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The VASCOVID project comes successfully to an end

The EU-funded project ends after two and a half years, having successfully developed a portable, non-invasive and real-time photonics platform that monitors the microvascular health of critically-ill patients. After several months of clinical testing in patients admitted to the intensive care unit, the device will continue the road towards commercialization, and clinicians will use it for further studies of patients with other illnesses.

August 21, 2023

During the first months of 2020 and as the Covid-19 pandemic extended worldwide, the surge in patients requiring intensive care unit admission overwhelmed the healthcare systems. In the context of scarce ICU resources, rapidly and correctly managing acute respiratory failure became even more critical.

An emergency call for innovation actions

In that framework, the European Commission launched an emergency call for innovative actions to address the pandemic and its aftermath, selecting VASCOVID as one of the thirteen projects to develop medical technologies and digital tools.

The idea of the project came after deploying the Hemocovid-19 clinical trial during the first weeks of the pandemic, as an international study which tested hundreds of patients in the intensive care units of three different countries. After the trials, researchers found that the microcirculation of Covid-19 patients was altered and that the severity of these alterations was related to the severity of the acute respiratory distress syndrome, caused by Covid-19. Due to the urgent nature of the study, there were several shortcomings that researchers needed to compensate for. As the Hemocovid-19 trial was designed during the pandemic, researchers used the already available commercial near-infrared spectroscopy devices, with reduced accuracy and precision, that could only provide information about the oxygenation of the tissues. And finally, there was also a need for standardization of certain protocols.

A fully integrated system to obtain key biomarkers

Steadily, the Covid-19 pandemic began to be under control, and the team decided to focus on researching the general ICU patients and introduced additional protocols. To develop the

device, the VASCOVID team gathered two research institutions, ICFO and Politecnico di Milano, the Hospital Corporacio Sanitaria Parc Tauli de Sabadell as the clinical partner, three start-up photonics companies, BioPixS, Pionirs and HemoPhotonics, the company Splendo, focused on the internet of things and artificial intelligence and the regulatory affairs company Asphalion.?

Two prototypes of the VASCOVID platform have been developed. Their core technologies time-resolved near-infrared spectroscopy (TRS) and diffuse correlation spectroscopy (DCS are based on near-infrared light, which penetrates mora than 1 cm deep into the tissue. B integrating these technologies with near-infrared spectroscopy (NIRS), the device measure the microvascular blood oxygen saturation, the blood flow and the estimated oxyge metabolism. Furthermore, by means of a provocative test, the technology also allows for th assessment of microvascular reactivity, reflecting endothelial function. The platfor measures in a**non-invasive** way, and gives accurate and robust information in **real-time**, that clinicians can use to make decisions regarding the health status of the patients.

Another key feature of the device is its **portability** and the fact that it is **wireless**, which allows clinicians to easily monitor patients by moving the platform to the bedside of the patients and afterwards storing it outside the rooms when necessary.

New areas of application

The platform was tested and validated, making sure that it complied with the current medical device regulation, measuring more than two hundred patients and healthy volunteers.

With the ultimate goal of making the device widely available, the team has created a business and commercialization plan. Researchers also developed a vision for further applications of the device and designed new pilot studies, testing the platform in other areas. Currently, the device is monitoring patients with ICU-acquired weakness and could potentially be useful for post-ICU personalized physiotherapy. The team has also developed a proof-of-principle focused on neuromonitoring, and they will also test the platform in other medical areas, such as estimating new biomarkers or managing fluid resuscitation.