

Project title: ‘*Somatosensation in ischemic stroke - a role of corticospinal tracts*’
or in plain words: ‘*How brain disturbances after stroke affect the way we feel touch and pain*’

After a stroke, many patients experience changes in how they feel touch, temperature or pain. Some people become unusually insensitive (for example, they do not feel light touch on the affected side), while others develop increased sensitivity or even pain when touched. Although these symptoms are very common, we still do not know exactly why they happen.

Recent scientific studies have shown that the brain, shortly after a stroke, produces waves of strong electrical disturbance called “*cortical spreading depolarisation*, or CSD for short”. These waves are known to spread through the injured brain tissue, but their effects on the spinal cord, the first place where touch and pain signals are processed, remain unexplored. Our research aims to understand whether these brain waves change the activity of a nerve pathway that connects the brain to the spinal cord (*the corticospinal tract*), and whether this leads to abnormal processing of sensory information.

In this project, we will study how the brain communicates with the spinal cord in three complementary ways: using advanced electrical recordings in animals, using modern imaging techniques to observe the activity of nerve cells, and using genetic methods to understand which molecules are involved. We will also collaborate with clinical researchers who will perform detailed sensory testing and measurements of nerve activity in stroke patients. This combined approach will allow us to link laboratory findings with real symptoms experienced by people.

Understanding these mechanisms is important not only for improving the diagnosis of sensory problems after stroke, but also for developing future therapies that could normalise the function of the nervous system and help patients recover. The expected outcome of this research is the identification of a new biological pathway that explains why touch and pain sensations change after a stroke, opening new possibilities for treatment in the future.