Probe for Sampling of Interstitial Fluid From Bone

Lyndon B. Johnson Space Center, Houston, Texas

An apparatus characterized as both a membrane probe and a bone ultrafiltration probe has been developed to enable in vivo sampling of interstitial fluid in bone. The probe makes it possible to measure the concentration of calcium and other constituents of the fluid that may be relevant to bone physiology. The probe could be especially helpful in experimental studies of microgravitational bone loss and of terrestrial bone-loss disease states, including osteoporosis.

The probe can be implanted in the bone tissue of a living animal and can be used to extract samples of the interstitial bone fluid from time to time during a long-term study. The probe includes three 12-cm-long polyacrylonitrile fibers configured in a loop form and attached to polyurethane tubing [inside diameter 0.025 in. (0.64 mm), outside diameter 0.040 in. (1 mm)]; the attachment is made by use of a 1-cm-long connecting piece of polyurethane tubing [inside diameter 0.035±0.003 in. (0.89±0.08 mm), outside diameter 0.060±0.003 in. (1.52±0.08 mm)]. At the distal end, a 2-cm-long piece of polyurethane tubing of the same inner and outer diameters serves as a connector to a hub. A 1-cm-long piece of expanded poly (tetrafluoroethylene) tubing over the joint between the fibers and the connecting tubing serves as a tissue-ingrowth site.

This work was done by Elsa M. Janle of Bioanalytical Systems, Inc., for Johnson Space Center. For further information, contact the Johnson Commercial Technology Office at (281) 483-3809. MSC-23044.