Restoration of Motor End-Plate and Sensory Nerve Terminal in the Heterogeneous Nerve Transplant Pretreated with Con A
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To determine the effects of Con A pretreated heterogeneous nerve transplants on motor end plate and sensory nerve ending restoration, we removed a segment of right sciatic nerve, 5mm in length, from Wistar albino rats under anesthesia. The nerve segment was resected at a site of 10cm from the lower margin of piriformis muscles. A 8mm long Con A infused tibial nerve of Japanese large ear rabbits was transplanted to the lesioned sciatic nerve in the rat using a 9/0 atraumatic suture to connect the proximal and distal ends of the cut nerve to the transplanted nerve. After 4, 8 and 12 weeks, the gastrocnemius muscles on the operated side were removed and fixed with 0.8% glutaraldehyde, frozen sectioned and reacted with AchE histochemical reaction and AchE reaction combined with silver impregnation method to show the motor end-plate. The claws on operated side was fixed with 10% formalin and frozen sectioned. Using Gross-Schultze modified Bielschowsky method, cutaneous nerve endings were shown. In 12 weeks post-operation, brownish red reaction product could be seen in the gastrocnemius, with AchE reaction positive. In 8 week post-operation the AchE positive reaction was weaker, and the brownish-red reaction product was lighter than that of the 12 weeks post-operation animals. In the incubating medium after added ISO-OMPA the above results could also be seen. In the incubating medium with physostigmine added or with basal medium added, AchE reaction of the gastrocnemius was negative. In 8 and 12 weeks post-operation, slides treated with silver impregnation staining had black silver granules associated with AchE positive locations, indicating that silver impregnated nerve fibers joined with the AchE positive sites -- motor end-plates. In 8 weeks post-operation the subcutaneous tissue had the appearance of regenerated nerve bundles. Occasionally small amount of isolated nerve endings were seen lying in the dermal layer. In 12 weeks post-operated animals similar results as above could also be seen, but in the dermal layer isolated nerve endings increased in number, some were in the dermal papilla and participated in the formation of Meissner's corpuscles, some nerve fibers penetrated between epidermal cells forming isolated nerve endings. After 4 weeks, in subcutaneous tissues, dermal layer and superficial skin had no obvious nerve bundle nor nerve ending. After Con A pretreated heterogeneous nerve grafting, the axotomized axons not only could regenerated, but also grow towards the distal segment to reinnervate the denervated skeletal muscles, and caused the restoration of cutaneous sensory nerve endings.