Introduction: Discussions continue to revolve around mobile vs. fixed bearing TKA and whether either TKA type offers an advantage to the patient. Over the past 12 years, over 2500 knees have been analyzed in our laboratory using fluoroscopy. The objective of this study was to analyze previously collected data for mobile bearing TKA to assess possible advantages for patients with respect to axial rotation of the implanted components.

Materials and Methods: Patients were each asked to perform a deep knee bend to maximum flexion, while under fluoroscopic surveillance. Using an accurate model-fitting analysis [1], in vivo data was recovered in three dimensions and analyzed. Individual fluoroscopic video frames, at 30 degree increments from full extension to maximum knee flexion were projected onto the image plane, and the corresponding implant models were then added to the scene. The operator manipulated the models into an initial position and then allowed the computer to iteratively determine an accurate fit. The correct fit was achieved when the silhouettes of the implant components perfectly matched the corresponding components in the fluoroscopic image. The pose of each component was then recorded and each measurement of interest was digitized using a CAD-modeling program. Then, the axial rotation patterns, specifically the magnitude and pattern of rotation, of the femoral component relative to the tibial component were assessed.

Results: Three significant findings were recovered from the data: (1) On average, the mobile bearing TKA groups experienced minimal axial rotation of the femoral component relative to the tibial component (Range = -1.1 to 6.3 degrees), significantly less than the normal knee averaging 27.7 degrees (p<0.001); (2) a high incidence of subjects having a mobile bearing TKA experienced an opposite axial rotation pattern compared to the normal knee (Range = 10 to 75%); and (3) the mobile bearing insert often rotates less than 2.0 degrees with respect to the tibial component and, at times rotates in the wrong direction.

Discussion: Although, conceptually it would appear that a mobile bearing TKA would offer the patient a greater advantage to achieve a more normal axial rotation pattern, under in vivo conditions these seven TKA types did not afford statistically greater amounts of axial rotation when compared to a fixed bearing TKA (p>0.05).