

## CHEMICAL PHYSICAL CHARACTERIZATION OF INORGANIC CRYSTALS IN HUMAN SYNOVIAL LIQUID

MARCO LELLI<sup>1\*</sup>, ELISABETTA FORESTI<sup>1</sup>, GIORGIO ISIDORO LESCI<sup>1</sup>, MARCO MARCHETTI<sup>1</sup>, GIUSEPPE GERMANÒ<sup>2</sup>, CARLO SALVARANI<sup>2</sup>, NORBERTO ROVERI<sup>1</sup>

<sup>1</sup>*Alma Mater Studiorum University of Bologna, Department of Chemistry “G. Ciamician”, Bologna, 40126, Italy*

<sup>2</sup>*UO Reumatologia, Arcispedale Santa Maria Nuova, Reggio Emilia, 42100, Italy*  
*marco.elli9@unibo.it*

Synovial fluid accumulates in the joint cavity in different conditions; this work outlines the data from those analyses that help in their differential and definitive diagnosis. The gross appearance of the fluid can provide a quick bedside orientation with regard to the amount of inflammation present in the joint: totally transparent synovial fluid originates in noninflammatory conditions of which osteoarthritis is the most common and the amount of turbidity grossly relates to the amount of inflammation. Most turbid to purulent fluids usually come from infected joints, but exceptions are not uncommon. The presence of these conditions and this ion in high concentration within the synovial fluid, can lead to formation and the precipitation of inorganic crystals of different shape and nature. Some examples are certainly represented by crystals of monosodium urate, calcium pyrophosphate dihydrate crystals and hydroxyapatite nanocrystals. The presence of these crystals determine the pathological onset of arthritis annoying for the patient. This work aims to study different synovial fluids from patients suffering from arthritic pain, to isolate the inorganic part in it present and study the nature and morphology through with different analytical methods, like scanning electron microscopy (SEM), transmission electron microscopy (TEM), Infrared analysis (FT-IR) and X-Ray Diffraction (XRD). The focus of this investigation has focused primarily on hydroxyapatite nano-crystals [1] and their size, morphology, structure, crystallinity degree, surface area and diseases related to them. In this way is possible to have a complete characterization of inorganic crystals found into synovial fluids and try to think of a cure that conflict and obstacles to the formation of these crystals.

[1] N. Roveri, E. Foresti, M. Lelli, I. G. Lesci, M. Marchetti. Microscopic investigations of Synthetic Biomimetic Hydroxyapatite. *Microscopy: Science, Technology, Applications and Education* vol. 3. pp.1868-1879 (2010).

Keywords: inorganic crystal, hydroxyapatite, synovial fluid