The Effects of Xenotransplantation on Anterior Cruciate Ligament Grafts in Humans

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My problem was what female animal tendon is sufficient for anterior cruciate ligament grafts in humans. Testing this would allow me to give patients another grafting option to lessen postoperative pain and recovery time, and promote agricultural medicine. I hypothesized that if I tested various female animal tendons, then bovine samples would have better results because cows have a larger anatomy, meaning their tendon's tensile strength will be larger. Based on my results, my hypothesis was upheld, bovine samples had a larger tensile strength, making bovine patellar tendon grafts a better option for surgical transplant, specifically for ACL reconstructions. After researching, I obtained 45 tendons from three animal species: bovine, porcine, and cervidae. A device was constructed to test tensile strength. A metal plate and cable were bolted to the concrete. A force gauge and two U-shaped metal brackets were fixed to the upper and lower cables. I dissected all legs, exposing the patella, patellar tendon, and tibia. Tendon circumference, length, diameter, and width were measured. Holes were drilled through the patella and tibia using a drill press. Metal rods were inserted through the U brackets and samples. Turning the handle, I applied pressure to the tendon until full breakage occurred. After testing all 45 patellar tendons, bovine samples resulted in the highest tensile strength. This information could be used to give patients another grafting option. With continuing this project, I would like to test male animal patellar tendons and compare quantitative data from both male and female.

Awards Won: