Marc D. McKee is a full professor at McGill University in Montreal with a joint appointment in the Faculty of Dentistry and the Faculty of Medicine where he holds the Canada Research Chair in Biominalization. He received his Ph.D. degree from McGill University in cell biology, followed by postdoctoral training at Harvard / The Children’s Hospital Boston, and then appointments at the Forsyth Institute in Boston and University of Montreal.

McKee’s research focuses on biominalization in bones, teeth, otoconia and eggshells, and in pathologic calcification. With 235 scientific papers, a Google Scholar h-index of 77 for his publications, and over 27,000 citations of his research, he has received two Distinguished Scientist Awards from the International Association for Dental Research (the 1996 Young Investigator Award, the 2003 Biological Mineralization Award), the 2018 Adele Boskey Esteemed Scientist Award from the American Society for Bone and Mineral Research, and the 2018 C.P. Leblond Award From the FRQS Network for Bone and Oral Health Research.

Reconciliation of the evolving interplay between organic moieties and inorganic crystals lies at the heart of modern biominalization inquiry. Recent biominalization research in vertebrates has identified, characterized and described functions for key non-collagenous extracellular matrix proteins interfacing with mineral and regulating crystal growth in the skeleton and dentition.

Gene mutations affecting mineral-regulating proteins typically lead to bone and tooth nanocrystallites defective in number, size, shape and/or orientation, and can even potentially lead to changes in mineral type, such that these otherwise hard tissues become diseased, soft and/or brittle. Several bone and tooth diseases will be discussed in terms of altered molecular determinants of mineralization. Some of these same proteins expressed in soft tissues undergoing pathologic calcification (like blood vessels) also inhibit ectopic crystal growth. In calcium carbonate biominalizing systems like inner ear otoconia and avian eggshells, similar proteins likewise regulate mineralization, and several examples of this will be presented.

Finally, in addition to peptides and proteins, amino acids alone can influence biominalization processes, and I will present an example of this where calcium carbonate (vaterite) chirality effects can be induced by chiral acidic amino acids.

Sept 18, 2020 at 1:30 PM
Zoom ID: 981 9974 4672
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