Neurovascular damage determines disease pathophysiology in pediatric mild traumatic brain injury: source of new biomarkers (Neu-vasc)

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Mild traumatic brain injury (mTBI) is a major pediatric clinical problem caused by primary mechanical trauma followed by disruption of brain functions that manifests with or without loss of consciousness and neurological symptoms. Importantly, part of mTBI patients (30%) can develop long-term sequels on the developing brain with to date no good tools for prognostic and classification of subjects within mTBI pathophysiology. Strategies to stratify mTBI in children are urgently needed for diagnostic and predictive value applicable to long-term outcomes.

Our main hypothesis is that, in pediatric mTBI (pmTBI), neurovascular damage determines disease pathophysiology, with early blood-flow alteration and promotes the presentation of blood biomarkers for early and long-term outcomes.

With the combination of experts in clinical and preclinical brain injury research fields, we proposed a translational project to: 1) validate the early loss of cerebral blood flow (CBF) as diagnostic for pmTBI along blood miRNA changes; 2) the molecular and cellular mechanisms linking vascular dysfunction and neuronal activity; 3) and assess the usefulness of these biomarkers for lifetime prognostic from experimental models and at the same time studying the mechanisms behind acceleration of brain aging after pmTBI.

This project could benefit directly patients with the use of laser flow Doppler at the emergency room to classify pmTBI in parallel with new blood biomarker development.