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Calcium phosphate-based Biomaterials

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Calcium phosphates ($CaPO_4$) are of the special significance for the human beings because they represent the inorganic part of major normal (bones, teeth and antlers) and pathological (those appearing due to various diseases) calcified tissues of mammals. For example, atherosclerosis results in blood vessel blockage caused by a solid composite of cholesterol with $CaPO_4$, while dental caries (tooth decay) and osteoporosis (a low bone mass with microarchitectural changes) mean a partial decalcification of teeth and bones, respectively, that results in replacement of a less soluble and harder biological apatite by more soluble and softer calcium hydrogen orthophosphates. Although the biological mechanisms appear to be quite different, chemically, the processes of both normal and pathological calcifications might be considered as an in vivo crystallization of CaPO4. Similarly, dental caries and osteoporosis might be considered as an in vivo dissolution of biologically formed $CaPO_4$. Due to the compositional similarities to the calcified tissues of mammals, $CaPO_4$ are widely used as biomaterials for bone grafting purposes. In addition, $CaPO_4$ have many other applications. Namely, natural $CaPO_4$ are the major source of phosphorus, which is used to produce agricultural fertilizers, detergents and various phosphorus-containing chemicals.

Speaker Biography

Sergey V Dorozhkin received his MSc in chemical engineering with honors in 1984 from Moscow Institute of Chemical Technology, Moscow, Russia, and his PhD in chemistry in 1992 from the Research Institute of Fertilizers, Moscow, Russia. From 1992 to 1994 he worked as a senior researcher at the same institute, and from 1994 to 1996 he worked as a biotechnologist at a Swiss-Russia joint venture. From 1996 to 2004 he held five postdoctoral positions in France, Portugal, Germany and Canada where he worked on various aspects of calcium phosphates. He has authored more than eighty research papers, about thirty reviews, twenty-five book chapters and seven monographs. All these publications have been cited over 5000 times and his publication H-index is 30.

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