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Salivary IgA Responses During the First Two Years of Life: A Study of Aboriginal and Non-Aboriginal Children

By

Su Mon Kyaw-Myint

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Abstract

Nontypeable *Haemophilus influenzae* (NTHi), *Streptococcus pneumoniae* and *Moraxella catarrhalis* are common bacterial agents of otitis media which is a major cause of morbidity in young children. Mucosal immune responses are an integral part of the immune defense against middle ear infection and it is known that certain populations, including Australian Aboriginal children, are highly susceptible to disease.

The current study focussed on the development of the mucosal immunity to the three bacterial pathogens in Aboriginal and non-Aboriginal children from birth to two years of age, living in the Kalgoorlie-Boulder region of Western Australia. Salivary and breast milk IgA levels were measured by the enzyme linked immunosorbent assay. The measured IgA levels, combined with socio-economic, demographic and bacteriological data were analyzed statistically to determine the influential factors on the mucosal IgA response in these children over time.

This study found that each antigen-specific IgA examined followed a distinct ontogeny pattern and IgA responses differed significantly according to age, indigenous status and feeding type. Indoors smoke exposure, maternal smoking, and sibling day care attendance had some impact on salivary IgA levels in the children. However, household crowding and the presence of older siblings had the most significant impact on salivary IgA levels for children of different age groups. These two factors were correlated to increased nasophayrngeal colonization by *H. influenzae*, *S. pneumoniae* and *M. catarrhalis* and colonization status was also found to influence salivary IgA levels in the children. No correlation between maternal breast milk IgA levels and child salivary IgA levels was observed.

The results suggest that the degree of exposure to environmental factors rather than immunological deficit is responsible for the observed differences in salivary IgA responses between Aboriginal and non-Aboriginal children and modifying these factors could lead to a reduction in the burden of otitis media experienced by the children. Further studies correlating specific salivary IgA levels to diseases such as otitis media will reveal the role of specific salivary IgA responses in the prevention of infection by respiratory pathogens.

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List of Abbreviations

AOM	Acute otitis media
BALT	Bronchus-associated lymphoid tissue
BSA	Bovine serum albumin
ELISA	Enzyme linked immunosorbent assay
g	Gravitational force
GALT	Gut-associated lymphoid tissue
Hi	*H. influenzae*
Hib	*Haemophilus influenzae* type b
HLA	Human leukocyte antigen
IgA	Immunoglobulin A
IgM	Immunoglobulin M
IgG	Immunoglobulin G
IL	Interleukin
Kda	Kilodalton
LB	Luria-Bertani
LMW	Low molecular weight
NTHi	Non-typeable *Haemophilus influenzae*
OD	Optical density
OM	Otitis Media
OME	Otitis media with effusion
OMP	Outer membrane protein
PAGE	Polyacrylamide gel electrophoresis
PBS	Phosphate buffered saline
PIgR	Polyimmunoglobulin receptor
Ply	Pneumolysin

PnPs	Pneumococcal polysaccharide
PsaA	Pneumococcal surface adhesin A
PspA	Pneumococcal surface protein A
QC	Quality control
rAOM	Recurrent acute otitis media
RER	Rough endoplasmic reticulum
SC	Secretory component
SDS	Sodium dodecyl sulphate
SIgA	Secretory IgA
TGF-β	Transforming growth factor-beta
TMB	Tetramethylbenzidene
TNF-α	Tumor necrosis factor-alpha
TRIS	Tris (hydroxymethyl)-aminomethane
UspA	Ubiquitous surface protein A
% CV	Coefficient of variation