

Nerve fibres regenerating through a trimethylenecarbonate/ ϵ -caprolactone nerve guide are electrophysiologically comparable to an autograft

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In order to develop an acceptable synthetic nerve guide as an alternative to an autograft, we evaluated four different biodegradable, non swelling and flexible tubes. Three grafts composed of a copolymer of 1,3-trimethylene carbonate (TMC) and ϵ -caprolactone (CL), and one graft made of ϵ -caprolactone (CL porous) were used to bridge a 6 mm gap in the rat sciatic nerve. The grafts composed of TMC copolymerized with CL (TMC non porous, TMC porous, TMC/CL porous) differed in the composition and porosity of the inner layer. We evaluated morphometrical and electrophysiological properties of the regenerating A α - and A β -nerve fibres separately, and made predictions on charge displaced, firing threshold and refractory period, based on diameter and number of fibres. We also studied morphometrical properties of the muscles distal to the grafts.

The number of nerve fibres was mainly determined by the number of A α -fibres, which branched more in the CL porous and TMC non porous compared to the TMC porous and TMC/CL porous grafted nerves. The charge displaced in the A α - and A β -fibres decreased more than predicted based on number and diameter, but deviated least from predicted values in the TMC/CL porous grafted nerves. Muscle cross sectional areas of tibial and gastrocnemius muscles were comparable in all synthetic grafted nerves.

Regenerating nerve fibres through the TMC/CL porous grafts were predominantly of the A α -type, their values for firing threshold and refractory period were comparable to those obtained in autografts, and the charge conducted per fibre was the best from our panel, both in the A α - and the A β -fibres. These favorable results may be associated with the complete *in vivo* degradation of the tube within 12 weeks. We therefore consider this graft to be the synthetic nerve graft of choice, which is able to compete with an autograft.

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heb een e-mail gestuurd met de vraag wie waar werkt....

Speaker in session 19