Introduction:
Platelet-rich-plasma (PRP) has been used for bone repair and wound healing in both orthopedic and maxillofacial surgical procedures. It is hypothesized that PRP represents a valuable autologous source of growth factors such as growth hormone (GH), platelet-derived growth factor (PDGF-BB), fibroblast growth factor basic (FGF-2), bone morphogenic proteins like BMP2, BMP4, BMP7, vascular endothelial growth factor (VEGF), transforming growth factor-beta-1 (TGF-β1), and insulin-like growth factor (IGF) essential for vascularization and bone regeneration. However, little is known regarding the variability of the growth factors throughout the aging process. In this study we will quantify the levels of growth factors present in the PRP of a large group of healthy volunteers from age 18-60.

Materials and Methods:
40 volunteers were divided equally into four age groups: 18-30, 30-40, 40-50 and 50-60 years respectively (n=10 for each group). Platelet-rich plasma was prepared using Recover® GPS® III Mini Systems (Biomet Biologics Inc, Warsaw, Indiana Cat#800-1003A) according to manufacturer’s recommendation. Platelet rich plasma was collected and subsequently frozen at -80C. Samples were subjected to four freeze-thaw cycles to release growth factors from the platelets. GH, VEGF, BMP-2, and BMP-4 were measured using the enzyme-linked immunosorbent assay (ELISA) method. All procedures were performed according to the manufacturer’s instructions.

Results:
Growth hormone, VEGF, BMP-2, BMP-4 levels were present in concentrations ≥ levels used in clinical treatments. The levels of growth hormone and BMP-2 significantly decreased with age (p<0.05), while VEGF and BMP-4 remained relatively constant throughout the aging process (p>0.05).

Discussion:
PRP contains a large quantity of growth factors which may be used for clinical applications such as bone and tendon healing, wound healing and tissue engineering. However, caution must be used with the use of growth hormone and BMP-2, as their levels of significantly decline with aging.

Future Directions:

1. Establish levels of the following growth factors: PDGF-BB, FGF-basic BMP-7, TGF beta 1, TGF beta 3, IGF-I, IGF-BP2, IGF-BP3.

References: