Mechanical Tension Prevents Fibrosis by Reducing Collagen Deposition After Injury On Subcutaneous Layer In Mice

Mariane Altomare and Andréa Monte-Alto-Costa
Tissue Repair Laboratory, State University of Rio de Janeiro, BRAZIL
Av Marechal Rondon 381/HLA, Rio de Janeiro, RJ Brazil
Phone + 55 21 2334 2421
Email: marialtomare@gmail.com and amacosta@uerj.br

HYPOTHESIS: Mechanical forces play an important role in connective tissue remodeling, scarring and fibrosis. We tested the hypothesis that brief (10 minutes) static tissue stretch and brief manual tissue stretch (3 cycles of 10 seconds) attenuates the new collagen deposition in response to injury
METHODS: Ethical guidelines to animal experimentation were followed, and the protocol approved by local Ethics Committee. Three different models were used: (1) swiss mice (n=5 animals) underwent a subcutaneous microsurgical injury on the back, then were stretched by elongating the trunk (20–30% strain for 10 min for 7 days); (2) swiss mice (n=5 animals) underwent a subcutaneous microsurgical injury on the back, then were stretched manually for 3 cycles of 10 seconds for 7 days, and (3) mice (n=5 animals) underwent a subcutaneous microsurgical injury on the back and no other treatment was performed (control group). Subcutaneous tissues of the back were histologically stained with hematoxillyn and eosin; picro sirius red and Mallory´s tricrome.
RESULTS: Microinjury resulted in a significant increase on collagen deposition in the absence of stretch, but not in the presence of stretch (in both groups elongated and manually).
CONCLUSION: Brief tissue stretch attenuated the collagen deposition following tissue injury. These results have potential relevance to propose treatments of different types of excessive scars - such as post liposuction fibrosis – by applying brief mechanical stretch to tissues.