

## SUPPLEMENTAL MATERIAL

Kiviranta et al., <http://www.jem.org/cgi/content/full/jem.20121187/DC1>**Table S1.** Full histomorphometric data from 3-wk-old Zfp521<sup>-/-</sup> and control mice

Parameter	Control	Zfp521 <sup>-/-</sup>
BV/TV (%)	5.89 ± 1.28	3.46 ± 1.53 <sup>c</sup>
Tb. Th (μm)	27.50 ± 2.51	22.07 ± 2.12 <sup>b</sup>
Tb. Sp (μm)	463.55 ± 149.92	713.10 ± 315.63
Tb. N (per mm)	2.92 ± 0.73	1.61 ± 0.85 <sup>a</sup>
MS/BS (%)	26.52 ± 3.30	26.60 ± 4.71
MAR (μm/d)	4.89 ± 0.27	2.52 ± 0.54 <sup>c</sup>
BFR/BV (%/yr)	3,465.90 ± 545.75	2,165.15 ± 179.01 <sup>b</sup>
BFR/TV (%/yr)	208.28 ± 66.11	73.56 ± 28.21 <sup>b</sup>
N.Ob/BS (per mm)	13.08 ± 3.35	21.38 ± 6.32 <sup>a</sup>
Ob.S/BS (%)	26.51 ± 6.52	38.50 ± 10.74
OS/BS (%)	7.21 ± 2.61	26.38 ± 11.21 <sup>a</sup>
N.Oc/BS (per mm)	0.65 ± 0.11	1.22 ± 0.44 <sup>a</sup>
Oc.S/BS (%)	0.89 ± 0.18	2.17 ± 0.91 <sup>a</sup>
ES/BS (%)	1.06 ± 0.32	2.99 ± 1.41 <sup>a</sup>

MS, mineralizing surface; N.Ob, number of OBs; N.Oc, number of OCs; Ob.S, OB surface; Oc.S, OC surface; OS, osteoid surface; Tb. N, trabecular number; Tb. Sp, trabecular separation; Tb. Th, trabecular thickness; TV, tissue volume.

<sup>a</sup>P < 0.05 versus control.

<sup>b</sup>P < 0.01 versus control.

<sup>c</sup>P < 0.001 versus control.

**Table S2.** Full histomorphometric data from 6-wk-old Zfp521<sup>hOC</sup><sup>-/-</sup> and control mice

Parameter	Control	Zfp521 <sup>hOC</sup> <sup>-/-</sup>
BV/TV (%)	8.51 ± 2.40	5.03 ± 1.56 <sup>a</sup>
Tb. Th (μm)	35.40 ± 5.31	28.00 ± 4.25 <sup>a</sup>
Tb. Sp (μm)	401.88 ± 99.10	565.48 ± 160.80
Tb. N (per mm)	2.38 ± 0.50	1.77 ± 0.37 <sup>a</sup>
MS/BS (%)	30.55 ± 5.46	22.36 ± 5.99 <sup>a</sup>
MAR (μm/d)	3.42 ± 1.47	1.72 ± 0.87 <sup>a</sup>
BFR/BV (%/yr)	1,972.37 ± 570.22	970.42 ± 427.65 <sup>c</sup>
BFR/TV (%/yr)	167.31 ± 100.01	57.82 ± 50.05 <sup>a</sup>
N.Ob/BS (per mm)	8.80 ± 2.68	16.12 ± 3.58 <sup>b</sup>
Ob.S/BS (%)	14.92 ± 5.32	24.65 ± 6.58 <sup>a</sup>
OS/BS (%)	2.38 ± 1.53	1.58 ± 0.28
N.Oc/BS (per mm)	0.38 ± 0.14	0.34 ± 0.03
Oc.S/BS (%)	0.54 ± 0.19	0.47 ± 0.17
ES/BS (%)	0.47 ± 0.18	0.44 ± 0.04

MS, mineralizing surface; N.Ob, number of OBs; N.Oc, number of OCs; Ob.S, OB surface; Oc.S, OC surface; OS, osteoid surface; Tb. N, trabecular number; Tb. Sp, trabecular separation; Tb. Th, trabecular thickness; TV, tissue volume.

<sup>a</sup>P < 0.05 versus control.

<sup>b</sup>P < 0.01 versus control.

<sup>c</sup>P < 0.001 versus control.

**Table S3.** Full histomorphometric data from 12-wk-old Zfp521<sup>hOC</sup><sup>-/-</sup> and control mice

Parameter	Control	Zfp521 <sup>hOC</sup> <sup>-/-</sup>
BV/TV (%)	7.31 ± 1.87	5.43 ± 0.71 <sup>a</sup>
Tb. Th (μm)	32.92 ± 6.60	29.80 ± 2.00
Tb. Sp (μm)	442.73 ± 54.16	528.07 ± 59.94 <sup>a</sup>
Tb. N (per mm)	2.13 ± 0.23	1.83 ± 0.22 <sup>a</sup>
MS/BS (%)	11.44 ± 3.34	6.29 ± 1.63 <sup>b</sup>
MAR (μm/d)	1.10 ± 0.23	0.67 ± 0.43 <sup>a</sup>
BFR/BV (%/yr)	279.90 ± 93.39	119.15 ± 108.40 <sup>a</sup>
BFR/TV (%/yr)	17.89 ± 7.38	6.82 ± 7.68 <sup>a</sup>
N.Ob/BS (per mm)	11.40 ± 4.30	8.23 ± 0.96
Ob.S/BS (%)	18.56 ± 7.60	13.24 ± 1.68
OS/BS (%)	15.67 ± 5.63	5.04 ± 1.63 <sup>b</sup>
N.Oc/BS (per mm)	0.36 ± 0.15	0.26 ± 0.09
Oc.S/BS (%)	0.79 ± 0.38	0.56 ± 0.14
ES/BS (%)	0.89 ± 0.49	0.59 ± 0.18

MS, mineralizing surface; N.Ob, number of OBs; N.Oc, number of OCs; Ob.S, OB surface; Oc.S, OC surface; OS, osteoid surface; Tb. N, trabecular number; Tb. Sp, trabecular separation; Tb. Th, trabecular thickness; TV, tissue volume.

<sup>a</sup>P < 0.05 versus control.

<sup>b</sup>P < 0.01 versus control.

**Table S4.** Full histomorphometric data from 6-wk-old Zfp521<sup>OSx</sup><sup>-/-</sup> and control mice

Parameter	Control	Zfp521 <sup>OSx</sup> <sup>-/-</sup>
BV/TV (%)	5.55 ± 1.08	3.89 ± 0.81 <sup>a</sup>
Tb. Th (μm)	27.78 ± 3.57	25.87 ± 3.31
Tb. Sp (μm)	492.20 ± 112.05	662.93 ± 164.96
Tb. N (per mm)	1.99 ± 0.39	1.51 ± 0.39
MS/BS (%)	30.11 ± 4.55	19.01 ± 3.93 <sup>b</sup>
MAR (μm/d)	1.48 ± 0.24	1.06 ± 0.26 <sup>a</sup>
BFR/BV (%/yr)	1,138.68 ± 177.47	533.81 ± 214.53 <sup>b</sup>
BFR/TV (%/yr)	60.15 ± 3.74	27.66 ± 15.15 <sup>b</sup>
N.Ob/BS (per mm)	11.55 ± 3.76	13.44 ± 5.30
Ob.S/BS (%)	17.44 ± 5.43	20.07 ± 8.68
OS/BS (%)	10.31 ± 4.09	10.20 ± 6.26
N.Oc/BS (per mm)	0.24 ± 0.06	0.42 ± 0.10 <sup>b</sup>
Oc.S/BS (%)	0.46 ± 0.13	0.71 ± 0.12 <sup>b</sup>
ES/BS (%)	0.49 ± 0.21	0.80 ± 0.17 <sup>a</sup>

MS, mineralizing surface; N.Ob, number of OBs; N.Oc, number of OCs; Ob.S, OB surface; Oc.S, OC surface; OS, osteoid surface; Tb. N, trabecular number; Tb. Sp, trabecular separation; Tb. Th, trabecular thickness; TV, tissue volume.

<sup>a</sup>P < 0.05 versus control.

<sup>b</sup>P < 0.01 versus control.

**Table S5.** Full histomorphometric data from 6-wk-old control, Zfp521<sup>+/-</sup>, Ebf1<sup>+/-</sup>, and Zfp521<sup>+/-</sup>:Ebf1<sup>+/-</sup> mice

Parameter	Control	Zfp521 <sup>+/-</sup>	Ebf1 <sup>+/-</sup>	Zfp521 <sup>+/-</sup> :Ebf1 <sup>+/-</sup>
BV/TV (%)	5.89 ± 1.15	4.26 ± 0.28 <sup>a,i</sup>	9.21 ± 2.96 <sup>b,f</sup>	6.74 ± 0.85 <sup>f</sup>
Tb. Th (µm)	28.31 ± 4.41	25.51 ± 3.39 <sup>g</sup>	31.81 ± 5.88 <sup>d</sup>	26.85 ± 1.52
Tb. Sp (µm)	455.76 ± 40.48	577.05 ± 90.26 <sup>b,i</sup>	324.63 ± 50.25 <sup>b,f</sup>	375.51 ± 48.91 <sup>f</sup>
Tb. N (per mm)	2.07 ± 0.17	1.70 ± 0.27 <sup>a,i</sup>	2.84 ± 0.37 <sup>c,f</sup>	2.51 ± 0.28 <sup>a,f</sup>
MS/BS (%)	28.48 ± 3.55	20.73 ± 2.97 <sup>b,i</sup>	34.98 ± 4.86 <sup>a,e</sup>	29.63 ± 4.81 <sup>a,e</sup>
MAR (µm/d)	1.38 ± 0.27	1.01 ± 0.42 <sup>g</sup>	1.76 ± 0.31 <sup>d</sup>	1.44 ± 0.47
BFR/BV (%/yr)	1,038.25 ± 270.73	594.71 ± 260.08 <sup>a,i</sup>	1,407.40 ± 158.40 <sup>a,f</sup>	1,149.41 ± 381.48 <sup>e</sup>
BFR/TV (%/yr)	58.10 ± 18.35	25.89 ± 12.78 <sup>a,i</sup>	128.51 ± 39.63 <sup>c,f</sup>	79.76 ± 37.29 <sup>e,g</sup>
N.Ob/BS (per mm)	13.79 ± 3.08	21.37 ± 5.27 <sup>b</sup>	18.72 ± 4.83 <sup>a</sup>	15.24 ± 2.65 <sup>d</sup>
Ob.S/BS (%)	21.62 ± 4.62	32.62 ± 9.94 <sup>b</sup>	30.07 ± 3.08 <sup>a</sup>	23.99 ± 6.94 <sup>d</sup>
OS/BS (%)	14.23 ± 3.62	24.83 ± 9.47 <sup>b</sup>	21.19 ± 3.13 <sup>a</sup>	17.59 ± 5.98
N.Oc/BS (per mm)	0.42 ± 0.14	0.64 ± 0.08 <sup>b,i</sup>	0.24 ± 0.06 <sup>a,f</sup>	0.43 ± 0.12 <sup>e,h</sup>
Oc.S/BS (%)	0.82 ± 0.28	1.34 ± 0.16 <sup>c,i</sup>	0.45 ± 0.17 <sup>b,f</sup>	0.77 ± 0.11 <sup>f,h</sup>
ES/BS (%)	0.92 ± 0.30	1.49 ± 0.22 <sup>c,i</sup>	0.46 ± 0.16 <sup>b,f</sup>	0.84 ± 0.12 <sup>f,h</sup>

MS, mineralizing surface; N.Ob, number of OBs; N.Oc, number of OCs; Ob.S, OB surface; Oc.S, OC surface; OS, osteoid surface; Tb. N, trabecular number; Tb. Sp, trabecular separation; Tb. Th, trabecular thickness; TV, tissue volume.

<sup>a</sup>P < 0.05 versus control.

<sup>b</sup>P < 0.01 versus control.

<sup>c</sup>P < 0.001 versus control.

<sup>d</sup>P < 0.05 versus Zfp521<sup>+/-</sup>.

<sup>e</sup>P < 0.01 versus Zfp521<sup>+/-</sup>.

<sup>f</sup>P < 0.001 versus Zfp521<sup>+/-</sup>.

<sup>g</sup>P < 0.05 versus Ebf1<sup>+/-</sup>.

<sup>h</sup>P < 0.01 versus Ebf1<sup>+/-</sup>.

<sup>i</sup>P < 0.001 versus Ebf1<sup>+/-</sup>.

**Table S6.** Full histomorphometric data from 6-wk-old Coll2.3-Ebf1 and control mice

Parameter	Control	Coll-Ebf
BV/TV (%)	7.09 ± 1.04	5.33 ± 1.32 <sup>a</sup>
Tb. Th (µm)	31.14 ± 1.62	28.94 ± 4.19
Tb. Sp (µm)	414.55 ± 52.55	531.75 ± 106.71 <sup>a</sup>
Tb. N (per mm)	2.27 ± 0.26	1.83 ± 0.31 <sup>a</sup>
MS/BS (%)	25.85 ± 4.42	17.18 ± 5.84 <sup>b</sup>
MAR (µm/d)	2.07 ± 0.33	1.50 ± 0.44 <sup>a</sup>
BFR/BV (%/yr)	1,214.17 ± 149.64	715.52 ± 289.42 <sup>b</sup>
BFR/TV (%/yr)	88.73 ± 23.17	39.65 ± 18.49 <sup>b</sup>
N.Ob/BS (per mm)	14.11 ± 4.20	22.54 ± 6.31 <sup>a</sup>
Ob.S/BS (%)	20.48 ± 6.18	32.71 ± 9.36 <sup>a</sup>
OS/BS (%)	12.21 ± 5.45	22.80 ± 9.09 <sup>a</sup>
N.Oc/BS (per mm)	0.44 ± 0.15	0.32 ± 0.11
Oc.S/BS (%)	0.76 ± 0.29	0.56 ± 0.16
ES/BS (%)	0.86 ± 0.34	0.58 ± 0.13

MS, mineralizing surface; N.Ob, number of OBs; N.Oc, number of OCs; Ob.S, OB surface; Oc.S, OC surface; OS, osteoid surface; Tb. N, trabecular number; Tb. Sp, trabecular separation; Tb. Th, trabecular thickness; TV, tissue volume.

<sup>a</sup>P < 0.05 versus control.

<sup>b</sup>P < 0.01 versus control.