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*"La mente è come un paracadute.
Funziona solo se si apre"
A. Einstein*

Analytic tools for identifying biomarkers of epileptogenesis after traumatic brain injury using multi-modal data

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Abstract

The Epilepsy Bioinformatics Study for Antiepileptogenic Therapy (EpiBioS4Rx), is a multi-site, international collaboration including a parallel study of humans and an animal model, collecting MRI, EEG, and blood samples. The development of epilepsy after TBI is a multifactorial process and crosses multiple modalities. Without a full understanding of the underlying biological effects, there are currently no cures for epilepsy. This study aims to address both issues, calling upon data generated and collected at sites spread worldwide among different laboratories, clinical sites, in different formats, and across multicenter preclinical trials. Before these data can even be analyzed, a central platform is needed to standardize these data and provide tools for searching, viewing, annotating, and analyzing them. We have built a centralized data archive that will allow the broader research community to access these shared data in addition to a variety of analytic tools to identify and validate biomarkers of epileptogenesis in images and electrophysiology as well as in molecular, serological, and tissue studies. Furthermore, we are working on crowdsourcing manual validation of algorithmically-segmented brain volumes using virtual reality (VR). One of our imaging workflow processes involves algorithmic segmentation of the scans into labeled anatomical regions using FreeSurfer software. Since this automation cannot yet achieve perfect accuracy, particularly for traumatic brain injury patients, we are working on transforming the way this is accomplished using VR technology to deal with the volumes directly in 3D space, which has been shown to be more efficient and intuitive.