



Microbiology Division

Special Bacterial Pathogens Reference Unit

BACKGROUND

The Unit provides unique diagnostic and reference services for certain dangerous bacterial zoonotic diseases, namely plague, anthrax and botulism, and for this purpose operates a BSL3 (high security) laboratory. The Unit is a WHO network laboratory for plague and anthrax and the Unit's expertise in laboratory diagnosis of plague and anthrax was called upon by WHO in previous years. A plague EQA programme is produced for WHO and this is sent out three times a year to 18 different countries in Africa, India, and Madagascar. Plague surveillance is in the process of being re-launched by the National Department of Health. This will start in KwaZulu-Natal Province and the other plague endemic provinces will follow. All plague surveillance samples will be sent to the SBPRU for processing. Additionally, several other zoonotic infections are also under investigation, including leptospirosis, bartonellosis and tularemia.

ACTIVITIES, HIGHLIGHTS AND ACHIEVEMENTS

The Unit was accredited by SANAS in November 2007.

MOLECULAR EPIDEMIOLOGY OF PLAGUE IN SOUTHERN AFRICA

The early 1990s saw a world-wide resurgence of human plague, culminating in the World Health Organization's decision to include this disease on its list of re-emerging pathogens. Africa, particularly the sub-Saharan region, is the continent most affected by plague. With the precise molecular techniques available today it is possible to study the organism in depth, its spread from one geographic area to another, and mechanisms by which it adapts to varying ecological niches. The molecular typing methods used include rRNA gene restriction patterns (i.e. ribotypes) and pulsed field gel electrophoresis. Results obtained thus far show that 43% of the strains from the SBPRU culture collection appeared to be ribotype B (as expected in southern Africa). (Researcher: L. Arntzen)

LEPTOSPIROSIS PILOT SURVEILLANCE STUDY

Leptospirosis is a well-known cause of febrile illness in many areas of the world, but its importance in South

Africa is not known. It has been recognized as a cause of sporadic disease and outbreaks elsewhere in Africa. Recent interest has been stimulated by surveys of humans and rodents in southern Africa, which showed serological evidence of previous exposure, and a small number of human cases have been recently identified locally. There is a lack of awareness of the disease amongst clinicians, and the absence of sensitive and specific laboratory tests suitable for use in routine diagnostic laboratories; in contrast, in the veterinary field, animal infections have been historically well-catered for by the reference microagglutination test (MAT). We are applying two methods of detection: a screening test using a rapid detection kit that demonstrates the prevalence of antibodies in the patients serum, and PCR, targeting the ribosomal gene sequences specific for pathogenic leptospires. To date small numbers of samples have been tested, but we hope to improve awareness of this infection amongst clinicians. (Researchers: L. Arntzen, J Rossouw)

BARTONELLA SPECIES IN HUMAN AND ANIMAL POPULATIONS IN GAUTENG

Bartonella is a genus of fastidious, rod-like Gram-negative bacteria responsible for a spectrum of both symptomatic and asymptomatic infections. They typically invade erythrocytes and can cause persistent infections in their hosts. There are several species of the genus that affect humans and animals. Some species are relatively unknown emerging pathogens of recent years. In contrast, *Bartonella bacilliformis* and *B. quintana*, the respective agents of South American bartonellosis and trench fever, have been known for many years. Application of modern molecular methods have recently led to recognition of several new species. Aspects of the epidemiology of *Bartonella* spp. infections in certain areas of South Africa. The specific objectives are to determine the prevalence of *Bartonella* infections in HIV-positive patients, compared with a control group of HIV-negative individuals; to investigate cats, dogs, and commensal and wild rodents for carriage of bartonellae; to determine the involvement of fleas from various animals (cats, dogs, rodents) as hosts and possible vectors of *Bartonella* species; and to identify species of *Bartonella* found in humans and animals. (Student: A Trataris)

TULAREMIA PILOT STUDY

Francisella tularensis is a small Gram-negative coccobacillus. Tularemia is primarily a disease of wild

animals, perpetuated in nature by ectoparasites, contaminated environment, predation, and chronic carriage. Human infection is incidental and is usually the result of interaction with wild animals and their environs. This organism has not been reported in South Africa. There are two main biovars, type A (*F. tularensis tularensis*) and type B (*F. tularensis palearctica*), with some additional local subgroups currently proposed. Thus far, type A is only found on the North American continent. Type B is widespread in most parts of the temperate zone in the northern hemisphere, including North America. Only a few poorly documented cases have been reported from the southern hemisphere, with no mention of biovars. This project involves using immunofluorescence and haemagglutination tests to detect antibodies in rodent and human sera. (Researcher: L. Arntzen)

During the year staff attended various technical, dangerous goods shipment, first aid, and software training courses.

COLLABORATIONS

University of Hohenheim, Stuttgart, Germany (Dr W Beyers): molecular epidemiology of southern African strains of *B. anthracis*.

Protechnik Laboratory, Pretoria (Dr T Woods): rapid dipstick detection methods for plague, anthrax and botulism.

CAPACITY BUILDING

Registered students

MSc	AN Trataris
Dip Biomed Tech	N Bakana

Graduated

MSc	R Padayachee
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