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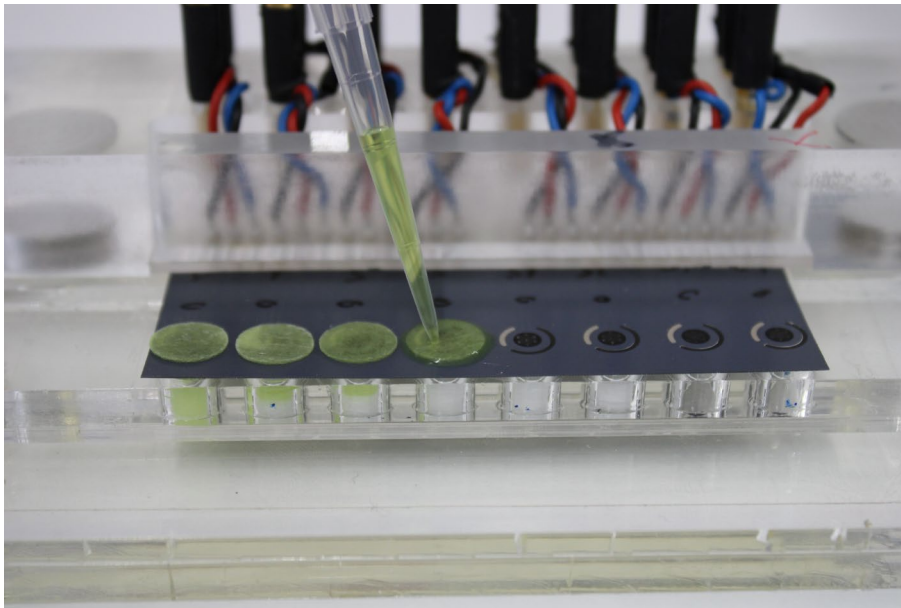
Research in the Grisons

Early detection of preeclampsia

Monitoring of Hypertension diseases during pregnancy

The conference “Graubünden forscht” (www.gr-forscht.ch; Davos; September 21 and 22, 2022) will bring together young scientists from a wide range of research fields that are of social importance for Graubünden and the Alpine region. Until September, we will give you a monthly preview of an exciting project.

High blood pressure, nausea, vomiting, water retention: If these symptoms occur during pregnancy, perhaps preeclampsia could be behind it. In Switzerland, the condition affects about two percent of all pregnant women. Preeclampsia can occur at different times during pregnancy, but more often after the twentieth week of pregnancy. First-time pregnancy, multifetal pregnancy, diabetes mellitus and obesity are among the factors that increase the risk of developing the disease. The sooner preeclampsia is recognized, the better the symptoms can be treated with physical rest, magnesium therapy, and blood pressure-lowering medications. If symptoms are severe, the unborn child must be delivered early.



Vertical flow enables the detection of the placental growth factor in a short period of time. Image: CSEM

The CSEM Center Landquart and the Empa spin-off MOMM Diagnostics, which was founded in 2018, are researching a point-of-care test for the early detection of pre-eclampsia. Point-of-care tests can be administered directly to patients in the doctor's office, in the pharmacy, or even at home by the patients themselves. Pregnancy tests are a well-known example. Chemistry researcher

Stefano del Giovane has been involved in the development of the new test at CSEM since September 2021. His main task is to develop an electrochemical sensor that can detect a specific protein, the placenta growth factor, even at low concentrations. The concentration of the protein in the blood provides an indication of preeclampsia.

Del Giovane describes the project: “We are pursuing three goals. The test should require only one drop of blood. The result should be available within thirty minutes. The biggest challenge is that the entire procedure should be carried out in one step. This means applying a drop to the

electrochemical sensor, waiting for the chemical reaction and reading the result. We are in the middle of developing and prototyping the case that will hold the sensor. We also want to improve the sensitivity of the sensor. We are not testing with blood yet, but are using a buffer solution made in the lab. We want to achieve the same performance with real blood later. To get good results, we are looking for something that cleans the electrochemical sensor after applying the blood. Blood contains various proteins that interfere with the measure and can cause false negative or positive results. An additional challenge is that we want to detect a very low concentration of the placenta growth factor. We plan to complete the project by December 2022 and hope to solve all issues by then.”

At the CSEM Center Landquart, a 25-member team from twelve nations develops optoelectronic and electrochemical sensors and miniaturized systems, and works with industrial companies to turn these technologies into innovative products.

www.csem.ch

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Stefano del Giovane and Daniela Heinen



Stefano del Giovane