



Supplementary Figure 1. The stiffness of the interweaving and non-interweaving fibers calculated by inverse fitting for several 3D collagen volume fractions. The 3D collagen volume fractions are smaller than projected fractions, and different for interweaving and non-interweaving models with the same number of fibers. The lines are shifted to the left compared with Figure 4a using the projected fractions, yet the plot still shows that at any given collagen volume fraction, the stiffness of a model with interweaving fibers was larger than that of a models with non-interweaving fibers.

Supplementary Table 1. Summary of projected and 3D collagen volume fractions of models with interweaving and non-interweaving architectures. For simplicity, unless specified, in the rest of this work we used the projected view of collagen volume fractions. Results from the 3D volume fractions are presented in the supplementary files.

Number of fibers	Collagen volume fraction (projected)		Collagen volume fraction (3D)	
	Interweaving	Non-interweaving	Interweaving	Non-interweaving
2x2	36%	36%	16%	16%
3x3	51%	51%	25%	24%
4x4	64%	64%	34%	31%
5x5	75%	75%	44%	39%
6x6	84%	84%	55%	47%
7x7	91%	91%	67%	55%