

**Erratum: “Response to Dr. Robert W. Mann”
[Journal of Biomechanical Engineering, 2004, 126(4), p. 539]****Gerard A. Ateshian**

In my recent response to Professor Robert W. Mann’s letter to the editor [1] regarding our theoretical study of a trapped lubricant pool during articular contact, I made the following statement regarding the study of Macirowski et al. [2]:

The limitation of their study is that “Strains in the porous layer are assumed uniaxial, i.e., displacements of the matrix are constrained to the vertical (radial) direction” [1]. It can be shown from the basic law of conservation of momentum that under the assumption of uniaxial displacement along the vertical direction, the gradient in fluid pressure can only vary along that same direction. Thus, from Darcy’s law, the direction of fluid flow can only occur in the vertical direction as well. Since the cartilage-bone interface is modeled as impermeable, the only direction in which the fluid can flow is out the surface, to satisfy the conservation of mass. Therefore, the “weeping” mechanism appears to be a foregone conclusion when assuming uniaxial displacement as in the model by Macirowski et al. [1].

Upon careful reanalysis of the governing equations of porous media, I realize that it is in fact possible for fluid to flow tangentially (laterally) even when the solid matrix displacements are constrained to the vertical (radial) direction. This is consistent with the statement in the study by Macirowski et al. [2] that “No assumptions are made concerning the direction of fluid flow; hence pressures can vary both vertically and laterally in the layer.” Therefore I would like to extend my sincere apology to Professor Mann for incorrectly characterizing his study.

References

- [1] Ateshian, G. A., 2004, “Response to Dr. Robert W. Mann,” *J. Biomech. Eng.*, **126**, p. 539.
- [2] Macirowski, T., Tepic, S., and Mann, R. W., 1994, “Cartilage Stresses in the Human Hip Joint,” *J. Biomech. Eng.*, **116**, pp. 10–18.