

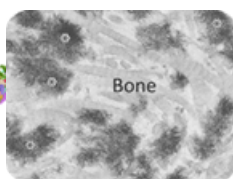
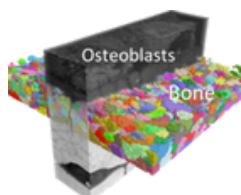
Department of Anatomy & Cell Biology Seminar Series

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Professor, Faculty of Dental Medicine and Oral Health Sciences
McGill University

Bones and Eggshells: Mineralization of extracellular matrix fiber networks in 3D imaged by X-ray and electron tomography

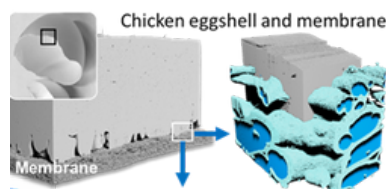
Biom mineralization often occurs as mineral crystal growth within extracellular matrix fiber assemblies. While small-molecule and protein inhibitors broadly prevent soft and compliant tissues from mineralizing, release from this inhibition in the skeleton (bone and enthesis fibrocartilage) occurs through local expression of enzymes that cleave these inhibitors.



Mutations in these enzymes result in inhibitor accumulation leading to debilitating mineralization defects and losses of mechanical function in osteomalacic diseases.

Correlative, multi-scale imaging approaches are now in common use in structural biology studies. However, this is not generally the case for hard mineralized tissues such as bone and cartilage, or eggshell – cases where fibrous matrices are permeated with a mineral phase that renders them difficult to analyze.

Mechanical properties of mineralized fibrous biocomposites originate from nanoscale relations of their constituent parts, and often propagate across several hierarchical levels in 3D. Our work utilizes multi-scale imaging approaches (including electron microscopy, particularly FIB-SEM



serial-surface-view tomography combined with deep learning-assisted segmentation) to better understand at multiple levels how mineralization develops in association with fibrous extracellular matrices to form biocomposites having diverse properties and functions. A particular emphasis is placed on lamellar bone and enthesis fibrocartilage (normal, and pathologic in rare bone and tooth mineralization diseases), and eggshells, as examples of mineralizing biosystems.



Wednesday, Sept. 27, 2023
11:30am - 12:30pm

Room 1/12 - Strathcona
Anatomy and Dentistry
Building

Hosted by: Carlos R. Morales, PhD



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