Supplementary Material

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**Supplementary Figure 1.** Comparison of mean Ct.Th results between analysis of a single slice (dashed black line) and a representative average taken over 101 CT slices (± 50 slices from the selected slice, measuring 482.75 m) above and below the 50% region of the mouse tibia for a 12 N peak load ((A) solid black line). Mean Ct.Th measurements obtained from a single slice closely match the mean results of the representative slice for the majority of the periosteal surface. The most notable variation occurs between 0 < Lper < 0.05 (A, red box), where the mean Ct.Th of the single slice was observed to be approximately equal to the mean Ct.Th plus one standard deviation of the representative slice. This variation stems from the absence (B) or presence (C) of blood vessel channels, circled in red. Taking a representative average across a large region of the tibia smooths out these channels, therefore affecting the observed growth percentage.