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The SOMA project starts to restore sensation of limb prostheses

Limb prosthetics used in amputees lack natural and tactile sensations. The EU-funded SOMA project aims to develop a new interface based on algorithms that enable the sensing of mechanical pressure, pain and changes in temperature. The Group of Neuroplasticity and Regeneration of the UAB, led by Prof. Xavier Navarro, will lead the validation of the new interface system *in vivo*.

The SOMA project, Ultrasound peripheral interface and in-vitro model of human somatosensory system and muscles for motor decoding and restoration of somatic sensations in amputees, funded by the European Commission, aims at developing novel low-invasive bidirectional interface based on ultrasound probes and algorithms enabling the decoding of muscular activity and the sensing of close-to-natural somatic sensations.

The team of partners is coordinated by Università Campus Bio-Medico, who will also develop the instrumented hand prosthesis, the algorithms for encoding somatic sensations and the techniques for stimulating the PNS through ultrasound probes. The international network of partners participating in the project includes: Fraunhofer-Institut für Biomedizinische Technik will develop the ultrasound (US) probes, University College of London will develop the miniaturized electronics, Imperial College London will investigate the myoelectric control based on US recording of the prosthesis, Università di Napoli “Federico II” will develop an in vitro model of the muscles and of the somatosensory system for the experimental validation of the US interfaces, Universitat Autònoma de Barcelona will perform tests of biocompatibility and functionality on animal models, and Össur, a world leader company in the development

of prostheses, will contribute to the development of the new SOMA prosthesis. The Group of Neuroplasticity and Regeneration of the UAB will lead the validation of the new interface system *in vivo.*

The virtual kick-off meeting took place on October 28th, and defined the first actions to achieve the ambitious objectives of the project: the prostheses will be able to feel and route back to the amputee tactile and thermal sensations, and also pain. To this purpose, SOMA will take advantage of the most advanced technology in the field of tissue engineering and neurocomputational modeling, integrated in a synergistic way with the most advanced technologies, hardware and software, in the field of neuroprostheses and implantable devices.

Understanding the spatiotemporal relationships between cutaneous stimuli and neural signals will help scientists apply focussed ultrasound stimulation to the peripheral nervous system. This is expected to provide amputees with sensory–motor control of their upper-limb prosthesis.

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References

Project SOMA “Ultrasound peripheral interface and in-vitro model of human somatosensory system and muscles for motor decoding and restoration of somatic sensations in amputees”
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