

Free neurovascular flaps: muscle biopsies studies

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Abstract

In plastic surgery free neurovascular flap is used with reconstructive purposes. In spite of the great number of improvements, aesthetic and functional results of free flap are not always successful, mostly because fibrosis and fatty change take place after some years. Spontaneous reinnervation lets the muscle preserve a certain degree of trophism. In this study, six biopsies were taken from six different free flaps. Biopsies were studied histologically and immunohistochemically to determine degree of muscle trophism, and embryonic myosin. Biopsies were analyzed morphometrically and the relative muscle, fibrous and fatty tissue content determined. In some instances activation of satellite cells was evident, confirming that even several years after the vascular free flap transfer the muscle still attempted to regenerate.

Key Words: human muscle, free muscle graft, muscle recovery, N-CAM, muscle regeneration, reinnervation.

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Muscle trophism depends on a variety of factors, among which the most important are vascularization and innervation. Therefore, a chronically denervated muscle is subjected to a transformation: first of all it becomes atrophied, with a decrease in muscle fiber diameter and number. Then it becomes dystrophic: myofibers degenerate and are substituted by fatty and connective tissue. In plastic surgery free neurovascular flap is used with reconstructive purposes. In spite of the great number of improvements, aesthetic and functional results of free flap are not always successful, mostly because fibrosis and fatty change take place after some years (muscle lipodystrophy). Otherwise, in a few number of cases the transplanted muscle (grafting) can be reinnervated by axons that are found in the grafting area. Spontaneous reinnervation preserve a certain degree of muscle trophism. A part from the muscle's possible transformation in free flap, regenerated events are found starting from satellite cells [1]. These are myogenic precursors which are able to become myocytes when muscle is damaged for different reasons. In the study, six biopsies were taken from six different free neurovascular flaps, made in a period of six years (1997-2003). The average age of subjects (5 male and 1 female) was 36 years, average time to biopsy was 4 years and 5 months, range 3-7 years.

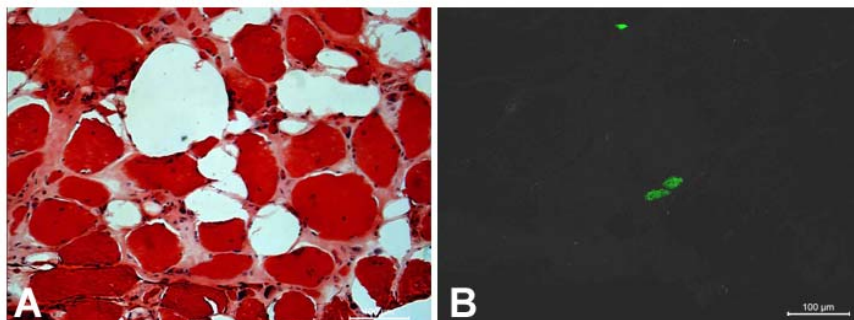


Figure 1. *Latissimus dorsi from seven-years human free flap. A, Hematoxyline-eosine stain. The cryosection shows quite trophic myofibers, some of which with an irregular profile and central nuclei. B, Anti embryonic MHC stain shows a pair of regenerated myofibers.*

Biopsies were studied histologically and immunohistochemically to determine degree of muscle trophism, and the presence of embryonic myosin [2]. The results suggest that muscular tissue, which is denervated for a long time, becomes atrophic in different degrees. In some cases activation of satellite cells is evident and several years after the free flap transfer, the muscle still attempt to regenerate.

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References

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