**DONOR – RECEPTOR TISSUE INTEGRATION OF ANTERIOR CRUCIATE LIGAMENT IN FEMORAL BONE OSTEOARTICULAR FROZEN ALLOGRAFTS: MOLECULAR AND HISTOLOGICAL EVALUATION**

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**Introduction:** Bone osteoarticular allografts are one of the current options for reconstruction of the knee joint following resection of bone tumors compromising the distal femur. Incorporation of the donor soft tissue structures may restore joint stability and regular distribution of mechanical forces on the articular surface and influence the long term survival of the knee joint. Late osteoarticular allograft failure is mainly attributable to articular cartilage deterioration [1]. Studies of retrieved human allografts suggest that capsule-ligamentous instability and dimensional mismatch of articular surfaces affect the rate of articular cartilage degeneration. The ruptured anterior cruciate ligament (ACL) does not heal spontaneously or after primary repair, however fibroblasts derived from intact and ruptured ACL retain the ability to migrate into collagen- glycosaminoglycan scaffolds in vitro [2]. One of the hypothesis to explain the failure of primary repair of intrarticular ligaments is the lack of blood clots in the healing process; this, impairs initial fibroblast migration. Intrarticular ligament reconstruction in knee osteoarticular frozen allografts is done in our center attaching donor end to host end ligament segments. The latter repair model may be different from injured ACL primary repair because frozen donor ligament contributes mainly extracellular matrix resembling in vitro collagen scaffolds.

The aim of this study was to determine the biological and histological aspects of ACL healing in donor – receptor tissue integration of massive distal femoral frozen allograft, using a pig model. Special importance was given to progression of fibroblast ligament repopulation by tissue DNA sample analysis at the donor – receptor interface of ACL allografts. Comparison of informative pig microsatellite polymorphisms (MSP) was performed in order to follow the cell repopulation at the donor end.

**Materials and Methods:** All procedures involving the laboratory animals were approved by our hospitals’ ethical review board. Twenty male Durok Jersey immunized adult healthy pigs (80 kg) were divided into 2 groups of 10 unrelated animals. Blood samples were obtained pre-operatively from all subjects and kept frozen at –80 °C in order to have a DNA reference sample of each animal. In the Donor group all animals underwent surgery of ten right distal femurs was performed, retaining all soft tissue and DNA reference sample of each animal. In the Operatively from all subjects and kept frozen at – 80 ºC in order to have a tumors compromising the distal femur. Incorporation of the donor soft tissues is the lack of blood clots in the healing process; this, impairs initial fibroblast migration. Intrarticular ligament reconstruction in knee osteoarticular frozen allografts is done in our center attaching donor end to host end ligament segments. The latter repair model may be different from injured ACL primary repair because frozen donor ligament contributes mainly extracellular matrix resembling in vitro collagen scaffolds.

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**Discussion:** In this model we observed that the ACL donor segment and the union zone were rapidly colonized by fibroblasts presumably from receptor origin. The union was bridged by small collagen bundles and abundant fibroblasts that colonize the donor end. The progenitor cells of these fibroblasts (sinovial tissues, fat pad, receptor ligament) cannot be addressed by the techniques used in this study. DNA microsatellite analysis of tissue samples provides accurate information of donor/host tissue identity. It allows to monitor cell turnover and repopulation in allografts [4-5]. Our findings show no evidence of donor DNA in any of the regions studied at 6 weeks after transplantation. At this time, all ligament segments show only receptor microsatellite alleles. This correlates with the histological absence of freezing-induced damage donor ligament. This is consistent with the fact that the allograft segment of the ligament is completely repopulated by host cells. The process of ACL cell repopulation after frozen osteoarticular allograft ligament reconstruction has not been previously reported in this model. The findings shown in this study may support the end to end reconstruction of donor and host ligaments in osteoarticular allograft transplantation procedures.

**References:**
1- Muscolo DL, Clin Orthop 2000 Apr;373 7-39  
4- Jackson DW, J Bone Joint Surg Am 1992 Jan 74:1 112-8  