Title	Uncovering functions of long-chain polyphosphate in higher eukaryotes: storage and synthesis of polyphosphate in matrix vesicles during mineralization
Author(s)	Li, L; Lui, ELH; Buchet, R; Mebarek, S; Tanner, JA
Citation	The 9th Pan Pacific Connective Tissue Societies Symposium (PPCTSS2013), Hong Kong, 24-27 November 2013.
Issued Date	2013
URL	http://hdl.handle.net/10722/203818
Rights	Creative Commons: Attribution 3.0 Hong Kong License

Poster Abstract

0052

Uncovering functions of long-chain polyphosphate in higher eukaryotes - storage and synthesis of polyphosphate in matrix vesicles during mineralization

Lina LI[1], Eric Lik-Hang LUI[1], Rene BUCHET[2], Saida MEBAREK[2], Julian TANNER[1]

[1]*Department of Biochemistry, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong,* [2]*ICBMS UMR 5246 - Universite Lyon 1 - CNRS - INSA Lyon - CPE Lyon, Villeurbanne, France*

Inorganic polyphosphate (polyP) is a fundamental molecule that occurs throughout life. PolyP has been found in mammalian tissues with particularly high levels of polyP in bone and cartilage, however its metabolism and functions remain poorly understood. Here, we initially demonstrate the highest concentrations of polyP yet observed in a higher eukaryote in matrix vesicles (MVs) secreted from mineralized osteoblasts. We also observed that MVs isolated from both osteoblasts and chondrocytes have a remarkable ability to synthesize very long-chain polyP under physiological condition. PolyP could be hydrolysed to P_i by one of the critical enzymes of mineralization, tissue non-specific alkaline phosphatase (TNAP). PolyP was consumed during mineralization induced by MVs. Extravesicular PolyP acted as an efficient inhibitor to suppress MV-induced HA formation. Biochemical properties of polyP synthesis were consistent with membrane-bound enzyme activity within the MV. Taken together, our work introduces a new fundamental macromolecule that could be a critical modulator of mineralization in the extracellular matrix.