ENDOPROSTHESIS WITH SAPPHIRE HEAD FOR THE TREATMENT OF THE DISEASES AND DAMAGES OF THE HIP JOINT

Description

Different artificial joints with metal, ceramic, metal-polymer and ceramic polymer trybological pairs which correspond to the natural biomechanical joint “head-acetabulum” are widely used for the hip joint arthroplasty at present time. Along with positive qualities of modern ceramic, polymer and metal constructions, they have some disadvantages, such as: insufficient biological inactivity and superfluous abrasion of the components. These factors lead to short life of the implant. Moreover, accumulation of toxic and carcinogenic substances in the soft tissue due to abrasion of the implant causes serious complications in up to 30%-40% cases.

We developed endoprosthesis with sapphire head for treatment of diseases and damages of the hip joint.

Innovative Aspect and Main Advantages

Endoprosthesis consists of a metal stem, sapphire head and lowmolecular polyethylene intermediate layer. Sapphire heads manufactured from pure material storage-oxide, which was synthesized in the temperature >2000° C.

Sapphire head has the following characteristics and advantages:

• does not resolve and its qualities do not change during the patient's life; has high level of biological compatibility;
• has constant effect of the friction (f = 0.05-0.10) with defined crystallography of the contacted sapphire trybological situations;
• has high durability;
• may bear 50kN;
• may be polished to high degree of the purity (higher than in metal and ceramic analogs).

In comparison with metal heads, allergic reactions are excluded. In comparison with corundum ceramic heads, single-crystal head is more durable because the sapphire is homogeneous and does not have bloc’s borders, that results in high wearproofness of material.

Areas of Application

Orthopedy and traumatology.

Stage of Development

Endoprosthesis with sapphire head is developed. Prototype samples are made and studied in experiments. Animal trials of the samples and clinical approbation in 10 patients are done.

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