A218 MATRIX VESICLES ARE PRESENT IN HUMAN OSTEOARTHRITIC SYNOVIAL FLUID AND PROMOTE FORMATION OF MONOSODIUM URATE CRYSTALS

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Background Matrix vesicles (MVs) are membrane-bound organelles that are physiologic components of the extracellular matrix of connective tissues. MVs from articular cartilage are well characterised and range in size from 50–100 nm. MVs participate in mineralisation by acting as foci of calcium crystal formation. Acute gouty arthritis preferentially occurs in osteoarthritic joints and can co-occur with calcium crystals, but the role of MVs in monosodium urate (MSU) crystal formation is unexplored. We hypothesised that degradation of articular structures in osteoarthritis results in release of MVs into the synovial fluid and that synovial fluid MVs may promote MSU crystal formation.

Methods MVs were isolated from human synovial fluid (SF) by serial centrifugation using protocols identical to those used to isolate MVs from tissue digests. Isolated MVs were assayed for protein content and levels of alkaline phosphatase, and NTPPPH enzyme activities were measured and compared to articular cartilage MVs. 144 ug/ml of MVs were added to a supersaturated urate solution. Controls included identical quantities of SF supernatant or bovine serum albumin added to a supersaturated urate solution. The resulting crystal pellet was isolated, washed and weighed. Crystal structure was confirmed by Fourier transform infrared **(**FTIR**)** spectroscopy and polarising light microscopy.

Results MVs were easily isolatable from 30 ml of human osteoarthritic SF. The MV fraction contained 0.144 ± 0.01 mg/ml protein. NTPPPH specific activity was considerably lower than from articular cartilage MVs at 14.7 pmol/mg. Alkaline phosphatase activity was undetectable. MSU crystals formed in all conditions. MVs increased MSU crystal production by 3.33 ± 0.07-fold over albumin control and 1.67 ± 0.08-fold over SF supernatant control. FTIR and polarising light microscopy confirmed the identity of the crystals as MSU and showed that MVs were incorporated into the crystal structure.

Conclusions MVs can be isolated from SF. These MVs differ in biochemical profile compared to articular cartilage MVs, and thus, their tissue source is unclear. MVs facilitate MSU crystal formation, perhaps as acting as scaffolding for formation of crystal or altering the microenvironment. The presence of synovial fluid MVs in OA joints may contribute to the strong association between gouty arthritis and OA.

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