

## Helminths and allergy in South-Africa and North Europe

Cecilie Svanes RDF project 2015

**WHY:** Asthma and allergies have increased greatly the last decades in high-income countries, and there is a beginning increase in developing countries. These diseases have become major public health challenges, with prevalence over 20% in many societies, and with substantial mortality if expensive medication is not available. High mortality may also be the consequence as childhood asthma increases the risk of COPD (chronic obstructive pulmonary disease) over 20 times, and COPD is expected to be the third most important mortality cause globally by 2020.

The causes of asthma and allergies are not well understood, and there is neither cure nor efficient prevention. Helminth infections have decreased in parallel with the increase in asthma and allergies, and have known immunological effects. Mice studies and a few human studies from developing countries indicate that certain helminth infections might protect against allergy. We have done mice studies that reveal transgenerational effects of maternal helminth infection prior to pregnancy on TH2 immunity in offspring. Norway (high-income), Estonia (middle-income) and South-Africa (low-income country) have widely different prevalence of allergies and of Helminth infections.

**WHAT:** We wanted to assess the role of Helminth infections in allergic diseases, by analysing Helminth antibodies in relation to allergy markers (clinical disease and IgEs) in cohorts from Norway, Estonia and South-Africa, and by analysing related epigenetic characteristics.

**HOW:** The RDF program measured antibodies towards certain helminths in serum from parents and offspring in a multigenerational cohort from Norway. The immunological analyses were done in Cape Town using established essays. We are currently seeking funding also to perform these measurements in a multi-generation cohort in Estonia and in a South-African children's cohort. These cohorts already have data on allergic diseases and total and specific IgEs. We are further seeking funding to analyse epigenetic markers in Southampton to shed light on transgenerational mechanisms.

**OUTCOME:** The program aimed to develop a platform and do a pilot-study to explore the role of helminths infections in allergy, aimed at preventing epidemic increases in asthma and allergies and develop innovative treatment alternatives. We have established such a platform, and we have performed a pilot-study. A manuscript based on the pilot-study is at an advanced stage and will be submitted to a high ranked allergy journal.

Specifically, we have had two conferences on transgenerational, preconception and early life origins of respiratory health and disease, with workshops on Helminths and allergy (Bergen, April 2015 and April 2016). Young researcher O Jogi and a colleague from Tartu had a two months researcher stay at UCT June/July/August 2015. They were trained and performed immunological analyses of helminths in serum from samples from two generations of study participants in Bergen, under the supervision of W Horsnell. O Jögi is drafting a manuscript under joint supervision of all collaborators, and supervisors from Bergen and UCT worked on the project during a meeting in Cape Town in November 2015. An abstract has been presented at the In-FLAME meeting in Maastricht 2016, and will be submitted to an international allergy conference. The collaborators have developed several funding applications to fund jointly supervised young researchers, measurements of helminths in samples from the Tartu and Cape Town cohorts and epigenetic measurements in the same samples. We have been successful in obtaining some additional funding, but not yet sufficient and we are continuing the effort with regard to funding. Scientifically, the project is developing to include not only of helminth infections but also of other long-standing infections.