HISTOLOGICAL STUDY OF THE DEEP FASCIAE OF THE LIMBS

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BACKGROUND: Today a lot of manual therapies speak about the role of the fascia in the aetiology of pain and in the proprioception. We wanted to see if from an anatomical and histological point of view the presuppositions for such hypothesis could exist. METHODS: Histological and immunohistochemical stains has performed in 72 specimens of the deep fascia of the limbs taken during 6 dissections in order to evaluate the collagen fibre bundle arrangement, the presence of elastic fibres and the type of innervation. RESULTS: The deep fascia of the limbs is a sheath that presents a mean thickness of 1 mm (0.5-
1.4 mm). It is formed of numerous layers of parallel collagen fibre bundles, presenting an undulating arrangement. Each layer is separated from the adjacent one by a thin layer of adipose tissue that permits to the different layers to slide one on the other. Adjacent layers show different orientations of the collagen fibres, so the fasciae of the limbs are similar to a plywood structure. Some short elastic fibres are present, forming an irregular mesh. Inside the deep fascia of the inferior limb some well delimited bundles of muscular fibres have been evidenced. In all specimens of the deep fascia nerve fibres were found. They were particularly numerous around vessels, but also distributed homogeneously throughout the fibrous components of the fascia. Some nerve fibres were connected to the collagen fibres, while others were surrounded by loose connective tissue. In some specimens, Ruffini and Pacini corpuscles were also highlighted. CONCLUSIONS: Thanks to the different orientations of the collagen fibres in the layers, the fascia has strong resistance to traction even when it is exercised in different directions. At the same time it can adapt to stretch, thanks to the elastic fibres together with the undulated arrangement of the collagen fibres. Once traction has been removed, it is probably that these same elastic fibres allow the fascia to return to its rest state. The capacity of the different collagen layers to glide one on the other could be altered in cases of overuse syndrome, trauma or surgery. The presence of many free and encapsulated nerve terminations, particularly Ruffini and Pacini corpuscles, indicates that the deep muscular fascia has probably a proprioceptive role. The capsules of these corpuscles are apparently connected to the collagen fibres that surround them and, therefore, probably subjected to stretching. On the contrary the larger nerve fibres are often surrounded by loose

connective tissue that preserves the nerve from the traction to which the fascia is subjected. The adaptation of the fascia is possible only within certain limits, over which the nerve terminations are activated by stretching. This mechanism allows a sort of "gate control" on the normal activation of the intrafascial receptors.