

Success Stories

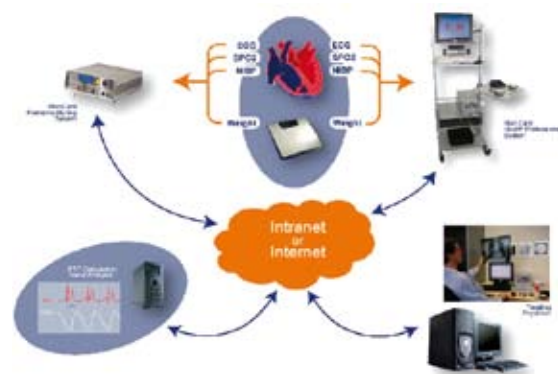
A new platform for monitoring heart failure

Luxembourg Heart Failure Project: Home-monitoring of patients with severe heart failure

Dr Daniel Wagner, who works at the Centre Hospitalier de Luxembourg, is about to complete a research project entitled "Luxembourg Heart Failure Project: Home-monitoring of patients with severe heart failure". This project is looking at the non-invasive tele-monitoring of heart function and studies non-invasive determination of cardiac output and pulse transit time, and it is undertaken in close collaboration with Norbert Rösch from the CRP Henri Tudor.

With new methods for treatment (such as dilatation) being available, patients who have had a heart attack have now a better chance for survival. However, a certain number of patients will have a weaker heart after a heart attack and they will often develop heart failure (insuffisance cardiaque), a condition in which water accumulates in the lungs and in the legs. Heart failure is a severe disease that is characterised by numerous relapses (rechutes), which will need prolonged stays in hospital. The quality of life of such patients is much diminished. In addition, the costs of heart failure are enormous (3% of the budget of the Caisses de maladie). Around 10 years ago, studies in which nurses regularly phoned with patients with heart failure have shown that a close following of these patients is very important in order to avoid relapses. In 2000, the idea came up to use more sophisticated means of telemedicine to follow patients with heart failure.

The initial idea was to find an easy parameter to measure, a parameter that, on the one hand, reflects the heart function and, on the other hand, can be transmitted via telemedicine from a patient's home to the hospital or medical cabinet (so called home-monitoring). Some of the products that are available on the market were initially tested, but these were too imprecise for measurements. Then, it was tried to measure the flow of the heart in a non-invasive way but this also provided measures that were not precise enough. Then, the speed of the pulse wave was studied and a platform was conceived that was capable of measuring and transmitting this new parameter. (The speed of the pulse wave is directly linked to the rigidity of arteries, which, in turn, augments proportionally with the degree of heart failure.) This platform for home-monitoring is original and the speed of pulse waves is measured with data obtained with an ECG (Electrocardiogram) and a little device fixed to a finger (a so-called oximeter). These measures are easy to make and can be done in one minute only.



The tele-home monitoring system

The FNR has contributed 720,000 Euros to the project. In addition, the FNR has also significantly helped to organise meetings which aimed at facilitating the technology transfer of the project. The platform for cardio-vascular monitoring is capable of measuring arterial tension, heart frequency, oxygen saturation, speed of pulse wave, as well as the weight of a patient. All these variables seem to be critical for following patients with heart failure. The fact that these variables can be reproduced with the help of the newly developed platform was confirmed with multiple measures which have been repeated over time with healthy patients and with patients with severe heart failure.

The variables that were obtained with the home-monitoring platform were studied in different phases of the disease and more than 50 patients were followed over a period of 12 months. It seems that the relation between the speed of pulse wave and the arterial tension varies according to the severity of the heart's condition. This parameter could be further used as an early marker for an eventual relapse of the disease.

The results of the project have been presented at a couple of international conferences and have been in part published. The platform for monitoring has also been patented. And, a start-up company (www.monitor-it.lu) was created in order to further develop and improve the project. In the near future, more work will be undertaken on the subject and there will be a small random study in Luxembourg. While there are contacts with cardiological centres in Homburg/Saarbrücken, Nancy and Munich for a study of a bigger scope, the funding of such a study still needs to be secured.

*For the FNR,
Morgan Meyer*