

Supplementary materials for manuscript: Armbrecht et al. "Cortical pore size distribution and viscoelastic tibia properties discriminate fragility fractures independent of bone mineral density"

Table A.1 | Associations between DXA, selected HR-pQCT, and CortBS parameters with anthropometric data and age. For HR-pQCT, either the parameters derived from the vendors "3D Density and Structure Analysis" (3D DSA) or the custom parameters selected from the fracture discrimination analysis (Table 5) were used. The values show the coefficient of correlation R^2 .

	Weight	Height	BMI	Age
DXA	0.34	0.40	0.23	0.14
HR-pQCT(3D DSA)	0.46	0.42	0.20	0.31
HR-pQCT(custom)	0.38	0.36	0.20	0.27
CortBS	0.25	0.36	0.22	0.45

Table A.2 | Associations between selected site-matched HR-pQCT (ROI) and CortBS parameters. The values show the Spearman's rank sum correlation coefficient ρ . The last rows show coefficient of correlation R^2 and RMSE obtained from the multivariate PLS

	Attenuation		Ct.Po.Dm.D						PLS	
	α_0	α_f	Peak	Q ₁₀	Q ₉₀	FWHM	FWHM _{Min}	FWHM _{Max}	R ²	RMSE
Bone Geometry										
<i>Tt.Ar</i> [mm ²]	-	-	-	0.28	-	-	0.30	-	0.27	44
<i>Ct.Pm</i> [mm]	-	-	0.33	0.33	0.31	-	-	-	0.29	5.1
<i>Ct.Ar</i> [mm ²]	-	-	-	-	-	-	-	-	0.29	30.0
<i>Tb.Ar</i> [mm ²]	-	-	0.31	0.34	0.30	-	0.33	0.30	0.28	37.8
<i>Tb.Meta.Ar</i> [mm ²]	-	-	0.32	0.34	0.30	-	0.34	0.31	0.29	15.2
<i>Tb.Inn.Ar</i> [mm ²]	-	-	0.31	0.33	0.29	-	0.33	0.30	0.30	22.1
Bone Density										
<i>Tt.vBMD</i> [mg HA/cm ³]	-	-	-0.32	-0.35	-0.32	-	-0.34	-0.32	0.34	59
<i>Tb.vBMD</i> [mg HA/cm ³]	0.41	-0.44	0.41	0.42	0.45	0.45	0.38	0.45	0.44	24
<i>Tb.Meta.vBMD</i> [mg HA/cm ³]	0.45	-0.51	0.47	0.49	0.50	0.48	0.44	0.50	0.48	29

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<i>Tb.Inn.vBMD</i> [mg HA/cm ³]	0.31	-	-	-	0.28	-	-	0.28	0.30	21
<i>Ct.vBMD</i> [mg HA/cm ³]	-0.53	0.45	-0.46	-0.49	-0.49	-0.45	-0.49	-0.49	0.46	32
Bone Structure										
<i>BV/TV</i>	0.43	-0.47	0.43	0.44	0.48	0.48	0.40	0.48	0.46	0.03
<i>Tb.N</i> [1/mm]	-	-	-	-	-	-	-	-	0.13	0.29
<i>Tb.Th</i> [mm]	0.29	-0.33	0.42	0.45	0.43	0.40	0.40	0.44	0.38	0.03
<i>Tb.Sp</i> [mm]	-	-	-	-	-	-	-	-	0.30	0.25
<i>Tb.1/N.SD</i> [mm]	-	-	-	-	-	-	-	-	0.21	0.19
<i>Ct.Th</i> [mm]	-	-	-	-	-	-	-	-	0.24	0.61
<i>Ct.Po</i> [%]	0.45	-0.43	0.46	0.55	0.44	0.37	0.51	0.46	0.50	1.2
<i>Ct.Po.Dm</i> [mm]	-	-	-	-	-	-	-	-	0.27	0.03
Custom (ROI)										
<i>Ct.Th</i> _(ROI) [mm]	-0.29	-	-	-0.33	-	-	-0.28	-	0.43	0.54
<i>Ct.Po</i> _{BH(ROI)} [%]	0.46	-0.43	0.37	0.38	0.36	0.31	0.37	0.36	0.45	1.7
Cortical Porosity Distribution										
<i>Ct.Po.D</i> _{Mean(ROI)} [%]	0.40	-0.32	0.31	0.33	0.29	-	0.34	0.29	0.39	3.2
<i>Ct.Po.D</i> _{SD(ROI)} [%]	0.36	-0.55	0.39	0.43	0.40	0.39	0.41	0.41	0.23	1.1
<i>Ct.Po.D</i> _{VAR(ROI)} [%]	0.36	-0.55	0.39	0.43	0.40	0.39	0.41	0.41	0.22	13.8
<i>Ct.Po.D</i> _{skewness(ROI)}	-	-	-	-	-	-	-	-	0.26	0.39
<i>Ct.Po.D</i> _{skewness(Full)}	-	-	-	-	-	-	-	-	0.19	0.44
<i>Ct.Po.D</i> _{kurtosis(ROI)}	-	-	-	-	-	-	-	-	0.21	2.1
<i>Ct.Po.D</i> _{kurtosis(Full)}	-	-	-	-	-	-	-	-	0.16	2.7
Cortical Pore Diameter Distribution										
<i>Ct.Po.Dm.D</i> _{Mean(ROI)} [μm]	0.49	-0.61	0.49	0.51	0.52	0.53	0.49	0.53	0.32	15.3
<i>Ct.Po.Dm.D</i> _{SD(ROI)} [μm]	0.43	-0.60	0.49	0.51	0.51	0.52	0.47	0.52	0.21	24
<i>Ct.Po.Dm.D</i> _{Q90(ROI)} [μm]	0.50	-0.59	0.46	0.47	0.48	0.50	0.45	0.49	0.28	42
Cortical Bone BMD Distribution										
<i>Ct.BMD.D</i> _{kurtosis(Full)}	-	-	-	-	-	-	-	-	0.39	0.31