ANNUAL HIGHLIGHTS IN CNAP

Chronic pain affects one out of five adults. The ability to adapt to changes within the body and in the surroundings is a fundamental characteristic of the central nervous system, and broadly defined as neuroplasticity. Continuing pain and increased pain sensitivity after injury resolution are in part considered due to maladaptive pain neuroplasticity. CNAP applies a biomedical engineering approach where new, advanced mechanistic pain provocation and probing platforms are studied to reveal fundamental aspects of human pain neuroplasticity.

Provocation of pain and neuroplasticity are studied by e.g. advanced electrodes for more selective activation of nociceptors (pain receptors). When warm and cold sensitive afferent nerves are stimulated simultaneously, it may provoke a paradoxical sensation, e.g. burning pain or the urge to scratch. A novel stimulation device has been designed to study the role of pain and itch neuroplasticity for the processing of paradoxical sensations. Another example of pain provocation is based on the perception of a continuous moving stimulus across the skin. The spatial perception of non-painful touch is different from the spatial perception of painful laser provocations, which indicates that painful sensory information is integrated differently compared to non-painful tactile sensory information. Such manifestations are studied further in conditions with pain neuroplasticity.

An important CNAP proof-of-concept study demonstrated that experimental human models provoking pain for several days in healthy subjects induced changes in the responsiveness of particular cortical brain areas that may link with pain neuroplasticity. Interestingly, after provoking such changes in the brain response, these could be partly reverted by repeated application of magnetic stimulation to the brain, which led to a reduction in pain perception. Animal models provide unique information on the development of chronic pain and are important for understanding details in the human models of cortical pain neuroplasticity. CNAP has established an animal model to investigate such short-term effects of pain and neuroplasticity. Finally, understanding traits (e.g. epigenetics or characteristics of neuroplasticity in other neural systems) for expressing pain neuroplasticity in long-term pain conditions is a core activity.

Marie Skłodowska-Curie Actions COFUND Grant to the PhD Programme FRESCO@CNAP

One of the CNAP highlights in 2017 was the awarding of a COFUND grant under the EU's Marie Skłodowska-Curie Actions, to the PhD programme FRESCO@CNAP. This grant will further strengthen the research training, internationalisation, interdisciplinarity, and excellence of CNAP and allow for the special recruitment of eight FRESCO@CNAP PhD Fellows within the CNAP funding period.

International Research Environment and Visiting Researchers

Maintaining a vivid and talented research environment, which is a core value for CNAP, involves welcoming guest researchers. In 2017, CNAP hosted several international guest researchers, e.g. through the Fulbright scholar programme (*Dr. Bement*, Marquette University) and the GROW programme (*PhD fellow Lannon*, University of Tulsa). Focusing on diversity within the centre, a fair balance was kept regarding both internationalisation and gender.

Congresses and Events

In 2017, the Congress of the European Pain Federation was held in Copenhagen (EFIC®, approx. 2500 participants). CNAP was not only very well represented with posters and workshops, but also involved in key organisational issues. Besides, CNAP was strongly involved in organising the Scandinavian Association for the Study of Pain (SASP) annual meeting taking place in Aalborg (approx. 170 participants). CNAP successfully concluded several events such as specific Round Table Discussions and PhD courses, all contributing to the research on pain and neuroplasticity.