

Biophysical and biochemical characterization of matrix vesicles

Emanuela FRUSTACI - *University of Rome Tor Vergata*

Mineralizing cells, including hypertrophic chondrocytes and mature osteoblasts, release a special class of extracellular vesicles, named matrix vesicles, that bind to the collagenous matrix and produce apatite at the sites of ossification. Matrix vesicles are also released by mineralizing vascular smooth muscle cells at the sites of medial vascular calcification. Current knowledge describes matrix vesicles as released by mineralizing cells by outward budding of apical microvilli and mineralize through a mechanism regulated by the vesicles' biochemical machinery. However, these studies have been mostly carried out on vesicles released from 2D cultures of primary cells (chondrocytes, osteoblasts, and vascular smooth muscle cells) as well as cell lines (e.g., MC3T3-E1 and Saos-2), whereas few studies have used matrix vesicles isolated from tissues (e.g., growth plate and calvaria). This has made difficult to draw a clear picture of the biochemical, biophysical, and biological properties of the matrix vesicles acting during physiological and pathological calcification processes. The final goal of our project is to fully characterize matrix vesicles acting during physiological calcification by using tissue-isolated vesicles. We will describe the results have obtained by isolating matrix vesicles from the growth plate of chicken embryos and characterizing the vesicles by means of both microscopic and spectroscopic techniques. The development of this project will translate into a better understanding of how matrix vesicles drive physiologic and ectopic calcifications.