

**MOLECULAR EPIDEMIOLOGY OF SOUTH AFRICAN SEROTYPE 3 AND
SEROTYPE 19A PNEUMOCOCCAL ISOLATES**

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DECLARATION

I declare that this dissertation is my own unaided work. It is being submitted for the degree of Master of Science (Dissertation) in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in other University.

(Signature of candidate)

_____ day of _____ 200_____

ABSTRACT

The clonality of a random sample of 102 invasive pneumococcal serotype 3 strains isolated from Gauteng Province during January 2000 to December 2003 was investigated. Pulsed-field gel electrophoresis (PFGE) and multilocus sequence typing (MLST) revealed a heterogeneous population with several PFGE clusters and sequence types (STs). The largest PFGE cluster comprised 36/102 (35%) isolates including seven that belonged to ST458, a clone that is not common in other parts of the world. The global clone (ST180) which is common in the United States and other countries was found in a cluster that represented only 14/102 (14%) of isolates examined.

The first multidrug-resistant pneumococcal serotype 19A strain that was isolated in South Africa in 1977 was compared with invasive serotype 19A multidrug-resistant strains isolated in South Africa during June 1999 to December 2004. PFGE analysis of these isolates demonstrated clonal diversity among the isolates. MLST of 16 randomly selected isolates revealed several STs, none of which was the same ST as the 1977 clone.

Both serotype 3 and 19A were not associated with increased mortality or HIV seropositivity compared to other serotypes.

DEDICATION

In memory of my father
Ramosalioahae Mothibeli
1944-2003
and
my brother
Kgosietsile Mothibeli
1969-2003

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LIST OF ABBREVIATIONS

<i>Pneumococcus</i>	<i>Streptococcus pneumoniae</i>
<i>S. pneumoniae</i>	<i>Streptococcus pneumoniae</i>
IPD	invasive pneumococcal disease
CSF	cerebrospinal fluid
HIV	human immunodeficiency virus
AOM	acute otitis media
DNA	deoxyribose nucleic acid
bp	base pair
PCR	polymerase chain reaction
PFGE	pulsed-field gel electrophoresis
MLEE	multilocus enzyme electrophoresis
MLST	multilocus sequence typing
DLV	double-locus variant
SLVs	single-locus variants
ST	sequence type
RAPD	random amplified polymorphic DNA assay
REP	repetitive extragenic palindrome
RFLP	restriction fragment length polymorphism
PMEN	Pneumococcal Molecular Epidemiology Network
PVC	pneumococcal conjugate vaccine
°C	degrees celsius

V/cm	volts per centimeter
s	seconds
g	gravitational force
UV	ultra violet
EDTA	ethylenediaminetetra-acetate
TBE	Tris-borate-EDTA
TE	Tris-EDTA
NaCl	sodium chloride
CTAB	hexadecyltrimethyl-ammonium bromide
RNAse	ribonuclease
P	penicilin
R	rifampicin
M	trimethoprim-sulfamethoxazole
T	tetracycline
E	erythromycin
C	Chloramphenicol
L	Clindamycin
<i>aro E</i>	shikimate dehydrogenase
<i>gdh</i>	glucose-6-phospate dehydrogenase
<i>gki</i>	glucose kinase
<i>recP</i>	transketolase
<i>spi</i>	signal peptidase I
<i>xpt</i>	xanthine phosphoribosyltransferase

<i>ddl</i>	D-alanine-Dalanine ligase
WC	Western Cape
KZ	KwaZulu-Natal
GA	Gauteng
EC	Eastern Cape
NP	Limpopo (previously Northern Province)

LIST OF SYMBOLS

%	percent
<	less than
≥	greater or equal to
μl	microlitre