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Peripheral nerve regeneration research

Why is it getting so “cool”?^H

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More than twenty years ago, when I first started working on plasticity and regeneration in the peripheral nervous system, I had the feeling of being part of a little, though lively, scientific community that was rather isolated in the world of neuroscience which appeared to me as almost only focused on central nervous system. Since then, things have progressively changed very much and, today, interest in the regeneration in the peripheral nervous system, and especially in its main component. i.e. the peripheral nerves (Geuna S, Raimondo S, Ronchi G, *et al.* Histology of the peripheral nerve and changes occurring during nerve regeneration. *Int Rev Neurobiol.* 2009;87:27-46.), is sprading tremendously among both basic and clinical neuroscientists.

Which could be the reasons for this change? I can see, at least, two major factors.

First, medicine and surgery have been slowly shifting from a difinition of health as “the absence of disease or infirmity” to a definition of health as “a state of well-being” (WHO. Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June 1946, and entered into force on 7 April 1948). In other words, more and more attention is being dedicated to the quality of live of the patient. In this view, although peripheral nerve lesions do not usually cause any threat to patients’ live and often the degree of disability is low, nonetheless these types of lesions always affect the quality of live of the patients. Therefore, they have always to be treated!

Yet, peripheral nerves are anywhere in the body and thus peripheral nerve regeneration and tissue engeneering touch all branches of medicine and surgery (from neurosurgery to orthopaedics, from plastic surgery to urology, just to make some examples) and thus the potential number of patients that would need to be treated is very high.

A second reason that I see as a major determinant of the recent success of peripheral nerve regeneration research is the great recent development of biomaterial sciences that leads to the continuous development of innovative medical devices for reconstructing damaged organs and tissues. For their complex three-dimensional anatomical organization, peripheral nerves represent a perfect target for biomaterial-based tissue engineering and have thus attracted very much the attention of materials scientists and engineers interested not only in the clinical spin off, but also in the potential for large scale industrial spin off generated from basic science results.

The collection of papers that have been brought together in this issue of *Neural Regeneration Research*, aims to give a view on the lively scientific interest on peripheral nerve regeneration research. It includes three review papers as well two research articles. The first review addresses some general emerging concepts in peripheral nerve repair that appears to be ready for being translated to the clinics. The other reviews focus on

two interesting aspects of peripheral nerve adaptation after injury and regeneration, namely the role of inflammatory cytokines and the sensory reinnervation occurring after complex free flap tissue reconstruction. The collection is closed up by two research articles, the first of which addresses the combined use of chitosan membranes and mesenchymal stem cells on nerve regeneration, while the second investigates the potentialities of combining direct muscle neurotization with end-to-end- and end-to-side neurotization for preventing denervation-related skeletal muscle atrophy.

I hope that this collection of papers will be of interest both for experienced nerve researchers, in their efforts for addressing the many challenging scientific questions that still need to be answered in this intriguing research field, and for young scientists and clinicians that are just moving their first steps in this field. I hope that they will create a new and interdisciplinary generation of enthusiastic investigators that will be able to face tomorrow's scientific challenges in peripheral nerve repair and regeneration.

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