MedicalXpress

Development of multifunctional films for peripheral nerve regeneration

October 27 2016

A vast number of people are affected by different types of peripheral neuropathies in United States alone. Peripheral nerve injuries frequently occur in people involved in accidents or in combat veterans who suffered loss of limb function or paralysis. The global nerve repair market is expected to grow from approximately $5 billion in 2015 to about $10 billion by 2020. To take care of peripheral nerve injuries, implantable devices in the shape of tubes or conduits are designed to facilitate the growth of nerves after they get damaged.

Conduits are usually engineered to incorporate one or more regenerative cues. Regenerative cues are properties of the conduit that support the growth of damaged nerves and also guide them in the right direction to connect with the existing neural tissue of the limbs and thus restore nerve function.

Interdisciplinary research conducted at Iowa State University in the labs of Dr. Surya Mallapragada and Dr. Donald Sakaguchi has resulted in the development of novel biodegradable multifunctional films that incorporate several regenerative cues such as micropatterns and drug gradients to push nerve growth in the desired direction; long-term drug delivery via microparticles and porous walls to transfer nutrients and waste materials and to foster growth of fibrous tissue. Both professors have more than 10 years of experience developing strategies to improve peripheral nerve regeneration. This strategy produced rapid neurite growth in PC12 cells and is expected to show similar results in animal studies to be performed in future.

Combining various regenerative or healing cues in one medical device holds great potential beyond treating nerve injuries, including other classes of tissue engineering like bone, cartilage, tendons, musculoskeletal tissues, etc.

More information: Metin Uz, Anup D. Sharma, Pratish Adhikari, Donald S. Sakaguchi, Surya K. Mallapragada, Development of multifunctional films for peripheral nerve regeneration, *Acta Biomaterialia*, Available online 29 September 2016, ISSN 1742-7061.