

Table S2 Genes differentially regulated in the stroma of RAR $\beta$  null mice and associated with cancer by Ingenuity pathway analysis

Gene	Expression in RAR $\beta^{-/-}$	Function/properties/association
<i>Ahcy11</i>	↑	Hydrolase implicated in drug resistance
<i>Cryab</i>	↓	Commonly expressed in basal-like tumors and contributes to their aggressive phenotype
<i>Cxcl12</i>	↓	The expression of CXCL12 (SDF-1) in breast tumors has been correlated with a poor prognosis, increased metastasis, resistance to conventional therapeutic agents and a poor outcome in the pathogenesis of breast cancer
<i>Cxcl14</i>	↓	CXCL14 is overexpressed in tumor myoepithelial cells and myofibroblasts, respectively, binds to receptors on epithelial cells and enhances their proliferation, migration, and invasion. Present in a stroma-derived prognostic predictor
<i>Elovl6</i>	↑	Plays a role in fatty acid metabolism and insulin sensitivity. Present in an ERR $\alpha$ -driven gene prognostic signature in breast cancer
<i>Esrrg</i>	↑	An orphan member of the nuclear receptor superfamily shown to be a favorable marker in breast cancer
<i>Exoc5</i>	↑	Essential for the biogenesis of epithelial cell surface polarity
<i>Got1</i>	↑	An enzyme which plays a role in amino acid metabolism and the urea and tricarboxylic acid cycles. Liver cancer is associated with down-regulation of Got1 expression
<i>Hipk2</i>	↓	A regulator of cell growth and apoptosis
<i>Hspb2</i>	↓	Up-regulated in breast cancer and stabilizes ERBB2 protein thus reducing Herceptin susceptibility
<i>Igj</i>	↑	Up-regulation in prostate cancer
<i>Il13ra1</i>	↑	A subunit of the interleukin 13 receptor. This protein binds tyrosine kinase TYK2, and may mediate the signaling processes that lead to the activation of JAK1, STAT3 and STAT6 induced by IL13 and IL4.
<i>Nfkbia</i>	↓	Transcription factor responsible for modulating the expression of genes involved in cell proliferation, differentiation, apoptosis and metastasis
<i>Nnmt</i>	↓	Involved in the metabolism of xenobiotics. NNMT is a Stat3-regulated gene that may be a candidate for a tumor marker
<i>Nupr1</i>	↓	Expression is up-regulated in metastatic breast cancer cells and in response to stress and influenced by the host micro-environment. NUPR1 has been found to aid the establishment of metastasis and to play a key role in the progression of malignancies including those of the breast
<i>Opcml</i>	↑	A broad tumor suppressor which is frequently inactivated by methylation in multiple malignancies

<i>Pbx1</i>	↑	A direct Notch3-regulated gene that mediates the survival signal of Notch3 in ovarian cancer
<i>Pcolce</i>	↓	A glycoprotein which binds and drives the enzymatic cleavage of type I procollagen
<i>Phgdh</i>	↓	A SERM-regulated protein in breast cancer cells
<i>Pink1</i>	↓	PTEN induced putative kinase that localizes to mitochondria. It is thought to protect cells from stress-induced mitochondrial dysfunction. Putative tumor suppressor gene
<i>Ppp3ca</i>	↑	Up-regulation in colorectal adenocarcinoma
<i>Pten</i>	↑	A tumor suppressor that is mutated in a large number of cancers at high frequency. It functions by negatively regulating AKT/PKB signaling pathway. Pten is a critical stroma-specific signalling pathway that suppresses mammary epithelial tumours
<i>Selp</i>	↑	Argioimmunoblastic T-cell lymphoma is associated with Selp expression
<i>Sfrp5</i>	↑	Secreted Frizzled-Related Proteins (SFRPs) are down-regulated in a series of human cancers
<i>Six1</i>	↓	Over-expression of the Six1 increases TGF-beta signaling in human breast cancer cells and induces an epithelial-mesenchymal transition (EMT) that is in part dependent on its ability to increase TGF-beta signaling
<i>Sncg</i>	↓	Mutations in this gene have been associated with breast tumor development. SNCG is an unfavorable prognostic marker for breast cancer progression
<i>Socs3</i>	↓	Increased expression of the transcript was shown within both tumour tissue and reactive stroma. Elevation of SOCS gene expression may be part of the host/tumour response
<i>Prelp</i>	↓	A leucine-rich repeat protein present in connective tissue extracellular matrix
<i>Synpo2</i>	↓	Highly correlated with the invasiveness of prostate cancers
<i>Tbx3</i>	↓	TBX3 is overexpressed in malignant cells of primary breast cancer tissues
<i>Timp2</i>	↑	Decrease orthotopic tumor growth, orthotopic metastatic behavior and do not develop brain metastases
<i>Timp4</i>	↓	Overexpression of TIMP-4 inhibits the invasion potential of breast cancer cells in an in vitro invasion assay
<i>Txnip</i>	↑	Required to maintain sufficient thioredoxin NADPH activity to reductively reactivate oxidized PTEN and oppose Akt downstream signaling
<i>Zbtb16</i>	↓	Better known as PLZF, located in the nucleus, involved in cell cycle progression and interacts with histone deacetylases