

# Neovascularization or Post-Natal Vasculogenesis induced by SW?

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## Introduction:

Over the last few years several reports have defined the existence of Endothelial Progenitor Cells (EPC's), which have an important role for neovascularization in ischemic tissues (1,2). Researchers in the field of Mesenchymal Stem Cells (MSC's) have suggested the presence of "bone marrow hematopoietic stem cell niches" (3), adding the concept of "circulating bone marrow hematopoietic stem cell"(4). Very recently, Da Silva Meirelles (5) presented an analysis of evidences that suggest "a perivascular location for MSC's, correlating these cells with pericytes" defining that "the perivascular zone is the MSC niche in vivo". On the other hand, accepted vascular mechanisms involved in tissue repair in adults were initially related to neovascularization and posteriorly to "post-natal vasculogenesis" (6,7,8), which infuse EPC's into sites of neovascularization and develop into endothelial cells (EC's). This process of "angio/vasculogenesis" appears to embrace recent discoveries and definitions derived from a stem cell's field (9).

## Discussion:

Our histological results on shoulder rotator cuff tendinopathic biopsies [n:53 observations, 12 biopsies (non-SW group) and 13 biopsies (SW-treated, devices Dornier Compact Alpha , Orthospec, Storz Duolith SD1)] that received immunohistochemical procedures (monoclonal antibodies and techniques for PCNA, cd34+, cd14+, D2-40, Col I, Col III, Tenascin-C)] are: Spontaneous reparative effects in shoulder tendinosis including 2 forms of responses: one is an open form, being the most common finding (diffuse focal angiogenesis with non-proper pericyte development and a propensity to micro-haemorrhagic foci); the second one is a "nodular form", much less frequent, in which we observed angio/vasculogenesis with proper pericyte development. Analysis of cd34+/cd14+ behaviour (activity) in spontaneous repair indicates a moderate response for cd34+ and PCNA/Col I/Col III/Tenascin-C showed diffuse or scant activity, depending on the degree of damage. Comparison with SW-treated tissue: we observed stronger cd34+ and cd14+ activity, developed mostly in "nodular form", with intense pericyte expression surrounding neovessels. Immunostaining for PCNA/Col I/Col III/Tenascin-C depicted higher activity, suggesting an anabolic condition for the node itself and for the original neighboring tissue, depending on migratory behaviour of a high number of cells PCNA(+) (focal hypercellularity). Histological analysis in cases of SW therapy, demonstrated that neo-vascularised areas appears along the tendon structure, being able to distinguish different stages of neo-blood vessels maturity. Also the Tenascin-C marker showed progressive stages of vessels maturation. D2-40 is a lymphatic marker that showed higher expression in SW treated tissues.

## Conclusion:

In summary, after SW therapy tendon tissue appears more vascularised and more cellular, indicating an improved repair capability. These findings suggests with high probability that both processes are involved after SW treatment.

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