

Study of the association between

BONE SIALOPROTEIN, HYPERTROPHIC DIFFERENTIATION OF CHONDROCYTES AND CARTILAGE LESIONS

in osteoarthritic cartilage

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Chondrocyte hypertrophy is commonly observed in OA cartilage, associated with matrix mineralization and vascularization. In previous work, we suggested a role played by blood supply in the hypertrophic differentiation of osteoarthritic chondrocytes. This study aims to investigate the production of Bone SialoProtein (BSP), an angiogenesis enhancer, during hypertrophic differentiation of OA chondrocytes and its expression in cartilage according to the severity of osteoarthritic lesions. ■

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Articular OA chondrocytes were cultured for 28 days in alginate beads in medium containing 10% Fetal Bovine Serum (FBS). DNA was quantified by fluorimetry. The expression of BSP and collagen type X (COL10A1) was evaluated by RT-PCR. Activity of alkaline phosphatase (AP) and 5' phosphodiesterase activity of NTPPPH were quantified by specific enzymatic methods. Proteic expression of BSP was analysed by Western Blot. BSP was immunolocalized in human cartilage tissue sections from Post Mortem individuals (PM) and osteoarthritic patients undergoing total knee joint replacement (OA). A scoring system was established according to the localization of BSP-immunoreactive chondrocytes in cartilage. ■

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Chondrocytes cultured in serum-supplemented medium underwent a hypertrophic differentiation process characterized by the increased expression of hypertrophic differentiation markers COL10A1, AP and NTPPPH. The expression of BSP increased in FBS with long-term culture and was associated with COL10A1 ($r=0,67$; $p=0,005$), AP ($r=0,8$; $p=0,0002$) and NTPPPH ($r=0,68$; $p=0,004$).

BSP-immunoreactive chondrocytes were localized at increased depth in cartilage from joints with greater chondropathy (Fig.1). The localization of BSP was significantly associated with the severity of macroscopic cartilage lesions (Fig.2). Highly significant correlations were also observed with the modified Mankin score (Fig.3) and with the individual scoring criteria of cartilage surface integrity ($r=0,8$; $p<0,0001$), chondrocyte appearance ($r=0,67$; $p<0,0001$) and proteoglycan loss ($r=0,74$; $p<0,0001$).

BSP immunoreactive chondrocytes
in the deep layer of an
osteoarthritic cartilage sample (10X)

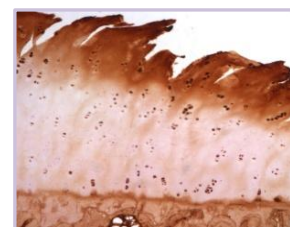


Fig.1

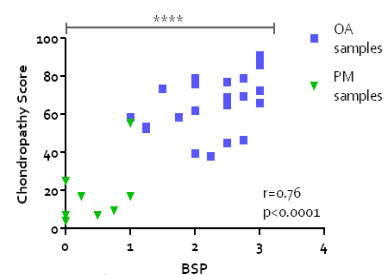


Fig.2

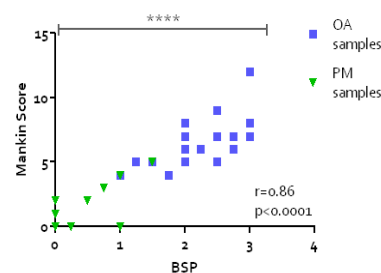


Fig.3

C O N C L U S I O N

High expression of BSP is associated with hypertrophic differentiation of chondrocytes in OA. The presence of BSP in OA cartilage is clearly associated with cartilage lesion severity. BSP may be an important factor in cartilage degradation and its role as an angiogenesis enhancer in OA is still to be demonstrated.

