Spinal cord injury (SCI) can lead to paraplegia or quadriplegia. Although there are no fully restorative treatments for SCI, many cellular and molecular therapies have been tested in animal models. Olfactory ensheathing cells (OECs) are known to enhance axonal regeneration and to produce myelin after transplantation and have become a prime candidate for cell-mediated repair following a variety of CNS lesions. Some grown factors like (acid fibroblast grow factor) αFGF are used to potentiate this effect. This study evaluated the effect of OEC+αFGF transplantation on spinal cord lesions in rat. Fifteen Wistar rats underwent a T8-T10 complete spinal cord section. Sixty days post injury, nine rats were injected directly into the injury with OECs+αFGF, and 6 rats were used as controls. Functional outcome was measured using the Basso-Beattie-Bresnehan score and inclined grid test 24 hour after the treatment and up to seventy five days after transplantation when the animals were sacrifized. Samples of spinal cord tissue were studied for ultrastructural changes. The results showed a clear and progressive functional recovery of the animals treated with OEC+αFGF transplantation, compared to controls (Fig. 1). Ultrastructural evaluation exhibited severe axonal and myelin changes, like ruptured myelin sheaths, neuropil edema, very thin myelin sheaths, axonal degeneration and peri-axonal edema, in control rats (Fig 2). In transplanted rats these changes were reduced in frequency and severety. In addition, in transplanted rats there were foci of remyelinated axons (Fig. 3) that were not observed in control rats. These results suggest that OEC+αFGF transplant induces axon regeneration and remyelination and functional recovery in chronic injured rats.

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Fig. 1: Figure 1. BBB score. Functional recovery of rats with chronic completely transected spinal cords after OEC+aFGF transplantation.

Fig. 2: Figure 2. Transmission electron micrographs from the lesion site of a control animal. A) Ruptured myelin sheaths (arrows) and neuropil edema (star). B) Very thin myelin sheaths (arrows). C) Thin myelin sheaths and axonal degeneration. D) Peri-axonal edema (arrows).

Fig. 3: Figure 3. Micrographs from the lesion site of a transplanted rat with OEC+aFGF. A) Semi thin sections with toluidin blue (TB). It shows foci of axonal regeneration and remyelination. B and C Transmission electron micrographs. B) Foci of remyelination (circle). C) Detail of the forward. Remyelinated axons by oligodendrocytes (arrows).