



Photonics and neurology in the annual meeting of the Barcelona Medical Photonics Network

The CosmoCaixa science museum in Barcelona hosts the network's annual meeting, focused on photonics in neurology and neurocritical care.

April 12, 2022

With spring right around the corner, the Barcelona medical and photonics community gathered in the CosmoCaixa museum, located in the privileged surroundings of the Collserola hillside. With the landscape of the waking city, the meeting focused on non-invasive brain monitoring in neurocritical care, clinical neurology, and neurosciences.

Ignasi Lopez Verdaguer, Director of the Research and Innovation Department at [La Caixa Foundation](#), was the first to welcome the attendees to venue and emphasize the importance of such networks for the city. He passed the word on to ICREA Prof at ICFO **Turgut Durduran**, leader of the [Medical Optics research group](#) and coordinator of the network, who defined the state-of-the-art and the market level of matureness within the field and highlighted the

different photonic devices developed by the group since 2004.

Dr. Antonio Belli, Professor of Trauma Neurosurgery at the [University of Birmingham](#) and Director of the [NHIR Surgical Reconstruction and Microbiology Research Centre](#) was invited to give the keynote speech. He discussed sports concussions, which are the leading cause of death and disability of people under 45 years and account for 10% of the traumatic brain injuries. Dr. Belli talked about the consequences of such traumatism during the practice of sports, highlighting the importance of having diagnosis tools specific and sensitive enough to allow choosing the correct treatment and management of the patients.

The following sessions were dedicated to show how photonics can help clinicians from different sectors assessing their treatments and possibly improving their diagnosis.

Photonics in critical care

As such, **Dr. Jaume Mesquida**, clinician at the [Parc Tauli Hospital](#), gave an overview of the research on critical care patients and how light-based non-invasive devices can help in intensive care units. In critical care, as Dr. Mesquida pointed out, one of the big questions is centered on where doctors need to measure the parameters on the patient to obtain the information about their status. Many of the research done in the field has not yet provided the necessary information, so there is room for improvement in photonic technologies.

" Photonics can help be non-invasive and provide new parameters to help doctors make decisions."

Dr Jaume Mesquida, clinician at the Parc Tauli Hospital.

PhD student at ICFO **Susanna Tagliabue** explained the ongoing research at the [Vall d'Hebron hospital](#). **Dr. Maria A. Poca**, clinician at the [Vall d'Hebron Research Institute](#), remarked how they have learned a lot about the processes of neurotraumatic injuries thanks to the collaboration among both institutions. Finally, **Veronika Parfentyeva**, PhD student at ICFO, talked about another joint project on machine learning predictions.

Monitoring the brain function and aging

The second session was centered on cerebral blood flow and autoregulation. **Dr. Raquel Delgado** from the [Hospital de Santa Creu i Sant Pau](#) talked about stroke and how photonic devices could be beneficial for the continuously monitoring of the brain, emphasizing how in these past 10 years, NIRS and DCS technologies have been used to evaluate the effectiveness of early rehabilitation and other parameters. **Dr. Ricard Valero**, clinician at the [Hospital Clinic](#) and [IDIBAPS](#) gave an overview of cerebral autoregulation, the ability of the brain's vasculature to maintain a stable cerebral blood flow. He pinpointed the utter need for photonic devices that can help assist doctors in the operating room.

"In our operating room, we need to directly measure the cerebral blood flow with devices that are non-invasive, stable, reliable, portable, and with minimal interferences".

Ricard Valero, clinician at the Hospital Clinic and IDIBAPS.

The conference was then geared towards the elderly, and **Dr. Marco Inzitari** and **Dr. Cristina Udina**, clinicians at the Parc Sanitari Pere Virgili and the [Vall d'Hebron Research Institute](#), focused on explaining the research they carry out on the brain and aging patients. Dr. Inzitari talked about cognition, movement, and exercise, insisting on the fact that the aging brain needs to be monitored not only at the bedside but when the patient is up and moving around. Dr. Udina then explained in detail the MEDPHOTAGE study, a medical photonics platform for aging.

Ongoing collaborations and future expectations

Dr. Joan Sanchez de Toledo, Head of the Paediatric Cardiology Department at the [Sant Joan de Deu Hospital](#), introduced [TinyBrains](#), a joint European effort to develop an integrated device to monitor the brain of newborn infants with structural heart problems. Postdoc researcher at ICFO **Lorenzo Cortese** presented the potential of the [VASCOVID](#) platform which was originally conceived for covid-19 patients, but that could also be used for other critically ill patients

Finally, Prof. Durduran wrapped up the event by inviting the attendees to create and build cross collaborations, exchange new ideas and introduce new problems that need to be solved. The day ended with a networking lunch in the midday sun.

