

Performing blood counts automatically

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If a blood count is abnormal, the medical laboratory scientist has to manually perform a differential blood count analysis. This costs time and money. The computer-assisted blood cell analysis system HemaCAM by the company Horn has recently been launched on the market and does just this.

The patient feels drawn and tired, keeps having a high temperature even after recovering from cold some time ago. The doctor suggests performing a differential blood count to try to determine the cause. He takes some blood and has it analyzed in the laboratory – a routine procedure in medical diagnostics. In a differential blood count the leukocytes, the white blood cells, are quantitatively and qualitatively assessed. The values obtained assist further diagnosis and are important indicators for disorders such as inflammations, allergies as well as parasitic or autoimmune diseases. Usually blood samples are analyzed with the aid of blood counting machines. However, if abnormalities are seen in the sample the MLS must assess the abnormal cells manually – a very time-consuming method. For the trained specialist at the microscope this means counting, counting and more counting.

With the HemaCAM, scientists at the Fraunhofer Institute for Integrated Circuits IIS in Erlangen have developed a system that automates the assessment of blood counts and at the same time improves the quality of the findings. In collaboration with Horn Imaging GmbH the device has been approved in accordance with the Medicinal Product Guidelines. "The core idea was to combine a microscope with digital [image processing](#)," explains Dr. Christian Munzemeyer, group manager for

medical image processing at IIS. "Whereas existing methods such as flow cytometry are based on physical measuring methods, the HemaCAM imitates humans." Like a human eye, a camera looks through the microscope. Image processing software automatically analyzes up to eight abnormal blood smears and provides classification suggestions.

The expert describes the operation of the new diagnosis system, which makes working procedures in the laboratory more efficient: "For this we have trained our system with expert knowledge. The background to this is a database in which every cell has been entered manually. Computer algorithms use this database to analyze and pre-sort the recorded cells. Every abnormal cell can be individually documented, enlarged up to 100 times. The MLS in the laboratory only checks the result, verifies and then approves it. The findings are then fed into the laboratory information system, and the laboratory director can send out the findings."

More than six years of development time were required to transform the idea into a fully operational series product. Since the beginning of October Horn Imaging GmbH HemaCAM has been marketing the microscopy system and installing it in specialist laboratories throughout Europe. Fraunhofer researchers are already working on further improvements, though, and will present these at Medica 2010. Director of the department of image processing and medical engineering Christian Weigand adds: "What is new is that we have now integrated a slide handling system that permits us to automatically evaluate and analyze up to 200 slides. In addition to this a further software component is an analysis support system for the morphology of the red blood count. This can be used to diagnose types of anemia, for example; at the same time the red blood count provides indications of liver or kidney damage, metabolic diseases and deficiency symptoms."

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