Table ESI-1 Resulting crystallinity and Mg/Ca and Sr/Ca molar ratios obtained from bone and serum samples

Sample	Endosteal lamellar				Intracortical non-lamellar				Serum	
	Mg/Ca ($\times 10^{-2}$)	Sr/Ca ($\times 10^{-4}$)	Crystallinity ($\times 10^{-2}$)	N	Mg/Ca ($\times 10^{-2}$)	Sr/Ca ($\times 10^{-4}$)	Crystallinity ($\times 10^{-2}$)	N	Mg/Ca	Sr/Ca ($\times 10^{-4}$)
Control										
Conorol-1	2.65 ± 0.09	2.16 ± 0.13	5.52 ± 0.14	60	2.75 ± 0.15	2.44 ± 0.09	5.40 ± 0.10	130	0.370 ± 0.006	1.49 ± 0.02
Conorol-2	2.55 ± 0.21	2.09 ± 0.11	5.53 ± 0.14	50	2.57 ± 0.14	2.53 ± 0.13	5.46 ± 0.11	90	0.341 ± 0.007	1.69 ± 0.03
Conorol-3	2.71 ± 0.15	2.27 ± 0.20	5.57 ± 0.15	90	2.75 ± 0.21	2.67 ± 0.11	5.51 ± 0.11	80	0.346 ± 0.006	1.55 ± 0.03
Conorol-4	2.55 ± 0.10	1.98 ± 0.12	5.57 ± 0.11	70	2.61 ± 0.14	2.41 ± 0.17	5.52 ± 0.10	120	0.276 ± 0.007	1.46 ± 0.03
Conorol-5	2.65 ± 0.16	2.28 ± 0.14	5.60 ± 0.16	40	2.77 ± 0.16	2.89 ± 0.13	5.45 ± 0.10	150	0.318 ± 0.005	1.46 ± 0.02
Conorol-6	2.67 ± 0.07	2.74 ± 0.13	5.53 ± 0.10	30	2.82 ± 0.15	3.08 ± 0.16	5.44 ± 0.10	130	0.348 ± 0.008	1.44 ± 0.03
Conorol-7	2.56 ± 0.10	1.96 ± 0.13	5.54 ± 0.14	60	2.68 ± 0.13	2.45 ± 0.16	5.48 ± 0.09	130	0.321 ± 0.008	1.22 ± 0.03
Mean (±1SD)	**2.62 ± 0.06**	**2.21 ± 0.27**	**5.55 ± 0.03**		**2.71 ± 0.09**	**2.64 ± 0.26**	**5.47 ± 0.04**		**0.331 ± 0.030**	**1.47 ± 0.14**
CKD										
CKD-1	3.51 ± 0.14	2.83 ± 0.07	5.12 ± 0.16	60	3.31 ± 0.24	2.87 ± 0.11	5.28 ± 0.13	100	0.462 ± 0.008	1.81 ± 0.03
CKD-2	3.79 ± 0.19	2.67 ± 0.07	5.25 ± 0.14	60	3.27 ± 0.26	2.76 ± 0.13	5.35 ± 0.13	90	0.424 ± 0.010	1.86 ± 0.04
CKD-3	3.03 ± 0.18	2.62 ± 0.08	5.36 ± 0.14	20	3.16 ± 0.19	2.91 ± 0.15	5.28 ± 0.15	160	0.402 ± 0.006	1.88 ± 0.03
CKD-4	3.12 ± 0.13	2.48 ± 0.19	5.41 ± 0.17	50	2.99 ± 0.24	2.79 ± 0.10	5.35 ± 0.12	120	0.360 ± 0.008	1.66 ± 0.04
CKD-5	3.16 ± 0.14	2.96 ± 0.08	5.37 ± 0.12	30	2.98 ± 0.20	2.99 ± 0.14	5.39 ± 0.11	140	0.399 ± 0.006	2.04 ± 0.04
CKD-6	3.62 ± 0.19	2.74 ± 0.09	5.15 ± 0.14	50	3.05 ± 0.25	2.78 ± 0.08	5.32 ± 0.14	60	0.593 ± 0.010	1.72 ± 0.03
Mean (±1SD)	**3.37 ± 0.31***	**2.72 ± 0.17***	**5.28 ± 0.12***		**3.13 ± 0.14***	**2.85 ± 0.09**	**5.33 ± 0.04***		**0.440 ± 0.082***	**1.83 ± 0.13***
DM										
DM-1	2.45 ± 0.08	1.94 ± 0.29	5.68 ± 0.08	60	2.61 ± 0.13	2.39 ± 0.09	5.56 ± 0.10	90	0.330 ± 0.007	1.37 ± 0.03
DM-2	2.48 ± 0.08	1.67 ± 0.15	5.70 ± 0.12	80	2.47 ± 0.18	2.37 ± 0.21	5.72 ± 0.10	50	0.358 ± 0.007	1.20 ± 0.02
DM-3	2.54 ± 0.11	2.12 ± 0.15	5.56 ± 0.08	30	2.61 ± 0.19	2.81 ± 0.25	5.54 ± 0.08	118	0.336 ± 0.007	1.28 ± 0.02
DM-4	2.87 ± 0.13	1.97 ± 0.04	5.53 ± 0.14	50	2.86 ± 0.14	2.10 ± 0.11	5.39 ± 0.11	70	0.342 ± 0.006	1.14 ± 0.02
DM-5	2.60 ± 0.11	1.85 ± 0.26	5.62 ± 0.11	60	2.68 ± 0.10	2.66 ± 0.14	5.55 ± 0.09	110	0.322 ± 0.007	1.35 ± 0.03
DM-6	2.52 ± 0.10	1.68 ± 0.10	5.55 ± 0.16	60	2.65 ± 0.16	2.43 ± 0.36	5.47 ± 0.09	100	0.310 ± 0.005	1.04 ± 0.02
DM-7	NA‡	NA‡	NA‡		2.66 ± 0.17	2.73 ± 0.11	5.59 ± 0.11	110	0.425 ± 0.008	1.27 ± 0.03
Mean (±1SD)	**2.58 ± 0.15**	**1.87 ± 0.17***	**5.61 ± 0.07**		**2.65 ± 0.11**	**2.50 ± 0.25**	**5.54 ± 0.10**		**0.346 ± 0.038**	**1.24 ± 0.12***

Uncertainties for the crystallinity and elemental ratio for bones were difined as 1σ calculated from multiple analysis spots.

Uncertainties for the Mg/Ca and Sr/Ca ratios in serum samples were defined as $1\sigma_m$ calculated from repeated measurements with time−resolved−analysis.

‡ No lamellar bone could be found in the endosteal area

* Steel's non-parametric rank sum test againse control: the data of $p<0.05$ were significantly different from control.