The Performing Material Used for Total Knee Replacement

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Abstract

With knee prosthesis, many patients with advanced osteoarthritis, rheumatoid arthritis, articular necrosis, sports accident or other origin..., can move again without human or mechanical assistance. The prosthetic knee replacement is much more complex than the hip. This is mainly due to the anatomy and biomechanics of this joint and the important role of peripheral and axial ligamentous structures. The knee joint, the largest joint in the human body, is a trochoid-joint articulation trochlear. The flexing movement consists of a rolling phase and a phase shift. When the joint is flexed, rotational movements are possible, (these movements are automatic), in the rotation, the femur and the meniscus moves relative to the tibia; by cons, in flexion and extension, the femur moves relative to the meniscus by sliding movements and rolling. The deterioration of the joint leads to the use of the Total Knee Arthroplasty (TKA), the materials used are titanium, cobalt chrome and Oxinium, the most powerful is the Oxinium for its very high mechanical properties that we found in our simulation with ABAQUS. The constraint Von mises and the pressure are maximum, in the contact assembly «femur / tibia», in the points of application of the load, to the two bodies in contact. The constraint Von mises for the couple PEHD / cobalt chrome is greater than the couple PEHD / Oxinium, and then it is higher than bone. This gives that the Oxinium prosthesis is the best, it protects the polyethylene plate against wear, so a long life for TKA.