Bone is a dynamic tissue with one quarter of the trabecular and a fifth of the cortical bone being replaced continuously each year in a complex process that continues throughout an individual’s lifetime. Bone has an important role in homeostasis of minerals with non-stoichiometric hydroxyapatite bone mineral forming the inorganic phase of bone. Due to its crystal structure and chemistry, hydroxyapatite (HA) and related apatites have a remarkable ability to bind molecules.

This lecture describes the accretion of trace elements in bone mineral giving a historical perspective. Implanted HA particles of synthetic origin have proved to be an efficient recruiting moiety for systemically circulating drugs which can locally biomodulate the material and lead to a therapeutic effect. Bone mineral and apatite however also act as a waste dump for trace elements and drugs which significantly affects environment and human health.