DEVELOPMENT OF BIOLOGICAL HIP RESURFACING IN DOGS

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ABSTRACT

Total joint replacement remains an excellent treatment for patients with debilitating joint degeneration. However, joint replacement using non-absorbable prostheses can deteriorate and become loose over time. A superior alternative would involve joint replacement with absorbable, biocompatible materials that facilitate re-generation of native cartilage and bone and that improve with time. Our objective with this research was to develop a femoral head replacement prosthesis for application in dogs. Our work was focused in three areas. First, we successfully developed and produced a prosthesis made of an absorbable material, poly-ε-caprolactone (PCL) with mechanical characteristics that are similar to that of cancellous bone. Second, we determined that use of hydrogen peroxide gas plasma sterilization techniques inhibit canine chondrocyte viability while gamma irradiation techniques provide a more compatible sterilization procedure that should facilitate cellular adhesion and proliferation. Third, we determined that the canine femoral anatomy is similar to humans and determined that accurate placement of a stemmed prosthesis is likely optimized by the fluoroscopic surgical techniques described herein. These results all set the stage for continued pursuit of PCL as a joint replacement material in general and for the canine femoral head specifically.