

**Table S1.** Reactome Pathways and processes enriched in differentially expressed genes in the synovial tissues.

Reactome Description	GeneRatio	BgRatio	pvalue	padj	-log10(adj pvalue)	geneID	geneName	EntrezID	Count	down	up
<b>SYNOVIAL TISSUES</b>											
R-MMU-52 Positive epigenetic regulation of rRNA expression	10/165	75/8206	2.21E-06	0.000495	3.305426841	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		10	10	0
R-MMU-52 B-WICH complex positively regulates rRNA expression	10/165	75/8206	2.21E-06	0.000495	3.305426841	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		10	10	0
R-MMU-42 NoRC negatively regulates rRNA expression	8/165	46/8206	3.07E-06	0.000495	3.305426841	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		8	8	0
R-MMU-42 SIRT1 negatively regulates rRNA expression	8/165	48/8206	4.29E-06	0.000495	3.305426841	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		8	8	0
R-MMU-73 RNA Polymerase I Promoter Opening	8/165	48/8206	4.29E-06	0.000495	3.305426841	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		8	8	0
R-MMU-52 Negative epigenetic regulation of rRNA expression	8/165	49/8206	5.04E-06	0.000495	3.305426841	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		8	8	0
R-MMU-56 Activated PKN1 stimulates transcription of AR (androgen receptor) regul	8/165	50/8206	5.90E-06	0.000497	3.304072109	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		8	8	0
R-MMU-89 ESR-mediated signaling	11/165	104/8206	6.90E-06	0.000508	3.29385569	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		11	11	0
R-MMU-56 RHO GTPases activate PKNs	9/165	69/8206	8.71E-06	0.000515	3.288045895	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		9	9	0
R-MMU-92 Nonsense-Mediated Decay (NMD)	10/165	88/8206	9.62E-06	0.000515	3.288045895	ENSMUSGC	Rpl41/Rps27a/Rpl27/LOC108167922/R 67945/782		10	8	0
R-MMU-97 Nonsense Mediated Decay (NMD) enhanced by the Exon Junction Comp	10/165	88/8206	9.62E-06	0.000515	3.288045895	ENSMUSGC	Rpl41/Rps27a/Rpl27/LOC108167922/R 67945/782		10	8	0
R-MMU-55 Transcriptional regulation by small RNAs	10/165	89/8206	1.07E-05	0.000523	3.281572369	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		10	10	0
R-MMU-73 RNA Polymerase I Promoter Clearance	10/165	90/8206	1.18E-05	0.000534	3.272682237	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		10	10	0
R-MMU-73 RNA Polymerase I Transcription	10/165	91/8206	1.30E-05	0.000547	3.261810283	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		10	10	0
R-MMU-22 Condensation of Prophase Chromosomes	8/165	56/8206	1.41E-05	0.000553	3.256995204	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		8	8	0
R-MMU-21 Epigenetic regulation of gene expression	10/165	93/8206	1.58E-05	0.000582	3.23542121	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		10	10	0
R-MMU-21 PRC2 methylates histones and DNA	8/165	58/8206	1.84E-05	0.000637	3.196038634	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		8	8	0
R-MMU-90 Estrogen-dependent gene expression	10/165	97/8206	2.29E-05	0.000751	3.124384082	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		10	10	0
R-MMU-21 Gene Silencing by RNA	10/165	98/8206	2.51E-05	0.000779	3.108617555	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		10	10	0
R-MMU-20 TCF dependent signaling in response to WNT	14/165	192/8206	2.99E-05	0.000881	3.054934261	ENSMUSGC	Hist1h3e/Wnt8b/Hist1h2bb/Hist1h2ad 319151/22		14	13	1
R-MMU-89 RUNX1 regulates genes involved in megakaryocyte differentiation and p	8/165	65/8206	4.29E-05	0.00117	2.931715666	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		8	8	0
R-MMU-25 Senescence-Associated Secretory Phenotype (SASP)	9/165	84/8206	4.37E-05	0.00117	2.931715666	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		9	9	0
R-MMU-20 Formation of the beta-catenin:TCF transactivating complex	8/165	70/8206	7.38E-05	0.001889	2.723747775	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		8	8	0
R-MMU-25 Oxidative Stress Induced Senescence	9/165	94/8206	0.000106	0.002611	2.583202245	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		9	9	0
R-MMU-60 Deposition of new CENPA-containing nucleosomes at the centromere	7/165	58/8206	0.000148	0.003348	2.475268723	ENSMUSGC	Hist1h2bb/Hist1h2ad/Hist2h2ac/H2afj, 319178/31		7	7	0
R-MMU-77 Nucleosome assembly	7/165	58/8206	0.000148	0.003348	2.475268723	ENSMUSGC	Hist1h2bb/Hist1h2ad/Hist2h2ac/H2afj, 319178/31		7	7	0
R-MMU-88 Transcriptional regulation by RUNX1	12/165	170/8206	0.000153	0.003348	2.475268723	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		12	12	0
R-MMU-32 RMTs methylate histone arginines	7/165	62/8206	0.000227	0.004777	2.320885584	ENSMUSGC	Hist1h3e/Hist1h2ad/Hist2h2ac/H2afj/t 319151/31		7	7	0
R-MMU-90 Signaling by Nuclear Receptors	11/165	153/8206	0.000247	0.00502	2.299273931	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		11	11	0
R-MMU-73 Chromosome Maintenance	8/165	84/8206	0.000268	0.005271	2.278127859	ENSMUSGC	Hist1h2bb/Hist1h2ad/Hist2h2ac/H2afj, 319178/31		8	8	0
R-MMU-19 Signaling by WNT	15/165	270/8206	0.000337	0.006401	2.19378232	ENSMUSGC	Hist1h3e/Wnt8b/Hist1h2bb/Hist1h2ad 319151/22		15	14	1
R-MMU-25 DNA Damage/Telomere Stress Induced Senescence	7/165	68/8206	0.000405	0.007448	2.127958278	ENSMUSGC	Hist1h2bb/Hist1h1b/Hist1h2ad/Hist2h: 319178/56		7	7	0
R-MMU-68 Mitotic Prophase	9/165	114/8206	0.00046	0.008216	2.085345306	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		9	9	0
R-MMU-32 HATs acetylate histones	7/165	72/8206	0.000575	0.00996	2.001753389	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h2ad/Hist2h: 319151/31		7	7	0
R-MMU-38 XBP1(S) activates chaperone genes	3/165	Oct-06	0.000863	0.01453	1.83773201	ENSMUSGC	Sec61g/Gm4184/LOC102637269 20335/100		3	1	0
R-MMU-89 Cellular responses to external stimuli	19/165	427/8206	0.000904	0.014797	1.829820656	ENSMUSGC	Hist1h3e/Hist1h2bb/Mt3/Hist1h1b/His: 319151/31		19	18	1
R-MMU-25 Cellular Senescence	10/165	155/8206	0.001102	0.01755	1.755715088	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h1b/Hist1h2: 319151/31		10	10	0
R-MMU-38 IRE1alpha activates chaperones	3/165	Nov-06	0.00117	0.018131	1.741583706	ENSMUSGC	Sec61g/Gm4184/LOC102637269 20335/100		3	1	0
R-MMU-89 Metabolism of RNA	20/165	478/8206	0.001408	0.021269	1.672251318	ENSMUSGC	Rpl41/Rps27a/Ppie/Rpl27/LOC108167: 67945/782		20	18	0
R-MMU-56 UCH proteinases	7/165	88/8206	0.001895	0.027903	1.554342793	ENSMUSGC	Hist1h2ad/Hist2h2ac/Rps27a/Tfpt/Psnr 319165/31		7	7	0
R-MMU-76 RNA Polymerase III Transcription Initiation From Type 3 Promoter	4/165	28/8206	0.002214	0.031806	1.497485602	ENSMUSGC	Polr3h/Polr2h/Polr2k/Snappc2 78929/245		4	4	0
R-MMU-22 Cellular responses to stress	16/165	364/8206	0.002622	0.036772	1.434482904	ENSMUSGC	Hist1h3e/Hist1h2bb/Hist1h1b/Hist1h2: 319151/31		16	16	0
R-MMU-89 Plasma lipoprotein clearance	4/165	30/8206	0.002872	0.039345	1.405110582	ENSMUSGC	Lipc/Apoc1/Ap2s1/Npc2 15450/118		4	4	0
<b>SPLEENS</b>											
R-MMU-19 Metabolism of folate and pterines	7/412	17/8026	1.11E-05	0.00867	2.061963243	ENSMUSGC	Aldh112/Mthfd11/Dhfr/Mthfd1/Mthfr/I 216188/27		7	3	4
R-MMU-33 HSP90 chaperone cycle for steroid hormone receptors (SHR)	10/412	47/8026	0.000107	0.041645	1.380438847	ENSMUSGC	Tubb2b/Hsp90aa1/Stip1/Hspa1a/Hspa 73710/155		10	2	8