Optimization of platelet isolation and extraction of autogenous TGF-beta in cartilage tissue engineering.

Abstract:
Platelets are enriched with Transforming Growth Factor-beta (TGF-beta). However, information is limited concerning TGF-beta's effects at the molecular level. Nevertheless, it has been demonstrated that TGF-beta activates cell proliferation and its positive influence on cartilage formation has been proven within the field of Tissue Engineering (TE). As Platelet Rich Plasma (PRP) contains TGF-beta, it was the purpose of this study to optimize PRP-isolation for further TGF-beta extraction. Red blood cell count (RBC) was separated from whole blood by centrifugation. From the supernatant PRP and platelet poor plasma (PPP) layer, the latter supernatant was re-centrifuged to extract PRP. Various experimental series were run to investigate influences concerning anticoagulating alternatives, different amounts of buffer, various centrifugal forces, or substituting centrifugation for sedimentation. TGF-beta levels were determined using ELISA. The technique of platelet-/ TGF-beta-extraction described here proves to be more effective than other methods, is easily repeatable and not time-consuming, which predisposes it for TE requirements.