

Healthcare industry BW

Diagnosis of myocardial infarction: a drop of blood is all that is required

Can myocardial infarction be diagnosed with a single drop of blood? The answer is yes: a new application of the ESEQuant Lateral Flow System developed by QIAGEN now makes this possible. The system, which is able to identify a broad range of bacterial and viral pathogens, including HIV, influenza virus and Chlamydia, was originally developed at the company's site in Stockach. It has recently been adapted for use in the diagnosis of myocardial infarction by the Chinese company Lepu Medical Technology and has achieved initial regulatory approval in human healthcare in China.

The ESEQuant Lateral Flow System was developed by Stockach-based QIAGEN Lake Constance GmbH. Run with Lepu Medical Technology's tests for key cardiac biomarkers, it can be used in emergency rooms alongside ECG to diagnose acute myocardial infarction. The system takes between five and twenty minutes to analyse a drop of a patient's blood on a test strip. It uses test strips produced by numerous diagnostics companies worldwide.

The immunodiagnostic device is based on a chromatographic measurement principle and comes with software that enables clients to develop lateral flow tests to suit their own applications and requirements. "Our devices have many different advantages," said Dr. Konrad Faulstich, Director of Strategic Alliances at QIAGEN Lake Constance GmbH, adding, "the device is extremely sensitive, requires limited laboratory space and is easy to operate." This makes it highly suitable for mobile applications where no power source or computers are available for the analysis of data.

Towards diagnosis: test strips to detect myocardial infarction



The ESEQuant Lateral Flow System can be used for the analysis of liquid samples such as saliva, urine and blood. The samples are applied to a test strip where they are absorbed by the pores and then flow from one end to the other of the strip. Antibodies or antigens that are specific to targets in the sample are immobilised on the strip. "As a dye-labelled molecule also binds to the antigen-antibody complex, in many cases the result can be seen with the naked eye," said Faulstich." The device is nevertheless extremely useful and in many cases even necessary, for example if the dye only shows up faintly on the test strip or when a number of analytes are being tested simultaneously on one test strip. In addition, colours remain invisible to the naked eye when fluorescent test strips are used. "The device can be used for the analysis of reflectometric and fluorescent test strips," said Faulstich.



The samples are applied to a test strip, absorbed by the pores and then flow from one end to the other of the test strip.
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The test strip is analysed in the device, which is equipped with an optical detector. Reflectometric measurements involve the use of colour-coded molecules. Although the colour is visible to the naked eye, visual inspection is nevertheless unable to determine the quantity of the bound molecules. The optical detector is far more sensitive than the human eye and also delivers a more accurate result in the form of a numerical value. Fluorescent test strips cannot be read out with the naked eye. They need to be placed into the system where they are excited with light of a certain wavelength; longer wavelength light is subsequently emitted. This method enables the rather specific labelling and sensitive detection of molecules. The result can either be viewed on the device or on a computer

connected to it. The system can be configured to display numerical values (drug tests) or positive/negative answers (HIV tests).

Six markers provide a reliable result

The Chinese company Lepu Medical, which has configured the device for the diagnosis of myocardial infarction from a drop of blood, sells most of the ESEQuant systems to hospitals. "Myocardial infarction leads to severe contractions, which cause damage to the heart tissue," said Faulstich. "These contractions are accompanied by the release of specific substances (markers) into the blood. The novel test is based on the identification of six markers in the blood of a patient. Run on the ESEQuant, these markers can be used alongside ECGs to diagnose acute heart failure," said Faulstich.

Together with its cooperation partners, QIAGEN's main focus of activity is on the optimisation of its on-site diagnostic tools. New biochemical methods, new dyes, new materials and new highly integrated optical and electronic components enable precise diagnosis in the emergency room, amongst other things. Treatment can be initiated quickly, which saves lives. "We have plans to specifically expand our activities in the field of human diagnostics," said Faulstich.

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