The effect of allogenic platelet rich plasma on equine mesenchymal stem cells in vitro

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Abstract

Regenerative medicine has been an emerging topic within the healing process of many surgical procedures. Within veterinary medicine the use of blood derivatives such as platelet rich plasma (PRP) have been used for certain orthopedic conditions such as osteoarthritis. However, the use of allogenic PRP has not been widely investigated and little is known about its effect on bone healing. The focus of this study was to test the effect of allogenic PRP on equine mesenchymal stem cells (MSCs) and osteoprogenitor cells (OCs). PRP contains a series of growth factors that may promote both proliferation and differentiation of these pluripotent cells. We hypothesized that the addition of PRP to the culture media of MSCs and OCs, would cause proliferation and differentiation into osteoblasts at higher rate, respectively, leading to increased production of bone nodules. The PRP used contained 5X the number of platelets (550 x 10^9 /L) compared to whole blood and is considered a leukocyte poor PRP as it contained less than baseline number of leukocytes. MSCs were divided into 4 groups based on different culture media: 1) Standard Media (SM), 2) SM + PRP, 3) osteogenic Media (OM) and 4) OM + PRP. Groups were evaluated using an XTT Proliferation Assay, quantitative Polymerization Chain Reaction, histochemical staining of bone nodules, and TNF alpha ELISA assay. Results showed that the PRP indeed provides an accelerated response of proliferation and increased expression for two osteogenic genes. There was no evidence of the pro-inflammatory mediator TNF alpha. The results in this study provide evidence for the use of allogenic PRP as a treatment on procedures involving bone healing.

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