congratulations to Inkosi Albert Luthuli Hospital Virology Laboratory on this achievement!

In order to assess the level of risk assessments in place at the various facilities, 269 different risk assessments were evaluated. In order to assist facilities, SHE Officers facilitated 177 of these risk assessments to ensure compliance.

As indicated above, the Section plans to report on audits done through the use of the Audit Module within the Occupational Health and Safety Information System (OHASIS) in the new financial year.

## OCCUPATIONAL HEALTH INFORMATION SYSTEM

### – OHASIS

The Health Information System, OHASIS, which is being used in the NHLS is still in the process of being moved away from a paper-based system to an online health information system.

Training of identified persons in facilities using online training accessed via the intranet is continuing.

**320 Safety Audits conducted. Congratulations to Inkosi Albert Luthuli Hospital Virology Laboratory for achieving 100% score.**

To date, 103 employees who are not SHE or NIOH Clinical staff have been loaded as users of OHASIS live and they are able to input data relating to either an incident and / or also recording of hazardous waste as well as access reports. The intention is to continue with this process throughout the new financial year.

With the indication from Adobe® that they will shortly be discontinuing support for Flash®, Bioinformatics Manager, Mr Lincoln Darwin, together with the Canadian developer of OHASIS, have embarked on a project to develop a new version of OHASIS, which will be lighter and faster than the current version and not be dependent on Flash®. The development is already at an advanced stage with the following modules completed together with the relevant reports: Incident Reporting an Investigation; Waste; Audit; and Administration. The Employee Health Module is currently in development. This new module can be used to manage the following individual employee health information:

- Occupational medical surveillance
- Health history: acute and chronic conditions
- Occupational history and risks
- Vaccinations: Hepatitis B, Influenza, MMR, and others
- Training received
- Respirator fit test results
- HIV: Counselling & testing, CD4 count, viral load, treatment
- TB: Symptoms, status, treatment

272 incidents were recorded into OHASIS in this financial year.

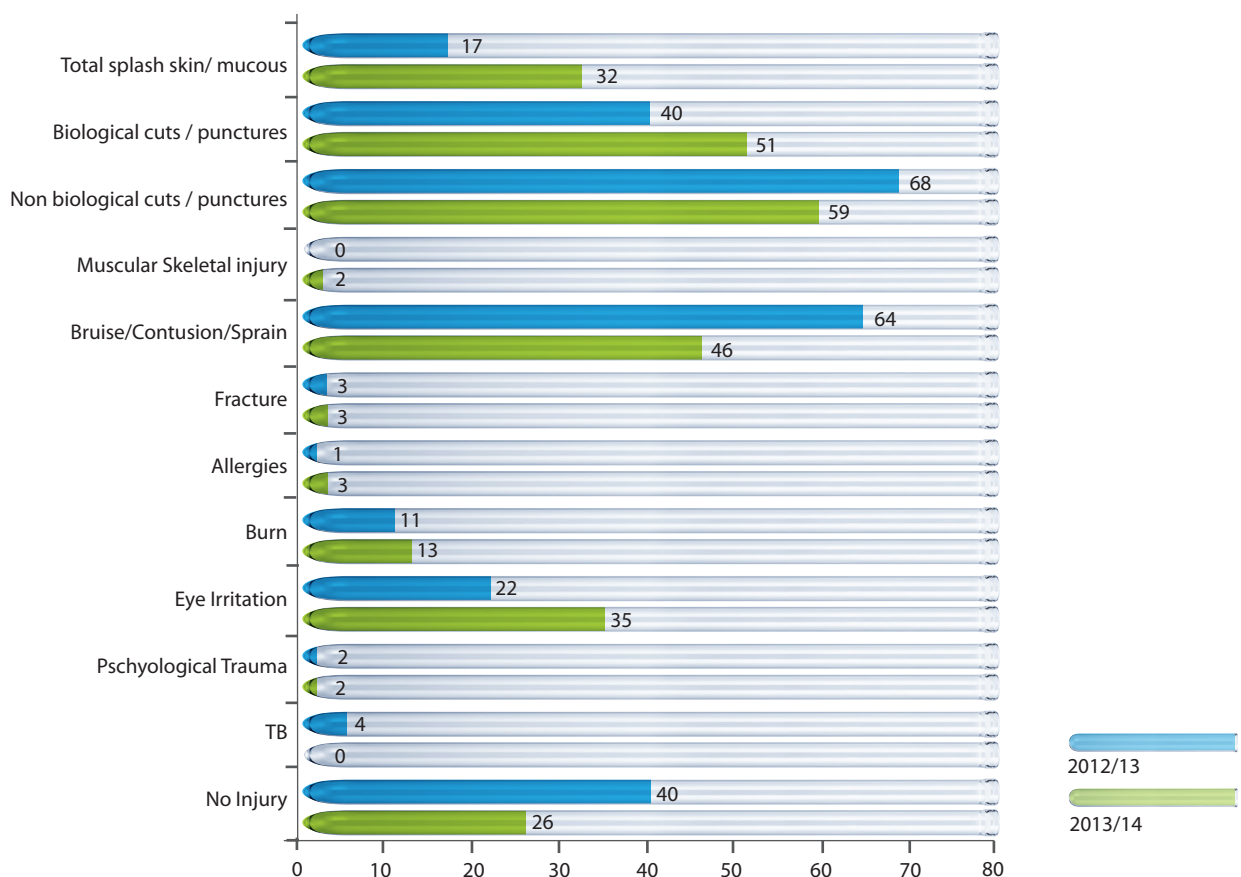
The roll out of the new version is planned, within the NHLS, in the new financial year.

The value of the OHASIS system is becoming recognised in South Africa beyond the NHLS, and interest in implementing it has also been expressed by other Provincial Health Departments.

The NHLS will continue to support the roll out of OHASIS in the Free State, at Universitas, Bongani and Pelonomi Hospitals, in partnership with the University of British Columbia (UBC).

A breakdown of the types and number of outcomes for the 272 incidents recorded into OHASIS in the year under review, compared to the 277 incidents recorded for the last financial year, are reflected below.

Table 1. Incidents recorded in OHASIS by outcome





*The Safety, Health and Environment (SHE) team. Back Row (L-R): Ms. T Chikoko, Sr. N Masiza, Sr M Magasa, Mr M Mulugisi, Sr M Naidoo. Front Row (L-R): Ms A Potgieter, Ms M Morgan (Deputy Manager), Mr D Jones (Manager), Ms N Mvakade and Ms N Mabuya. Not in photograph : Sr. P Letsoalo*

## Four Occupational Health Nurse Managers appointed.

### CONFERENCES AND TRAINING

#### Health and safety representative training

Online training of Health and Safety Representatives, coordinated by the SHE Officers, continued during the year under review. A concerted effort was made to ensure that all new Health and Safety Representatives in the NHLS who were appointed in April 2013 did the six-module online training course.

A total of 112 employees completed all six modules between June and November 2013. The new Health and Safety Representatives are participating in training on an ongoing basis after appointment.

#### Training and presentations

The SHE Department conducted a total of 49 training presentations within their respective areas. These ranged from Safety Orientation/Induction, Health Care Risk Waste, Occupational Health and Safety Information System (OHASIS), to Business Manager meeting presentations, Management Review meetings, Evacuation Drills, etc.

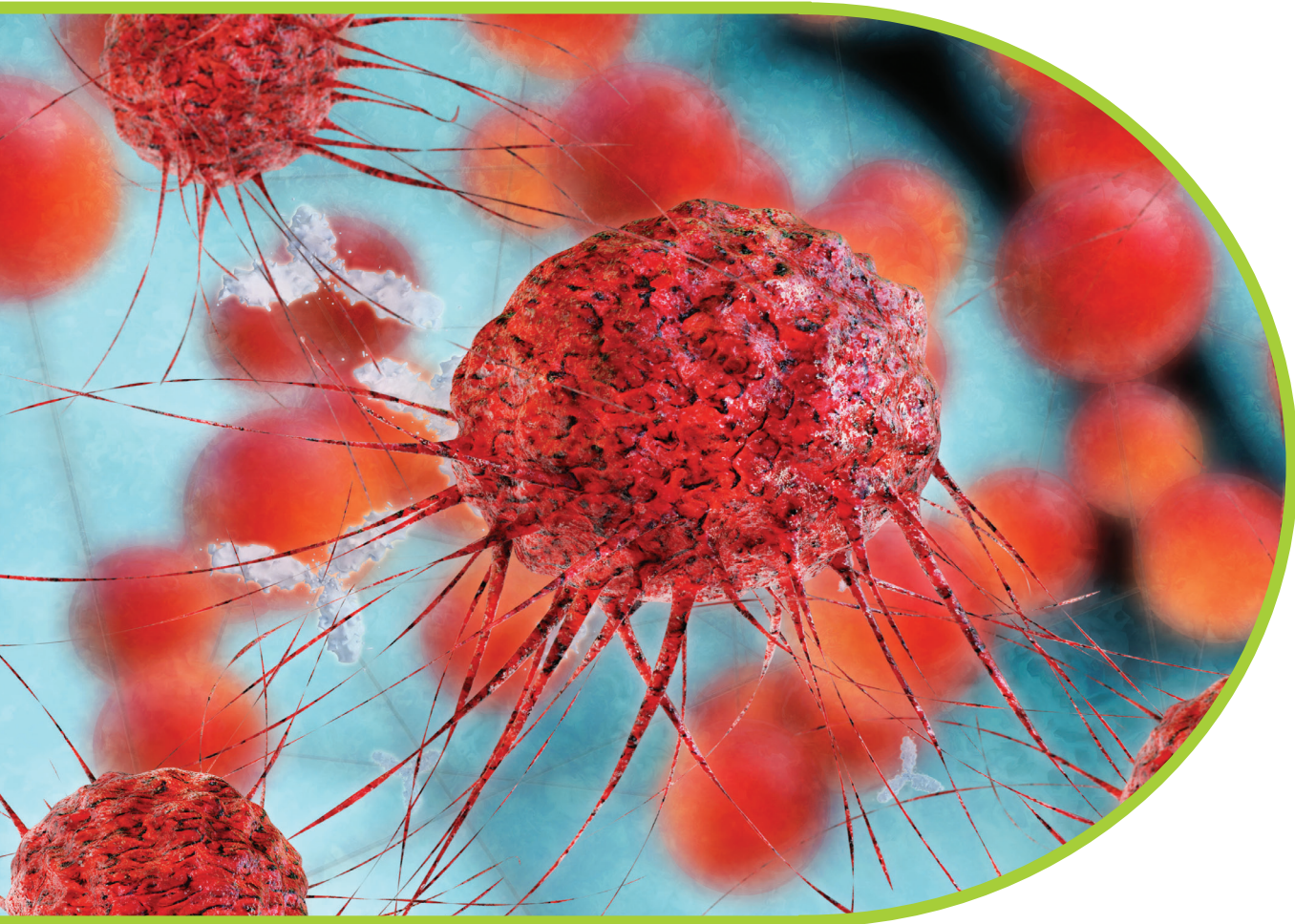
Grant funding was obtained from the Centre for Disease Control and Prevention (CDC) to run two Bio Safety and Bio Security training courses dedicated to NHLS employees. The African Centre for Integrated Laboratory Training (ACILT) ran a course in Umtata, which catered for the Eastern Cape employees, followed by another in Durban, which catered for KwaZulu-Natal employees.

Mr D Jones presented a poster on the implementation of OHASIS in the NHLS at the American Society for Tropical Medicine and Hygiene. Members in the Section attended various training courses, including: Strengthening Bio Safety and Bio Security; OHASIS User Training; and an Ethics Workshop.

Eight NHLS staff members received funding to attend the 56th American Biological Safety Association Conference (ABSA) Missouri, USA in October 2013. The 3-day Conference included state-of-the-art keynotes, papers and panels highlighting the best practices and hands-on skills crucial for bio safety and bio security professionals.



# HIV TB IN THE WORKPLACE UNIT



## INTRODUCTION

The HIV TB in the Workplace Unit is a nascent unit within the NIOH and is in its third year of operation. The unit is one of a few units of its kind within South Africa, which provide services, research, teaching and training for HIV and TB in the workplace. The unit continued to provide these services to government departments, trade unions and employer organisations. Although the unit started the year with only two filled positions out of five approved posts, the third quarter of the year saw the unit fill all five posts. These posts include the positions of the section head (Public Health Medicine Specialist), a Medical Officer, an Epidemiologist, a Public Health Practitioner and the Unit Secretary.



*Dr Muzimkhulu Zungu*  
Head



# The HIV TB in the Workplace Unit collaborated with SADC in the production of the “SADC Declaration on TB in the mines”

## SERVICES

### NHLS HIV TB workplace programme

The HIV TB in the Unit is managing the ongoing implementation of the NHLS HIV TB Workplace Programme and has successfully produced the HIV TB Workplace Programme Strategic Plan of the NHLS. The Unit delivers the NHLS HIV TB Workplace Programme through partnerships and collaboration with the International Labour Organization (ILO), as well as other units within the NIOH, trade unions and NHLS Management.

### TB in the mines

Mining in South Africa and the Southern African Development Community (SADC) is a critical contributor to the economy. The growth of the mining industry has seen the unintended consequence of Occupational Diseases, especially tuberculosis, within the industry, in labour sending and peri-mining communities. It is with this background that the Unit has collaborated with SADC in the production of the ‘SADC Declaration on TB in the mines’, and subsequently with the World Bank, World Health Organization (WHO), International Organization for Migration and other national and multinational agencies in the production of the Harmonized TB Treatment Guidelines for South Africa, Swaziland, Mozambique and Lesotho, which were signed by the Ministers of Health in the respective countries on the 25 March 2014 in Sandton. The Unit contributed to the TB Technical Working Group (TWG) of the National Department of Health in successfully bidding for the Global Fund Grant for the control of TB in South Africa; a mining industry led collaboration for the elimination of TB in the mines; the World Bank TB mapping study in the mines of West Rand District; and contribution to the World Bank economic benefit analysis and cost of TB control in the mines.

### Occupational health services in the public service

The HIV TB in the Workplace Unit through the National Department of Health, especially the Medical Bureau for Occupational Diseases (MBOD) and the Compensation Commissioner for Occupational Diseases (CCOD), provides ongoing clinical services and plays a leadership role in the provision of occupational health services, especially for miners and healthcare workers. The unit has also been instrumental in the conceptualisation, adoption, establishment and fund raising for the One Stop Service Delivery model for occupational health, vocational rehabilitation, surveillance and social protection for workers in South Africa. The unit is also heading several initiatives in the alignment of the delivery of occupational health within the provinces and between the provinces. The unit collaborated with Kalafong Hospital in the provision of occupational medicine services and epidemiological support.



*The HIV TB in the Workplace unit heads initiatives in the alignment of the delivery of occupational health within provinces.*



The Unit also provides technical support services to the Departments of Mineral Resources, Labour, Energy, Environmental Affairs and several provincial Departments of Health (DoH) Occupational Health Units.

### Collaboration and partnerships

The Unit continues to strengthen its relations with several key stakeholders such as:

1. The World Health Organization (WHO), on a project to introduce occupational health services within the Primary Health Care (PHC) Level, in line with both the National Health Insurance (NHI) and the Re-engineered PHC frameworks.
2. The World Bank and the SADC on the control of TB in the mines both in South Africa and the SADC region.
3. The International Labour Organisation (ILO), in the development of HIV TB workplace programmes.
4. The University of British Columbia (UBC), in strengthening occupational health services for healthcare workers in Gauteng and Free State Provinces.

### RESEARCH

The unit is involved in two research projects:

#### **An evaluation of risk of exposure to tuberculosis among healthcare workers in a regional hospital, South Africa, 2012-2017**

**Authors:** Dr M Zungu, Ms M Malotle, Dr T Singh, Dr K Kyaw

1. The study aims to evaluate TB Infection Control interventions, including the compensation for Occupational TB with focus on the following:
  - a) Baseline assessment of administrative, engineering and environmental infection control measures in place; implementing the intervention(s) including a TB surveillance system based on the findings from 1(a).
  - b) Repeat the baseline assessments 1(a) to evaluate the effectiveness of interventions.
2. The study aims to document the concentration of Mycobacterium Tuberculosis in the air in Kalafong Hospital.

#### **Incidence of TB disease among healthcare workers in two provinces in South Africa: A historical prospective cohort study**

**Authors:** Dr M Zungu, Ms M Malotle, Dr K Kyaw

This study will determine the incidence rate of TB disease among Health Care Workers (HCWs) in the Free State and Gauteng provinces from 2009-2012. Current estimates of disease burden among HCWs in high incidence regions are based on the results of occupational health record reviews (therefore missing all HCWs who are diagnosed/treated elsewhere) or have relied on self-reporting by the HCW of TB status.

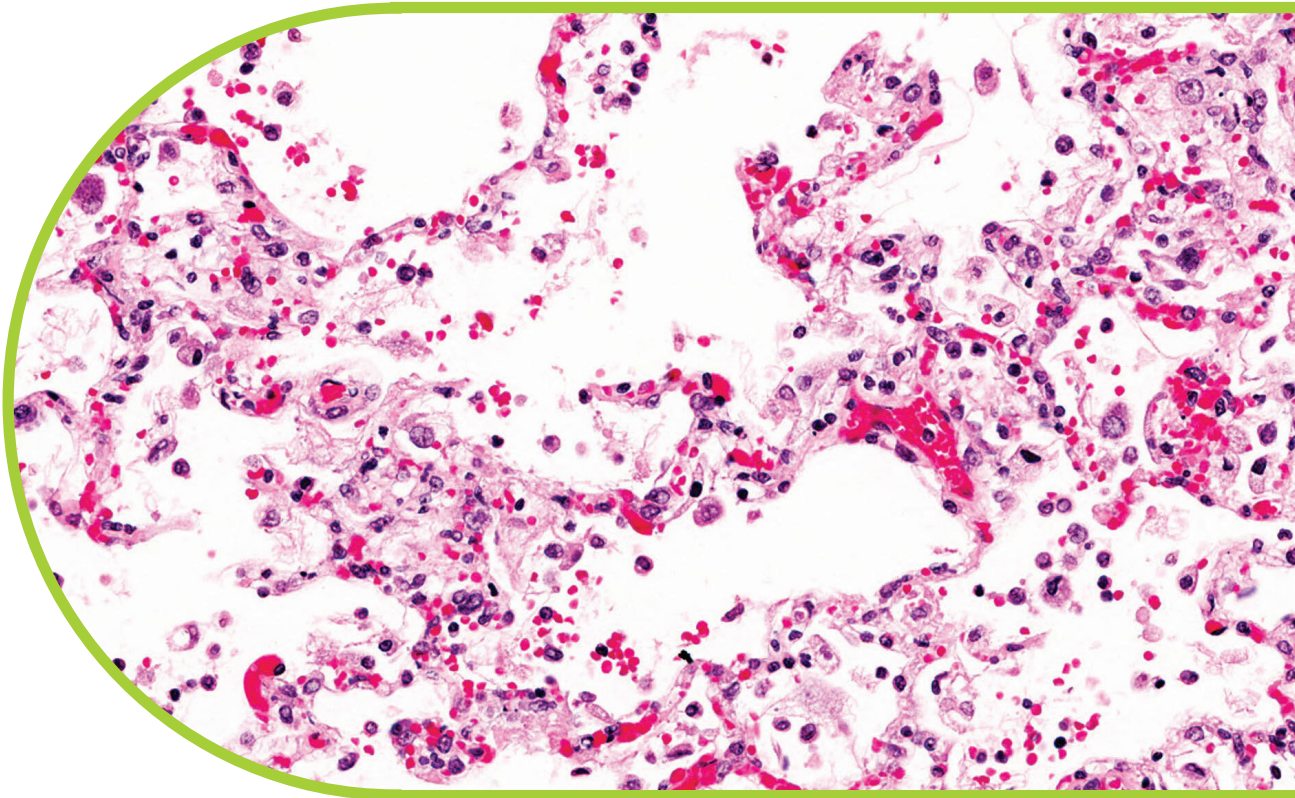
To the Unit's knowledge, this will be the first study in South Africa to link confirmed TB disease to healthcare human resource records. Methodologies, similar to those proposed in this study, have been used extensively around the world to determine the rate of health outcomes among a wide variety of occupational cohorts.

Incidence  
rate of TB  
disease  
among  
HCWs will  
be the first  
in SA to link  
confirmed  
TB  
disease to  
healthcare  
human  
resource  
records

Unit members participated and presented posters and oral presentations in the following conferences: 1) International Conference on Occupational Health (ICOH) in Brazil, 2) World Health Assembly: Geneva and 3) the Public Health Association of South Africa (PHASA) in Cape Town.

## TEACHING AND TRAINING

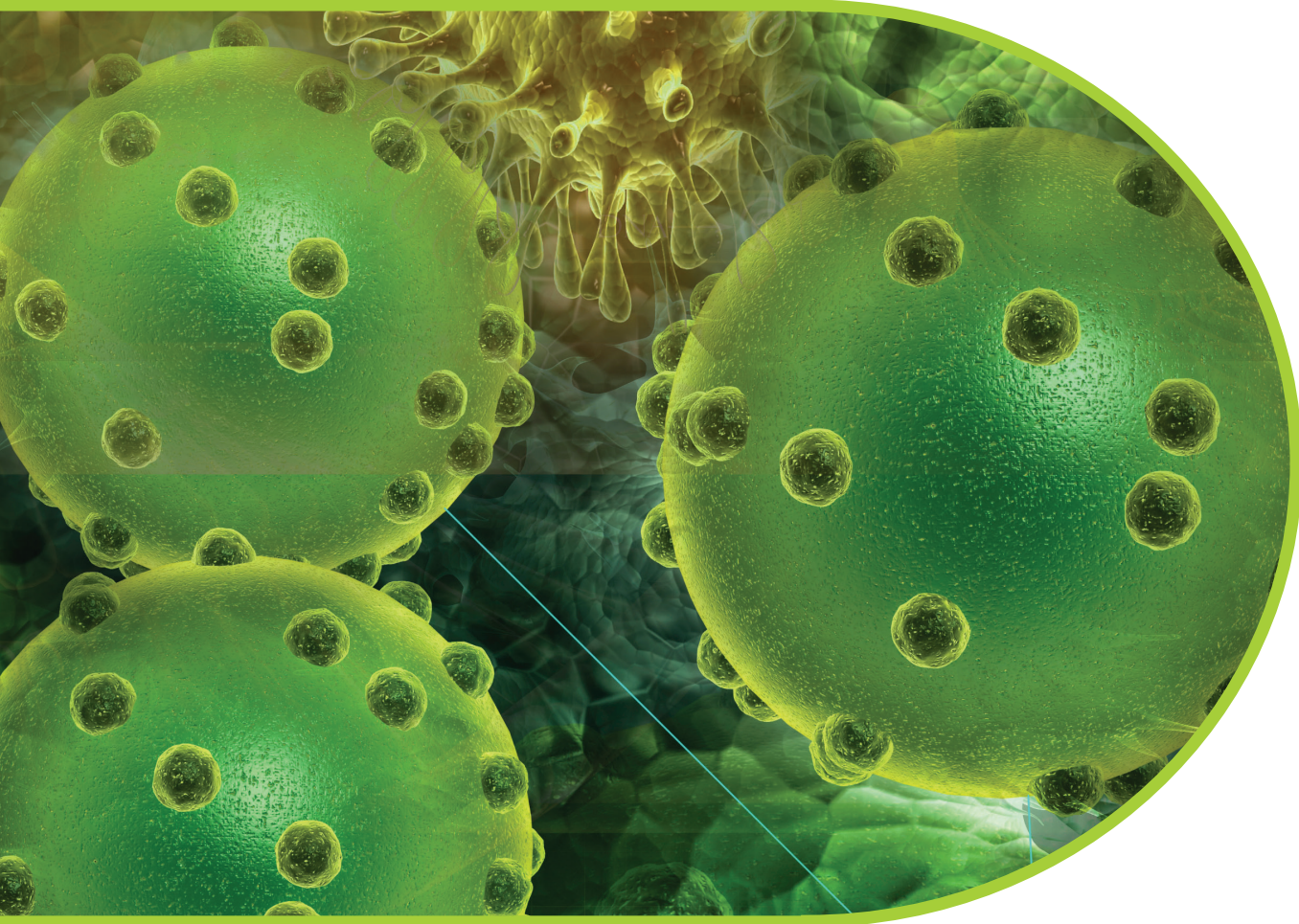
During the period under review, the unit successfully hosted Registrars in Public Health Medicine (PHM) from the University of Pretoria. The Unit is collaborating with the University of Pretoria in coordinating the Diploma in Occupational Medicine in the School of Health Systems and Public Health of the University of Pretoria. Staff members also provide teaching to undergraduate students and postgraduate students at the University of Pretoria and the University of the Witwatersrand, as well as several other public and private institutions. The unit participated in meetings of the College of Medicine South Africa (CMSA) to discuss the training of undergraduate medical students in public health.



The unit successfully hosted  
**Registrars in Public  
Health Medicine  
(PHM)** from the University  
of Pretoria



# EPIDEMIOLOGY AND SURVEILLANCE



*Shutterstock: Green bacterial intruder cells causing sickness*

## INTRODUCTION

The Epidemiology and Surveillance Section not only provides key support for many of the projects conducted at the NIOH, but also conducts research into occupational health topics of national importance. This section uses the skills acquired in Epidemiology and surveillance to design studies, surveys and questionnaires, train fieldworkers in the administration of the questionnaires, and data collection. It also provides training to health professionals in basic Epidemiology, and staff within the section mentor junior researchers. The section conducts both simple and complex data analysis and interpretation of results. The areas of expertise are study design, collaborative field surveys, teaching of Occupational Epidemiology and research on exposure and disease in the workplace.



*Dr Danuta Kielkowski*  
Head



The focus of the Section during the period under review involved data management, analysis and interpretation for various projects undertaken by the NIOH. The focus this year was more on collaborative support for the NIOH projects and government departments rather than independent research. This allowed the Section to work towards the mandate of support for strategic development and research into nationally important needs.

The Epidemiology and Surveillance Section holds key data analysis skills not found in the other sections that make up the NIOH, National Cancer Registry (NCR) and Cancer Epidemiology Research Group (CERG). Based on this, the Section provides support to all other NIOH sections where complex data analysis and interpretation is required and provides government support where required.

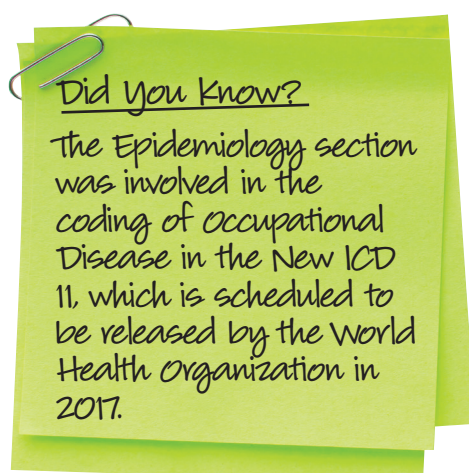
## DIAGNOSTIC SERVICES

The Section was involved in Cancer Tables' calculations, involving the analysis of Cancer Registry data to provide the public with official data tables for the years 2005 and 2006. The 2005 and 2006 tables have been released, and 2007 tables are due to be released shortly.

There has been involvement of the Section, through Dr Danuta Kielkowski, in the coding of Occupational Disease in the New ICD 11, which is scheduled to be released by the World Health Organization in 2017. These are new codes for Occupational Disease that take into account classification by hazardous exposures. The Section was involved in the Millennium Development Goals Country Report and attended many meetings to finalise indicators and data sources for the Report.

Support for the Medical Bureau for Occupational Diseases (MBOD) and the Compensation Commissioner for Occupational Disease (CCOD), in terms of data management and analysis, has been a key output of the Section for the year and involved data quality improvements, particularly around information required for planning and in analysis of data for presentations and workshops, for the purpose of enhancing the delivery of services by the MBOD and the CCOD. Analysis of claims data for the accurate calculation of liabilities of the fund were conducted and provided to the finance section of the CCOD. Presentations at workshops were also prepared by the section, as well as attendance in government meetings around service provision by the MBOD and CCOD.

**Key data analysis skills and support where complex data analysis and interpretation is required.**



## RESEARCH

### Health screening of workers in a smelter in Namibia

*C Nattey, K Wilson*

The section planned the study and conducted the data analysis of current and ex-workers at a smelter in Namibia. The main finding of the analysis was an association between arsenic exposure and a small reduction in lung function in current workers indicating a need to control arsenic exposure.

### OHASIS baseline survey

*K Wilson*

A survey of selected NHLS staff on the Occupational Health and Safety Information System (OHASIS) indicated that staff were aware of contact details for health and safety staff. Many in lower levels, with similar work exposures, required training on needle stick injury prevention and other aspects of health and safety. The staff were aware of the OHASIS, but many had not yet used the system. The OHASIS has since been implemented more widely and a repeat survey will be conducted in the early months of 2015 to assess if the system has resulted in improvements in health and safety among staff.

### Cancer research

*C Nattey*

Analysis of data for presentations made by Cancer Registry staff at congresses was conducted specifically on childhood cancer and adolescent cancers. The section also conducted literature reviews for research and management of the National Cancer Registry (NCR). Analyses of 2005/2006 NCR data were also completed by the section.

### Department of Public Service and Administration project

*C Nattey, K Wilson*

The Epidemiology Section conducted data analysis and interpretation for the Department of Public Service and Administration (DPSA). Data analysis was conducted on a data set collected by the Department on management and policy of all government departments in Occupational Health and Safety, and a comparison was made with the same survey conducted previously.

### TB services mapping on the West Rand

*C Nattey; K Wilson*

The mapping study of TB services in the West Rand District, in collaboration with the World Health Organization (WHO), was supported by the Epidemiology and Surveillance Section with questionnaire design, data collection, data capturing and analysis. Mapping of services was also conducted by the Section. The results showed that TB services were not always within easy reach of mining communities and mines did not, at the time of the survey, provide community services.

## TEACHING AND TRAINING

Teaching and training is an ongoing function of the Section, and teaching in 2013 consisted of a one week course in basic Epidemiology and statistics, provided with a few refresher sessions, to the students of the Diploma in Occupational Health course at the University of the Witwatersrand. The Section also set and marked the examinations.

In 2013, the Section also became involved in the South African Field Epidemiology Laboratory Training Programme (FELTP) course for Field Epidemiology students, initially providing a three day statistical analysis (STATA) course followed by supervision and consultations with the students on Biostatistics.

The section provided supervision of one Wits Masters in Public Health (MPH) student for her research project on respirator fit testing. Consultations on Biostatistics were provided to the School of Public Health students from the University of the Witwatersrand. Introductory lectures to Epidemiology were provided at both the Universities of Witwatersrand and Pretoria. A one day lecture on research methodology was provided to participants from the Democratic Nursing Organisation of South Africa (DENOSA).

Mrs K Wilson presented a talk on TB infection control at the Gauteng Department of Health (GDoH), Wellness and OHS meetings, and presented the work at the 1st Annual National Personal Protective Equipment (PPE) Summit held by the CSIR. Examples used included the noise induced hearing loss study conducted by the Occupational Medicine and Occupational Hygiene Departments at the NIOH.

Mrs K Wilson attended the 23rd International Conference on Epidemiology on Occupational Health where two posters were accepted for exhibition: 'Possible HIV Exposure: Laboratory Workers Knowledge, Attitudes and Behaviour' and 'Intervention Studies & Health Management: Workplace Occupational Health Information'. Mr V Ntlebi attended an ICOH conference in Brazil where he presented a poster on 'TB Surveillance and Control Measures in a large South African Hospital'. Mr Cornelius Nattey attended the biannual African Organisation for Research and Training in Cancer (AORTIC) conference in 2013, where he gave an oral presentation titled 'Lung Cancer and Occupation'.

## PROFESSIONAL DEVELOPMENT

Postgraduates enrolled: two (one PhD submitted for examination and one PhD enrolled, both at the University of the Witwatersrand).

**New codes for Occupational Disease** by hazardous exposures in the **New ICD 11**; scheduled to be released by the **World Health Organization** in **2017**.



# OCCUPATIONAL HYGIENE



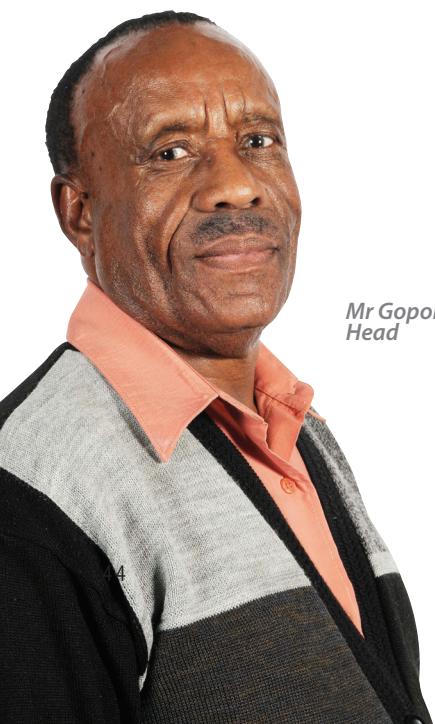
## INTRODUCTION

The Occupational Hygiene Section provides professional Occupational Hygiene services to National and Provincial government departments, industry, private clients as well as support for Occupational Health and Safety initiatives within the NIOH and the NHLS.

The Section has made a considerable investment in facilities, equipment and skills over the last few years and is now in a strong position to provide valuable input to the Occupational Hygiene needs of the SADC Region. The Section will be continuing with its efforts to provide Occupational Hygiene support in the form of training, advice, risk assessments and exposure monitoring to the National and Provincial Departments including Health, Labour and Minerals and Energy, National Defence and Environment.

## SERVICES

Occupational Hygiene risk assessments, audits, surveys and advisory services are provided to several organisations including the Namibian Government departments of Environment and Tourism, Transnet Freight Rail, SGS South Africa and NHLS laboratories. The services provided by the Section are aimed at providing recommendations, which will contribute to improved Occupational Health and Safety in all work places. Improved health and safety at work makes for possible higher productivity and creates a reduced occupational related morbidity burden on workers, families and communities. The Section conducted 25 Occupational Hygiene Surveys on various health stressors in a wide range of work places including smelters, laboratories, offices and plastic manufacturers.



*Mr Gopolang Sekobe  
Head*

The Section participates in two International Quality Control Schemes. These are the Respirable Crystalline Silica International Quality Assurance of the Health and Safety Laboratory (HSL) in the United Kingdom, as well as the Institute for Occupational Medicine's Africa Asbestos Proficiency Testing Scheme. The Section has managed to keep within the HSL (UK) standard range and maintained a "1" grading ("Good") for asbestos proficiency testing.

The X-ray Diffraction (XRD) / Fourier Transform Infrared Spectroscopy (FTIR) Laboratory functions within the Occupational Hygiene Section and is headed by Ms T Madzivhandila, under the supervision of Mr G Sekobe. Dust and solutions are analysed to determine workplace risk. Two posters were developed to further the research and service aims of the laboratory. Four presentations were made at international conferences about the work that has been done in the laboratory. Thirty five samples (five bulk samples from quarries and 30 filter samples from mines and factories) were analysed for Quartz using X-ray Diffraction (XRD). Twenty nano-gold particle samples were analysed using either FTIR or Attenuated Total Reflectance (ATR). A new X-Ray Fluorescence (XRF) instrument for the geochemical analysis of light and heavy elements is in the process of being acquired for the XRD/FTIR Laboratory, which will support the Section's field x-ray analytical capabilities.

## RESEARCH

### Nanoparticles

**Title: Occupational exposure assessment of metal oxide nanomaterials during their synthesis in research laboratories**

*M Mogane*

The ongoing study aims to assess tasks, which result in the emission of nanoparticles into the work environment. Occupational exposure to engineered metal oxides during synthesis will be evaluated, together with effectiveness of the control measures in place. During 2013, iron oxide nanoparticles were characterised from a Nanoparticle Synthesising Laboratory, and emission and exposure measurements were taken.

Acknowledgements: NRF for funding.

### Evaluating the effectiveness of respiratory protection programme at NHLS laboratories

**Title: A survey of South African facial characteristics and respirator fit test**

*Lead by J Manganyi*

The project is currently at an advanced stage, with 150 NHLS laboratories being tested and trained on respirator fit testing in 2013. The ongoing study aims to describe the proportion of NHLS respirator users with adequate quantitative respirator fit, investigate the influence of face size on respirator fit and evaluate the usefulness of the NIOSH respirator fit test panel for the South African worker. This research project will inform respirator importers, employers providing respirators, and employees wearing the respirators about the need to ensure a proper fit.

### Asbestos

**Title: Environmental exposure to asbestos along railway freight depots**

*Lead by G Mizan*

The study was conducted over a period of four months at 11 railway freight depots to assess the asbestos fibre concentrations in the air and the degree of asbestos contamination in these depots. The depots were utilised in past years for the transportation of this hazardous substance.

## TEACHING AND TRAINING

Undergraduate training support included the visit to the NIOH by 40 Environmental Health and BTech students from the University of Johannesburg. The students attended a short practical training course conducted by staff within the Section. Three BTech students from the University of Johannesburg spent a week at the NIOH for their experiential training learning to carry out risk assessments.

Post-graduate teaching and training activities included course management, student supervision and teaching, and practical support for the Masters in Public Health (MPH - Occupational Hygiene) degree from the University of the Witwatersrand. Support was also given to the University of Pretoria's School of Public Health, where a staff member acts as an external examiner for the mini-dissertations for the MPH students.

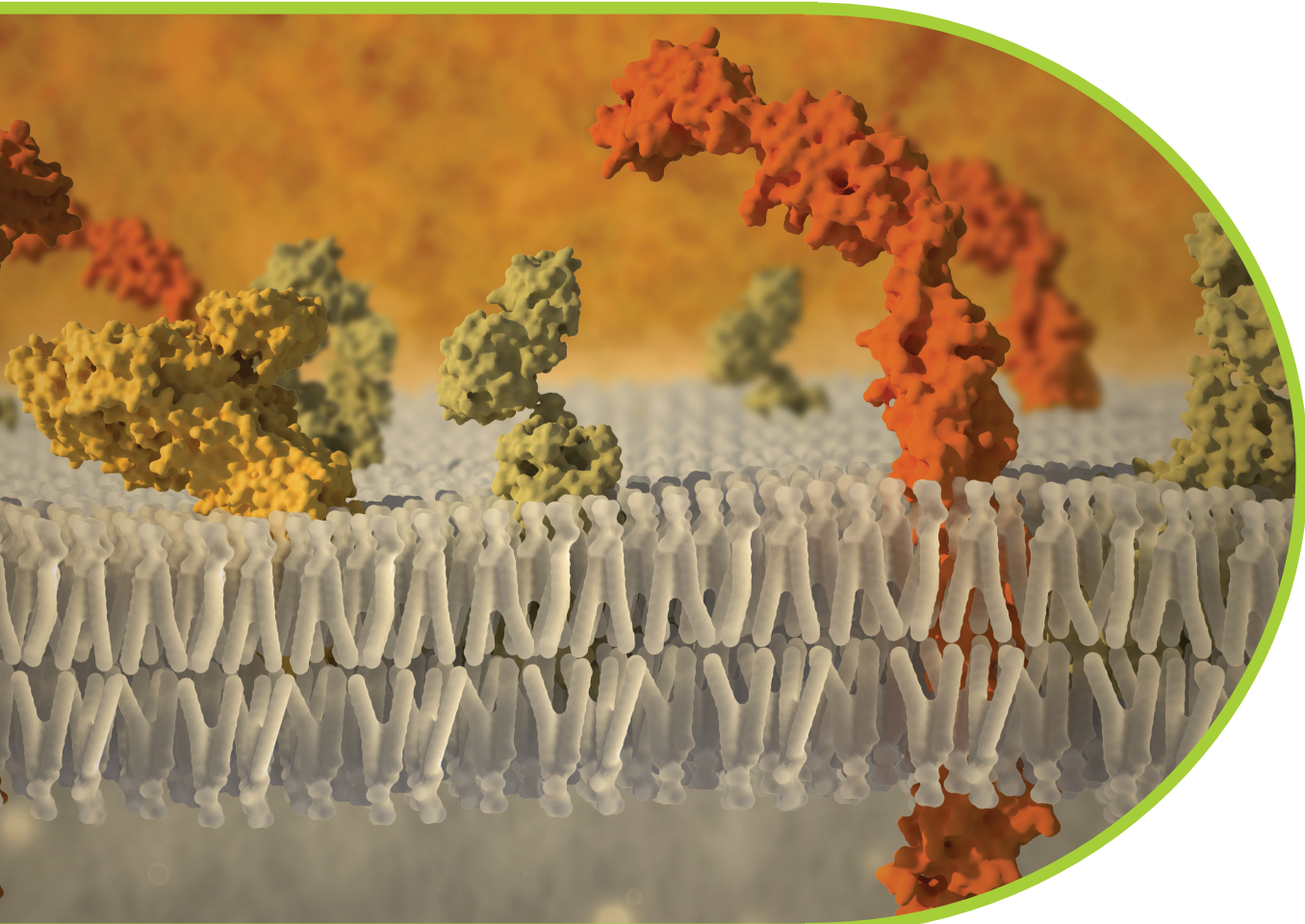
## PROFESSIONAL DEVELOPMENT

Postgraduates enrolled: five (three MSc at the University of Pretoria, one MPH at the University of the Witwatersrand and one BTech at the Central university of Technology).

Postgraduates completed: one (MPH - Occupational Hygiene at the University of the Witwatersrand) .



# ANALYTICAL SERVICES



*Shutterstock: Artistic impression of a plasma membrane of a human cell. The plasma membrane is a bilayer composed of phospholipids in which lots of transmembrane and surface proteins reside*

## INTRODUCTION

The Analytical Services Section continues to provide specialised laboratory tests, support to research, advisory services and training to support private industries, government departments and academic institutions in the occupational and environmental health. The Section has principally focused on the analysis of hazardous substances in environmental and biological media as a way of strengthening the assessment of workplace exposures in compliance with the regulations of Hazardous Chemical Substances.

In addition, the Section provided support for various research projects of national importance, rendered advice to the private and public sectors, and trained undergraduate and postgraduate students on biological monitoring techniques for chemical contaminants in the workplace. Through the attendance and provision of seminars, workshops and lectures, the Section has increased its capacity to respond to occupational health concerns. Furthermore, by admitting students for in-service training, internships and mentoring programmes, the Section continues to assist national institutions to prepare students for laboratory-focused careers.



*Dr Boitumelo Kgarebe*  
Head



## DIAGNOSTIC SERVICES

A total number of 11 588 tests (for diagnostic and research purposes) were completed during the reporting period; this is a little lower than the 12 294 tests completed in the previous financial year. The tests included assays on toxic metals, mainly for aluminium, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, uranium, vanadium, and zinc in blood, serum, urine, water and other environmental samples.

Organic assays requested on biological samples were mainly for o-cresol, dichloromethane, hexanedione, hydroxypyrene, mandelic acid, methanol, methylene diphenyl isocyanate methylhippuric acid, methyl ethyl ketone, phenol, toluene diamine isocyanates, organophosphate metabolites, toluene, benzene, trichloroacetic acid, and t, t-muconic acid. The decrease in the total number of tests performed was mainly due to staffing constraints.

## NEW DEVELOPMENTS

In line with increasing its scope of activities and client-driven requests, notwithstanding the various staffing challenges, the section developed and validated some new methods. Development and validation of new methods resulted in the completion of 3 096 tests for urinary arsenic; the ability to provide this type of analytical data will place the NIOH in an expertise niche area. The project, which is being completed in conjunction with the Occupational Medicine Division, is the initial part of a wider project that will perform the speciation of the element arsenic to enable full interpretation results of community exposure to arsenic. The ability to provide this type of analytical data will place the NIOH in an expertise niche area, which up to now remains untapped.

Furthermore, in a project led by Mr Xolani Masoka (NIOH-Toxicology), the existing NIOSH Method 7303 was modified and validated for the measurement of airborne gold nanoparticles on Membrane Cellulose Ester (MCE) filters using the recently commissioned ICP-MS instrument. Sixty samples were analysed using this method. The project, entitled 'Nanomaterials Exposure Case Study: Gold Nanoparticle Occupational Exposure Assessment in a Pilot Scale Facility', is the contribution made by the NIOH to a study on the responsible development of Nanotechnology in South Africa. The study is in line with the research thrust of the Department of Science and Technology, and the report produced will be of national and industrial importance.

## ACCREDITATION

The Metals and Organic Units maintained their ISO 15189 accreditation status. A total of 11 tests were accredited in the Metals Unit, and six tests in the Organic Unit. The Metals Unit tests include aluminium in serum; cadmium, lead, mercury, chromium, creatinine and arsenic in urine; as well as cadmium, lead, manganese and mercury in whole blood. The Organic Unit's accredited tests include mandelic acid, phenol, o-cresol, hexanedione, 1-hydroxypyrene and methylhippuric acid in urine.

Regular internal audits continue to be conducted throughout the year to maintain quality and competence in the laboratory.

**NIOH** has  
the ability  
to provide  
analytical  
data which is  
becoming an  
expert niche  
area.

In terms of benchmarking both quality and competence of the results and personnel, the section continued with its participation in the following External Quality Assurance (EQA) programmes:

1. New York State Department of Health for arsenic, cadmium, chromium, lead, manganese and mercury in blood and urine.
2. The German EQA programme for mandelic acid, nickel, phenol, o-cresol, hexanedione, 1-hydroxypyrene and methyl hippuric acid in urine and aluminium in serum.
3. The Thistle EQA programme for creatinine in urine.
4. The LAMP Program CDC-USA for cadmium, lead and mercury in blood.
5. The SABS-Water Check Scheme.

## RESEARCH PROJECTS

Mr P Poongavanum developed a method and analysed airborne gold nanoparticles on Membrane Cellulose Ester (MCE) filters for a research project from the Toxicology Section, on Gold Nanoparticle Occupational Exposure Assessment in a pilot facility. Mr P Poongavanum and Mr F Sethosa also developed an analytical method to analyse gold in cell lines. One hundred and eighty samples were analysed for an on-going PhD project in the Toxicology Section. The next step will be the validation and accreditation (ISO 15189) of this method, which will be applied for the routine testing for gold in human tissue (biopsies) for the biological monitoring for exposure to gold nanoparticles.

## TEACHING AND TRAINING

Dr B Kgarebe conducted a Laboratory Workshop for the Middle East Region on the Sampling, Analysis and Detection of Chemicals related to the Chemical Weapons Convention on behalf of the Organisation for the Prohibition of Chemical Weapons (OPCW), at the Ben Hayyan International Laboratories, in Aqaba, Jordan, from 27 October–7 November 2013.

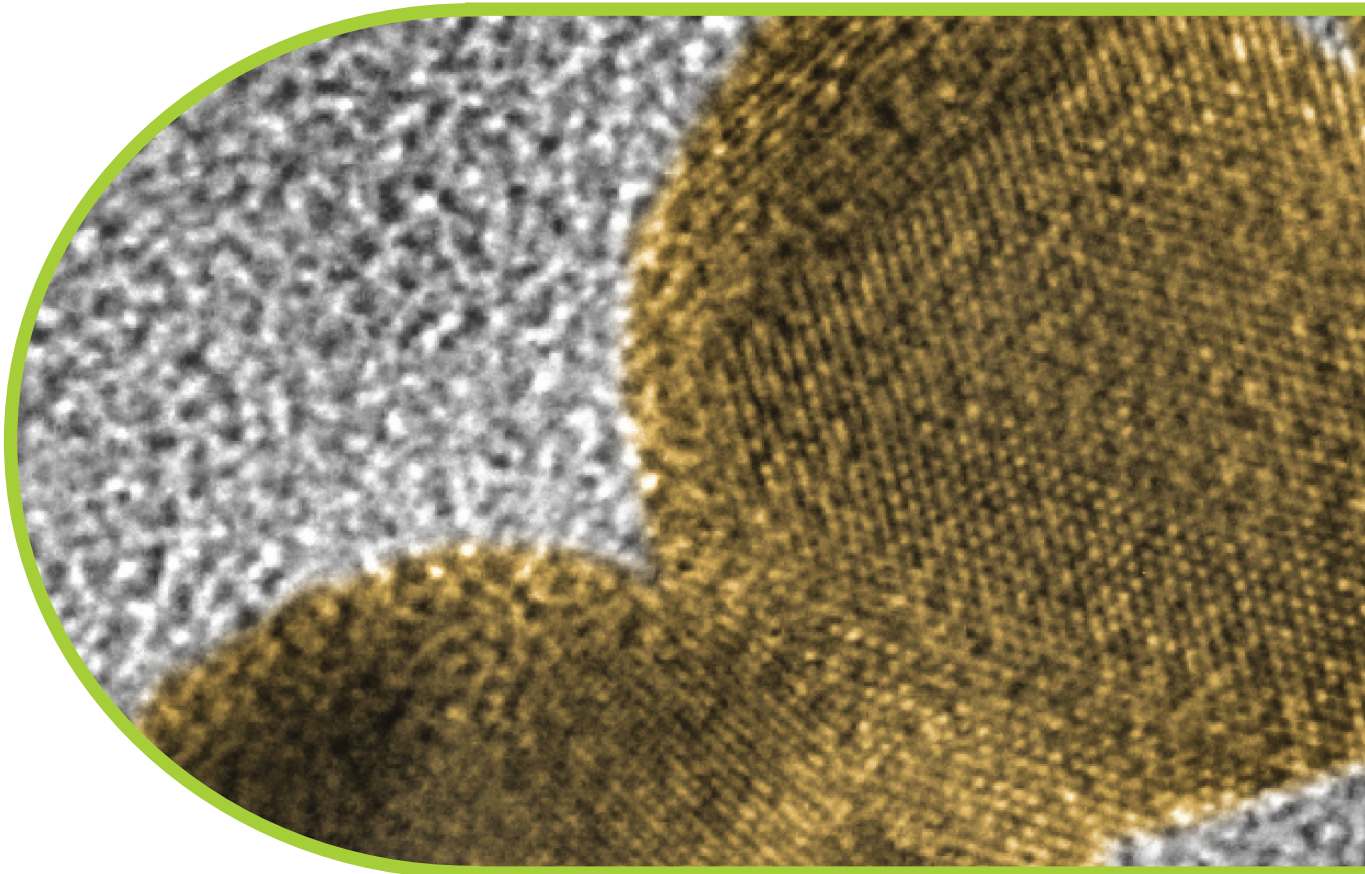
Dr Kgarebe has been appointed as co-supervisor for a PhD (Chemistry) student by the University of Johannesburg. Dr Kgarebe has also been appointed as co-supervisor for an MSc project in the Faculty of Science at University of the Witwatersrand.

## HONOURS

The Analytical Services section continues to serve as a Reference Laboratory for the German External Quality Assessment Scheme (G-EQUAS) due to continued good performance in the determination of 2,5-hexandione in urine.

Dr B Kgarebe was elected as a Fellow of the African Academy of Sciences (AAS).

11 tests  
were  
accredited  
in the  
Metals  
Unit, and  
six tests  
in the  
Organic  
Unit



Shutterstock: Nanoparticles of gold produced by laser ablation of a bulk Au target in water. One can see the atomic planes of Au.

## PROFESSIONAL DEVELOPMENT

Staff attended a training course on the newly commissioned ICP-MS instrument.

Staff attended a Course on Laboratory Systems (Based on ISO 15189:2012) given by the SANAS. Staff also attended the Advanced Statistical Method Validation for Test Laboratories Course.

The Section continued to host students on experiential training in Analytical Chemistry from the Vaal University of Technology and the University of Johannesburg.

Two scientists, who were undergoing a two-year internship in Clinical Chemistry (Analytical Chemistry) for registration as Medical Interns with the Health Professional Council of South Africa, have completed their training.



Two scientists completed a two-year internship in Clinical Chemistry for registration as Medical Interns.



# TOXICOLOGY DIVISION



## INTRODUCTION

In line with the NIOH's mission, the Toxicology Section is committed to promote research in collaboration with national and international scientific institutions, provide specialised services, contribute to capacity development by training and teaching Occupational Toxicology to undergraduate and post graduate students and also provide consultation to governmental departments and industries in Occupational Toxicology. The delivery of the aforementioned functions in the Section is achieved through the four specialised units namely, the Genotoxicity Unit, Health Risk Assessment (HRA) Unit, Nano and Micro Particle Toxicity Unit and Toxicogenomics Unit.

## SERVICE DELIVERY

The Section has conducted the risk assessment of a number of pesticides for registration purposes with the Department of Agriculture, Forestry and Fisheries (DAAF), as per the requirements of Act No. 36 of 1947.



*Prof Mary Gulumian*  
Head

## RESEARCH AND SPECIAL PROJECTS

Research projects conducted in the Toxicology Section include those investigating the toxicity of incidental and engineered nanoparticles, as well as projects conducting the risk assessment of toxic substances in the workplace including macro and micro particles, toxic metals and pesticides.

### Nanotoxicology

The Nanotechnology Strategic Plan within the NIOH was initiated in 2009 where the toxicity of incidental and engineered nanoparticles were investigated under a number of projects.

#### Current projects:

The current projects for post graduate work within which the toxicity of incidental nanoparticles are being investigated include gold, platinum, coal and diamond mine dusts as well as gold mine tailings dust.

#### ***In vitro* toxicity assessment of dust emissions from six South African gold mine tailings sites**

The aim of this project is to establish the hazardous nature of mine tailings particles collected as bulk-, ambient PM10- and respirable (personal) samples from 6 South African gold mine tailings storage facilities. The perception is that these wastes may be a major source of environmental pollution, putting surrounding communities at risk. Conducting this study will either confirm or disprove this premise. The project is funded by the Mine Health and Safety Council (MHSC) and is conducted by Miss C Andraos who is completing the work for her PhD under the supervision of Professor M Gulumian.

#### **Investigation into surface activity of airborne particles in the gold, platinum and coal mining environment phase 2**

The aim of this project is to report on physico-chemical properties and cellular toxicity and genotoxicity of bulk and respirable dust samples from various occupational working environments from gold, diamond, platinum and coal mines. The ultimate aim hereof is to produce recommendations on the importance of the physico-chemical properties of dusts when establishing a more relevant dose response relationship of exposure in producing their pathological effects. The project is funded by the MHSC, and is conducted by Mr X Masoka under the supervision of Professor M Gulumian.

The current projects within which the toxicity of the number of engineered nanoparticles is being investigated include:

#### ***In vitro* assessment of the toxicity of gold nanoparticles**

The aim of this project is to confirm the suitability of OECD tests to assess toxicity of citrate stabilised and functionalised gold nanoparticles on BEAS-2B and also their genotoxicity on CHO (Chinese Hamster Ovary) cells as a requirement in the hazard assessment of gold nanoparticles through the measurement of various endpoints and via elucidation of mechanisms of toxicity and genotoxicity. Within this project, the inter-laboratory study on non-fluorescent Colony Forming Efficiency (CFE) assay to estimate the maximal tolerated concentration of nanomaterials in cultured cells is conducted in collaboration with a number of OECD member countries. The project is funded by the Department of Science and Technology (DST) and is conducted by Miss M Vetten under the supervision of Professor M Gulumian.

#### **An *in vitro* study investigating the effects of functional groups on the toxicity of gold nanoparticles**

The aim of this study is to investigate the effects of functional groups on toxicity using HEK 293 kidney cells and HEPG2 liver cells to ascertain the role of functional groups and surface moieties as key players in the different cytotoxic mechanisms. The project is funded by the DST and is conducted by Miss N Tlotleng under the supervision of Prof M Gulumian.

### Did You Know?

The Toxicology Section comprises four units, namely, the Genotoxicity Unit, Health Risk Assessment (HRA) Unit, Nano and Micro Particle Toxicity Unit and Toxicogenomics Unit.

### **The Biodegradation/Biodurability of Gold nanoparticles and their Surface Ligands in Biological and Environmental Fluids**

The aim is to investigate the biodurability of gold nanoparticles and their ligands in lung lining, digestive tract and other biological as well as environmental simulated fluids mimic phagolysosomal, lung epithelial lining, artificial lung lining gastrointestinal (gastric and intestine), synovial, saliva, sweat and human blood plasma simulant fluids in vitro, using the following techniques: Ultraviolet-Visible Absorption, Transmission Electron Microscopy, Dynamic Light Scattering, Fourier Transform Infra-Red, Raman Spectroscopy, Inductively Coupled Plasma Mass Spectrometry, Time-of-Flight Secondary Ion Mass Spectrometry, Proton Nuclear Magnetic Resonance, Carbon 13 Nuclear Magnetic Resonance and X-Ray Photoelectron Spectroscopy. The project is funded by the DST and is conducted by Miss K Potgieter for her PhD under the supervision of Professor M Gulumian.

Three additional projects, funded by the DST, within which the toxicity of number of engineered nanoparticles is being investigated include:

### **Interference of gold and silver nanoparticles in conventionally used toxicity and genotoxicity tests**

The aim of this project is to assess the interference of nanoparticles tested in the assay systems conventionally used in the toxicity testing of chemicals.

### **Association between metallothionein single nucleotide polymorphism and gold nanoparticle toxicity**

*Principal Investigator: P Matatiele*

The aim is to investigate the role of metallothionein SNP on the toxicity of gold nanoparticles.

### **Assess the ability of different types of nanoparticles to generate free radicals in the absence and presence of cells**

The aim of this project is to determine the ability of different nanoparticles to generate free radicals without using dyes or chemicals which may interfere with nanoparticles with the aid of Electron spin resonance.

Finally, two collaborative projects with international collaborators to assess the toxicity and the ability to affect the reproductive function were initiated.

### **Nanosolutions**

The overarching aim of the NANOSOLUTIONS project is to provide a means to develop a safety classification of ENM based on an understanding of their interactions with living organisms at the molecular, cellular and organism levels. This will permit the crucial transition from descriptive toxicology to predictive toxicology. The particles tested will include TiO<sub>2</sub>, CuO, Ag, MWCNT, CdTe, Au spherical, Au rod-shaped and Nanodiamonds. The project is funded by the EU FP7 and is conducted by Mr K Boodhia under the supervision of Professor Gulumian.

### **Effect of gold nanoparticles on reproductive function**

The aim of this project is to:

1. Determine the tissue/organ distribution of gold nanoparticles (Au NP) in a pregnant mouse model following oropharyngeal aspiration (OPA) exposure.
2. Examine the effects of exposure to AuNP on reproductive function and obstetric outcomes.
3. Train/mentor a student at the New York University (Environmental Medicine) for 3 months from the Toxicology Section on new methods for exposing pregnant mice to AuNP by both OPA and inhalation routes and in reproductive/developmental toxicological methodologies.
4. Transfer knowledge to South Africa. The project is conducted in collaboration with the New York University School of Medicine.

### **Completed projects**

Two projects on nanoparticles were completed during the current reporting period:

### **Characterisation of Manganese dioxide (MnO<sub>2</sub>) dust particles collected from a ferromanganese smelter and in vitro cytotoxicity and genotoxicity studies**

The aim of this project was to characterise the MnO<sub>2</sub> dust collected from a ferromanganese smelter works, determine their cellular uptake, cell viability, genotoxic effects and the effect of treatments on NF-κB p65 and Nrf-2 translocation to the nucleus. Miss L Koekemoer has completed her MSc with distinction under the supervision of Prof M Gulumian.

### **Assessing the potential toxicity of gold nanoparticle carrier systems conjugated with therapeutic peptides**

The aim of this project to assess the toxicity of 14 nm AuNPs used as intracellular carriers of therapeutic and targeting peptides. These peptides have included the proapoptotic peptide (klaklak)<sub>2</sub>, the targeting Glucose-Regulated Protein 78 (GRP-78) binding peptide and the carrier Trans-Activating Transcriptional (TAT) cell penetrating peptide (CPP), which were conjugated to the AuNPs via poly(ethylene glycol) (PEG) polymers. Investigation was conducted of the toxic effects of these peptides when conjugated to AuNPs, on U937 monocyte-derived macrophages. Mr K Boodhia has completed his MSc with distinction under the supervision of Prof M Gulumian.



**Assessment of DNA Methylation in a group of Silicosis, Lupus and Scleroderma patients**

The aim of this study was to determine global and gene-specific DNA methylation in lupus and scleroderma, with the purpose of identifying “overlap” genes. The project is conducted by Dr P Matatiele under the supervision of Prof M Gulumian. A manuscript has been prepared for publication.

**RISK ASSESSMENT**

Risk, a scientific analysis and characterisation of adverse effects of environmental and occupational hazards, is a product of hazard and exposure. Hazard is the inherent capacity of a substance or a mixture to cause adverse effects in humans or the environment under the condition of exposure. There are three projects under this research area:

**Exposure assessment to nanoparticles in research laboratories**

As part of the risk assessment process of nanoparticles, it is essential to determine exposure during synthesis. As such, a study was initiated to assess the levels in the work environment at different laboratories. The project is being conducted by Mr X Masoka under the supervision of Prof M Gulumian.

**Risk assessment of nanoparticles**

This project was initiated, in collaboration with Washington University, to derive predictive models to aid in the risk assessment of gold nanoparticles.

**Health risk assessment of lead exposure to children in Blantyre, Malawi**

The aim of the study is to determine if children in Blantyre are exposed to hazardous levels of lead. In the United States, the risk assessment of lead is performed using the Environmental Protection Agency's Integrated Exposure Uptake Biokinetic (IEUBK) model. The model predicts the risk (probability) that a typical or hypothetical child exposed to specified media lead concentrations will have a blood lead level  $\geq 10 \mu\text{g/dL}$  (the blood lead level of concern). The model has been used in many countries, but not as yet in Africa. In this risk assessment, the applicability of the IEUBK model in an African setting such as Malawi will be investigated. The project is conducted by Mr W Utembe for his PhD under the supervision of Prof M Gulumian.

**TEACHING AND TRAINING**

The Section trains and supervises postgraduate students for Masters and PhD degrees. In addition, it has also contributed to the training of students organised by the Department of Science and Technology (DST) on nanotechnologies, held at the University of the Western Cape from 24–29 November 2013. The school has focused on training emerging Masters, PhD and experienced scientists on Nanotechnology.

**HONOURS**

The Section has received major funding from the Department of Science and Technology (DST) to establish the Nano Health and Safety Platform in South Africa, from EU FP7 on collaborative work on Nanotoxicology, and from the Mine Health and Safety Council (MHSC) on collaborative work on the toxicity of mine tailings dust. The Section has been successfully accepted, for the first time from South Africa, for document development for ISO on Nanotechnologies.

The Section has successfully participated in the development of a test system in the assessment of the toxicity of nanoparticles in participation with a number of other OECD countries and has signed a number of memoranda of understanding with other universities to conduct collaborative work on Nanotoxicology and Risk Assessment.

Prof M Gulumian has been invited by the World Health Organization (WHO) to join the Committee on the development of WHO/NANO Guidelines for Nanomaterials in the work environment.

Ms L Koekemoer and Mr K Boodhia have completed their MScs with distinction.

**PROFESSIONAL DEVELOPMENT**

Postgraduates enrolled: Eight (Three MSc, Five PhD at the University of the Witwatersrand)

Postgraduates completed: Two (MSc at the University of Witwatersrand)

# INFORMATION SERVICES



## INTRODUCTION

The Information Services Section encompasses South Africa's national reference library for Occupational Health (NIOH AJ Orenstein Memorial Library); a query handling service providing technical and scientific information on Occupational Health to practitioners throughout South Africa, Southern Africa and internationally; an archive which is being developed and aimed at fully documenting and preserving the character and the identity of the organisation and providing evidence of the historical development and changes of the organisation over time; the National Institute for Communicable Diseases (NICD) library located in Sandringham which largely serves the information needs of the NICD community; as well as the NHLS library, formerly known as the SAIMR library, situated in Braamfontein and serving the needs of all the NHLS staff including those located in laboratories and the eight medical schools throughout South Africa.

## SERVICES

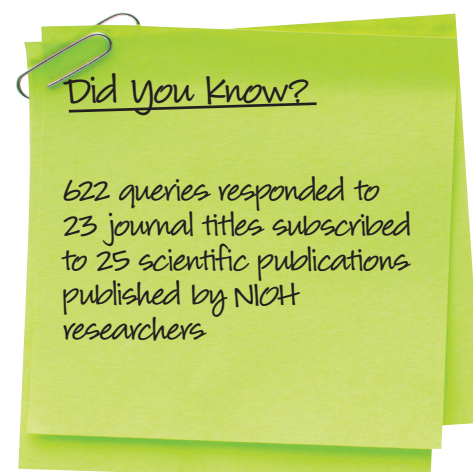
In support of the organisation's training, teaching and research functions, the Information Services section supplied a wide variety of information resources during the year under review. These included electronic databases, scientific periodicals and monographs, both in print and electronic formats. The NIOH library, dealing exclusively with Occupational Health topics and being the only specialist Occupational Health reference library in South Africa, continued in its principal function of searching, retrieving and disseminating information in support of Occupational Health services throughout South Africa and the SADC region.



*Ms Angel Mzoneli*  
Head

Skills to source information in Occupational Health were shared with Occupational Health professionals, university students, workers, management, health and safety representatives as well as labour union officials.

The section used the query handling service to respond to queries received for technical and scientific information on occupational health issues. These queries came through the 'info mailbox', which is linked to the organisation's website, and were captured on the query ticket system. These queries mainly dealt with requests for information, training and guidance on Occupational Health topics such as asbestos; on training interventions offered by the institute; information on autopsy services offered by the NIOH to ex-miners and information held by the Medical Bureau for Occupational Diseases and outcomes on applications for compensation of 2nd degree benefit examinations; information on occupational health studies offered by the NIOH and assistance from university students with research guidelines. These queries came from university students, government departments, private industries, construction and mining companies, Occupational Health practitioners, doctors, academic institutions, etc. Queries that were responded to came from all nine provinces, as well as other countries such as Zimbabwe, Mozambique, Botswana, Nigeria, India, USA, China, Congo, Australia and many more that were not indicated by the requestors. This reiterates the national and international role played by the information service section. Combined, the NIOH library and the query handling service responded and supplied information to a total of 622 queries during the reporting year.



In terms of collection development and expanding collections in libraries, a total of 23 journal titles were subscribed to, of which nine of them dealt with Occupational Health topics. In support of research activities, the libraries also added 30 open access electronic resources / databases to the library collection, which researchers could access through the library page on the intranet. The information services continued to provide researchers with relevant literature required to conduct and complete their research projects. A total of 25 scientific publications published by NIOH researchers were uploaded on the website. The information services section also disseminated 19 publication summaries from the research output to various regional Occupational Health Coordinators and other Occupational Health Practitioners in South Africa.

To commemorate world health events, the libraries held displays and exhibitions to create awareness of various themes. Various library resources were made available in support of those themes. The libraries also organised an event in celebration of Open Access Week, which was aimed at maximising the organisation's research investments, increasing the exposure and use of published research, facilitating the ability to conduct research across available literature and enhancing the overall advancement of scholarships.

The Section also celebrated Human Rights Day, with a strong emphasis on the promotion of access to information (PAIA). This underlines the importance of access to information for an open, democratic and transparent organization, and ensures that the Section is able to respond to requests for information and assist right holders (requestors) to exercise their rights accordingly.

## TEACHING AND TRAINING

The Section hosted six students from the Durban University of Technology (DUT) for an internship programme, including an experiential learning programme. The libraries provided training to new employees and interns on information search tools such as the use of TDNet, a portal for electronic journals and Zotero, a citation builder tool. Internal staff members from various sections were trained on the query ticket system, which includes capturing and responding to queries. The Section also provided library orientation sessions to Occupational Health Nurses, Registrars, officials from provincial government departments, health practitioners, university students, as well as international visitors.

## PROFESSIONAL DEVELOPMENT

The staff of the information section attended and participated in the 51st training meeting of the ILO CIS Network in Turin, Italy. The objective of the training meeting was to review and modernize the terms and conditions governing the participation of agencies, institutions and organisations in the CIS network of National and Collaborating Centres as a means to improve its functioning and ensure further development in the dissemination of Occupational Health and Safety information. The staff of the section also attended various training courses to enhance their skills in sourcing information and carrying out their work responsibilities.



# GRAPHICS, MARKETING AND COMMUNICATION



## INTRODUCTION

The Graphics, Marketing and Communication Section provides a support function to the NIOH, the National Cancer Registry (NCR) and the NHLS. In addition, the section also assists the Medical Bureau for Occupational Diseases (MBOD) with marketing and graphics design. Its primary objectives are the promotion of Occupational Health and Safety, and the development of human resources and networks in the SADC region through international training and outreach programmes. Besides coordinating NIOH and visitor programmes, the section also provides an event management, marketing, communications, public relations and graphic design service internally and externally, locally and internationally. Additionally, the Section manages and coordinates the NIOH programme for continuing professional development (CPD) through the Health Professions Council of South Africa (HPCSA) and provides support to the NIOH Occupational Health and Safety (OHS) Training Unit.



*Ms Shanaz Hampson*  
Manager

## SERVICES

During the reporting period, the Section staff contributed to the management, content creation and design of the websites of the National Institute for Occupational Health, the South African Vaccine Producers (SAVP), the National Cancer Registry (NCR), the NHLS Biobanking and the National Health Laboratory Service (NHLS), as well as the NHLS intranet. The SAVP website was redesigned and developed in order to align itself with the corporate identity of the NHLS and was re-launched in April 2013. Ms S Hampson assisted the developers with content sourcing and managed the front-end design specifications as well as all the technical specifications and design elements for the site. The NCR website domain registration was activated and the content pages, currently housed on the NIOH website, were redesigned in terms of hierarchy of content and graphic layout and linked to this domain. The Section ensured consistency of layout and design, in alignment with the corporate identity of the NHLS, and the website was launched to key stakeholders as a robust information dissemination portal.

The Section staff, who are members of the NHLS Communications Forum, attended meetings, brought together communications representatives from the NHLS, NIOH and NICD in order to develop and implement a common integrated marketing communications strategy across the NHLS. The aim of these meetings is to share experiences and knowledge, and ensure that the integrated marketing communications methodologies and strategies employed align with the overall corporate strategies of the NHLS. During the period under review, staff of the section also attended the NHLS communications strategy planning meeting in an attempt to consolidate the roles and responsibilities of the communications team and to plan the strategic approach required to meet the organisation's strategic and operational goals. In addition, Section staff hold membership with the Public Relations Institute for South Africa (PRISA).

Assistance was also offered to the MBOD, CCOD and NIOH Pathology Division for outreach activities, including the National Union of Mineworkers (NUM) compensation awareness campaign. This campaign was aimed at educating union members, and their dependents, on the various benefits that they are entitled to in case of injuries and diseases on duty, including possible termination of service. The campaign took place during the third quarter at the AGA Vaal Reefs in the Matlosana region. The decision was made following consultation with AngloGold Ashanti and the regional and branch leadership of NUM.

During the period under review, Section staff also assisted with poster design and preparation, as well as the provision of marketing materials to NIOH staff attending both local and international conferences. These included the 9th International African Organisation for Research and Training in Cancer (AORTIC) Congress in Durban; International Commission for Occupational Health (ICOH) Congress in Brazil; The Public Health Association of South Africa (PHASA) in collaboration with the African Federation of Public Health Association Congress in Cape Town; 6th International Symposium on Nanotechnology – Occupational & Environmental Health in Nagoya, Japan; and the International Conference on Childhood Cancers in Argentina.

**NIOH attended the NHLS communications strategy planning meeting in an attempt to consolidate the roles and responsibilities of the communications team and to plan the strategic approach required to meet the organisation's strategic and operational goals.**



## MARKETING AND STAKEHOLDER RELATIONS

Stakeholder engagement provides opportunities to further align business practices with societal needs and expectations, helping to drive long-term sustainability and value. This engagement is intended to help public and Occupational Health practitioners and specialists fully realise the benefits of stakeholder engagement in their organisation, to compete in an increasingly complex and ever-changing business environment, while at the same time bringing about systemic change towards sustainable development.

During the second quarter, the Graphics, Marketing and Communication Section, together with the HIV/TB Unit, assisted with the coordination of the Health Impacts of Climate Change Gauteng roundtable meeting. Ms S Hampson provided logistic and administration support to GroundWork, who managed this initiative. GroundWork is a non-profit environmental justice service and developmental organisation, working primarily in South Africa but increasingly in Southern Africa. It seeks to improve the quality of life of vulnerable people through assisting civil society to have a greater impact on environmental governance. GroundWork places particular emphasis on assisting vulnerable and previously disadvantaged people who are most affected by environmental injustice.

Following on the first Global Climate and Health Summit that GroundWork co-hosted during COP 11 (Conferences of the Parties) in Durban, which brought together over 200 participants from more than 30 countries and concluded with the adoption of the Durban Declaration on Climate and Health and the Health Sector Call to Action, the aim was to follow on with a series of provincial roundtables. The first roundtable was planned for the 2nd quarter in 2013 in Gauteng.

The stakeholders that engaged in this roundtable included the Public Health Association of South Africa, as well as associated special interest groups including Occupational Health, Public Health Registrars, Public Health Medicine Specialists and Masters students in Public Health; Schools of Public Health in Gauteng and the Free State; Nursing Associations of South Africa (DENOSA, etc.); The Colleges of Medicine of South Africa (CMSA) and the College of Physicians of South Africa.



*Members of the SEWA team on a tour of Tolstoy farm, May 2013. The team visited NIOH for a study tour and collaborative discussions on the informal economy.*

Staff in the section, with support from the OHS Training Unit, were responsible for coordinating and providing the logistic arrangements for visits by key stakeholders, which aimed to re-establish links and initiate new collaborative endeavours. During the reporting year, meetings were held with representatives from the Medical Bureau for Occupational Diseases (MBOD); the Department of Labour and the Compensation Commissioner; provincial Occupational Health Coordinators; the Chamber of Mines; the International Cooperation Branch of the Organisation for the Prohibition of Chemical Weapons (OPCW-The Hague, Netherlands); NIOSH-CDC (USA); the International Atomic Energy Agency (IAEA); the World Health Organization (WHO); the International Labour Organization (ILO); the Mine Health and Safety Council (MHSC); the American Society for Tropical Medicine; Women in Informal Employment, Globalising and Harmonising (WIEGO); Self-employed Women's Association (SEWA); the Asia Monitor Resource Centre (AMRC); senior officials from the Namibian Ministry of Environment and Tourism as well as the Namibian Ministries of Labour, Health and Mines.





*Visit by Namibian Minister of Environment & Tourism & senior officials from the Ministries of Labour, Health, and Mines to South Africa in July 2013. The members of the delegation are pictured above with Analytical Services staff during their tour of NIOH.*

The Section, in collaboration with the OHS Training Unit, also coordinated visitor programmes for Occupational Health nursing students from the University of the Witwatersrand and Tshwane University of Technology; eight senior representatives from SEWA in Ahmedabad, India; Mr Khalid Mahmood, Director of the Labour Education Foundation in Lahore, Pakistan; 15 members of the WHO Guideline Development Group on Nanoparticles; eight officials from the Ministry of Health in Namibia and six Occupational Health specialists from international universities/industry.

Special presentation sessions were given to NIOH staff, during the period under review, by visiting academics on a variety of topics including: 'Method Development and Determination of Organic and Inorganic Molecules in Bio-environmental Matrices using Chromatography / mass spectrometry and ICP-OES' – Dr Masgati (University of Johannesburg); 'Occupational Exposures to Respirable Crystalline Silica in Hydraulic Fracturing: Risks and Controls' – Dr Esswein (NIOSH-CDC, USA); 'The Chemical Weapons Convention and Chemical Exposures' – Ms Rodrigues (OPCW, the Hague); and 'The Right of Access to Information – the PAIA Act' – Ms Molefe from the Human Rights Commission (HRC).

## INFORMATION DISSEMINATION

The section also dealt with a number of queries from the media and Occupational Health professionals from various industries, both public and private, for marketing materials (printed and audio-visual), technical and scientific information on a variety of Occupational Health-related issues. These queries are pulled from the website or are directly sent to the section.

The staff also fostered online links with many Occupational Health-related organisations' and societies' web platforms. These links allowed the NHLS and the NIOH to act as a single entry point for these information resources.

## LOCAL AND INTERNATIONAL COLLABORATIONS IN OCCUPATIONAL HEALTH

The Section has contributed to collaborating, networking, fostering and maintaining links with international organisations such as the World Health Organization (WHO), International Labour Organisation (ILO), International Commission on Occupational Health (ICOH), NIOSH-CDC, USA, Finnish Institute for Occupational Health (FIOH), Health and Safety Laboratory (HSL) UK, International Association of Cancer Registries (IACR)] as well as local societies and stakeholders. These include the national and provincial Departments of Health, the Departments of Labour and Mineral Resources, the South African Society of Occupational Medicine (SASOM), African Regional Association for Occupational Health (ARAOH), South African Society of Occupational Health Nurses (SASOHN), Mine Medical Professionals Association (MMPA), academia, union representatives, employers, employees, and public and private sector groups.

The NIOH's commitment to workers in the informal economy continued with collaboration and involvement in key strategic initiatives in the sector, both locally and internationally. During the last quarter, Ms S Hampson and Mr L Darwin (Bio-medical Informatics Manager) represented the NIOH at the mHealth Alliance Workshop on Mobile Technologies, held in Johannesburg. WIEGO is a global action-research-policy network that seeks to improve the status of the working poor, especially women, in the informal economy and recently embarked on a short project together with NGO mHealth Alliance and VitalWave (a private sector USA-based consultancy firm) on how mobile technology, especially cellular phones, could be used to spread health-related information to informal workers. The Section plans to become more involved in the arena of information dissemination to informal workers in the year ahead, and will be more actively involved with the mHealth project as well as continue links with the SEWA group.

During the second and last quarter of the year, the NIOH hosted two workshops on 'Risk Assessment in Mining and Quantification of Exposure and Disease'. These workshops were held with the aim of assisting the MBOD and CCOD to get an accurate baseline of the numbers of workers / ex-workers at risk of developing occupational lung disease. It is important to consider the risks to workers and ex-workers in the mining sector, and to prepare the Compensation Fund for a proper actuarial evaluation. Ms S Hampson and Ms I Naik managed the logistics and pre-workshop preparation for this meeting, which took place from 30 July–02 August 2013, and again from 20–21 January 2014. In total, 73 colleagues from across the country and across disciplines/areas of expertise attended this meeting. In addition, six international experts also attended the meeting: Prof R Parsa (College of Business and Public Administration [CBPA], Drake University, USA); Mr S Pandita (AMRC, Hong Kong); Dr A Mittal (India); Prof T Gassert (Harvard University, USA); Dr H Upegui (IBM Curam Research Institute, Germany) and Mr A Oza (SEWA, India).



*Delegates attending the Risk Assessment in Mining and Quantification of Exposure and Disease Workshop in July/August 2013 at Sunnyside Park Hotel, Johannesburg*

During the third quarter, the Toxicology Division, in collaboration with the WHO, held a two-day international workshop entitled: 'Exposure Assessment to Nanoparticles'. The workshop was held at the Sunnyside Park Hotel, Parktown, Johannesburg, and was the first of its kind to be held in South Africa. International leaders in the field presented talks pertinent to Occupational Health and Safety, focusing on instrumentation and methods of measurements, importance of exposure assessment in the risk assessment of nanoparticles, as well as in their regulatory aspects and management. Case studies in the exposure assessment on specific nanoparticles in the work and research environments were also reported from developed and developing countries. In total, 77 delegates attended the workshop, with 17 international speakers delivering information during the workshop.



*The WHO Guideline Development Group (GDG) Nanotechnology experts that presented at the Nanotoxicology Workshop at Sunnyside Park Hotel, Johannesburg in November 2013*

**The Toxicology Division**, in collaboration with the **WHO**, held a two-day international workshop entitled: 'Exposure Assessment to Nanoparticles' - the **first of its kind** to be held in **South Africa**



*Working for mobile solutions in the informal economy at the mHealth Alliance Workshop, March 2014 in Melville, Johannesburg*



# INTERNATIONAL LIAISON



## OUTREACH TO THE SADC REGION

The HIV/TB unit led the planning and piloting of a World Bank project to collect data on resources available for TB control in mines, labour sending areas and surrounding communities. Dr B Kistnasamy and Dr M Zungu attended a meeting with the World Bank to prepare for activities in TB in the mining sector in South Africa. Dr Zungu participated in an Advisory Committee for TB in the mines for the World Bank that is reviewing an Economic Analysis on TB in the mines. The NIOH hosted the workshop on Risk Assessment, Quantification of Exposure and Disease in Mining with international and local delegates from the 29 July–2 August 2013.

The Cancer and Epidemiology Research Group (CERG) hosted Prof T Rebbbeck from the University of Pennsylvania on the 25–26 July 2013 and also held a joint academic meeting at the Wits School of Public Health. Prof Rebbbeck gave a seminar on 'Developing Capacity for Cancer Research in Africa'. Dr E Singh attended the African Cancer Registry Network Annual meeting held in Zimbabwe, while Dr B Kistnasamy attended the annual meeting of the VUCCnet hosted by the IAEA in Vienna, Austria, in support of cancer capacity building initiatives in selected countries in Africa from 23–25 July 2013.



*Dr Tanusha Singh*  
Head

Dr B Kgarebe attended Work Service on Economic and Technological Development (Article XI of the Chemical Weapons Convention) for the African region, held in Nairobi, Kenya, 19– 21 November where she gave a presentation on 'The Role of Occupational Health Laboratories in Monitoring for the Chemical Industry in Countries Sub-Saharan Africa'.

The HIV/TB in the Workplace Unit provided occupational medicine services to Kalafong Hospital healthcare workers (HCWs). The Unit also provided services to mine workers and ex-mine workers through the Medical Bureau for Occupational Diseases (MBOD) and the Compensation Commission for Occupational Diseases (CCOD).



*The National Cancer Registry and Research hosted Prof Timothy Rebbeck from the University of Pennsylvania on 25 – 26 July. Prof Rebbeck spoke at a Joint Academic Meeting with the Wits School of Public Health on "Developing Capacity for Cancer Research in Africa" on 26 July*

*From L-R: Charles Chasela (Wits, School of Public Health), Danuta Kielkowski (NCR), Chantal Babb (CERG), Timothy Rebbeck (University of Pennsylvania), Margaret Urban (CERG), Martin Hale (Anatomical Pathology, Wits University), Azwi Takalani and Pascalia Munyewande (Wits, School of Public Health)*

## INTERNATIONAL COLLABORATIONS IN OCCUPATIONAL HEALTH

Collaborations and networks continued to be fostered and maintained with various international organisations, through links with NIOH sections. The NIOH hosted the Namibian Ministerial Delegation from the 3–5 July 2013. The visit was in preparation for the establishment of the Namibian Institute for Occupational Safety and Health. The Occupational Medicine Section conducted a health screening of workers at a smelter in Namibia between April and June 2013. The Occupational Hygiene section conducted a health risk survey at the smelter in October 2013.

Dr Babb returned from a six week International Cancer Technology Transfer Fellowship, awarded by the Union for International Cancer Control (UICC), at the Cancer Research Division of the Cancer Council New South Wales (CCNSW) in Sydney, Australia. In addition to developing advanced skills in multi-factorial case control analyses, the visit should result in the publishing of at least one publication. Dr Babb has been made a lifetime member of the Association of Union for International Cancer Control (UICC) Fellows (AUF).

The work on Nanoparticles progressed substantially when Prof M Gulumian was invited to give two presentations at the 5th African Regional Meeting on the strategic approach to International Chemicals Management (SAICM) meeting in Pretoria 18–22 November 2013:

1. 'Risk assessment of endocrine disrupting chemicals';
2. 'Nano Health, Safety and Environment activities internationally and nationally'. She also attended the OECD Expert meeting on Physical-Chemical Properties of Manufactured Nanomaterials, 28 February – 1 March 2013 in Queretaro, Mexico to:
  - a. Analyze the outcome of the Phase I of the WPMN Sponsorship Programme on the Safety of Manufactured Nanomaterials and identify which Test Guidelines and/or Guidance documents should be updated to become applicable to nanomaterials, in particular to assess a number of additional end-points for nanomaterials and the need to develop new OECD Test Guidelines and specific OECD Guidance Documents for these end-points.
  - b. Ensure that the discussion benefits from ISO's knowledge concerning standardisation of the measurement and characterisation of materials.



Prof Gulumian attended the 12th OECD WPMN meeting 9–12 December at the OECD Headquarters in Paris France. She presented on the Exposure Assessment of Manufactured Nanomaterials and Assessment of Biodurability of Nanomaterials. Two documents have been submitted related to their contribution to Nanomaterials: Gulumian M. Vetten Melissa. The dossier on 'Gold Nanoparticles CAS No. 7440-57-5'; Gulumian M. Masoka M. 'Report on the Occupational Exposure Assessment case-study on nano-gold (AuNP) in a Pilot Scale Facility'.

Prof Gulumian also contributed to telediscussions on the physico-chemical properties of nanoparticles. In her capacity as Director of the International Union of Toxicology (IUTOX) Executive Committee, Prof Gulumian attended a series of meetings in tandem with the Society of Toxicology in San Antonio, Texas from 9–14 March 2013, finalised details for the General Assembly and considered several award nominations. She also met with organisers from Mexico and Brazil to discuss the possibility of Congresses being held in 2015 and 2016 respectively. Further, she contributed to the discussions on financial and scientific programme planning.

Prof Gulumian was elected as Vice-President of the Executive Committee (EC) of IUTOX at its recent General Assembly held in Seoul, Korea 28 June–6 July 2013. As a member of the TRTF group and vice-president of IUTOX, she also participated in discussions regarding the way forward in global harmonization of registration and accreditation of toxicologists. As the leader and expert of the Working Group 3 (WG3) representing South Africa on the ISO TC229 on Health, Safety and Environment, Prof Gulumian attended the ISOTC229 Meeting held on 4–8 March 2013 in Queretaro, Mexico and discussed several technical aspects of engineered and manufactured nanomaterials. In her capacity as a member of the SABS Committee on nanotechnologies, Prof Gulumian attended the ISO/TC 229 WG 3 Schedule, held from 29–31 May 2013 in Chicago, USA and presented an outline of the nanomaterial research conducted at the NIOH. She also attended the 16th ISO TC229 Nanotechnology meeting 11–15 November 2013 in Bella Horizonte, Brazil. At the 6th NanOEHS Symposium in Nagoya, Japan, Prof Gulumian won the bid to organise the 7th NanOEHS Symposium in South Africa in 2015. Prof Gulumian and Melissa Vetten participated in a teleconference with Professor Elaine Faustman of University of Washington to discuss the collaborative work on the modeling of the risk assessment of gold nanoparticles. A memorandum of understanding (MoU) was signed between the Faculty of Sciences of the University of Washington and the NIOH to collaborate on research on Nanotoxicology. As a collaborator in the FP7 sponsored project "Nanosolutions", Professor Gulumian attended the collaborators meeting in Helsinki 15–16 May 2013, where the timelines for delivery on major objectives were discussed. Also, the nanoparticles on which tests need to be conducted were specified. Prof Gulumian has responded to queries pertaining to cell culture techniques in order to harmonize procedures implemented between different laboratories pertaining to culturing conditions of the BEAS 2 B cells, as well as the concentration of the nanoparticles used. The NIOH also hosted a meeting with Mr Khalid Mahmood, Director of the Labour Education Foundation in Lahore, Pakistan and shared information about the services that are provided by the Institute.

Dr B Kistnasamy gave the keynote address on 'Occupational Health Services for Workers in the Informal Economy' at the SEWA Conference in New Delhi, India, 3–4 April 2013. In addition, he presented on 'Victims and the Justice System in South Africa' at the ANROEV Conference, Bangkok, Thailand, 9–10 May 2013. He also presented on the 'Diagnostic Challenges in Occupational Health' at an ANROEV workshop in Hong Kong, 28–29 October 2013. Dr B Kistnasamy led the delegation of the NICD, Department of Health and Treasury officials to the Centers for Disease Control and Prevention (CDC) in Atlanta, USA, on a study tour to gain insight into the setting up of the National Public Health Institutes of South Africa (NAPHISA). The delegation was briefed by the CDC, IANPHI (International Association of National Public Health Institutes), the Georgia State Department and Public Health Canada officials.

## WORLD HEALTH ORGANIZATION

The NIOH continued to be an integral part of the WHO Collaborating Centres (CC) in the Occupational Health Global Network Plan (2012–2017). The NIOH is in its second year of its designation as a WHO (CC) in Occupational Health and has contributed to a number of activities. Dr B Kistnasamy, Dr M Zungu and Prof Gulumian hosted a side event at the World Health Assembly on behalf of the Department of Health and the WHO on Occupational Health and Primary Health Care. The meeting was chaired by Dr B Kistnasamy and the keynote address was made by Minister A Motsoaledi, with additional inputs from Dr M Neira (WHO). Dr B Kistnasamy and Dr M Zungu made inputs on workers' health in the statement on Non-Communicable Diseases at the World Health Assembly. The WHO held a training programme on a costing tool for Occupational Health services at the Primary Healthcare (PHC) level. A presentation was also made by the WHO concerning the delivery of Occupational Health services at the PHC level.



Dr B Kistnasamy attended the WHO meeting on the 'UN Interagency Technical Consultation on Green Procurement for Health Products, Pharmaceuticals and Biomedical Devices' in Bonn, Germany. Dr Zungu assisted the NDoH in the compilation of information used at the WHO TB Meeting. Prof Gulumian is a member of the WHO Core Group on Health Risk Assessment and participated in telediscussions on establishing WHO CCs on health risk assessment, as well as the participation of the group in the session on WHO efforts on the topic at the ICTXIII Congress sponsored by IUTOX in July 2013, Seoul, Korea. She attended the launch of the 'WHO Chemical Risk Assessment Network' on 3 July held at the 13th International Congress of Toxicology (ICTXIII) in Seoul, Korea. Discussions were also led on the resource acquisition strategy for the Network. Prof Gulumian was elected as Vice-President of the Executive Committee (EC) of the International Union of Toxicology (IUTOX) at its recent General Assembly held in Seoul Korea June 28 June–6 July 2013. In her capacity as a member of the WHO Guideline Development Group (GDG) for developing countries on nanotechnologies, she entered in discussions on developing WHO Guidelines on 'Protecting Workers from Potential Risks of Manufactured Nanomaterials' (WHO/NANO). The NIOH hosted the Guideline Development Group (GDG) meeting and WHO workshop on 'Exposure of Nano-particles' held from 1–3 October 2013. Dr T Singh participated in telediscussions as a co-chair of the Health Workers Group.

**The NIOH is an integral part of the WHO Collaborating Centres in Occupational Health - Dr B Kistnasamy, Dr M Zungu and Prof Gulumian hosted a side event at the World Health Assembly on behalf of the Department of Health and the WHO on Occupational Health and Primary Health Care.**

## INTERNATIONAL LABOUR ORGANISATION

The HIV/TB unit held several meetings with the International Labour Organization (ILO), in preparation of the launch of the NHLS HIV/TB workplace programme. Ms A Mzoneli attended and represented the NIOH as a CIS National Centre at the 51st meeting of the ILO-CIS Network meeting in Turin, Italy on 11–12 November. The main objective of the meeting was to review and modernize the terms and conditions governing the participation of agencies, institutions and organisations in the CIS network of National and Collaborating Centres, as a means to improve its functioning and ensure further development. Dr S Kgalamono visited the ILO in Geneva, Switzerland from the 17–22 June 2013 to participate as a member of an expert panel in reviewing the ILO list of Occupational Diseases and developing criteria for diagnosing Occupational Diseases internationally. Dr B Kistnasamy presented on 'Compensation for Occupational Diseases in South Africa' at the ILO meeting in Dusseldorf, Germany from the 6–7 November, 2013.

# OHS TRAINING UNIT



*asbestos chrysotile fibers that cause lung disease, COPD, mesothelioma*

## INTRODUCTION

The Occupational Health and Safety (OHS) Training unit was initiated in January 2012, and is managed by Ms I Naik. The Department provides specialised training services to support the practice of Occupational and Environmental Health within the private and public sectors. As part of its core function, it is responsible for building capacity in the country through a variety of training programmes in Occupational Health. The training done by the unit primarily targets Occupational Health professionals through seminars, workshops and lectures. Also included in the training are continuing education and supplementary courses aimed at developing and maintaining professional skills. Many of the training events are Continuing Professional Development (CPD) accredited through the Health Professionals Council of South Africa (HPCSA). Mrs S Hampson, Head of Graphics, Marketing and Communications, provides logistic support and administrative assistance with CPD accreditation for the training, as well as the generation of certificates.

The Department also provides support to the Graphics, Marketing and Communications Department in managing events and hosting visitors.



*Ms Inakshi Naik*  
Head

The training courses conducted during the period under review were:

### Ergonomics – Manual Materials Handling (MMH): A Participatory Approach

A training workshop on Ergonomics on “Manual Materials Handling” was held in May 2013. The workshop, targeted at Occupational Health Practitioners, Physiotherapists, Occupational Therapists, Occupational Hygienists, Chiropractors, Ergonomists and anyone with an interest in Ergonomics, aimed to highlight the link between the design and manual handling of workplace technologies (such as equipment, tools) and adverse health outcomes.

The objectives of the training were to:

- Raise awareness of Ergonomics and Manual Materials Handling (MMH) in the workplace.
- Presentation of case studies of poor work design and MMH in the workplace.
- Assessment of risks associated with poor design and MMH in the workplace.
- Developing solutions that reduce or eliminate the risks associated with MMH.

Twenty five delegates attended the training workshop with six participants from the Mpumalanga Department of Health, six from the NHLS and the remainder from private sectors. The workshop was presented by Prof Gaur Ray from the Indian Institute for Technology (IIT) in Mumbai, India together with Dr Moreshnee Govender (Wits University) and Ms Busisiwe Nyantumbu-Mkhize (NIOH, Ergonomics Department).

### Asbestos fibre counting using phase contrast microscopy

The Department organised training in Asbestos Fibre Counting, using Phase Contrast Microscopy (PCM) in June and July 2013 and in February 2014. Six delegates were trained during each training session. The groups were kept small due to the practical components of the training as well as the competency assessment that followed after the training workshop. Certificates of competency were given to delegates who showed proficiency in counting asbestos fibres accurately.

### Occupational Cancers: Topical issues

A seminar on Occupational Cancers was held in February 2014 at the Sunnyside Park Hotel in Johannesburg and was attended by 40 delegates comprising Occupational Health doctors, nurses, hygienists and environmental scientists. Prof Hilary Carman (University of the Witwatersrand) presented a lecture on the sun/UV radiation and occupational skin cancer; Dr Caradee Wright from the CSIR gave a talk on sun exposure and outdoor work; Dr Cas Badenhorst from the North West University, Potchefstroom, presented two talks on exposure to carcinogenic chemicals and preventing cancer and diesel exhaust emissions; Prof David Rees for the NIOH presented case studies on the attribution of cancer to workplace exposure in individual patients; Dr Naseema Vorajee presented on surveillance/screening for lung cancer/occupational lung cancer; Dr Danuta Kielkowski presented an introduction to occupational epidemiology of cancers and occupational cancers; and Dr Elvira Singh presented on the National Cancer Registry. The seminar led to dynamic group discussions and the feedback received indicated that a large proportion of delegates were in favour of the NIOH organising a follow-up seminar on Carcinogenic Chemicals in the Workplace during 2014.

## CAPACITY BUILDING ACTIVITIES FOR OCCUPATIONAL HEALTH PROFESSIONALS

### Global Harmonization System (GHS) of Chemicals and Material Safety Data Sheet (MSDs) training

The GHS of Classification and Labelling of Chemicals is an international system, which harmonises the classification and labelling of hazardous chemicals. The goal of the GHS is to harmonise the various existing classification and labelling systems all over the world for a common and coherent approach, define and classify hazards, and communicate information on labels and safety data sheets. It also provides infrastructure for the establishment of national and international comprehensive chemical safety programmes.

The Global Harmonization System (GHS) will be incorporated into the new Hazardous Chemical Substances regulations that are currently under review by the Department of Labour in South Africa, and therefore there is a need to provide training to Occupational Health Professionals engaged in the management of chemical exposures. Training was provided by Mrs I Naik to 35 Occupational Health Nurses from various industries and public sectors on the Global Harmonization System (GHS) of chemicals and Material Safety Data Sheets (MSDs) in June 2013. The training was organised by Lancet Laboratories and took place at the Midrand Conference Centre. The training was also given to a group of Occupational Medical Practitioners in August 2013 at the Lancet Centre in Johannesburg.



### **Occupational Allergies: Awareness and TB/HIV and Silicosis in the workplace training for the Primary Health Care (PHC) nurses**

A two day training course titled: 'Occupational Allergies: Awareness and TB/HIV and Silicosis in the workplace' was conducted for registered PHC nurses, enrolled for the Diploma in Clinical Health Assessment course at the Lillian Ngoyi Community Health Clinic, in April 2013. The lectures were given by Ms K Wilson (Epidemiology), Ms A Fourie (Immunology), Ms E Ratshikhophu (Immunology), Dr O Abrahams (Occupational Medicine), Prof D Rees (Occupational Medicine), Ms Z Ndlovu (Pathology), Ms O Mabe (Immunology), Dr N Beylis (NHLS TB lab) and Mrs I Naik (OHS Training). The training encouraged very stimulating discussions from a dynamic group of delegates.

The training unit noted some very encouraging comments on the evaluation forms, which included:

*"Interesting course, I now know the importance of a patient's occupation"*

*"I really enjoyed this workshop, it is really eye opening"*

*"I think I must do Occupational Health Nursing"*

### **Health and Safety Representatives (HSR) training programme for nurses at Anne Latsky**

The OHS Training Department conducted a 3-day training course titled: 'Health and Safety Representative (HSR) Training' for nurses at the Anne Latsky Nursing College in May 2013. The course was attended by 20 HSRs appointed at the Anne Latsky Nursing College. A certificate of competency was issued to the qualifying HSRs. Mrs I Naik was supported by Ms O Mabe (Immunology & Microbiology) who presented on the Legislation for Hazardous Biological Agents.

Some of the encouraging comments on the evaluation forms included:

*"The training was quite an eye opener and empowering. I am looking forward to serve in the Health and Safety Committee with confidence."*

### **Management of Chemical Exposures, Simple and Cost Effective Solutions using Stoffenmanager as a Risk Assessment Tool**

Mrs I Naik was invited to give a presentation at the Chemical and Allied Industries Association (CAIA) on the use of the Stoffenmanager (Chemical Risk Assessment) toolkit in March 2014. Stoffenmanager is a web-based IT-tool (public and freely available) to help small- and medium-sized enterprise (SME), which allows non-expert users in the companies to manage their chemical substances more efficiently. The innovative method of risk assessment empowers owners/operators to evaluate their workplace for hazards and risks. The concept was very well received by the 'Responsible Care' team of the CAIA. Consequently, in June 2014, training will be conducted by the OHS Training unit to CAIA members from the African continent on the use of Stoffenmanager.

## **TRAINING SUPPORT AND CAPACITY BUILDING WITHIN THE NHLS**

### **Lectures**

During the period under review, the OHS Training Department developed and facilitated a series of Quality Management System (QMS) lectures, covering a variety of Occupational Health and Safety related topics. The intention of these lectures was to build capacity within the NIOH and NHLS in the disciplines of Occupational Health and Occupational Hygiene. These lectures are approved by the HPCSA for CPD points.

### **Health and safety representative (hsr) training online**

The training material developed by the OHS Training Unit for the online Health and Safety Representative (HSR) Training course was rolled out on the NHLS intranet for the second year during the period under review. One hundred and twelve NHLS staff registered for the course and completed assessments for the modules they had registered for.

### **Risk assessment course**

The OHS Training Unit coordinated the training for NIOH staff on the fundamental principles of Risk Assessment, which was conducted by the Occupational Hygiene Section in March 2014 at the NIOH. Eighteen staff members attended the training and are currently in the process of completing their assessments for competency.

**Five screening questions were developed and sent to the Primary Healthcare branch of DoH to incorporate the screening questionnaire into the CHW training manual - to ensure that the CHWs are able to identify possible Occupational Health-related ill health**

#### First aid and fire marshall training

The Unit coordinated training for NIOH and NICD staff for First Aid and Fire Marshalling together with the Safety, Environment and Health section through Ms Anna Potgieter. Fourteen staff members were trained in May 2013 for First Aid Level 1, and a further 15 trained as Fire Marshalls. The training was repeated in November 2013 where 14 staff members were trained for First Aid Level 1, and 12 were trained as Fire Marshalls.

### PROFESSIONAL DEVELOPMENT

Mrs Naik attended training courses on 'Biorisk Management Trainer Development Programme' in May 2013 and 'Advanced Biorisk Management: Trainer Workshop' in November 2013. Both the courses were offered by the African Centre for Integrated Laboratory Training (ACILT) at the NHLS. Mrs Naik can now conduct training on 'Biorisk Management' using the Global Biorisk Management curriculum, developed by Sandia National Laboratories, USA.

### STRATEGIC INITIATIVES IN OCCUPATIONAL HEALTH

During the reporting period, Ms I Naik delivered a lecture to Public Health Professionals at the University of Pretoria (UP) on the Compensation for Occupational Injuries and Diseases (COIDA) Act, 130 of 1993.

Prof L Nickels, from the National Institute for Occupational Safety and Health (NIOSH) USA, visited the OHS Training Unit to work on the curriculum development for training Primary Healthcare Nurses to identify occupational-related diseases. The curriculum is currently under development.

In March 2014, five screening questions were developed and sent to the Primary Healthcare branch of the National Department of Health to incorporate the screening questionnaire into the Community Health Workers' (CHW) training manual. The objective of this was to ensure that the CHWs are able to identify possible occupational health-related ill health within communities through screening questionnaires.

Mrs Naik presented a paper titled 'Experience and Training Process to Develop Occupational Health Capacity in South Africa' at the Asia Monitoring Resource Centre (AMRC) workshop. This workshop, which was for medical practitioners, was held from 28–29 October 2013 in Hong Kong. The aim of the workshop was to define and discuss the current status of Occupational and Environmental Health (OEH) in the Asian region and to develop a strategy for training of health professionals (Medical Doctors, Nurses and Occupational Hygienists) and supporting parties (labour inspectors, trade unions and NGOs) towards mitigation and prevention of occupational and environmental exposures and illnesses.

A one week training programme was organised for Dr Ashish Mittal, an Occupational Medical Practitioner from Delhi, India in July 2014. The training was focused on learning the functions and technicalities in Occupational Medicine, Occupational Hygiene, Pathology, Cancer registry, OHS Training and the OHASIS system. He was also trained for a day on Asbestos Counting using Phase Contrast Microscopy. Dr Mittal is actively engaged in developing occupational health capacity in India through risk assessment, medical surveillance and the implementation of OHS programmes in small and medium enterprises. He is also actively involved in organising occupational health conferences and training at national level and therefore the training at the NIOH empowered him to build capacity in India.

# NATIONAL CANCER REGISTRY AND RESEARCH



## INTRODUCTION

The National Cancer Registry (NCR) is the largest cancer surveillance system in South Africa reporting on all laboratory-diagnosed cancers from both the NHLS and privately-operated laboratory services in the country. In addition to its pathology-based surveillance system, the NCR has also been tasked with establishing population-based cancer registration for the country (Regulation No 380 of 2011).

As a natural progression from the production of surveillance data, the NCR conducts original research on cancer through its research division, the Cancer Epidemiology Research Group (CERG).

## HIGHLIGHTS OF THE NCR

The NCR has developed a business plan that outlines the strategic vision and operational activities of the NCR for the next 10 years. In effect, the plan provides direction for cancer surveillance activities in the country for the immediate future. The objectives of the plan are to update the pathology-based cancer surveillance system and to implement four population-based cancer registries at selected sentinel surveillance sites.



*Dr Elvira Singh  
Acting Deputy Director*



The NCR business plan has been endorsed by the NHLS, the National Department of Health and the Ministerial Advisory Committee on Cancer Care and Control. A funding request has been submitted to the National Department of Health and supplementary funding is being sought from the private healthcare sector.

The Cancer Registry has made good progress with regards to tackling the backlog of pathology-based cancer registration data, which has been accumulating over the past 10 years. In the financial year under review, the NCR published cancer incidence data for 2006 and 2007.

In 2013/14, the NCR strengthened its relationship with the Centre for Disease Control and Prevention (CDC) of the United States. The first activity under this new partnership was a visit to the NCR by Dr JM Underwood, an Epidemiologist in the Division of Cancer Prevention and Control. Multiple projects for publication were initiated using data from the Cancer Registry and the Johannesburg Cancer Case-Control Study.

In August 2013, Dr Freddy Bray, the Deputy Head: Section of Cancer Information at the International Agency for Research on Cancer (IARC) visited the NCR to discuss the implementation of population-based cancer registration in South Africa and offer implementation assistance for the country.

The NCR continues to be the focal point for South Africa for the Virtual Cancer University Network (VUCCNet), an initiative facilitated by the International Atomic Energy Agency (IAEA). The VUCCNet aims to establish an e-Learning platform for pre-service and in-service cancer training in six African countries.

## RESEARCH

### **Distribution and age-incidence curves of receptor-defined breast cancer in Southern Africa: 12 000 patients**

*C Dickens, R Duarte, A Zietsman, H Cubasch, P Kellett, J Schuz, D Kielkowski, V McCormack*

**Collaborating organisations:** NCR, IARC (France) and Windhoek Central Hospital (Namibia)

Sub-Saharan estimates of receptor-defined breast cancer vary considerably, possibly influenced by ethnicity and histo-pathological quality. This was a two country study of receptor determination at diagnosis that facilitated direct comparisons. Receptor specific prevalence and ER-specific age-incidence curves were examined in all race groups.

### **Effects of smokeless tobacco (snuff) on cancer in Black South Africans**

*C Babb, M Urban, S Egger, M Weber, L Ayo-Yusuf and F Sitas*

**Collaborating organisations:** NCR, University of Witwatersrand, University of Pretoria, Cancer Epidemiology Research Unit at the Cancer Council of New South Wales (Australia)

The risk of developing cancer from the use of smokeless tobacco products such as snuff is unclear. This study determined the risk for several cancers among snuff users in the Johannesburg Cancer Case Control Study. There was an increased risk with increasing snuff exposure among people with nasal cavity cancer and myeloid leukaemia, with an increase of 11% per sniff. This is the largest study looking at nasal snuff use and risk of cancer in Africa. This work received funding from the MRC and the Union for International Cancer Control (UICC).

### **HIV-related Cancers in South Africa: The leDEA-SA Collaboration and National Cancer Registry Linkage Study**

*M Sengayi, D Kielkowski, M Davies, A Boule, M Maskew, J Giddy, A Spoerri, J Bohlius, M Egger*

**Collaborating organisations:** NCR, University of Cape Town, Themba Lethu Clinic, McCord Hospital, International Epidemiologic Databases to Evaluate AIDS – Southern Africa (leDEA-SA), University of Bern (Switzerland)

The aim of the study was to determine the incidence, prevalence and risk factors of AIDS-defining and non-AIDS defining cancers in HIV-infected adults on antiretroviral treatment in South Africa through probabilistic data linkage of the leDEA-SA HIV cohort data to the National Cancer Registry.

The pilot linkage used 8 721 adult patients on ART from McCord Hospital in KwaZulu-Natal province with 35 536 cancer records of the NHLS laboratories in the province. Three hundred and fifty seven cancer cases occurring in 338 patients were identified. The median age at cancer diagnosis was 38 years (IQR 32 – 48) and 35 years (IQR 30 – 41) in men and women respectively. Over 70% of cancers identified in men and women had a known infectious cause. This work was funded by leDEA SA, Grant Number U01AI069924 from the NIH (NIAD, NICHD, NCI).



*NCR staff (L-R): Ms Matshediso Mohlala; Ms Margaret Urban, Dr Mazvita Sengayi, Ms Asanda Jekwa, Dr Danuta Kielkowski, Ms Lerato Khoali, Ms Evelyn Nkosi, Mr Tonicah Mapanga, Dr Elvira Singh, Ms Meriam Ramela; Dr JM Underwood (CDC, Atlanta); Ms Moira Beery, Ms Dikeldi Rasoaosi*

## INTERNATIONAL COLLABORATIONS

The NCR has ongoing collaborations with the International Agency for Research on Cancer (IARC), the University of Berne (Switzerland), the African Cancer Registry Network and the Centre for Disease Control and Prevention (United States).

In addition, the Cancer Epidemiology Research Group (CERG) has been involved in a number of research collaborations including: the Oxford Collaborative Group on Epidemiological Studies of Female Cancers, International Collaboration on HPV and Oesophageal Cancer (InterSCOPE), African Female Reproductive Organ Cancers in the Context of Emerging NCDs (AFROCaNN) and Men of African Decent and Carcinoma of the Prostate (MADCaP). Each of these collaborations has resulted in publications or grant applications at various stages of preparation, submission or review.

## HONOURS

After 21 years of dedicated service at the NHLS, of which 14 years were at the NCR, Ms M Urban retired in August 2013. Ms Urban continues to provide invaluable support to the NCR through participation in selected research projects. Dr E Singh was seconded to the NCR as Deputy Director (Acting) as of October 2013 to provide support for the management of the research and surveillance arms of the NCR. Dr Singh has also been appointed to represent the National Cancer Registry on the Ministerial Advisory Committee on Prevention and Control of Cancer.

## PROFESSIONAL DEVELOPMENT

DST-NRF interns (Ms B Ndlovu and Ms B Modipa) successfully completed internships and work experience at the NCR/NHLS and provided valuable support to the research initiatives from NCR, including the extraction of DNA from over 1 000 blood samples.

Dr C Babb attended a six week International Cancer Technology Transfer Fellowship, awarded by the Union for International Cancer Control (UICC) at the Cancer Research Division, Cancer Council New South Wales (CCNSW) in Sydney, Australia. In addition to developing advanced skills in multi-factorial case-control analyses, the visit will result in at least one publication. As a result of this fellowship, Dr Babb has been made a lifetime member of the Association of Union for International Cancer Control (UICC) Fellows (AUF).

Postgraduate students enrolled: two (1 PhD at the University of Bern (Switzerland) and one MSc at the University of Pretoria).

A student, Ms L Pule, completed her MSc research project with the NCR in December 2013 through the University of the Witwatersrand.

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## CONFERENCE PRESENTATIONS – ORAL PRESENTATIONS

### NATIONAL CONFERENCES

**Seven abstracts were presented at the conference of the African Organisation for Research and Training in Cancer (AORTIC) in Durban in November 2013.**

T Maphanga: *The changing face of black cancer patients at Charlotte Maxeke Johannesburg Academic Hospital*: 2001 to 2008.

C Nattey: *Lung cancer risk attributable to occupation: in a case control study in black South Africans*, 2001-2008.

G Mokwatle: *Counselling patients with the dual diagnosis of cancer and HIV*.

C Babb: *Effects of smokeless tobacco (snuff) on cancer in black South Africans*.

M Sengayi: *The use of computerized record linkage for cancer ascertainment in a South African HIV cohort.*

E Singh: *10 year cancer incidence trends for teenagers and young adults in South Africa.*

D Kielkowski, Moira Berry and E Singh: *Childhood Cancer in South Africa: Analysis of six years of pathology data.*

D Kielkowski, E Singh, and M Sengayi: *Ekurhuleni a hospital based cancer registry: a study of cancer referral, treatment and survival in South Africa*

**Pre-Congress workshop (Theme: skin Barrier, eczema and allergy) of the 66<sup>th</sup> Annual Congress of Dermatology Society of SA in Cape Town, 30 August-01 September 2013.**

A Fourie: *Hand dermatitis among patients seen at an occupational dermatology clinic.*

**The 5<sup>th</sup> African Regional Meeting on the strategic approach to International Chemicals Management (SAICM) meeting in Pretoria 18-22 November 2013.**

Gulumian M: *Risk assessment of endocrine disrupting chemicals*."

**The Toxicology Workshop, 28 August 2013, held in DG 20 the DTI Offices.**

Gulumian M: Toxicology associations: *National and International*" and *"The interim process of obtaining EU Certification.*

Gulumian M: *The interim process of obtaining EU Certification and Toxicology associations: National and International.*

**The 12<sup>th</sup> International Chemistry Conference Africa (ICCA), University of Pretoria, South Africa, 8 July – 12 July, 2013.**

George JM, Vetten M, and Gulumian M: *Genotoxic potential of gold nanoparticles on mammalian cells.*

Utembe W, Alfazema L, Gulumian M: *Research needs for the health risk assessment of lead in Africa.*

**SAIOH Conference, Elangeni Hotel, Durban, 20-21 August.**

G Mizan: *Reproductive Health Risk Evaluation in NHLS Histopathology Laboratories*

J Manganyi: *Respirator fit testing*

K Renton: *Interpreting Occupational Hygiene Measurements a European Perspective.*

T Madzivhandila: *Correlation between FTIR and XRD techniques for analysing respirable crystalline silica.*

M Mogane: *Occupational Health & Safety in the Informal and 'very small' Enterprise sector- Johannesburg Area, Part B: Hazardous Chemical Substances, Hazardous Biological Agents and ergonomics.*

M Mogane: *Occupational Health & Safety in the Informal and 'very small' Enterprise sector- Johannesburg Area, Part A: Physical, Psychosocial & Safety hazards.*

**The Public Health Association of South Africa in collaboration with the African Federation of Public Health Association, Cape Town International Convention Centre, 23-23 September 2014.**

M Mogane: *Exposure to nanomaterials: Public health challenges.*

MGL Ntlailane: *Occupational Exposure assessment to fine & ultrafine particles during the sieving of dust from gold mine tailings.*



## LOCAL CONFERENCES

**The 5<sup>th</sup> African Regional Meeting on the strategic approach to International Chemicals Management (SAICM) meeting in Pretoria 18-22 November 2013.**

Gulumian M: *Nano health, Safety and Environment activities internationally and nationally.*

**Workshop on Risk Assessment in Mining and Quantification of Exposure and Diseases". 29<sup>th</sup> July – 3<sup>rd</sup> August 2013. Sunnyside Park Hotel, Johannesburg.**

Gulumian M: *Risk assessment in the mining sector.*

**GEOFORUM 2013 Conference at Turbine Hall, Newtown, South Africa 3<sup>rd</sup> and 4<sup>th</sup> of July 2013.**

T Madzivhandila: *The investigation of crystalline silica polymorphs present in dust collected from different Gold, Platinum, Coal, and Diamond Mines in South Africa*

T Madzivhandila: *The analysis of functional groups and quantification of individual ligands from the surface of multi-functionalised gold nanoparticles using FTIR.*

## INTERNATIONAL CONFERENCES

**XIII International Congress of Toxicology, Seoul, Korea, 30 June – 4 July 2013.**

Gulumian M: *Risk assessment - Continuing Education Course.*

**6<sup>th</sup> Conference of the Society of Environmental Toxicology and Chemistry (SETAC) Africa, Lusaka Zambia, 2-3 Sep, 2013.**

Utembe W, Alfazema L, Gulumian M: *Key outstanding issues in the health risk assessment of lead: Implications for Africa.*

Utembe W, Gulumian M: *Challenges in environmental and health risk assessment for pesticide registration in Africa.*

**The 6<sup>th</sup> International Symposium on Nanotechnology, Occupational and Environmental Health (NanOEh) on 28 to 31 October, 2013, Nagoya, Japan.**

Gulumian M, Utembe W: *Solubility, dissolution, biodurability: important parameters in occupational health of nanoparticles.*

**ISO TC229 Meeting, 11-15 November, Bella Horizonte, Brazil 2013.**

Gulumian M: *The use and suitability of in vitro tests and methodologies to assess nanomaterial biodurability.*

**International Conference Cancer registries at 21 -24 October 2013, Buenos Aires Argentina.**

D Kielkowski, Moira Berry and E Singh: *Childhood Cancer in South Africa: Analysis of six years of pathology data.*

**1<sup>st</sup> International Symposium on Medical Geology in South Africa (ISMGAF) at University of Johannesburg, 26 March 2014.**

T Madzivhandila: *Characterization of respirable crystalline silica dust from abandoned mines around Roodepoort.*

**International Chemistry Conference Africa University of Pretoria, 09th – 11th July 2013.**

T Madzivhandila: *The analysis of functional groups and quantification of individual ligands from the surface of multi-functionalised gold nanoparticles using FTIR.*

**International Chemistry Conference Africa University of Pretoria, 09<sup>th</sup> – 11<sup>th</sup> July 2013.**

T Madzivhandila: *The investigation of crystalline silica polymorphs present in dust collected from different Gold, Platinum, Coal, and Diamond Mines in South Africa.*

**6<sup>th</sup> International Symposium on Nanotechnology – Occupational & Environmental Health Nagoya, Japan, 28-31 Oct 2013.**

G Sekobe, T Madzivhandila: *The analysis of functional groups and quantification of individual ligands from the surface of multifunctionalised AuNPs using FT-IR.*

**6<sup>th</sup> International Symposium on Nanotechnology – Occupational & Environmental Health Nagoya, Japan, 28-31 Oct 2013.**

X Masoka, G Sekobe & T Madzivhandila: *Assessment of occupational exposure to AuNps during their synthesis in a research and development laboratory*

**3<sup>rd</sup> Global H & S Forum in Mining, Radisson Blu, Gautrain Hotel, Sandton Johannesburg on 16<sup>th</sup> & 17<sup>th</sup> September 2013.**

K Renton: *Gauging the burden of diseases from work-related dust*

**POSTER PRESENTATIONS****INTERNATIONAL CONFERENCES****The 53<sup>rd</sup> Annual SOT meeting, Phoenix, Arizona, 23<sup>rd</sup> – 27<sup>th</sup> March 2014.**

Gulumian M, Sanabria N, Andraos C: *Interference study of conventional assays, caused by gold nanoparticles (AuNPs) exhibiting surface plasmon resonance (SPR).*

Andraos C, Gulumian M: *In vitro toxicity assessment of dust emissions from South African gold mine dumps.*

Koekemoer L, Gulumian M: *Assessing Toxicity of FeMn Dust Particles Collected from a South African Ferromanganese Smelter Works: In vitro Studies on Primary Rat Astrocytes and BEAS-2B cells.*

**XIII International Congress of Toxicology, Seoul, Korea, 30 June – 4 July 2013.**

Vetten M, George J and Gulumian M: *In vitro genotoxicity of 14 nm citrate stabilised gold nanoparticles.*

**International conference on Cellular & Molecular mechanisms of Toxicity, Gordon Research Conference, 11-16 August 2013, Proctor Academy, Boston, USA. (Poster presentation).USA.**

Sanabria NM, Vetten M, Andraos C, Gulumian M: *Molecular Diagnostics of Nano-particles with regards to Toxicology and Health Risk Assessment.*

**LOCAL CONFERENCES****Wits 5<sup>th</sup> cross-faculty graduate symposium on 02 August 2013**

B Binta: *The prevalence of  $\beta$ -lactamase-producing oral anaerobes in South African patients.*

## GLOSSARY

ACTG AIDS	clinical trials group
ARMS-PCR	amplification refractory mutation system PCR
ART	antiretroviral therapy
ARV	antiretroviral
CANSA	Cancer Association of South Africa
CAPRISA	Centre for the AIDS Programme of Research in South Africa
CCHF	Crimean-Congo haemorrhagic fever
CCMT	Comprehensive Care Management and Treatment
CDC	Centers for Disease Control and Prevention
CDW	Corporate Data Warehouse
CMJAH	Charlotte Maxeke Johannesburg Academic Hospital
CMV	cytomegalovirus
CNS	central nervous system
CPD	continuing professional development
CPUT	Cape Peninsula University of Technology
CRC	colorectal cancer
CSF	cerebrospinal fluid
CSIR	Council for Scientific and Industrial Research
CVD	cardiovascular disease
DST	drug susceptibility testing
EQA	external quality assurance/assessment
EU	European Union
DGGE	denaturing gradient gel electrophoresis
DGM	Dr George Mukhari Hospital
DST	Department of Science and Technology
EID	early infant diagnosis
ESBL	extended-spectrum beta-lactamase
FA F	anconi's anaemia
FBC	full blood count
FISH	fluorescence in situ hybridisation
FNA	fine needle aspiration
GC-MS	gas chromatography-mass spectrometry
GEMP	graduate entry medical programme
GERMS-SA	Group for Enteric, Respiratory and Meningeal disease Surveillance in South Africa
GSH	Groote Schuur Hospital
HA	haemophilia A
HAART	highly active antiretroviral therapy
HBV	hepatitis B virus
HBC	hepatitis C virus
HEU HIV	exposed uninfected
HHV	human herpesvirus
HLA	human leucocyte antigen
hMPV	human metapneumovirus
HPV	human papillomavirus
HVTN	HIV Vaccine Trials Network
IALCH	Inkosi Albert Luthuli Central Hospital
ICU	intensive care unit
IMD	inherited metabolic disease
IPC	infection prevention and control



IRMA	immunoradiometric assay
KEH	King Edward VIII Hospital
KIDCRU	Children's Infectious Diseases Clinical Research Unit
LTI	Laboratory for Tissue Immunology
MDR-TB	multidrug-resistant tuberculosis
MIC	minimum inhibitory concentration
MGIT	mycobacterium growth indicator tube
MLPA	multiplex ligation-dependent probe amplification
MRC	Medical Research Council
MRSA	methicillin-resistant <i>Staphylococcus aureus</i>
MSSA	methicillin-susceptible <i>Staphylococcus aureus</i>
NAAT	nucleic acid amplification test
NIAID	National Institute of Allergy and Infectious Disease
NICD	National Institute for Communicable Diseases
NIH	National Institutes of Health
NRF	National Research Foundation
PBMC	peripheral blood mononuclear cell
PCR	polymerase chain reaction
PFGE	pulsed-field gel electrophoresis
PRF	Poliomyelitis Research Foundation
QF-PCR	quantitative fluorescent polymerase chain reaction
RA	rheumatoid arthritis
RCCH	Red Cross Children's (Memorial) Hospital
RFLP	restriction fragment length polymorphism
RIA	radioimmunoassay
RSV	respiratory syncytial virus
RT-PCR	real-time polymerase chain reaction
SAAVI	South African AIDS Vaccine Initiative
SABMR	South African Bone Marrow Registry
SADC	Southern African Development Community
SANAS	South African National Accreditation System
SARI	severe acute respiratory infection
SCC	staphylococcal cassette chromosome
SLE	systemic lupus erythematosus
SME	sub-acute measles encephalitis
SNP	single nucleotide polymorphism
STI	sexually transmitted infection
TB	tuberculosis
TMS	tissue microarray analysis
T-RFLP	terminal restriction fragment length polymorphism
UCT	University of Cape Town
UFS	University of the Free State
UKZN	University of KwaZulu-Natal
US	Stellenbosch University
WHO	World Health Organization
Wits	University of the Witwatersrand

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