

Voorstel MDO-opdracht

Opleiding Technische Geneeskunde

Universiteit Twente

A. Algemeen

1. Titel MDO-opdracht: **New Technologies for simple and affordable CD4 counting in resource-limited settings.**
2. Gegevens instelling/indiener:
Naam indiener: Markus Beck
Instelling/afdeling: UT TNW Medical CII Biophysics
Contactgegevens: m.beck@utwente.nl
Medisch begeleider: dr. Ten Napel
Technologisch begeleider (UT): Markus Beck

B. Faciliteiten

1. Welke faciliteiten zijn nodig voor een adequate uitvoering van de vraagstelling?
Flow cytometer, image cytometers, fluorescent microscope, chemical lab and lab equipment, reagents and other consumables.
2. Wat zijn daarbij mogelijke risico's voor de voortgang van de opdracht?
None.

C. Overige opmerkingen

-

D. Inhoudelijke informatie MDO-opdracht

Omschrijving van de technisch geneeskundige vraagstelling :

The concentration of T helper cells (CD4+ lymphocytes) in blood is a good indicator for the immune status of HIV patients. Anti-retroviral therapy is recommended by the WHO when this concentration drops below 200 cells per microlitre. The gold standard for this test is flow cytometry. Several hundred samples can be tested per day with instruments designed solely for this test.

However, these instruments are expensive to run and can only be operated by well-trained persons. Especially rural areas in low-income countries do not have access to the CD4 counts because they lack the necessary infrastructure. These areas need an affordable test that can be carried out with a portable instrument by non-professionals with some hours of training, and which gives immediate and reliable results. During the last years, an enormous effort has been

taken by a large number of groups worldwide to fill this gap. Many claim that they have the ideal solution for the problem. However, there are only a few approaches (if any) which really have the potential to be simple, robust, portable and cheap enough. One of the unsolved problems appears to be a blood sampling method that is safe and reliable enough to be carried out by non-professionals.

Project description:

Literature

- What blood sampling technologies for point-of-care diagnostics are currently used or have been proposed in the literature?
- What technologies for CD4 counting are currently available?
- What technologies have been developed, published, proposed?
- Investigate whether the technologies fulfill the above-mentioned requirements

Laboratory

- Carry out CD4 counts with three different methods:
 - Flow cytometry (FACS Aria)
 - Image cytometry with magnetically enriched samples (StarCount/EasyCount)
 - Image cytometry with newly developed microfluidic chip with dried reagents
- Compare the technologies with respect to
 - Precision and potential causes of error
 - Robustness and portability of instrument
 - Simplicity and ease-of-use