RESEARCH NEWS

Nanobacteria – Not life forms but nano-particulate nidi for calcification

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The term nanobacteria (NB) was given by Kajander for the nanoscale (100-500 nm) particles as contaminants in mammalian cell culture^{1,2}. A number of publications followed this report on the role of NB in various diseases². Kajander's group provided evidence that NB are, in fact, life forms³. This was followed by another seminal publication which proved unequivocally that the microbes (*Nanobacterium sanguineum* and *Nanobacterium* sp.) from Kajander's lab³ were in fact contamination of *Phyllobacterium mysinacearum*⁴. So, the controversy persisted. Certainly, there was consensus that living or nonliving NB did cause many diseases associated with calcification of soft tissues, viz., arterial heart disease, kidney stones, gall stones and gall bladder inflammation⁵. The two recent papers by Kajander's group discuss the present status^{6,7}. A more descriptive term "Calcifying Nano Particles (CNP)" has been coined for the so-called nanobacteria. The precipitation and growth of calcium phosphate (apatite) occurs in systems containing trace amounts of CNP. When serum concentration in the medium is reduced (~ 5%) CNP start to mineralize and grow bigger in size⁶. No nucleic acid has been isolated from CNP. On the other hand, CNP inhibit the amplification of added DNA. Kidneys are the preferred site of action of CNP. There is strong evidence that CNP have a link to calcification diseases and are nidi for calcification in biological systems⁶. CNP grow faster under the conditions of microgravity and the observation has implication for the health aspects of astronauts⁵. Interestingly, CNP satisfy the Koch's postulates linking CNP to pathologic calcification disease. Cuerpo et al. found that translumbar, percutaneous, intrarenal injection of NB or CNP (isolated from kidney stones) into rats resulted in kidney stone for-

mation⁸. However, CNP do not match the current criteria for 'living organisms' in spite of the fact that they propagate, cause cell death *in vitro* and are associated with many human diseases^{6,9}. NB or CNP are distinct from nanoorganism reported from biofilms growing in pH 0.5 to 1.5 solutions within the Richmond Mine, California¹⁰. Current thrust of research is to know how CNP work irrespective of whether they are living or non-living.

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