Effect of the Schwann Cell Basement Membrane Component -- Collagen Type IV on Neural Regeneration
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Based on the studies of basement membrane components - laminin and fibronectin, we further investigated the action and effect of another important component of basement membrane -- collagen type IV (coll. IV) on maintaining neuronal survival during regeneration, on promoting axonal outgrowth and survival of other non-neuronal cells.

The experiment was carried out with 90 Wistar rats. In 30 rats, after bilateral sciatic nerve degenerative treatment, segments of sciatic nerve 1cm long were resected as donor nerves. The 60 recipient rats were divided in random into control group (30 rats) and anti coll. IV group (30 rats). The donor nerves (60 nerves) were frozen and heated 5 times respectively to kill the Schwann cells, then treated with normal mouse serum diluted 50 folds. The treated nerve segments were transplanted into the right side of the control group; the rest of the nerve segments were treated again with anti coll. IV antiserum and then transplanted into rats of the anti coll. IV group. After 5, 7, 10, 15 and 30 days, samples were taken (control group and anti coll. IV group each 6 rats). At 1, 5 and 9mm of the transplanted nerve, segments were taken out and processed for light microscopy and electron microscopy. Counting and statistical analysis done. The results showed that: 1. Axon growth rate and degree of maturity of the anti coll. IV group were all lower than that of the control group. The percentage of regenerated axon in anti coll. IV group when compared with the control group was: 15 day after operation at 1mm and 5mm in the transplant were 65% and 4% respectively. In 30 days after operation, at 1, 5 and 9mm in the transplant, the percentage were 94%, 82% and 57% respectively. In 30 days postoperation, at 1mm in the transplant, the axon number of two groups had no marked difference, indicated that the number of survived neurons of the two groups was quite close. 2. The number of macrophage reached peak at 7 days after operation, then gradually decreased, and that the rate of decrease was faster in control group than anti coll. IV group.

Number of macrophage of the two groups when compared with each other were: at 5-7 days the two groups were almost the same; on postoperation day 10 the anti coll. IV group was 1.7 times that of the control; on postoperation day 15 it was two times; on 30 day postoperation it was 3 times. The results indicated that: 1. Coll IV of the Schwann cell basement membrane was involved in the early phase of nerve regeneration and promoted axon growth and maturation. 2. The effect of Coll IV in maintaining survival of injured neurons was not as obvious as laminin and fibronectin. 3. Coll IV also produced positive effect to the macrophages which was an important effect in injury repair. Therefore Coll IV is an important substance in nerve regeneration micro-environment.