

Mobile monitoring

Precise sensors record the heartbeat and count the steps – 24 hours a day. The patient usually doesn't notice any of this, however; the tiny sensors are worn on the body or carried as handheld devices like the spirometer, which measures lung function while everyday life continues. All of these sensors collect valuable data that can also be used to improve the development of new medicines. For instance, doctors and researchers in the Department of Cardiovascular Experimental Medicine at Bayer HealthCare are using a number of innovative sensor technologies in clinical studies, for example. Sensors can be used to select suitable patients for clinical studies with even greater specificity, and while the study is ongoing they improve monitoring of the efficacy and safety of the new drugs. This enables the experts to tailor the treatment optimally to the needs of the individual patient.



Patients wear tiny sensors, known as wearables, on their bodies. These measure body functions such as pulse and blood pressure around the clock. A **plaster on the chest 1** continuously monitors the heart function of people with heart disease. Patients with lung problems regularly check their lung function using a **spirometer 2**. **Movement sensors 3** worn on the wrist or belt also enable doctors to determine how active a patient is in everyday life. A greater level of activity can also indicate that a new medicine is working. The devices collect information in everyday situations, and so provide more than the snapshot a doctor usually gets during an examination or at the study center.

A **base station**, such as a smartphone or tablet, collects the data, encrypts them, and sends them to a database. During a clinical study, for example, this allows the ongoing collation of information from all study subjects.

The information provided by wearables and handheld devices could be used to **improve treatment**. The vast amount of data for comparison, illustrating such things as the effect of a medication on a patient group, makes it possible to tailor the treatment of individual patients even more precisely to their specific disease profile and life situation.

Data security has top priority. All patient information is encrypted and stored in a certified central database.

Specialist medical staff monitor the incoming data in centers that are manned day and night. This enables a rapid response if a patient's condition deteriorates. Depending on the situation, the **doctor** treating the patient **can be alerted**, or the patient can be requested to **modify the treatment** in consultation with the doctor. If all the body's **functions are normal**, on the other hand, there is no need to disturb the patient's routine.

Technologies for health

The objective for the researchers and doctors working in the Department of Cardiovascular Experimental Medicine at Bayer HealthCare is to improve the robustness of the information obtained by using modern sensor technology and to optimize future therapies. "We are working with technology companies to identify opportunities for using innovative sensors in clinical studies in the future," explains Dr. Frank Kramer. "We hope that this will enable us to tailor therapies to the individual patient even better than in the past." His colleague Dr. Wilfried Dinh adds, "The parameters are measured continuously and the figures are sent to the doctor using secure data connections. This reduces the number of monitoring visits that have to be made to the study center, making it easier for the patient to take part in the study." At the same time, physicians like Dr. Gerrit Weimann can monitor important functional parameters independently of scheduled visits, enabling the safety and efficacy of the substance being investigated to be monitored in the patient's everyday situation.

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