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The detection of Burkholderia spp. and pathogenic Leptospira spp. in South Africa

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DECLARATION

This dissertation was supervised by Dr. J. Rossouw and Prof. J.A. Frean.

I hereby declare that this dissertation, submitted in fulfilment of the requirements for Magister Scientiae at the University of the Witwatersrand, Johannesburg, is the result of my own investigation unless acknowledged to the contrary within the text.

_____ _____

Adrienne N Saif Date

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SUMMARY

The Detection of *Burkholderia* spp. and pathogenic *Leptospira* spp. in South Africa

By

Adrienne N. Saif

Leptospirosis is a zoonosis of ubiquitous distribution and causes a wide spectrum of disease. *Burkholderia* species are important plant and human pathogens. Little or no investigation has been performed on any clinically-relevant *Burkholderia* or *Leptospira* species in Johannesburg. Environmental samples were taken from different sites in Johannesburg along the Jukskei River. These were subjected to culturing for *Burkholderia* spp. and polymerase chain reaction (PCR) for *Burkholderia* and *Leptospira* spp. Human serum, animal serum and kidney samples were also subjected to PCR for both organisms. A *Leptospira* IgM ELISA was also performed on human serum samples. More *Burkholderia* spp. were isolated by culture from soil samples than water samples. The PCR yielded a significantly higher PCR positive from soil samples ($p = 0.015$). There was a high prevalence of pathogenic *Leptospira* spp. in soil samples. The ELISA yielded only 7.8% (26/332) positive samples. There were no human or animal positive PCR results for either organism. There is an environmental presence of both leptospires and *Burkholderia* in the area sampled. More studies are needed to establish how both organisms might affect patients with compromised immune systems, and how often both infections are incorrectly or under-diagnosed.

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LIST OF ABBREVIATIONS

AESC	Animal Ethics Screening Committee
AIDS	Acquired-immunodeficiency syndrome
Amp	Amperes
API	Analytical Profile Index
ATP	Adenosine triphosphate
ATCC	American Type Culture Collection
Bcc	*Burkholderia cepacia* vcomplex
BCSA	*Burkholderia cepacia* selective agar
Bp	Base pairs
ca	Approximately
CF	Cystic fibrosis
DMP	Diagnostic Media Products
DNA	Deoxyribonucleic acid
dNTP	Deoxyribonucleic triphosphate
EDTA	Ethylene
ELISA	Enzyme linked immunosorbent assay
EPS	Exopolysaccharide
et al	et alii (and others; abbreviation from Latin)
EtBr	Ethidium Bromide
g	Gram/s
HIV	Human immuno-deficiency virus
HRP	Horseradish peroxidase
HREC	Human Research Ethics committee
IL	Inter-leukin
IgM	Immunoglobulin M
IHA	Indirect haemagglutination
LPS	Lipopolysaccharide
lpxO	Dioxygenase gene
MAT	Microscopic agglutination test
Min	Minute
M	Molar
µg/ml	Microgram per milliliter
UHQ	Ultra high quality
µl	Microlitre/s
ml	Milliliter
mM	Milli-molar
mm^3	Cubic millimeter
mol	Mole
ms	Millisecond
NICD	National Institute for Communicable Diseases
NHLS	National Health Laboratory Services
n	Sample number
nm	Nanometer
n-PCR	Nested PCR
OFPBL	Oxidation-fermentation bactitracin lactose agar
PCA	*Pseudomonas cepacia* agar

PCR	Polymerase Chain Reaction
pmol/µl	Pico-moles per microliter
recA	Recombination gene
rRNA	Ribosomal RNA
rpm	Revolutions per minute
s	Second
SBPRU	Special Bacterial Pathogens Reference Unit
spp.	Species
16S rRNA	16 small sub-unit ribosomal RNA
TAE	Tris/acetate/EDTA
TNFα	Tumour necrosis factor alpha
U	Units
U/µl	Units per microliter
µM	Micromolar
µm	Micro-meters
UV	Ultra-violet
V	Volts
Wits	University of the Witwatersrand
w/v	Weight per volume
v/v	Volume per volume

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