Dmitri A Rusakov et al., J Neurol Neurophysiol 2016, 7:5(Suppl)
http://dx.doi.org/10.4172/2155-9562.C1.040

Nanoencapsulated drug delivery for nerve treatment and beyond

Dmitri A Rusakov[1], Olga Kopach[1], Dong Luo[2], Andrei Sapelkin2 and Gleb B Sukhorukov[2]
[1]University College London, UK
[2]Queen Mary University of London, UK

Targeted drug delivery is a high-priority issue in the emerging concept of precision medicine. We have been developing a breakthrough methodology involving nano-engineered biodegradable polymer microcapsules (0.5-2 μm in diameter) that carries medicinal cargo and are equipped with controllable biophysical and cargo-release properties. Our aim has been to implement this technique in the targeted treatment of nervous tissue and potentially other complex tissues. In our recent studies, we have established nano-engineering tools and protocols to encapsulate releasable drugs relevant to neuronal control, with a wide range of parameters that control capsule permeability. In the case study, we used patch-clamp electrophysiology to document physiological effects of encapsulated sodium channel blocker QX-314 on excitability of nerve cells in culture. In experiments on intact animals, we have established beneficial longer-term effects of encapsulated QX-314 injected in vivo, using a standard behavioral model of inflammation-induced peripheral hypersensitivity in the rat. Building upon these advances, we are currently advancing to optimize preparation, delivery and release of encapsulated anesthetics agents, attempting to establish the underlying physiological mechanisms, controlling factors, and a feasible application scope pertinent to this methodology. Our quest should pave the way for exploring future clinical trials involving microencapsulated drug delivery.

Biography

Dmitri A Rusakov is a Professor of Neuroscience and Wellcome Trust Principal Fellow at Institute of Neurology, University College London. His laboratory has been focusing on multi-faceted synaptic mechanisms of memory trace formation in the brain also involving astroglial signaling.

d.rusakov@ucl.ac.uk

Notes: