

## **Tribological behavior of UHMWPE (disc) against Ti6Al4V (pin) under different lubrication conditions**

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### **Abstract.**

The operating behavior of prosthetic implants have long been under the attention of both the industrial and research world, which focused their attention on the choice of materials and production processes to achieve better performance. In this respect, the issues due to metal alloy - polymer contact are very current and worthy of attention. Therefore, the proposed research work is addressed to the study of the wear behavior of Ultra High Molecular Weight Polyethylene (UHMWPE) under the contact with Ti6Al4V alloy, which is largely used for production of the last generation of prosthetic implants by electron beam manufacturing (EBM).

In our laboratory, several specimens of UHMWPE are made and subsequently subjected to wear due to the contact with a Ti6Al4V pin, dry and in various lubricating conditions. The pin was produced by EBM and then worked by mechanical abrasion to obtain a rounded tip. Thereby the metal-polymer system, created for the experimental tests, perfectly simulates the operation of a knee joint prosthesis (or hip), in which the tibial (or femoral) component, made of titanium alloy, wears the insert in polyethylene. Materials are characterized by wear behavior in different lubricant fluids, optical and SEM morphological observations, wet-ability measurements. UHMWPE is found to be a material with high resistance to abrasion and wear, especially in conditions of lubrication with distilled water and with synovial fluids (both natural and artificial). In engineering terms this indicates that the service life of a prosthesis with this polymer can be increased if compared to the commonly used prostheses.