

## **Intervertebral Disc Regeneration Using Platelet-Rich Plasma and Biodegradable Gelatin Hydrogel Microspheres**

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This study evaluated the regenerative effects of platelet-rich plasma (PRP) for the degenerated intervertebral disc (IVD) in vivo. After induction of IVD degeneration in rabbits, we prepared PRP by centrifuging blood obtained from these rabbits. These PRP were injected into the nucleus pulposus (NP) of the degenerated IVDs after impregnation into gelatin hydrogel microspheres that can immobilize PRP growth factors physiochemically and release them in a sustained manner with the degradation of the microspheres. As controls, microspheres impregnated with phosphate-buffered saline (PBS) and PRP without microspheres were similarly injected. Histologically, notable progress in IVD degeneration with time courses was observed in the PBS control, PRP-only, and sham groups. In contrast, progress was remarkably suppressed over the 8-week period in the PRP group. Moreover, in immunohistochemistry, intense immunostaining for proteoglycan in the NP and inner layer of the annulus fibrosus was observed 8 weeks after administration of PRP-impregnated microspheres. Almost all microspheres were indistinct 8 weeks after the injection, and there were no apparent side effects in this study. Our results suggest that the combined administration of PRP and gelatin hydrogel microspheres into the IVD may be a promising therapeutic modality for IVD degeneration.