**Table S4**A partial list of genes significantly down-regulated in S1P*cko* chondrocytes identified from microarray analysis. Shown are top 20 genes that are differentially down-regulated when compared to WT, and some selected genes that belong to fatty acid and cholesterol biosynthesis pathways. RNAs with no corresponding gene names are not included in this list.

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| **Gene Symbol** | **Fold Change** | **Gene Name** |
| Fgfr1op2 | -12.4085 | Fibroblast growth factor receptor 1 oncogene partner 2 |
| Sparc | -11.2739 | Osteonectin (secreted protein, acidic, cysteine-rich) |
| Krtap13 | -11.0803 | Keratin associated protein 13 |
| Lor | -9.17809 | Loricrin |
| Lce1m | -7.22621 | Late cornified envelope protein 1m (small proline-rich protein) |
| Prg4 | -6.49905 | Proteoglycan 4 (lubricin) |
| Scd1 | -6.09877 | Stearoyl-CoA-desaturase 1 |
| Crct1  | -5.41591 | Cysteine-rich C-terminal 1 |
| Lce1a1 | -4.99055 | Late cornified envelope protein 1A1 |
| Tm7SF3 | -4.53791 | Transmembrane 7 superfamily member 3 |
| C1qtnf3 | -4.53193 | Complement C1q tumor necrosis factor related protein 3 |
| Lce3F | -4.24526 | Late cornified envelope protein 3F |
| Ldlr | -4.16262 | Low-density lipoprotein receptor |
| Kprp | -3.89984 | Keratinocyte proline-rich protein |
| Ppp1r3b | -3.85025 | Serine threonine phosphatase, protein phosphatase 1 |
| Sc4mol | -3.75594 | Sterol-C4-methyl oxidase-like  |
| Pcsk9 | -3.74258 | Proprotein convertase subtilisin/kexin type 9 |
| Insig1 | -3.62052 | Insulin-induced gene 1 |
| Calm4 | -3.60394 | Calmodulin 4 |
| Stard4 | -3.13912 | Star-related lipid transfer (START) domain containing 4 (Stard4) |
| Fads2 | -3.05881 | Fatty acid desaturase 2 |
| Lss | -2.77893 | Lanosterol synthase |
| Fdps | -2.66886 | Farnesyl diphosphate synthase |
| Hmgcr (Hmdh) | -2.50716 | 3-Hydroxy-3-methylglutaryl-CoA reductase |
| Idh1 | -2.28061 | Isocitrate dehydrogenase 1 |
| Scd2 | -2.21651 | Stearoyl-CoA-desaturase 2 |
| Nsdhl | -2.15225 | NAD(P) dependent steroid dehydrogenase like gene |
| Hapln3 | -2.06203 | Hyaluronan and proteoglycan link protein 3 |
| Sqle (Erg1) | -2.14067 | Squalene epoxidase gene  |
| Cyp51 | -2.01021 | Sterol 14-alpha-demethylase |