

RASTUD

There is a galloping need for blood and blood products in the West, and Europe is no exception. Today's 75 million donations of blood per year hardly suffice.

More serious still, the reliability of the red blood cells, platelets and plasma poses a problem. An estimated 13 million units of blood products are not verified from the standpoint of the possible contamination by viruses or bacteria.

To ensure total safety of blood products, a fast and accurate means of analysis must be found. This goal has been achieved by small and medium-sized companies working in cooperation with each other and European universities under the RASTUD projects.

Interview

Peter SALMON

Managing BLOOD ANALYSIS

York = United Kingdom

"We had to turn a technology, which was more a concept actually, into a real commercial application".

The idea is very simple: by plunging two electrodes in blood and passing an electric current through them, the cells are irresistibly attracted by the electrodes, as if by a magnet. After that we just have to count them. This is called dielectrophoresis.

By varying the frequency of the electric field between the electrodes, we capture cells of different types.

At 1Mhz, all the cells will be attracted. But at only 100 kHz, we can attract specifically a all family of identical cells among a large group.

Consequently, by gradually increasing the intensity of the magnetic field, we literally get the signature of each bacterium in graphic form.

The solution for rapid detection of bacteria in the blood could therefore be a machine with technologically sophisticated electrodes, but we had no idea what it would look like. Nor did the electrodes exist. The machine for detecting bacteria had to be invented.

Map of Europe:

RASTUD was a project involving the United Kingdom, Germany and Spain.

The European Union contributed 750 000 euros (to be checked cfr. Martina) to the financing of the RASTUD project out of a total budget of 3 million euros (to be checked cfr. Martina). The United Kingdom, Germany and Spain were partners in RASTUD.

Small businesses Cell Analysis in York and IDC design in Slough, in the United Kingdom, and Proton Mikrotechnik in Bremen, Germany carried out this project between January 2001 and December 2003.

Under the European cooperative research programme for small and medium-sized enterprises business, these companies were able to work with:

Complutense de Madrid University
York University
Sheffield University, Hallam and
Bremen University.

to create what has become a real pan-European research and development network.

In Bremen, Germany, not far from the museum devoted to scientific research, in the middle of the University campus, Proton Mikrotechnik developed the needed electrodes.

According to the simulations done by Complutense de Madrid University, the electrodes could not exceed 8 μ in thickness – quite a challenge for this small German firm with a staff of only five people.

Engineer Andreaz MENZ
Managing Director Proton Mikrotechnik
Bremen, Germany

"We are a company specialized in manufacturing extremely accurate microsystems like this one. For our collaboration in the project, first we had to obtain an extremely precise electrode. So we developed this electrode, which in fact is a set of eight electrodes. In a second stage, we had to reach a very low price, since these electrodes can be used

only once to avoid blood contamination problems. In the future, we should be able to get down to a price of three or two euros a piece, and perhaps less."

Very special facilities are needed to develop electrodes.

Engineer Andreaz MENZ
Managing Director Proton Mikrotechnik
Bremen, Germany

"We are now going into the clean chamber."

The manufacture of electrodes is done using highly sophisticated technological instruments in a rigorously clean environment. This type of laboratory entails the kind of very expensive infrastructure that is indispensable for research work.

Engineer Andreaz MENZ
Managing Director Proton Mikrotechnik
Bremen, Germany

"You can easily understand that the main reason why we work with the university is that we, as a small or medium-sized business, can not afford this kind of infrastructure."

Professor Dr. Wolfgang BENECKE
Institute for Micro sensors, actuators and systems
Bremen University, Germany

"The main advantage for the university is that by taking part in this kind of project, on one hand we can offer concrete solutions to business, and on the other we have an opportunity to broaden our own knowledge and to create new technologies that can be used by companies."

Collaboration between Bremen University and the small business has also reduced the production costs for the project, with a spectacular miniaturization of the electrodes. ...

Dr. Robert ANTHONY
York-United Kingdom

"Before we joined the EU we made our own electrodes ..."

Peter SALMON
Managing BLOOD ANALYSIS
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