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Poly-gamma-glutamic acid as a novel material for viscosupplementation and treating OA of the knee: A pilot study

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In patients with osteoarthritis (OA) of the knee, hyaluronic acid is used to reduce inflammation. Despite the increasing use of HA, limitations exist. In the event that an alternate material could be shown to be non-inflammatory, non-immunogenic, and non-cytotoxicity reducing inflammation, it would likely find significant application in treating OA of the knee. Poly-gamma-glutamic acid is a polymer of the amino acid glutamic acid (GA). The current work to date has shown gPGA to be non-toxic, non-immunogenic, and non-cytotoxic to chondrocytes. For these reasons, we decided to perform a pilot study to evaluate gPGA's effect on inflammation in a rat model of OA. 18 rats were divided into 3 groups of six. All rats had their left knee injected with monoiodoacetate (MIA). 7 days later the rats were treated with a single 50 uL injection, in that knee, of either saline, Hyalgan® (a commercially approved HA), or gPGA. At Day 9, all animals were sacrificed, the hind limbs disarticulated, and the cartilage removed. Collagenase MMPs were extracted using a two-step procedure described in Janusz. Results were reported as equivalent MMP-1 activity per mg cartilage. The data shows a lower collagenase MMP activity level for the PGA group than the other groups. The standard deviation of the PGA group was also much smaller. The average of the MMP concentration in the control group was 2.96 AU/mg while the gPGA was 2.065, 30.2% lower. HA was only 10.4% lower than the control group, suggesting lower inflammation with gPGA.

Biography

Prescott has held many positions in the technical and customer service field of the polymer, pharmaceutical, biotech and medical device fields. His responsibilities have included all aspects of operations including facility construction management, product development, project management, budget management and personnel management. Mr. Prescott has led numerous cross-functional teams in the areas of new drug/device development from projects as simple as generic drug approval, to devices as complicated as bio-artificial pancreases. Mr. Prescott has worked and consulted for some of the preeminent biotech and biomaterials companies including Genzyme, Genetics Institute (now Wyeth), Abbott Bioresearch, and W. R. Grace and Company. He was a senior process development engineer at Anika Therapeutics Inc., a manufacturer of HA-based ophthalmic, orthopedic, and surgical scar reduction products. Mr. Prescott has a Bachelor of Science from Worcester Polytechnic Institute, as well as a Graduate Certificate in Biotechnology and a Master of Science from the University of Massachusetts Lowell.

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