

Multi-scale investigation of synaptic dysfunction after stroke (MISST)

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Each year about 15 million people suffer a stroke worldwide, a disorder typically caused by lack of blood supply to the brain. Many patients survive a stroke acutely, but are struck with life-long disabilities like paralysis, loss of speech, depression, loss of memory, and eventually dementia resembling Alzheimer's disease. While many lives were saved in recent years due to improved emergency and hospital care for acute stroke, therapeutic options for the chronic consequences of stroke are still missing. The main reason for this unfortunate situation is that we still do not know how the brain reacts to a stroke in the long-term and how these changes are linked to long-term disabilities which usually affect patients for their entire remaining life.

The current application brings together the best and most experienced European researchers specialized in synapses, the structures responsible for communication between neurons, and experts in experimental stroke research. This unique consortium of excellence aims to investigate how a stroke in one brain region may affect the function of the whole brain and how these remote and chronic changes after stroke may be manipulated in such a manner that neurological dysfunction may be reduced or even partially or fully restored. Hence, the ultimate aim of the current consortium is to determine the underlying causes of chronic stroke and to pave the way for the development of effective cures. In order to achieve this goal the current group of European scientists will use novel animal models of chronic stroke and investigate tissue from stroke patients with highly innovative imaging technologies such as super-resolution microscopy and high-resolution whole brain and single neuron 3D reconstruction. First we aim to characterize and understand the degeneration of synapses in brain areas far away from the injury induced by stroke in mice and man. Finally, we aim to use this knowledge to evaluate novel therapeutic concepts for the restoration of synaptic function thereby developing novel treatments for chronic stroke.