Supplementary material

Table i. The bone histomorphometric parameters of the same sham specimen of mandible and tibia at the five scanning resolutions

Parameters*	2D histology	Scanning resolutions (μm)				
		8.82	13.57	35.32	43.74	104.84
Mandible						
BV/TV (%)	*62.11*	*63.38*	*71.68*	*57.41*	*55.26*	Incalculable
BS/BV (mm^2/mm^3)	14.53	15.53	10.34	11.37	11.34	
Tb.Th (mm)	0.13†	0.13	0.19	0.18	0.18	
Tb.N (1/mm)	4.07	4.92	3.71	3.26	3.13	
Tb.Sp (mm)	0.06	0.07	0.08	0.13	0.14	
Tibia						
BV/TV (%)	*44.23*	*50.07*	*80.88*	*64.08*	*77.57*	Incalculable
BS/BV (mm^2/mm^3)	21.35	27.84	10.05	10.36	7.68	
Tb.Th (mm)	0.08*	0.07	0.20	0.19	0.26	
Tb.N (1/mm)	4.05	6.97	4.06	3.32	2.98	
Tb.Sp (mm)	0.06	0.07	0.05	0.11	0.08	

BV/TV, bone volume density; BS/BV, bone surface density; Tb.Th, trabecular thickness; Tb.N, trabecular number; Tb.Sp, trabecular separation; OVX, ovariectomised rats; OVX-ZOL, zoledronate-injected ovariectomised rats
*all parameters were calculated from the same rat in the sham group
†Tb.Th in two-dimensional histology is derived from Tb.Dm. It assumes that trabeculae are cylindrical rods; Tb.Dm = 4/(BS/BV). It assumes that trabeculae are thin plates; Tb.Th = 2/(BS/BV)

Table ii. Basic descriptive statistics of histological and micro-tomographic parameters of the mandible.

Parameters	Sham (n = 5)			OVX (n = 5)			OVX-ZOL (n = 5)		
	Mean	SD (CV %)	Range	Mean	SD (CV %)	Range	Mean	SD (CV %)	Range
2D histology									
BV/TV (%)	60.33	2.52 (*4.17*)	58.03 to 63.16	48.00	5.29 (*11.02*)	44.23 to 53.96	62.19	1.02 (*1.64*)	60.05 to 62.33
BS/BV (mm^2/mm^3)	16.69	0.15 (*0.90*)	16.53 to 16.83	19.33	1.28 (*6.62*)	18.37 to 20.78	16.24	0.08 (*0.49*)	16.17 to 16.32
Tb.Dm (mm)*	0.24	0.02 (*6.45*)	0.22 to 0.25	0.18	0.02 (*11.11*)	0.16 to 0.20	0.22	0.02 (*7.05*)	0.20 to 0.23
Tb.N (1/mm)	4.20	0.27 (*6.41*)	3.98 to 4.50	4.87	0.23 (*4.78*)	4.66 to 5.12	4.94	0.14 (*2.89*)	4.82 to 5.10
Tb.Sp (mm)	0.07	0.01 (*14.29*)	0.06 to 0.08	0.10	0.01 (*5.97*)	0.09 to 0.10	0.05	0.01 (*20.00*)	0.04 to 0.06
3D tomography									
BV/TV (%)	61.11	2.50 (*4.09*)	58.25 to 62.86	50.01	3.79 (*7.58*)	46.11 to 53.68	64.45	2.83 (*4.38*)	62.77 to 67.71
BS/BV (mm^2/mm^3)	17.29	0.80 (*4.60*)	16.44 to 18.01	23.18	1.74 (*7.52*)	21.24 to 24.61	17.65	0.83 (*4.72*)	16.69 to 18.22
Tb.Th (mm)†	0.12	0.01 (*4.66*)	0.11 to 0.12	0.09	0.01 (*7.77*)	0.08 to 0.09	0.11	0.01 (*4.84*)	0.11 to 0.12
Tb.N (1/mm)	5.28	0.18 (*3.49*)	5.11 to 5.48	5.78	0.37 (*6.38*)	5.46 to 6.18	5.68	0.03 (*0.61*)	5.65 to 5.72
Tb.Sp (mm)	0.07	0.01 (*7.99*)	0.07 to 0.08	0.09	0.01 (*11.88*)	0.08 to 0.10	0.06	0.005 (*7.55*)	0.06 to 0.07

BV/TV, bone volume density; BS/BV, bone surface density; Tb.Th, trabecular thickness; Tb.N, trabecular number; Tb.Sp, trabecular separation; OVX, ovariectomised rats; OVX-ZOL, zoledronate-injected ovariectomised rats
*Assumes that trabeculae are cylindrical rods; Tb.Dm = 4/(BS/BV)
†Assumes that trabeculae are thin plates; Tb.Th = 2/(BS/BV)
The coefficient of variation (CV) is calculated as the standard deviation (SD) in percentage of the mean

Table iii. Bivariate linear regressions as well as mean actual and percentage differences between histological and micro-tomographic parameters of the mandible

Parameter (n=15)	Coefficient of correlation (*r*)	Coefficient of determination (r^2) (%)	Mean actual difference	Mean % difference
Mandible				
BV/TV	0.95	*90*	2.080	*3.55*
BS/BV	0.94	*88*	1.956 mm^2/mm^3	*9.24*
Tb.Dm* (Tb.Th)†	0.86	*74*	–0.106 mm (–0.0002 mm‡)	*–101.08*(–0.54‡)
Tb.N	0.90	*81*	0.909/mm	*16.39*
Tb.Sp	0.92	*85*	0.002 mm	*4.59*
Tibia				
BV/TV	0.97	*94*	*9.683*	*24.70*
BS/BV	0.99	*98*	4.325 mm^2/mm^3	*16.84*
Tb.Dm* (Tb.Th)†	0.85	*72*	–0.068 mm (0.006 mm‡)	*–96.88* (1.56‡)
Tb.N	0.87	*76*	1.773/mm	*31.81*
Tb.Sp	0.97	*94*	0.001 mm	*10.37*

BV/TV, bone volume density; BS/BV, bone surface density; Tb.Th, trabecular thickness; Tb.N, trabecular number; Tb.Sp, trabecular separation; OVX, ovariectomised rats; OVX-ZOL, zoledronate-injected ovariectomised rats
*Assumes that trabeculae are cylindrical rods; Tb.Dm = 4/(BS/BV)
†Assumes that trabeculae are thin plates; Tb.Th = 2/(BS/BV)
‡The results are calculated when Tb.Dm is derived to Tb.Th according to above formula (Tb.Dm = 2* Tb.Th)
Mean actual difference is the average of 3D parameters minus 2D parameters
Mean percentage difference is the average of the percentage differences between undecalcified histological sections and micro-CT
The formula of the percentage differences is (3D parameters – 2D parameters) / 2D parameters

Table iv. Basic descriptive statistics of histological and micro-tomographic parameters of the tibia

Parameters	Sham (n = 5)			OVX (n = 5)			OVX-ZOL (n = 5)		
	Mean	SD (CV %)	Range	Mean	SD (CV %)	Range	Mean	SD (CV %)	Range
2D histology									
BV/TV (%)	40.33	4.04 (*10.02*)	38.11 to 45.24	14.67	2.08 (*14.19*)	12.87 to 17.41	47.33	3.51 (*7.42*)	43.83 to 51.35
BS/BV (mm^2/mm^3)	24.68	1.38 (*5.59*)	23.35 to 26.11	32.65	1.04 (*3.19*)	31.38 to 33.33	14.09	2.38 (*16.89*)	11.85 to 17.83
Tb.Dm (mm)*	0.15	0.01 (*6.67*)	0.14 to 0.17	0.12	0.01 (*8.33*)	0.12 to 0.13	0.17	0.01 (*5.88*)	0.16 to 0.19
Tb.N (1/mm)	4.40	0.42 (*9.65*)	4.05 to 4.87	2.70	0.25 (*9.25*)	2.50 to 2.98	4.39	0.81 (*18.45*)	3.60 to 5.21
Tb.Sp (mm)	0.06	0.01 (*9.12*)	0.06 to 0.07	0.21	0.03 (*13.53*)	0.18 to 0.23	0.05	0.01 (*12.37*)	0.04 to 0.05
3D tomography									
BV/TV (%)	47.20	2.51 (*5.31*)	45.41 to 50.70	23.40	1.60 (*6.82*)	22.00 to 25.14	60.78	2.98 (*4.91*)	58.74 to 64.20
BS/BV (mm^2/mm^3)	28.95	1.37 (*4.73*)	27.84 to 30.48	36.62	1.17 (*3.19*)	35.72 to 37.94	18.82	3.63 (*19.26*)	16.19 to 22.96
Tb.Th (mm)†	0.07	0.003 (*4.64*)	0.066 to 0.072	0.055	0.001 (*1.82*)	0.053 to 0.056	0.12	0.004 (*3.33*)	0.11 to 0.12
Tb.N (1/mm)	6.82	0.21 (*3.08*)	6.58 to 6.97	4.28	0.27 (*6.21*)	3.98 to 4.49	5.70	0.97 (*17.00*)	5.09 to 6.82
Tb.Sp (mm)	0.08	0.01 (*6.77*)	0.07 to 0.08	0.18	0.01 (*8.30*)	0.17 to 0.20	0.07	0.01 (*15.47*)	0.06 to 0.08

BV/TV, bone volume density; BS/BV, bone surface density; Tb.Th, trabecular thickness; Tb.N, trabecular number; Tb.Sp, trabecular separation; OVX, ovariectomised rats; OVX-ZOL, zoledronate-injected ovariectomised rats
*Assumes that trabeculae are cylindrical rods; Tb.Dm = 4/(BS/BV)
†Assumes that trabeculae are thin plates; Tb.Th = 2/(BS/BV)
The coefficient of variation (CV) is calculated as the standard deviation (SD) in percentage of the mean

Table v. Comparison of the same histomorphometric parameters of the tibia or mandible among sham, ovariectomised (OVX) and zoledronate-injected ovariectomised (OVX-ZOL) groups by histological indices or micro-CT analysis

Parameters	Tibia			Mandible		
	Sham (n = 5)	OVX (n = 5)	OVX-ZOL (n = 5)	Sham (n = 5)	OVX (n = 5)	OVX-ZOL (n = 5)
2D histology						
BV/TV (%)	*40.33 SD 4.04*	*14.67 SD 2.08§*	*47.33 SD 3.51‡,***	*60.33 SD 2.52*	*48.00 SD 5.29§*	*62.19 SD 1.02***
BS/BV (mm^2/mm^3)	24.68 SD 1.38	32.65 SD 1.04§	14.09 SD 2.38**,**	16.69 SD 0.15	19.33 SD 1.28	16.24 SD 0.08
Tb.Dm (mm)*	0.15 SD 0.01	0.12 SD 0.01§	0.17 SD 0.01**	0.24 SD 0.02	0.18 SD 0.02§	0.22 SD 0.02¶
Tb.N (1/mm)	4.40 SD 0.42	2.70 SD 0.25§	4.39 SD 0.81**	4.20 SD 0.27	4.87 SD 0.23§	4.94 SD 0.14§
Tb.Sp (mm)	0.06 SD 0.01	0.21 SD 0.03‡	0.05 SD 0.01¶	0.07 SD 0.01	0.10 SD 0.01§	0.05 SD 0.01‡,**
3D tomography						
BV/TV (%)	*47.20 SD 2.51*	*23.40 SD 1.60§*	*60.78 SD 2.98§,***	*61.11 SD 2.50*	*50.01 SD 3.79§*	*64.45 SD 2.83***
BS/BV (mm^2/mm^3)	28.95 SD 1.37	36.62 SD 1.17§	18.82 SD 3.63§,**	17.29 SD 0.80	23.18 SD 1.74§	17.65 SD 0.83**
Tb.Th (mm)†	0.07 SD 0.003	0.05 SD 0.001§	0.12 SD 0.004§,**	0.12 SD 0.01	0.09 SD 0.01§	0.11 SD 0.01**
Tb.N (1/mm)	6.82 SD 0.21	4.28 SD 0.27§	5.70 SD 0.97	5.28 SD 0.18	5.78 SD 0.37‡	5.68 SD 0.03
Tb.Sp (mm)	0.08 SD 0.01	0.18 SD 0.01§	0.07 SD 0.01**	0.07 SD 0.01	0.09 SD 0.01	0.06 SD 0.005**

BV/TV bone volume density, BS/BV bone surface density, Tb.Th trabecular thickness, Tb.N trabecular number, Tb.Sp trabecular separation, OVX ovariectomised rats, OVX-ZOL zoledronate-injected ovariectomised rats
Data are expressed as mean and SD
*Assumes that trabeculae are cylindrical rods; Tb.Dm = 4/(BS/BV)
†Assumes that trabeculae are thin plates; Tb.Th = 2/(BS/BV)
‡$p < 0.05$
§$p < 0.01$ vs sham group (one-way analysis of variance (ANOVA))
¶$p < 0.05$
**$p < 0.01$ vs OVX group (one-way ANOVA)