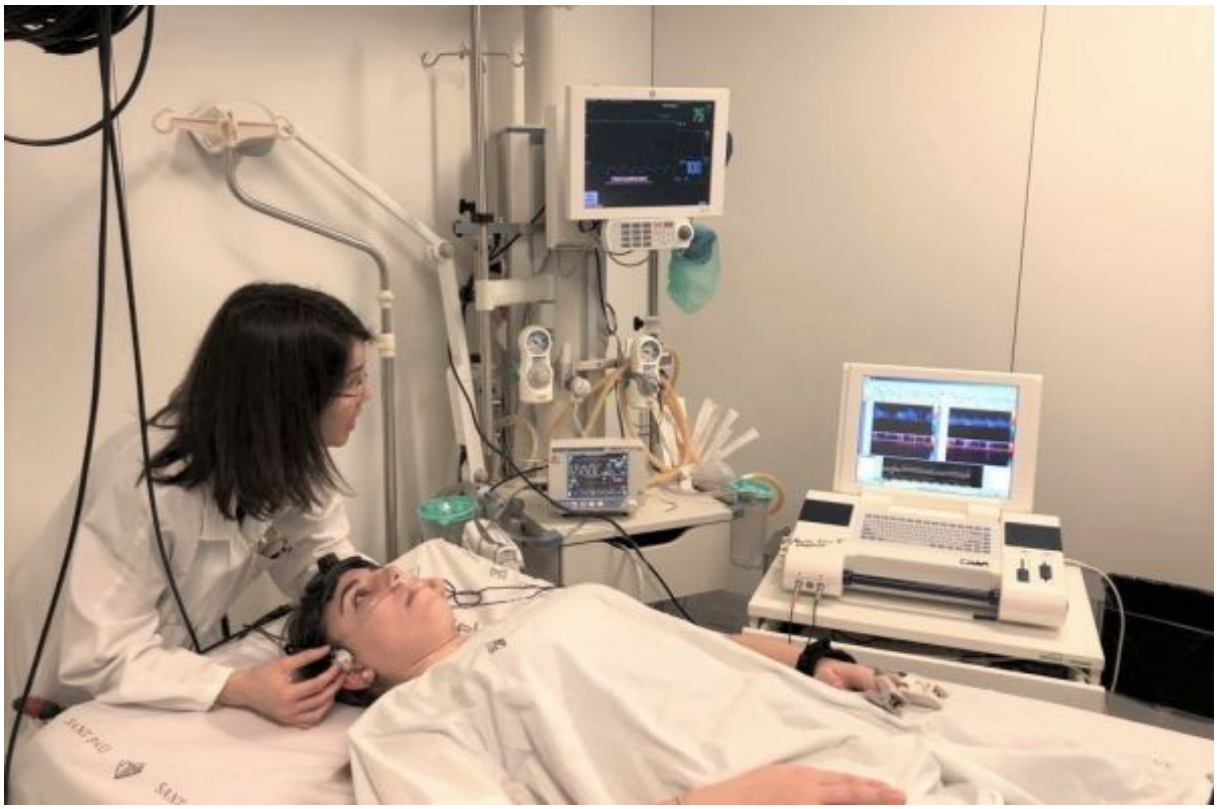

A non-invasive, bed-side optical device could help reduce Stroke-associated disability

Study published in OSA?s Biomedical Optics Express

March 12, 2018

Stroke is the number one cause of disability in adults and the second leading cause of death in the world, with more than 400,000 deaths every year in Europe. Often known as a "brain attack", they occur when the blood flow to a specific area in the brain is cut off, caused by a clot that obstructs the vessel or because the blood vessel ruptures. When a stroke occurs, the blood flow decreases drastically and the brain cells in the damaged areas are deprived of the oxygen and glucose needed to survive.

Stroke, in particular, ischemic stroke, is a complex condition. Today, the most common treatments involve the rapid dissolution of the clot using systemic or local administration of a clot-buster drug or the mechanical extraction of the clot. Treatments must be administered within few hours of the stroke in the emergency room. Unfortunately, only a small subset of patients receive this treatment and the outcome is favorable in only a small percentage of treated patients. Individualized treatment based on a continuous assessment of blood flow to the brain has been proposed as a means to improve the outcome of treatments, however this is currently unavailable in clinics. This is the objective of a device developed by **ICFO researchers Clara Gregori, Peyman Zirak, Igor Blanco,** led by ICREA Prof at ICFO **Turgut Durduran**, which has been brought into the hospital through a collaboration with the **Stroke Unit at the Hospital de la Santa Creu i Sant Pau** in Barcelona led by Dr. **Raquel Delgado-Mederos**. This collaboration has been possible thanks to the support of "La Caixa" Foundation through the initiative LlumMedBcn, the Cellex Foundation and the Spanish Ministry of Health.

A recent study published in *OSA?s Biomedical Optics Express* has reported on the development of their non-invasive optical device that can provide clinicians with real-time feedback and help them determine, on a continuous basis, whether the chosen treatment applied to the patient that have suffered an ischemic stroke has been effective or not. It is the first time that this non-invasive device has been included in the emergency room of a hospital and tested on a group of patients that arrived to the emergency room. Prof Durduran has been working on this technique for many years now, certain of its potential as a future tool for non-invasive medical monitoring to improve the actual diagnosis systems used to date.

The first results of this technique hold a promising future for medical applications, aiming to provide customized treatments for patients that could help improve their chances of a prompt recovery, and thus reduce long-term disabilities for patients that have suffered this disease. Hemophotonics, an ICFO spin-off company, has been commercializing the technology aiming to develop user-friendly software and probes to facilitate large-scale implementation of the system in fast-paced clinical environments.

Both ICFO and Sant Pau groups have recently received a *TV 3 Marato* funding to embark on a new study that will utilize this technology to stratify stroke patients into different treatment groups related to management strategies in the Stroke Unit. This will be the first controlled, randomized clinical study aiming to demonstrate the efficacy of patient stratification with diffuse optics



Forehead sensors. Image Credit: Raquel Delgado-Mederos, Hospital de la Santa Creu i Sant Pau