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Oral Presentation

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Sustained Release of Transforming Growth Factor-β1 from Platelet-Rich Chondroitin Sulfate-Glycosaminoglycan Gels

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Focal cartilage lesions of the knee are common and can be a source of significant pain and dysfunction for patients. Current clinical therapies result in a substandard cartilage with poor long-term performance. Augmentation of these therapies with biologics such as platelet-rich plasma (PRP) may improve their efficacy. The objective of this study was to compare the release of transforming growth factor (TGF)-β1 PRP in autologous fibrin and chondroitin sulfate-glycosaminoglycan (CS-GAG) gels. PRP was prepared from nine healthy dogs using a commercially available device. Each PRP was split into 2 aliquots; one activated with bovine thrombin and $CaCl_2$ to form a platelet-rich fibrin (PRF) gel, and the other was used to rehydrate a lyophilized CS-GAG gel. Both gels were incubated in media for 13 days. Media was collected, saved, and replaced after 24 hours and then every 48 hours through day 13. Media samples were frozen at -80°C until assayed for TGF-β1 concentrations by ELISA. Overall differences between groups were compared using a 2-way ANOVA and a Wilcoxon paired samples test was used to compare treatment groups on individual days. The type of gel had a significant effect on TGF-β1 release ($p < 0.001$) with significantly ($p<0.05$) greater concentrations of TGF-β1 released from the CS-GAG gels than the PRF gels on days 3, 5, 7, 9 and 13. TGF-β1 concentrations were up to 365% more with use of the CS-GAG gels than the PRF gels on an individual day. Use of the negatively charged CS-GAG hydrogels significantly increased the duration and amount of TGF-β1 eluted from canine PRPs *in vitro*. PRP's regenerative potential is likely dependent on provision of anabolic growth factors. Therefore, a delivery method that provides sustained release of such growth factors, such as the CS-GAG gels investigated in this study, may improve efficacy *in vivo*.