

Figure S1. Boxplots displaying temporal gene expression for a batch of gene markers associated with osteoporosis. Based on the RNA-seq analysis, CPM is used to denote genes expression levels. \*P<0.05 vs. healthy HM; \*\*P<0.01 vs. sham. CPM, count per million reads; OVX, ovariectomy; HM, human; OP, osteoporotic; ALPL, alkaline phosphatase, biomineralization associated; BGLAP, bone  $\gamma$ -carboxyglutamate protein; RUNX2, runt-related transcription factor 2; SOST, sclerostin; IBSP, integrin binding sialoprotein; SP7, Sp7 transcription factor; OPG, osteoprotegerin.

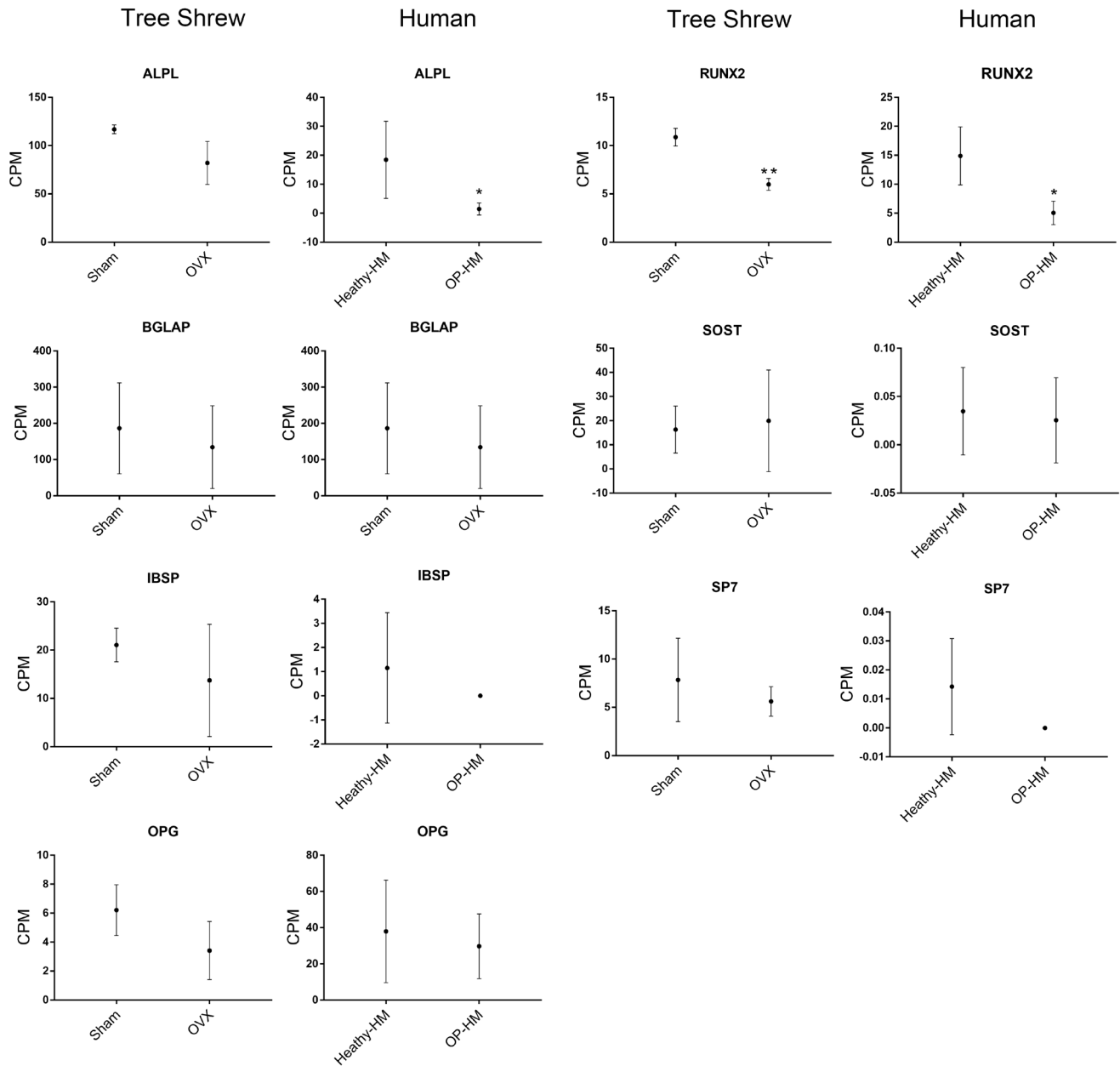


Table SI. Upregulated genes identified in the Ovariectomy vs. Sham group.

Gene_ID	Sham FPKM	Model FPKM	Blast Swiss gene name
102468156	60.76042513	359.0330911	MDFI
102469529	7.319695787	35.35347076	TEST
102470035	56.00766769	207.4114605	RABP2
102470343	37.89543543	166.1338249	INSC
102477388	0.453147095	8.645531842	LRCC1
102477531	16.37517859	74.09758313	PRS33
102477966	10.69690964	56.30402404	PRS41
102478219	28.21213454	148.7934171	TDT
102482618	34.33479383	137.6226695	RSP04
102483117	28.65534	122.1991541	REM1
102483210	664.9868972	2816.737855	PDYN
102484736	6.309577222	33.17543821	RAG2
102485521	154.6461831	848.955805	SFRP4
102486357	28.11779774	284.5442451	IGLL5
102489772	3.649399642	21.42196458	NDUC1
102492887	871.7265735	4147.088408	SERPH
102496350	6.978021502	49.06377656	IGLL1
102496881	11.65352744	149.7859715	VPREB
102498123	53.79499001	323.7544993	MMP11
102498948	1.762338604	28.89716952	CAPSL
102501856	99.08127784	567.3478167	HUTU
106734611	48.68464985	323.202053	VPRE3
Novel01457	13.34069771	83.1494862	-
Novel01612	3.971905047	22.43911315	-
Novel01771	7.552368757	52.02021249	-
Novel02203	62.9494226	305.3002174	-
Novel02997	54.87082635	230.5776488	-
Novel03127	2.917457074	25.14127607	-
Novel03719	2.679096734	21.59458879	-
Novel04286	30.46591968	134.0353164	-
Novel04648	25.547376	107.2941079	-
Novel04792	20.07411836	77.91582197	-
Novel05452	40.23586409	156.5745257	-

FPKM, fragments per kilobase of transcript per million mapped reads.

Table SII. Downregulated genes identified in the Ovariectomy vs. Sham group.

Gene_ID	Sham FPKM	Model FPKM	Blast Swiss gene name
102468786	6835.693055	1007.568121	PDK4
102469110	172.4275157	48.53420512	ONCM
102469207	1103.950952	295.3783168	SPB10
102469268	73.42911128	11.26841291	DDIAS
102472146	145.0653931	24.8143509	GYS2
102473349	1354.832043	296.2078213	SC6A6
102473389	9260.784447	2302.877737	RBM3
102474225	3384.903781	72.26283531	AACT
102475225	118.1644356	31.46908451	PDZD4
102475703	133.2714015	26.89528509	EDN1
102477091	5653.871908	217.406566	TRI63
102478468	592.4459238	147.8363749	PAI1
102478593	126.2863505	28.07560741	IL18R
102481435	6860.775057	1536.436963	PERE
102483475	340.7392718	94.1204547	PCAT2
102484602	191.665718	45.06391653	K226L
102484756	1027.405012	285.5624161	ADH1E
102484856	370.0839586	98.4829365	ABCA6
102484985	2070.461452	531.6614437	ADAM8
102486222	323.151645	74.84328468	ABCG1
102486497	323.9442544	51.18993635	IL1AP
102486709	9184.834312	360.8457227	MT1C
102487165	119.6214415	28.04521508	NSUN3
102487490	2045.098806	441.6792788	MEPE
102489626	1219.387876	327.3416891	ABCA1
102489982	814.1739429	222.7708328	S36A4
102491778	376.1387914	59.08760569	HYAS2
102492385	364.2684885	79.36628883	CLC4D
102493244	2165.389952	22.26920314	ILRL1
102495718	834.8841443	153.1582542	KLF9
102496910	4683.050488	1225.029939	FKBP5
102500090	285.8270759	67.7613362	S12A5
102500678	252.2599073	42.51886108	FMO2
102501016	506.4869226	119.5421078	NR1D2
102501796	1226.589833	156.4431932	FMO3
106733861	480.0445683	102.4225874	IRS2
106734708	51.30653441	10.22446848	-
106735723	670.701312	142.026703	-
Novel00395	29.57401141	0.681661469	-
Novel02247	17.34167411	2.581791505	-
Novel03205	33.74454021	5.051410925	-
Novel04560	61.63647368	11.71092686	-
Novel04871	3225.795427	36.32573201	-
Novel04981	29.68926767	3.663588012	-

FPKM, fragments per kilobase of transcript per million mapped reads.