

# Available M.S. or Ph.D. Project in Mechanical Engineering

## Microtribological Measurements of Cartilage Degradation

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### Our observations to date:

- 1) Sustained physiological lubrication is possible under microscale contacts
- 2) Microtribometry is sensitive to changes in stiffness & local lubrication
- 3) Stiffness and lubrication are sensitive to velocity, path length, probe radius & lubricant
- 4) Friction coefficient is *insensitive* to normal force

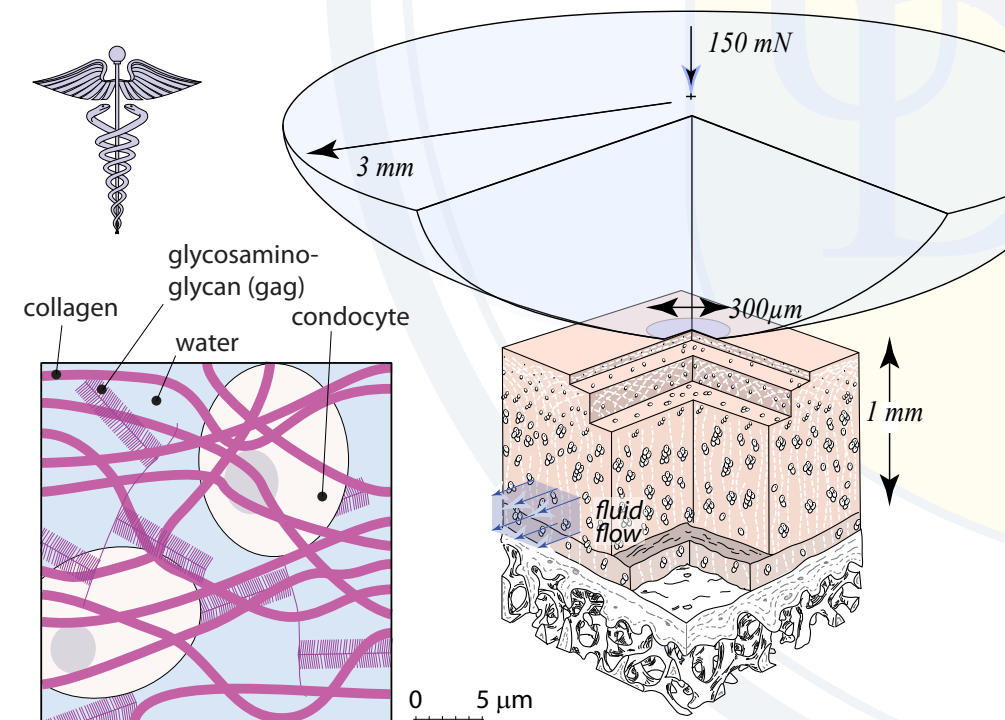
### Plans for this project:

Study the effect of cartilage digestion on structure and tribology

- harvest adjacent cores from tibial plateau
- mechanical test on first, OA grade on second (Saffrin-O/fast green)
- evaluate versus papain digestion exposure

Induce and map damage (OA) under controlled loading conditions

Isolate effects of collagen, proteoglycans, chondrocytes & lubricin w/ selective digestion



The cellular make-up of articular cartilage. When loaded, water (~70%) is forced through nanoscopic channels; the hydraulic resistance creates fluid pressure to support load and lubricate. This biphasic structure enables ultra-low friction and wear under physiological conditions.

