J Biomech Eng. 1985 Nov;107(4):327-35.

Structural models for human spinal motion segments based on a poroelastic view of the intervertebral disk.

Simon BR, Wu JS, Carlton MW, Evans JH, Kazarian LE.

Abstract
Analytical and finite element models (FEMs) were used to quantify poroelastic material properties for a human intervertebral disk. An axisymmetric FEM based on a poroelastic view of disk constituents was developed for a representative human spinal motion segment (SMS). Creep and steady-state response predicted by FEMs agreed with experimental observations, i.e., long-time creep occurs with flow in the SMS, whereas for rapid steady-state loading an "undrained," nearly incompressible response is evident. A relatively low value was determined for discal permeability. Transient and long-term creep FE analyses included the study of deformation, pore fluid flow, stress, and pore fluid pressure. Relative fluid motion associated with transient creep is related to nuclear nutrition and the overall mechanical response in the normal disk. Degeneration of the disk may be associated with an increase in permeability.

PMID: 4079359 [PubMed - indexed for MEDLINE]