

TinyBrains: Four years of teamwork towards better infant brain monitoring

The TinyBrains project officially wrapped up at the end of Jun 2025. Funded by the EU's Horizon 2020 programme, TinyBrain has brought together researchers, clinicians, and engineers fro across Europe to develop a new non-invasive neuromonitorin platform for newborns with congenital heart defects.

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Back in 2020, the project begun with the goal of developing a tri-modal and non-invasive neuromonitoring device, suitable for use on the most vulnerable infants born with a critical illness. Since then, it has evolved into a series of prototypes: one allowing imaging of brain function to study brain networks, before and after surgery; and another allowing the detection of dangerous events during surgery. Both platforms combine near-infrared spectroscopy (fNIRS), diffuse correlation spectroscopy (DCS), and electroencephalography (EEG) to monitor and image blood flow, oxygen metabolism and brain activity at the same time. The ultimate goal is to help researchers and clinicians better understand how changes in brain oxygenation, blood flow and neuronal function are related to developmental

outcomes in these infants, so they can avoid risky events during complex heart surgeries to better protect the brain, a crucial step towards improving care.
As the coordinating institution, ICFO has led the efforts in device development, integration, and validation, while also coordinating the project management, exploitation and communication. The team worked closely with partners to design the head cap, carry out the technology integration and testing, and design and conduct the preclinical and clinical studies. Currently, data collection is still ongoing at Hospital Sant Joan de Deu in Barcelona, where newborns with congenital heart defects are being monitored.
i¿½The idea for the project stemmed from our long-lasting collaboration over the la t decadei¿½says ICREA Prof. at ICFO **Turgut Durduran,** coordinator of TinyBrains. i¿½It is qui e remarkable that we became aware of the call during the COVID-19 lockdown and were able o put together a very strong consortium rapidly, formulate the project and respond to this ca l where the understanding of microscopic origins of brain injury through multi-modal imagi g was the goali¿½he explains. i¿½It has been an adventure, a pleasure and a highly motivati g experience to work together through this period - especially when clinician , business-people, physicists and engineers sit together to discuss novel methods a d resulting data.i¿½
The final review meeting with the European Commission will take place in September, where the full consortium will present final outcomes and discuss next steps for clinical adoption and future research. The TinyBrains journey has been full of challenges, but it is also a real example of what cross-disciplinary collaboration can achieve. A big thank you to all our project partners, the Hospital Sant Joan de Deu, UPJV, BioPixS and Seenel Imaging for their energy, ideas, and dedication.