

Group #03

**Tendon Fixation Screw**

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**Abstract**

Current tendon fixation procedures for Flexor Digitorum Longus (FDL) transfers often utilize solid, rigid interference screws that cause stress shielding and disorganized scar tissue formation that compromise long-term recovery outcomes, as well as being limited to only specific, standardized sizing. To address these limitations, three patient-specific and biointegrative fixation screws, cylinder, self-tapping, and buttress, were designed in Fusion360 and SolidWorks with integrated Voronoi lattice structures to promote long-term osseointegration. Following preliminary plastic prototyping, titanium models were fabricated with the 3D printers at Spitrex 3D and subjected to static pull-out testing using a Mark-10 test frame alongside Finite Element Analysis (FEA). Both testing modalities demonstrated strong tensile load resistances across all designs, with the self-tapping design consistently outperforming the others. Ultimately, these designs provide a framework for transitioning from a solid interference screw to porous, lattice-integrated devices that encourage bone ingrowth and improve recovery outcomes in foot and ankle surgeries.