

Abstract Submitted
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Regulatory inhibition of biological tissue mineralization through post-nucleation shielding¹ JOSHUA CHANG, National Institutes of Health, ROBERT MIURA, New Jersey Institute of Technology — In vertebrates, insufficient availability of calcium and phosphate ions in extracellular fluids leads to loss of bone density and neuronal hyper-excitability. To counteract this problem, calcium ions are present at high concentrations throughout body fluids at concentrations exceeding the saturation point. This condition leads to the opposite situation where unwanted mineral sedimentation may occur. Remarkably, ectopic or out-of-place sedimentation into soft tissues is rare, in spite of the thermodynamic driving factors. This fortunate fact is due to the presence of auto-regulatory proteins that are found in abundance in bodily fluids. Yet, many important inflammatory disorders such as atherosclerosis and osteoarthritis are associated with this undesired calcification. Hence, it is important to gain an understanding of the regulatory process and the conditions under which it can go awry. We adapted mean-field classical nucleation theory to the case of surface-shielding in order to study the regulation of sedimentation of calcium phosphate salts in biological tissues.

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