

Connective Tissue Substitutes, Method of Preparation and Uses

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Technology description

The present invention relates to the technology of production of tissue-engineered ACL substitute.

Description

The rupture of an anterior cruciate ligament (ACL) of the knee joint is a frequent trauma, particularly during the practice of various sports such as ski, snowboard, soccer or hockey.

The therapeutic options for ACL replacement include:

synthetic prostheses

allografts (ACL excised from cadavers) et

natural autografts (central portion of the patellar tendon or hamstring tendon of the patient).

Synthetic prostheses have shown many problems that include long-term failure due to synovitis, joint laxity, arthritis and mechanical deterioration. For these reasons, synthetic prostheses are not often used. Allografts overcome the need for autologous tissues, avoiding donor site morbidity. However, it involves risks of disease transmission, graft rejection and inflammation. Permanent attachment of ACL prosthesis to bone is of critical importance.

For the last 12 years, the best solution is the autologous bone-patellar ligament-bone grafts.

Unfortunately, graft laxity is often observed post-surgery, leading to knee instability, chronic pain, quadriceps weakness and patella rupture. The orthopedic surgeons conclude that it is clinically highly justified to explore other strategies for ACL replacement. On their request, my team has developed a tissue-engineered ACL substitute.

Market

The market is considerable in North America and everywhere in the world. For instance, scientific articles reported 80,000 torn ACL per year in United States. We evaluate at more than 50,000 the number of ACL reconstructions performed every year in Canada. There is a potential market in veterinary medicine, if the technology is adapted to horse and dog's knee joints.

Application area

Our ligament substitute is a serious solution to replace the torn anterior cruciate ligament of the knee joint. It is produced through an novel technology that can be adapted for the replacement of other tissues, like the periodontal ligament of the tooth. In veterinary medicine, ACL reconstructions are often performed on dogs. Racing horses have to be discarded when ACL rupture happens. It would be great to adapt our technology to save such expensive horses.

Advantages

Our approach presents several unique advantages, comparatively to the conventional alternatives for ACL reconstruction. It will eliminate the morbidity, avoiding the use of healthy tissues from the patient to replace a torn ACL. In the eventuality of another trauma, conventional surgical options can be performed or a second ACL substitute can be produced and grafted, using the patient's cells stored in a bank. Our ACL substitute doesn't present any risk of rejection post-implantation. The surgical procedure for implantation will be performed by arthroscopy rather than arthrotomy, reducing the risks of infection, pain and swelling. The absence of scar is expected to accelerate patient's rehabilitation, reduce post-surgical hospitalisation period and fees, comparatively to current practice.

Institution

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