



Communication and Marketing Department
Isebe loThungelwano neNtengiso
Kommunikasie en Bemerkingsdepartement

Private Bag X3, Rondebosch 7701, South Africa
Welgelegen House, Chapel Road Extension, Rosebank, Cape Town
Tel: +27 (0) 21 650 5427/5428/5674 Fax: +27 (0) 21 650 5628

www.uct.ac.za

6 February 2024

Rural childhood positively impacts immune development, UCT study finds

Researchers at the University of Cape Town's (UCT) Division of Paediatric Dermatology and Paediatric Allergy have found that early childhood is a window for shaping immune development in allergic and non-allergic South African children.

The researchers described the molecular profiles of children with atopic dermatitis (AD) in the January issue of the journal *Allergy* – the European Journal of Allergy and Clinical Immunology.

AD is a debilitating skin disorder that disproportionately affects children globally and is associated with multiple allergic diseases. However, growing evidence suggests an “immunological window of opportunity” early in life when the immune system may be particularly responsive to environmental exposures that help establish immune functional trajectories that can have long-term consequences, including altered risk of immune-mediated diseases such as allergies.

Dr Nonhlanhla Lunjani, lead author on the study, said these interactions ideally should promote appropriate immune training that effectively defends against infection and tolerates the otherwise harmless allergen exposures, with limited collateral damage to host tissue, and without any subsequent aberrant inflammatory or allergic reactions.

According to Lunjani, epidemiology studies have shown that allergic diseases are increasing rapidly in South Africa and have shown lower disease prevalence in rural communities.

“Previous work done by our group, including senior authors Professors Carol Hlela and Mike Levin, demonstrated allergic immune profiles in urban and rural children with atopic dermatitis compared to their healthy counterparts. However, an immune profile emerged that characterised rural vs urban living irrespective of disease state. Our current study aimed to further examine the molecular mechanisms and environment exposures underpinning the rural/urban immunological gradient in South African children with or without AD,” she said.

The group performed RNA sequencing of peripheral blood mononuclear cells (PBMCs) obtained from children with AD and healthy controls from the same ethnolinguistic population in Cape Town and Mthatha. Bioinformatic analysis demonstrated several differentially expressed genes in AD cases, including IgE, a key antibody isotype in allergic disease.

Notably, the living environment dominated the PBMC gene expression clustering. Pet, maternal antenatal, and childhood farm animal exposure, vaginal delivery, as well as sunlight exposure were some of the associated exposures with the rural cluster. Peanut and Amasi consumption, higher household income, and increased paracetamol use were some more strongly associated with urban living exposures. Multiple gene expression pathways that are well described to regulate or suppress aberrant inflammatory immune responses were more highly expressed in rural children.

Lunjani said these results illustrate the dramatic effect of the living environment on the developing infant's immune system. "Exposure to animals and time spent outdoors promotes immune regulatory networks that can protect against infection and immune-mediated diseases such as allergies. Understanding the environmental interactions and molecular switches responsible for developing a healthy immune system will help us develop public health interventions and provide appropriate guidance to mothers of young children," she concluded.

ENDS

Issued by: UCT Communication and Marketing Department

Ridovhona Mbulaheni

Media Liaison and Monitoring Officer
Communication and Marketing Department
University of Cape Town
Rondebosch
Tel: (021) 650 2333
Cell: (064) 905 3807
Email: ridovhona.mbulaheni@uct.ac.za
Website: www.uct.ac.za