The regulation of adult hippocampal neurogenesis by astrocytes

Adult neurogenesis results in the continuous formation of neurons in the subventricular zone and the hippocampus. It is strongly influenced by the individual's life experiences or diseases and inversely, newborn neurons participate to mechanisms of learning and memory as well as mood control. Thus, adult neurogenesis can be considered both a target to restore cognition in diseases and a marker of brain health. Interestingly, most regulation mechanisms are mediated by the cellular environment of the new cells, named the neurogenic niche and our recent work focused on one major component of the neurogenic niche: astrocytes. We found that molecules produced by astrocytes increase adult neurogenesis, resulting in enhanced memory performances and reduced depression-like symptoms.

The aim of this project is to explore the role of astrocytes in adult neurogenesis and cognition. In particular, we will use biochemistry approaches to identify the molecules responsible for the effect of astrocytes-released molecules on cognition. We will also focus on a newly-identified peptide and examine the mechanisms by which it increases adult neurogenesis. We will test the possibility that the reduction of adult neurogenesis observed in depression and cognitive aging may result from impaired regulation by astrocytes. Finally, we will test the possibility that the administration of these peptides may alleviate the symptoms of depression and cognitive impairment in animal models.

This project will use techniques such as histology, behavioral assessment, viral-mediated gene delivery, inducible transgenic mice, live-cell imaging, western blot and immuno-precipitation.

Further information can be found on our website https://tonilab.org/