

# Simple point-of-care diagnostics

*Simple, low cost blood tests fabricated by inkjet printing*

All student projects at MCBP are part of on-going research. This leads to a choice of relevant topics and close supervision of all students as there is a group interest in the outcome of the project.

## Project description

Within the (finished) “InstantCount” project, we have developed printed microfluidic cell counting chambers for point-of-care blood tests, with the goal to provide diagnostics to resource-poor settings that do not have access to lab testing. The concept is based on the release of cell staining reagents from hydrogels to realize on-chip sample preparation. Based on this principle, we have demonstrated a simple and affordable CD4 count, a test that is used for HIV staging, and developed printing techniques to fabricate these test chambers in an affordable and reproducible way. Currently, we are transferring the concepts towards new applications and extending the functions that can include in the simple microfluidic chambers.

## Our research

We characterize and optimize the hydrogel materials involved in the sample preparation, develop low cost fabrication techniques (inkjet printing), design and build prototype instruments, program software for image analysis and benchmark our results against standard techniques (FACS, hematology analyzer, microscopy).

## Student projects

### Bead-based immunoassays on the cell-counting platform

Instead of capturing antibodies on molecules on a cell surface, we can use microbeads to capture molecules from a sample fluid. By labeling the captured molecules in a “sandwich assay”, we can use the existing approach for the detection of soluble biomarkers. One of the applications we are working on is the detection of procalcitonin for the rapid diagnosis of sepsis.

### Complete blood count

In addition to white blood cell counts, which can be realized with the solution we have developed, a general blood test (“complete blood count”) includes several more parameters, such as red blood cell counts, platelet counts, cell volumes or hemoglobin content. For some of these parameters, you would start from an existing proof-of-concept and evaluate the performance, for others, you would start from an existing idea and try to proof the principle.

Student assignments will generally combine several aspects (assay development in the biochemical lab, designing an experiment in the optical lab, data collection and analysis, which may include some programming), but can also be tailored according to the students’ interests and preferences. If you are interested in a project related to these topics, please feel free to contact Markus Beck by [email](#), Tel +31 (0) 53 489-4001 or at CR4.431.

