The brain and the spinal cord form the central nervous system (CNS) which, together with peripheral nerves, is organized to detect changes in the environment and inside the organism, integrate the information, and respond accordingly. Neurons are specialized cells that constitute the basic units of the nervous system and communicate with one another through electric impulses. Each neuron consists of multiple information-receiving protrusions called dendrites, that transfer the information to the cell body, where it is decided how to respond. The response is emitted along a single, long protrusion called axon, which carries the electric impulse to communicate with the next neuron in the point where they touch each other (synapse). Alterations of the function and morphology of neurons appear in a wide range of pathologies, including Parkinson's disease, amyotrophic lateral sclerosis, epilepsy, muscle atrophies, and dementia.

The responses that the CNS can emit include basal functions like breathing or moving, but it is also capable of higher cognitive processes such as learning and memory. The hippocampus is a brain region that takes part in complex cerebral processes (learning and formation of memories, control of stress responses, emotional behaviour). Its malfunctioning is associated with many neurological diseases like Alzheimer's disease, autism, schizophrenia, and major depression disorder.

The aim of this project is to study the cellular mechanisms that control the morphology of neurons in the hippocampus. Particularly, we are interested in an intracellular signalling pathway called Hippo pathway, that controls how much cells and tissues grow. Therefore, it is related to normal processes, like proliferation during development and remodelling after receiving external or internal stimuli (plasticity), but it is also intensively studied because of its relation to pathological conditions such as cancer. The Hippo pathway acts by modulating the localization of proteins inside the cell via the addition of phosphate groups to their chemical structure. These proteins act inside the cell nucleus and bind to the genetic material, thus their localization determines if genes are expressed or not. Yap1 is one of these proteins, and my laboratory is one of the firsts on collecting evidence in cultured neurons (*in vitro*) for its involvement in neuronal morphology and dendritic plasticity. This project is focused on studying the role of Yap1 in the organization of dendrites in the hippocampus of mice (*in vivo*), including effects on hippocampal morphology, dendritic tree complexity, and hippocampal-dependent behaviour.

Brain disorders and derived impairments of neurological processes constitute one of the greatest challenges to the health system. In this sense, the experiments I propose will try to unveil how synapses and dendrites are capable of such plasticity in the hippocampus, one of the core regions of learning and memory. Conducting research dedicated to understanding the mechanisms that regulate development and plasticity of the CNS can help in developing new strategies for treatment and prevention of neurological disorders. Thus, the experiments planned in this project will include innovative techniques and have high chances of representing a significant contribution to the neurobiological field.