SectorCon

Project AuReLia
Development of an non-invasive method for monitoring cerebral blood flow and autoregulation in the perioperative setting

Project objectives

- Non-invasive Monitoring using optimized sensors to be worn comfortably on the head and body
- Application area in anesthesia and intensive care for non-invasive patient monitoring
- Exploration of the assessment of cerebral perfusion and autoregulation

Key factors

- Multiple synchronised sensors and data acquisition units
- Wireless server connectivity
- Server-based signal processing and data analysis
- Machine learning and deep learning algorithms
- Low costs sensor material
- Risk-free monitoring process

Partner

CHARITÉ
UNIVERSITÄTSMEDIZIN BERLIN

Department of Anesthesiology and Operative Intensive Care Medicine, Charité-Universitäts-medizin Berlin Campus Mitte

Due to its six intensive care units with about 46.000 administered anesthesias and approximately 10.000 patients treated per year the Department of Anesthesiology and Operative Intensive Care Medicine of the clinical university Charité Berlin offers an ideal infrastructure for the investigation of the new sensor technology.

In addition, the department's long term experience in the undertaking of clinical studies in perioperative and intensive care makes for an ideal partner for SectorCon GmbH in this common research project.

This projet is co-financed be the European Union [EFRE]

EUROPEAN UNION
European Regional Development Fund

Background

A delirium is a frequent and severe complication following surgical operations and intensive care treatment, which manifests itself in an impairment of cognitive function. Recent studies show that up to 80% of intensive care patients receiving ventilation can be affected by delirious symptoms.

For the patient, a delirium often implies a severe and long-lasting impact on their autonomy and quality of life. Particularly elderly patients are often discharged from the hospital in permanent need of care and are consequently unable to return to their homes.

In terms of health economics, deliriums cause significant costs due to an associated prolongation of hospital stays, an increased frequency of complications as well as an increased intensity of care. This is even intensified by the possibility to develop dementia syndrome in the further course of a delirium.

Project objectives

As of today, there is no clinically acceptable method for monitoring the perfusion of the brain and the process of cerebral autoregulation in order to reduce the risk of delirium.

In this context, the objective of project AuReLia is to develop a new monitoring method using non-invasive sensors to be comfortably worn on the patient's head and body for the monitoring of cerebral blood supply in the perioperative setting. The continuous monitoring of cerebral perfusion and autoregulation is supposed to allow the attending anesthetist to intervene when faced with impending cerebral hyper- or hypotension and consequently reduce the patient's risk to experience delirium.

Machine learning algorithms

A central aspect of the research project is the development of self-learning algorithms for the interpretation of the sensor raw data by means of artificial neural networks. Using modern concepts of machine learning and deep learning it is planned to gain new insights in the autoregulation of cerebral pressure as well as the perfusion of the brain.

Monitoring of cerebral blood flow and autoregulation

Sever-based analysis of a multitude of synchronised sensor data-streams

Non-invasive sensors to be worn on the head and body

Perioperative monitoring

Server-based signal analysis

Furthermore, all algorithmic signal analysis will be decoupled from the monitoring hardware used in the perioperative setting. For this purpose, all data recording units will be wirelessly connected to a high-performance server structure. This allows for performance-intensive data processing, which would not be viable using a conventional patient monitor. Instead the data streams of a multitude of sensors and data acquisition units can be synchronized, combined and analyzed collectively.

For further information about our activities and business areas, please visit our website at www.sector.de

About SectorCon

SectorCon GmbH was founded in Berlin in 1992. Since then we stand for solid German Mittelstand, high professional competence as well as sustainable and responsible entrepreneurship. Our customers are the main focus of all of our activities. It is our aspiration to provide them with innovative, high quality products and services for business, science and administrative applications. Furthermore, it is of prime importance to us, that all of our work is shaped by both high technical expertise and high social skills as well as integrity and reliability.

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