Supplemental materials: Multi-scale analysis of bone chemistry, morphology and mechanics in the *oim* model of osteogenesis imperfecta

Bart ZR, Hammond MA, Wallace JM. Multi-scale analysis of bone chemistry, morphology and mechanics in the oim model of osteogenesis imperfecta. Connect Tissue Res. 2014 Aug 1;55(S1):4–8. Available from: http://dx.doi.org/10.3109/03008207.2014.923860

Table S1: Assessment of chemical properties obtained via Raman Spectroscopy

	WT (n = 6)	oim/oim (n = 5)
MMR Amide I	2.54±0.31	1.92±0.124[a]
MMR CH_2	4.34±0.56	3.76±0.24
MMR Amide III	3.77±0.64	3.44±0.22
Amide I:Amide III	1.50±0.12	1.80±0.13[a]
Carbonate:Phosphate	0.50±0.03	0.49±0.04
Crystallinity	0.054±0.0006	0.052±0.0002[a]
Volumetric Bone Mineral Density (g/cm^3)	1.58±0.03	1.54±0.05
Crosslinking Maturity (1660/1690)	1.22 ± 0.17	1.03 ± 0.08[a]

[a]Significantly different from WT data at α = 0.05. *Volumetric bone mineral density (vBMD) measured at five posterior sections along the diaphysis via μCT. Data are presented as mean ± standard deviation.

Table S2: Micro-scale indentation measures from Reference Point Indentation

	WT (n = 6)	oim/oim (n = 5)
Indentation Distance (μm)	9.57±0.31	12.53±1.03[a]
Indentation Distance Increase (μm)	3.91±0.75	4.60±0.91
Total Indentation Distance (μm)	31.65±1.07	35.29±1.77
Creep Indentation Distance (μm)	1.18±0.11	1.36±0.24
Energy Dissipation (μm)	4.60±0.48	5.28±0.87
Unloading Slope (N/μm)	0.27±0.01	0.21±0.01[a]

[a]Significantly different from WT data at α = 0.05. Data are presented as mean ± standard error.

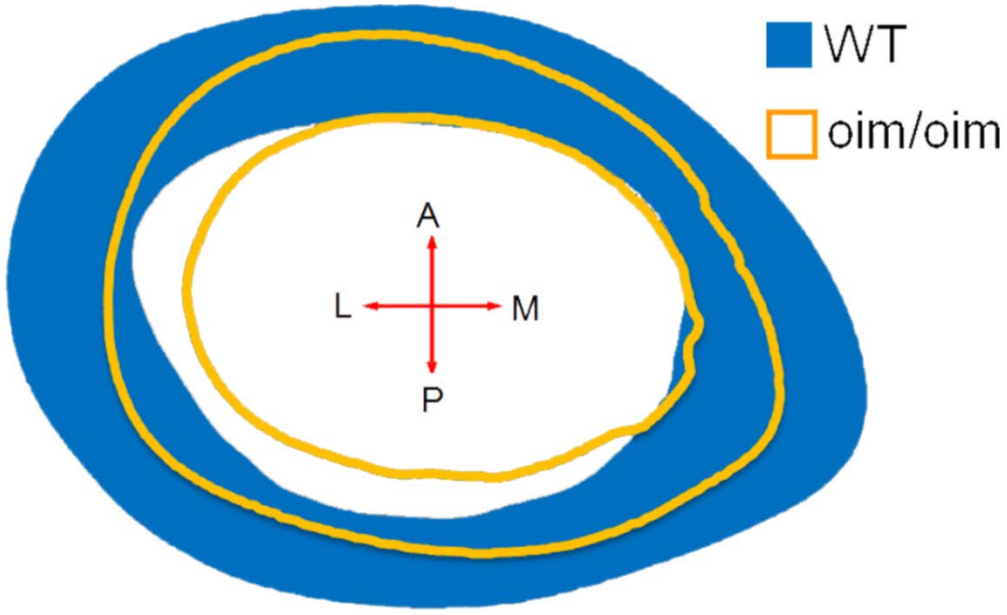

Figure S3: Average midshaft cross-section of oim/oim (yellow) overlaid on the WT (blue) animal. The significant differences in Table S3 are shown to be dramatic changes in structure.

Table S4: Measurements of femur cortical geometry at midshaft site

	WT (n = 15)	oim/oim (n = 9)
Cross-Sectional Area (mm^2)	2.002±0.140	1.365±0.186[a]
Cortical Area (mm^2)	1.144±0.081	0.632±0.075[a]
Marrow Area (mm^2)	0.858±0.087	0.733±0.172[a]
Cortical Thickness (mm)	0.274±0.015	0.178±0.023[a]
Periosteal Surface (mm)	5.900±0.180	5.000±0.374[a]
Endocortical Surface (mm)	4.100±0.241	3.789±0.579
AP Width (mm)	1.353±0.047	1.172±0.098[a]
ML Width (mm)	1.918±0.071	1.536±0.176[a]

[a]Significantly different from WT data at α = 0.05. Data are presented as mean ± standard deviation.

Table S5: Trabecular analysis in the distal femoral metaphysis

	WT (n = 15)	oim/oim (n = 9)
BV/TV (g/cm^3)	35.03±3.98	12.82±7.78[a]
Trabecular Thickness (μm)	7.36±0.55	5.84±1.05[a]
Trabecular Separation (μm)	13.35±0.75	23.76±7.67[a]

[a]Significantly different from WT data at α = 0.05. Data are presented as mean ± standard deviation.

Table S6: Structural and tissue mechanical measurements of femora

	WT (n = 15)	oim/oim (n = 9)
Stiffness (N/mm)	181.18±7.49	69.97±8.40[a]
Yield Force (N)	18.54±0.55	8.19±0.74[a]
Ultimate Force (N)	30.28±0.84	9.38±0.88[a]
Yield Displacement (μm)	118.32±4.63	136.58±7.56[a]
Postyield Displacement (μm)	391.96±19.82	60.25±26.92[a]
Yield Work (mJ)	1.09±0.05	0.54±0.05[a]
Postyield Work (mJ)	10.09±0.51	0.57±0.30[a]
Modulus (GPa)	2.54±0.16	2.13±0.25
Yield Stress (MPa)	82.68±3.41	64.60±5.70[a]
Ultimate Stress (MPa)	134.95±5.00	74.74±7.96[a]
Yield Strain (με)	3.82e4±1704	3.61e4±2635
Failure Strain (με)	1.64e5±6119	5.14e4±5637[a]
Resilience	1.55±0.07	1.11±0.09[a]
Toughness	16.06±0.87	1.96±0.65[a]

[a]Significantly different from WT data at α = 0.05. Data are presented as mean ± standard error.