Experimental Study of the Transplantation of Schwann Cells into Dacron Artificial Tube for Repair of Peripheral Nerve Defects
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In recent years, many researchers have been looking for the methods to repair lesioned peripheral nerve, and to look for a kind of clinically practical and more effective nerve substitute. We have also explored some of methods. In this experiment, we chose to use dacron artificial tubes to make a condition very similar to the microenvironment of the injured peripheral nerve. We implanted into the tubes in vitro culture of rat Schwann cells and observe the possibility of it to bridge lesioned sciatic nerve, and compared with autogenous nerve transplantation.

Sixty SD rats, weighting 200-250g, were used in this experiment. They were divided into 4 groups in random. In the first group the bridging substance was dacron tube + autogenous rat blood plasma + Schwann cells (DZZ Group). The second group used dacron tube + autogenous rat blood plasma + xenogenous Schwann cells (DZY Group). The third group had Dacron tube + autogenous rat blood plasma (DZ Group). The fourth group had autogenous nerve transplant (ZN Group). The animals were examined on 7, 15, 30 days after operation (each group with 5 animals). The upper, middle and lower segments of the bridging substance were embedded separately and observed under light and electron microscopes. Experimental results indicated that on 30 days after operation, there was myelinated axons at the distal segments, total number of axons in DZZ Group (240.1) is very close to ZN Group (260.6). There was no significant difference between these two group but the numbers were obviously higher than those in DZY Group (142.5) and DZ Group (97.5). The difference was significant. Study of regeneration rate of the myelinated axons also showed a result similar to the above results. The regeneration rate in DZZ Group was 16.62 %, slightly lower than 18.13% of the ZN Group (P<0.05), but far higher than those in DZY Group (9.83%) and DZ Group 6.71% (P<0.01) Electron microscopy observations also showed that the regenerated axons of DZZ Group had greater diameters and thicker myelin sheath than the DZY Group and DZ Group, but close to ZN Group. This experiment showed that the easily available Dacron tube which is a permeable membrane, after implantation of autogenous biological viable Schwann cells, can form a micro-environment similar to that in the peripheral nerve and it is able to allow the regenerated nerve to grow. The addition of autogenous blood plasma into the transplant tube could again provide nutrition to the isolated Schwann cells and to keep them alive, therefore the DZZ nerve transplant substitute designed in this experiment has a definite clinical application in future.