EYE DISEASES IN HIV-INFECTED INDIVIDUALS IN RURAL SOUTH AFRICA
In our Western world where treatment is available, HIV/AIDS has become a chronic disease. In all other parts of the globe, HIV/AIDS is still a major health concern and it is the biggest viral killer in the world. UNAIDS estimates that 34 million people are HIV infected worldwide. Most of them, some 22.4 million people, live in sub-Saharan Africa, where access to medical treatment and care is poor. The use of antiretroviral therapy (ART), which has brought so many benefits to HIV infected patients in our developed countries, is hence very limited.

The decrease in the body’s normal response to infections renders the people living with HIV vulnerable to many diseases, including devastating eye conditions. The World Health Organisation estimates that currently there are 285 million individuals worldwide who are visually impaired due to both infectious and non-infectious causes. A stunning 90% of these individuals live in developing countries and over 80% of all visual impairment can be cured or could have been avoided. At the same time, we now know that eye diseases and complications occur in 50-75% of HIV infected individuals at some point during the course of their illness, which can lead to visual impairment and blindness if left untreated. Needless to say that visually impaired individuals, as well as their families, face serious social and economical challenges that affect their lives forever.
ABOUT EYE DISEASES
The most common eye diseases are retinitis (damage to the retina), uveitis (inflammation of the middle layer of the eye between the retina and the white of the eye) and keratitis (inflammation of the cornea), with keratitis being the main cause of blindness in Africa. In Western countries, keratitis is mainly caused by two virus types: varicella zoster virus (VZV) and herpes simplex virus (HSV). Whether the same goes for sub-Saharan Africa remains unknown.

In addition to these eye diseases, HIV infected patients are also at increased risk for ocular complications like immune recovery uveitis (IRU). Paradoxically, IRU is elicited by successful antiretroviral therapy. When the immune system begins to recover, it may respond to a previously acquired infection with an overwhelming inflammatory reaction that makes the symptoms of infection worse.
Since the number of HIV infected individuals is increasing thanks to better access to treatment, eye diseases and complications will increase too.

**Early diagnosis and treatment of eye diseases is therefore of major importance**, yet it requires ophthalmological expertise (an ophthalmologist is a specialist in medical and surgical eye problems). Ophthalmological care in rural Africa is usually unavailable or inaccessible and if available, very poor due to understaffing and lack of knowledge and skills.
South Africa has one of the largest HIV epidemics worldwide with an estimated 5.6 million HIV-infected individuals. Within South Africa, the Mopani District in Limpopo Province has one of the highest HIV prevalence rates. It is one of the 18 priority districts identified by the South African government based on poor quality of healthcare, education and infrastructure. In the Mopani District, eye care is limited to specialist nurses. Logistical and operational challenges and a high workload make referral to specialist care extremely challenging and problematic. Currently, there is no full-time ophthalmologist available in public health care and critical patients need to be referred to the provincial hospital in another district.
The project will provide insight in the important clinical field of ophthalmology in HIV-infected individuals in order to improve future management of eye diseases. This will have great impact on the quality of life of individuals, preventing vision loss and of the population as a whole as it will stimulate professional care in rural areas of South Africa where this is virtually non-existent. In addition, this project will guarantee that those treated with antiretroviral therapy can lead an active life, socially and at work.

The project will also increase awareness of eye diseases among health care workers and provide training, it will have a positive effect on health economics (e.g. reducing the demand for health care and job retention), and the project results will be used for scientific publications in peer-reviewed scientific journals. In this way, the project will have an impact that stretches far beyond the Mopani District and even South Africa.
The project runs in three phases.

A
First, a seroprevalence study of uveitogenic and keratogenic pathogens in the Mopani District will be conducted, which is essential to define the burden of disease and to estimate the needs for improved clinical care.

B
The second phase is a prospective cohort study on the prevalence, cause and development of eye diseases before and after initiation of antiretroviral therapy.

C
The third part of the project involves a cross-sectional study on pathogens of infectious keratitis in HIV-infected and uninfected individuals. The second and third phases will partly run simultaneously.
PHASE 1A: VALIDATION
- Design research protocol
- Seroprevalence study
- Preparation phase A (MEC)
- Develop laboratory skills

PHASE 1B: VALIDATION
- Design research protocol IRU study
- Seroprevalence study
- Preparation phase B (MEC)
- Develop ophthalmologic skills

PHASE 2A: IMPLEMENTATION
- Seroprevalence study

PHASE 2B: IMPLEMENTATION
- IRU study

PHASE 1C: IMPLEMENTATION
- Design research protocol infectious keratitis study
- Preparation phase C (MEC)

PHASE 2C: IMPLEMENTATION
- Infectious keratitis study

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PHASE A
Submit seroprevalence study

PHASE B
Submit MEC IRU study

PHASE B
Submit MEC infectious keratitis study
PROJECT PARTICIPANTS

We have assembled a dedicated team of Dutch scientists covering all respective disciplines mandatory for this project. **Dr. Remco Peters** has an outstanding research experience in resource-poor settings, clinical management of HIV-infection and related complications, and guarantees epidemiological quality. **Prof. Albert D.M.E. Osterhaus** has an outstanding reputation as a virologist and is an international expert and pioneer on viruses. **Dr. Georges M.G.M. Verjans** is an expert on human herpesviruses, especially related to eye manifestations. Both **Prof. Jan C. van Meurs** and **Dr. G. Seerp Baarsma** have specific knowledge of ophthalmology in general and eye infections in specific and have outstanding research experience. **Dr. Ina Meenken** has specific knowledge of HIV-related eye problems, also in resource-poor (limited) countries and clinical research experience in a resource-poor setting. **Dr. Eric C.M. van Gorp** is a HIV patient treating physician with experience in HIV research projects in South Africa. **Dr. Erik Schaftenaar** has both clinical and research experience in resource-poor settings and is ophthalmology resident at the Rotterdam Eye Hospital Rotterdam.
The project is embedded in the Anova support structure. Anova Health Institute is the PEPFAR-designated District Support Partner for Mopani District with improving healthcare delivery, capacity building and health systems strengthening in relation to HIV/TB/STI programmes as the main objectives. This is done in strong collaboration with the Department of Health. Throughout the project continuous education, capacity building and health systems strengthening is offered in collaboration with the Anova team in the district.