a.) Tendons natural healing potential is very low mainly due to hypocellularity and hypovascularity of tendon tissues. The application of stem cells can aid in enhanced repair of tendon ruptures, therefore the main aim of this study was to assess the potential of using periodontal ligament cells (PDL), easily obtainable from patients undergoing orthodontic treatment, as a novel cell source for tendon cell-based therapy and compared them to tendon-derived cells (hAT) in a clinically relevant rat Achilles tendon model.

b.) This study consisted of four different groups: native tendon (NT), empty defect (ED, injured and non-implanted), PDL and Achilles tendon-derived cells (hAT) implanted. We implicated a previously established defect model (Pietschmann et al. 2013). In short, three millimetres tissue from the Achilles tendon proper was surgically removed, then the defect was reconnected by suture and it was filled with a 3D cell pellet. The Achilles tendons were harvested for histological and molecular biological evaluation at 16 weeks after surgery.

c.) Periodic acid schiff, safranin O and alcian blue staining results showed that the mucopolysaccharide content and remnant cartilaginous areas in the PDL and hAT groups were significantly lower while still visible in the ED group, suggesting an advanced stage of tissue remodelling in PDL and hAT groups. Based on the nuclear aspect ratio, angular deviation and polarized light microscopy analyses, we observed that the PDL and hAT groups displayed morphological features and higher birefringence of aligned collagen fibers that were similar to that of native tendons.

d.) We believe that the PDL can be considered as novel source for stem cell banking and treatment of different tendon or ligament pathologies. Moreover, patient-specific PDL cells can be easily harvested from healthy permanent teeth in routine orthodontic procedures and in vitro pre-expanded to high numbers, and ready to use.