

Morphofunctional study of human temporomandibular joint disc

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During temporomandibular joint movement, the articular disc translates antero-posteriorly, supported the anterior attachment to the lateral pterygoid muscle and posterior attachment to the retrodiscal tissue. The articular disc is describe as a biconcave lens with two faces, superior and inferior, two margins, medial and lateral, and two extremities, anterior an posterior. The articular disc can be also divide into three different functional portions: posterior band, intermediate zone and anterior band. The extracellular matrix of the disc is composed mainly of collagen I and elastin and their distribution is different in the three functional zone [1]. The collagen I is the predominant ECM component. This protein forms a network and it's very important for resisting tensile forces. The elastin is also present in entire disc, but its distribution is different depending on the region; this protein is associated with resistance and elasticity and it is responsible to maintain the shape after deformation. Collagen I and elastin lie parallel to each other; some authors have demonstrated that collagen I is more present in the posterior and lateral zones in respect to elastin [2]. On this basis, here we studied the localization of collagen I and elastin in normal human temporomandibular joint disc by confocal laser scanning microscopy and scanning electron microscopy. Our results demonstrated that both proteins are present in entire disc and they run parallel to each other. In particular, collagen I and elastin, in intermediate zone, have an antero-posterior orientation, with longitudinal direction in condylar surface, while oblique orientation in temporal surface. In medial margin, the tested proteins have a similar staining pattern, and they cross each other with an oblique orientation. In lateral zone, the staining pattern of collagen I is more represented than to elastin and they form a thick network. Moreover, these preliminary immunofluorescence results are confirmed by scanning electron microscopic observations. The present results suggest that, during temporomandibular joint movements, the lateral margin of disc is submitted to a major compression forces due to a major presence of collagen I; however, the medial margin, corresponding to attachment of lateral pterygoid muscle, is submitted mainly to elastic forces because we observed similar staining patterns for both tested proteins.

References

- [1] Detamore et al. (2003) Structure and function of the temporomandibular joint disc: Implications for tissue engineering *J Oral Maxillofacial Surg* 61: 494-506
- [2] Wright et al. (2016) Tensile biomechanical properties of human temporomandibular joint disc: Effects of direction, region and sex. *J Biomech*. 49: 3762-3769

Key words

Temporomandibular joint disc, collagen I, elastin.