LETTER TO THE EDITOR

Possible Association between Nanobacteria and Malignant Microcalcifications in Breast Cancer

To the Editor:

Breast calcifications are deposits of calcium that can be seen on a mammogram of the breast. There are two types: macrocalcifications and microcalcifications. Microcalcifications are one of the most common abnormalities detected on screening mammography for breast cancer. Microcalcifications are tiny specks of calcium in the breast. They may appear alone or in clusters. Calcifications associated with benign conditions are usually larger, fewer in number, widely dispersed, and round. However, less than 10% of microcalcifications suspect on mammography are associated with a malignancy on follow-up biopsy.

Two distinct forms of microcalcification are found in breast disease. The more commonly recognized type is basophilic and nonbirefringent and consists predominantly of calcium phosphates (type II). The other type is a birefringent, colorless crystal that is composed of calcium oxalate (type I). Oxalate calcifications (type I) are generally associated with proliferating, but noninvasive diseases of the breast, whereas calcium phosphate in the crystalline form of hydroxyapatite is usually correlated to invasive malignant tumors (1). Data in the literature suggest that deposition of the bone-specific mineral hydroxyapatite results from an active biological process, the mechanism of which has not yet been elucidated.

Nanobacteria have recently been described as novel microorganisms characterized by small size, slow growth, and the ability to form calcium phosphate crystals at neutral pH and at physiologic calcium and phosphate concentrations. They are gram negative, have a unique structure and apparent nucleic acid, and their growth in vitro is best inhibited by tetracycline. Nanobacteria have been discovered in human and cow blood and commercial cell culture serum, and have been hypothesized to mediate tissue calcifications (2). Nanobacteria have been isolated from demineralized kidney stone extracts (3).

One study provides anatomic evidence that calcified human arterial and valvular tissue contain nanometer-size particles that share characteristics of nanoparticles recovered from geologic specimens, mammalian blood, and human kidney stones and were observed by transmission electron microscopy in a calcified human mitral valve. The anatomic and ultrastructural evidence of the existence of nanoparticles in calcified human tissue was also strengthened by immunohistochemical microscopy and in vitro culture of nanoparticles (4). Moreover, one interesting study showed that nanobacteria promote crystallization of psammoma bodies in ovarian cancer (5).

Taken together, since malignant microcalcifications consist of mostly calcium phosphate in the crystalline form of hydroxyapatite, and nanobacteria has been shown to contribute to different benign and malignant calcifications in the form of calcium phosphate crystals, nanobacteria may also contribute to malignant calcifications in breast cancer. This proposal needs to be validated by microbiological analysis of microcalcified breast cancer tissue.

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