UNIVERSITÄT BERN

Fabric-Elasticity Relationships in Healthy and Diabetic Individuals

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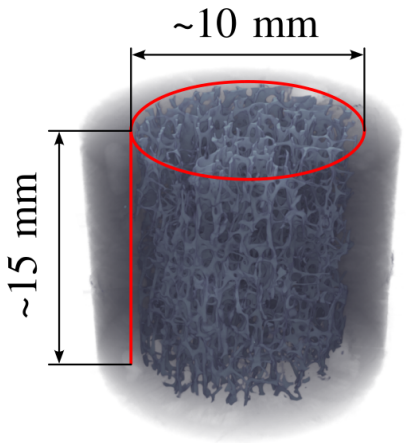
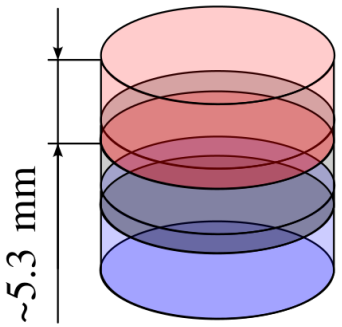
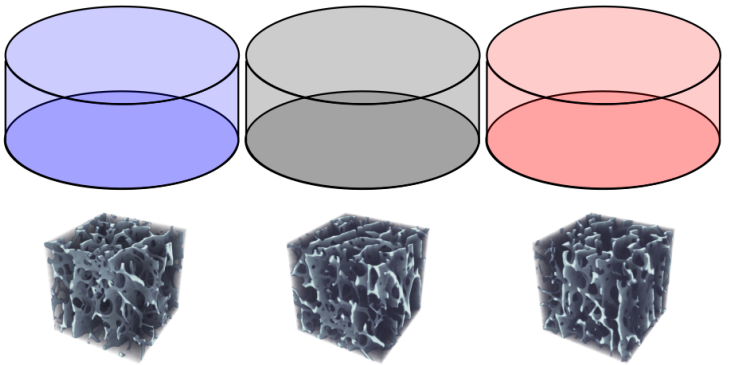
Samples



31 Samples

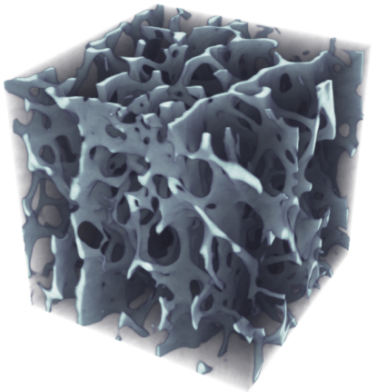


3 Stacks

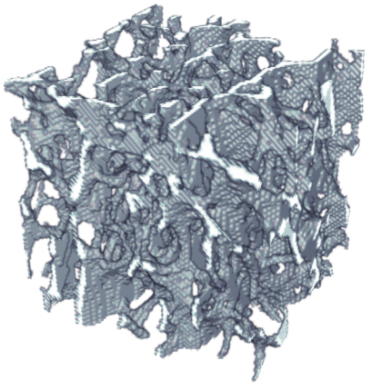


1 Cubic region of interest (ROI) per stack

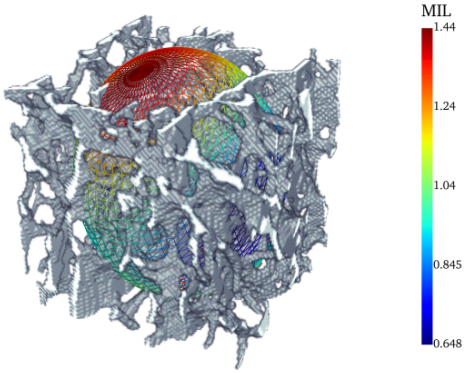
Medtool 4.8



93 ROIs

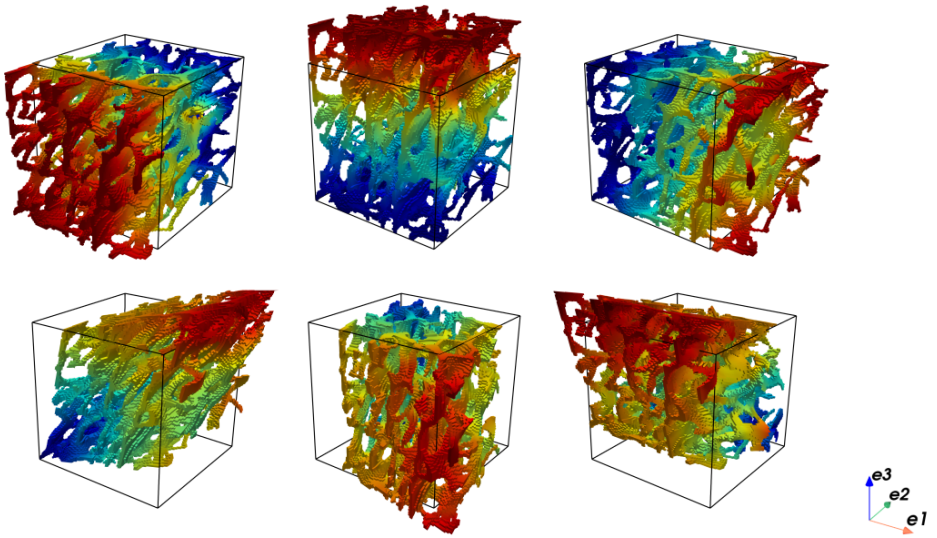


Downsampling (Factor 4)
Segmentation

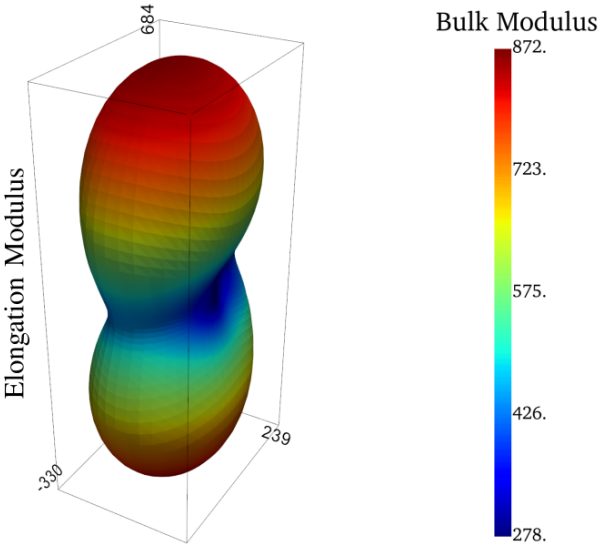


Morphometry
Fabric

Abaqus 2023



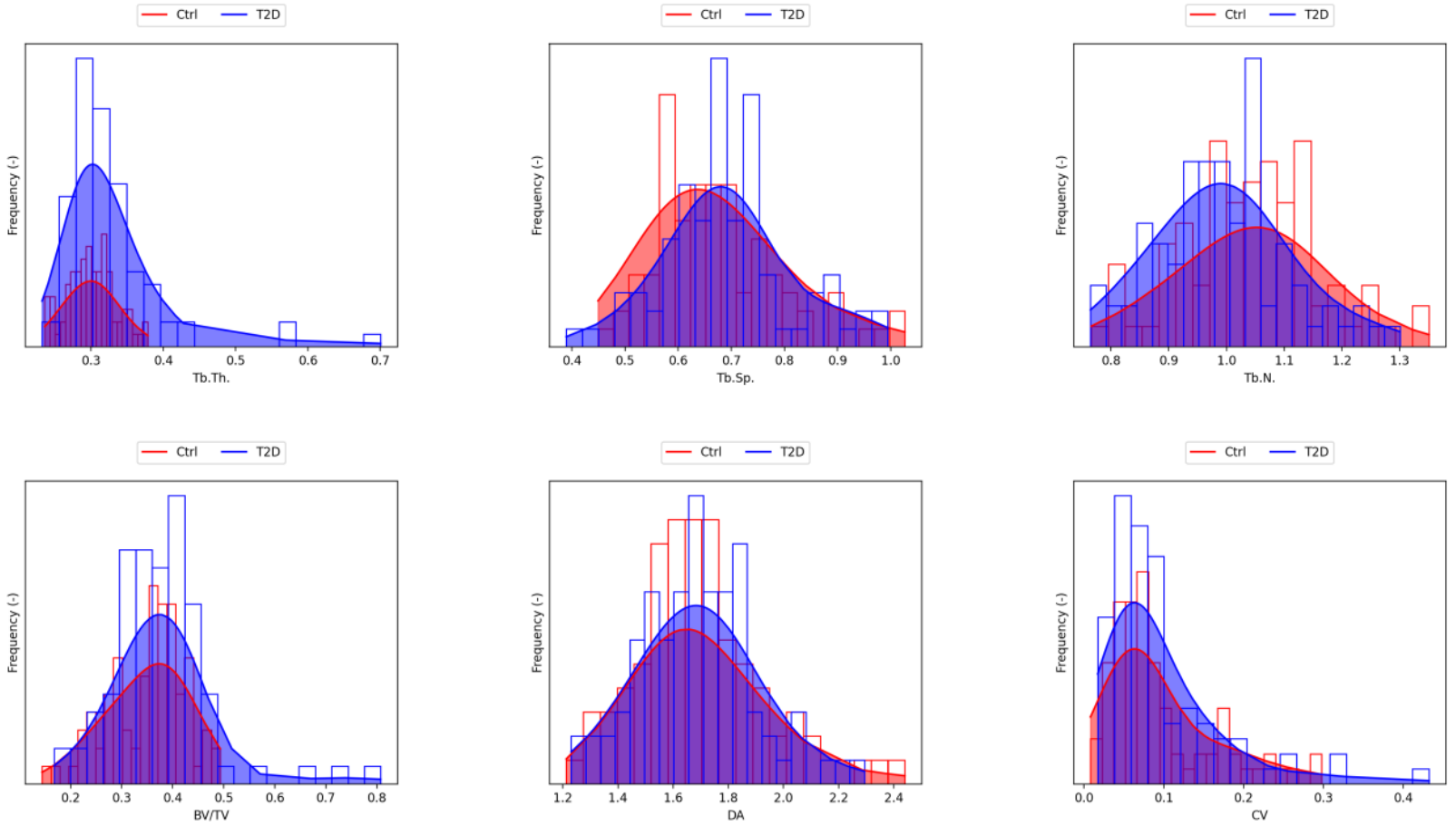
Homogenization (KUBCs)



Stiffness Tensor

Morphometry - Distributions

Femoral head samples



Morphometry - Statistics

Femoral head samples

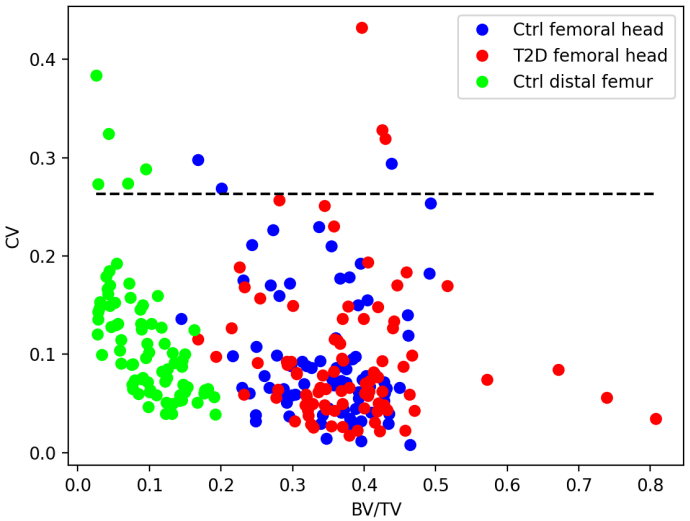
Variable	Distribution	Variances	Test	p-value	Ctrl	T2D
BV/TV	Not-normal	Equal	Mann-Whitney	0.17	0.35 ± 0.07	0.38 ± 0.10
Tb.N.	Normal	Equal	t-test	<0.01	1.04 ± 0.12	0.99 ± 0.11
Tb.Th.	Not-normal	Not-equal	Permutation	<0.01	0.30 ± 0.03	0.33 ± 0.07
Tb.Sp.	Not-normal	Equal	Mann-Whitney	0.11	0.67 ± 0.12	0.69 ± 0.12
Tb.Sp.SD	Not-normal	Not-equal	Permutation	<0.01	0.08 ± 0.01	0.09 ± 0.05
DA	Not-normal	Equal	Mann-Whitney	0.86	1.70 ± 0.23	1.69 ± 0.20
CV	Not-normal	Equal	Mann-Whitney	0.84	0.09 ± 0.07	0.09 ± 0.07

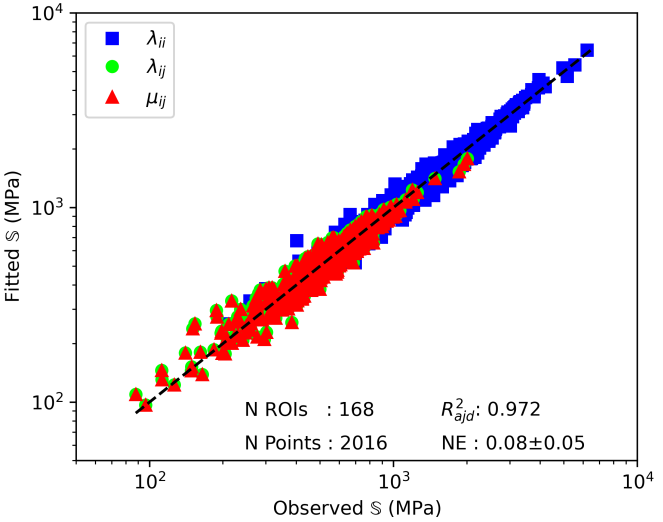
Fabric-Elasticity Relationships

Coefficient of variation (CV)

- Homogeneity of mass distribution within the ROI
- Threshold defined in Panyasantisuk et al. [1]

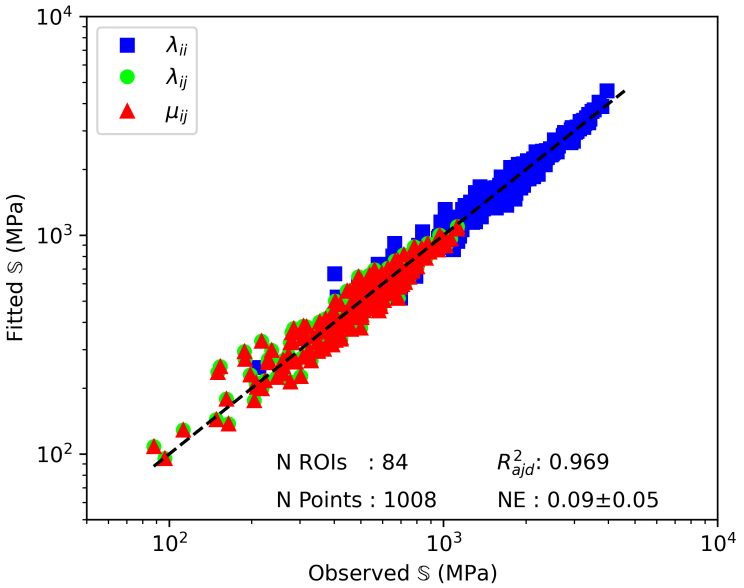
Matching femoral head Ctrl with T2D for BV/TV and DA [2]



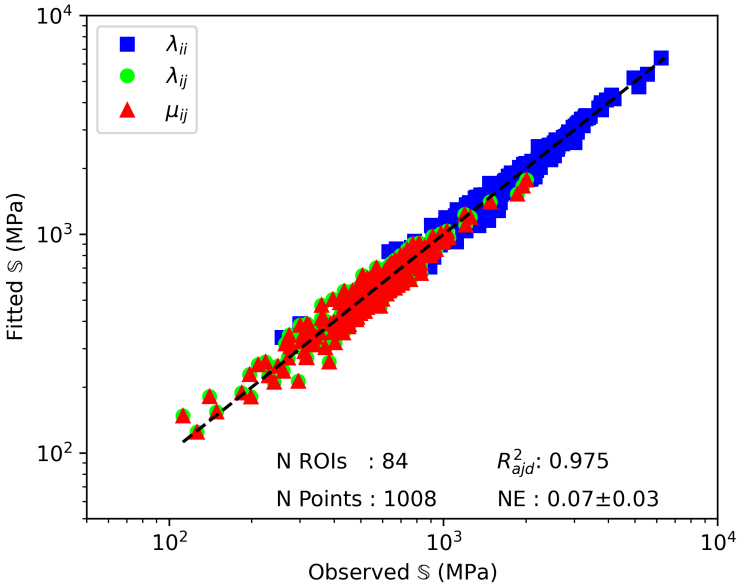


Fabric-Elasticity Relationships II

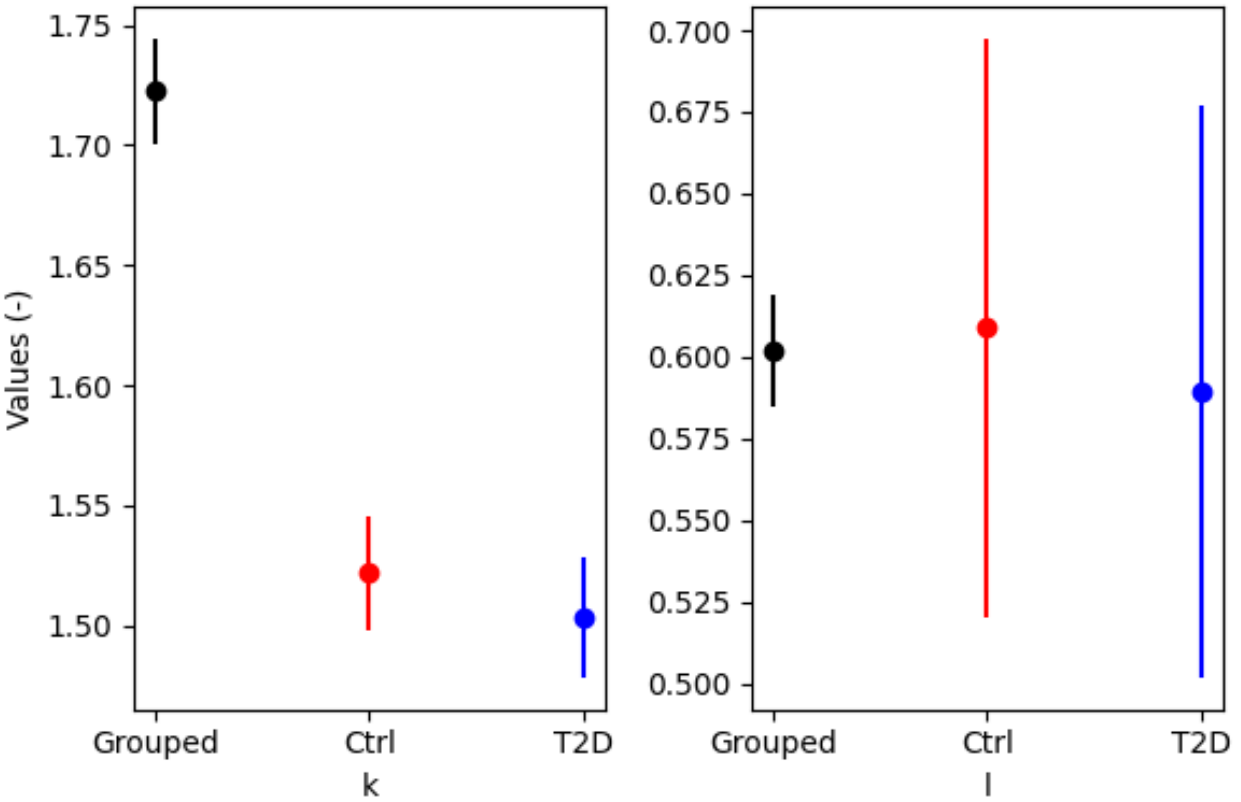
Control



T2D



Fabric-Elasticity Relationships III



References

- Panyasantisuk, J., Pahr, D. H., Gross, T., and Zysset, P. K. (2015)

  Comparison of Mixed and Kinematic Uniform Boundary Conditions in Homogenized Elasticity of Femoral Trabecular Bone Using Microfinite Element Analyses

  J Biomech Eng., 137(1)

  https://doi.org/10.1115/1.4028968

- Simon M., Indermaur M., Schenk D., Hosseinitabatabaei S., Willie B.M., Zysset P. (2022)

  Fabric-elasticity relationships of tibial trabecular bone are similar in osteogenesis imperfecta and healthy individuals

  Bone, 155

  https://doi.org/10.1016/j.bone.2021.116282