

Supplementary Table 4. IPA-suggested canonical pathways (p<0.05) for significantly mutated genes from B-cell lymphomas from cocker spaniel, golden retriever, and both breeds combined

Cocker spaniel

Ingenuity Canonical Pathways	p-value	Ratio	Genes
Small Cell Lung Cancer Signaling	2.57E-04	2.82E-02	<i>MYC, TRAF3</i>
Telomerase Signaling	5.01E-04	2.02E-02	<i>MYC, POT1</i>
Role of Macrophages, Fibroblasts and Endothelial Cells in Rheumatoid Arthritis	4.37E-03	6.71E-03	<i>MYC, TRAF3</i>
Telomere Extension by Telomerase	5.25E-03	6.67E-02	<i>POT1</i>
Polyamine Regulation in Colon Cancer	7.59E-03	4.55E-02	<i>MYC</i>
Estrogen-mediated S-phase Entry	8.32E-03	4.17E-02	<i>MYC</i>
TWEAK Signaling	1.17E-02	2.94E-02	<i>TRAF3</i>
April Mediated Signaling	1.32E-02	2.63E-02	<i>TRAF3</i>
Role of PKR in Interferon Induction and Antiviral Response	1.38E-02	2.50E-02	<i>TRAF3</i>
B Cell Activating Factor Signaling	1.38E-02	2.50E-02	<i>TRAF3</i>
Thyroid Cancer Signaling	1.38E-02	2.50E-02	<i>MYC</i>
Melanoma Signaling	1.45E-02	2.38E-02	<i>MITF</i>
Role of RIG1-like Receptors in Antiviral Innate Immunity	1.55E-02	2.22E-02	<i>TRAF3</i>
Endometrial Cancer Signaling	1.78E-02	1.92E-02	<i>MYC</i>
Lymphotoxin β Receptor Signaling	1.86E-02	1.85E-02	<i>TRAF3</i>
Thrombopoietin Signaling	1.91E-02	1.82E-02	<i>MYC</i>
ErbB2-ErbB3 Signaling	1.95E-02	1.75E-02	<i>MYC</i>
Myc Mediated Apoptosis Signaling	2.00E-02	1.72E-02	<i>MYC</i>
ERK5 Signaling	2.19E-02	1.59E-02	<i>MYC</i>
Activation of IRF by Cytosolic Pattern Recognition Receptors	2.19E-02	1.56E-02	<i>TRAF3</i>
Cell Cycle: G1/S Checkpoint Regulation	2.19E-02	1.56E-02	<i>MYC</i>
CD40 Signaling	2.24E-02	1.54E-02	<i>TRAF3</i>
Prolactin Signaling	2.51E-02	1.37E-02	<i>MYC</i>
STAT3 Pathway	2.51E-02	1.37E-02	<i>MYC</i>
Acute Myeloid Leukemia Signaling	2.63E-02	1.30E-02	<i>MYC</i>
PDGF Signaling	2.63E-02	1.30E-02	<i>MYC</i>
Melanocyte Development and Pigmentation Signaling	2.88E-02	1.19E-02	<i>MITF</i>
Bladder Cancer Signaling	3.02E-02	1.15E-02	<i>MYC</i>
Neuregulin Signaling	3.02E-02	1.14E-02	<i>MYC</i>
Altered T Cell and B Cell Signaling in Rheumatoid Arthritis	3.02E-02	1.14E-02	<i>TRAF3</i>
RANK Signaling in Osteoclasts	3.02E-02	1.14E-02	<i>MITF</i>

OX40 Signaling Pathway	3.09E-02	1.12E-02	<i>TRAF3</i>
Chronic Myeloid Leukemia Signaling	3.16E-02	1.08E-02	<i>MYC</i>
Mouse Embryonic Stem Cell Pluripotency	3.24E-02	1.05E-02	<i>MYC</i>
p38 MAPK Signaling	3.98E-02	8.55E-03	<i>MYC</i>
P2Y Purigenic Receptor Signaling Pathway	4.07E-02	8.40E-03	<i>MYC</i>
Aryl Hydrocarbon Receptor Signaling	4.79E-02	7.14E-03	<i>MYC</i>

Golden retriever

	p-value	Ratio	Genes
Ingenuity Canonical Pathways			
NGF Signaling	1.91E-03	2.80E-02	<i>TP53,MAP3K14,NTRK1</i>
TWEAK Signaling	2.75E-03	5.88E-02	<i>MAP3K14,TRAF3</i>
April Mediated Signaling	3.39E-03	5.26E-02	<i>MAP3K14,TRAF3</i>
Role of PKR in Interferon Induction and Antiviral Response	3.80E-03	5.00E-02	<i>TP53,TRAF3</i>
B Cell Activating Factor Signaling	3.80E-03	5.00E-02	<i>MAP3K14,TRAF3</i>
Thyroid Cancer Signaling	3.80E-03	5.00E-02	<i>TP53,NTRK1</i>
Glutamate Biosynthesis II	4.57E-03	5.00E-01	<i>GLUD2</i>
Glutamate Degradation X	4.57E-03	5.00E-01	<i>GLUD2</i>
Role of Oct4 in Mammalian Embryonic Stem Cell Pluripotency	5.01E-03	4.35E-02	<i>TP53,PHC3</i>
Lymphotoxin β Receptor Signaling	6.76E-03	3.70E-02	<i>MAP3K14,TRAF3</i>
NF- κ B Signaling	7.24E-03	1.73E-02	<i>MAP3K14,TRAF3,NTRK1</i>
Induction of Apoptosis by HIV1	8.32E-03	3.33E-02	<i>TP53,MAP3K14</i>
CD40 Signaling	9.77E-03	3.08E-02	<i>MAP3K14,TRAF3</i>
Small Cell Lung Cancer Signaling	1.15E-02	2.82E-02	<i>TP53,TRAF3</i>
STAT3 Pathway	1.20E-02	2.74E-02	<i>NTRK1,SOCS2</i>
Arginine Biosynthesis IV	1.38E-02	1.67E-01	<i>GLUD2</i>
Aspartate Degradation II	1.58E-02	1.43E-01	<i>MDH2</i>
Altered T Cell and B Cell Signaling in Rheumatoid Arthritis	1.74E-02	2.27E-02	<i>MAP3K14,TRAF3</i>
Apoptosis Signaling	1.78E-02	2.25E-02	<i>TP53,MAP3K14</i>
Assembly of RNA Polymerase I Complex	2.04E-02	1.11E-01	<i>TAF1C</i>
p53 Signaling	2.14E-02	2.04E-02	<i>TP53,ST13</i>
Telomerase Signaling	2.14E-02	2.02E-02	<i>TP53,POT1</i>
Type I Diabetes Mellitus Signaling	2.63E-02	1.82E-02	<i>MAP3K14,SOCS2</i>
Type II Diabetes Mellitus Signaling	2.95E-02	1.71E-02	<i>MAP3K14,SOCS2</i>
Telomere Extension by Telomerase	3.39E-02	6.67E-02	<i>POT1</i>
Adipogenesis pathway	3.39E-02	1.57E-02	<i>TP53,FBXW7</i>
RAN Signaling	3.80E-02	5.88E-02	<i>KPNA2</i>
GADD45 Signaling	4.27E-02	5.26E-02	<i>TP53</i>

DNA damage-induced 14-3-3 σ Signaling	4.27E-02	5.26E-02	<i>TP53</i>
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Cocker spaniel + Golden retriever

Ingenuity Canonical Pathways	p-value	Ratio	Genes
Thyroid Cancer Signaling	1.17E-04	7.50E-02	<i>TP53,MYC,NTRK1</i>
Small Cell Lung Cancer Signaling	6.46E-04	4.23E-02	<i>TP53,MYC,TRAF3</i>
STAT3 Pathway	7.08E-04	4.11E-02	<i>MYC,NTRK1,SOCS2</i>
Telomerase Signaling	1.70E-03	3.03E-02	<i>TP53,MYC,POT1</i>
NGF Signaling	2.14E-03	2.80E-02	<i>TP53,MAP3K14,NTRK1</i>
TWEAK Signaling	2.95E-03	5.88E-02	<i>MAP3K14,TRAF3</i>
April Mediated Signaling	3.72E-03	5.26E-02	<i>MAP3K14,TRAF3</i>
Role of PKR in Interferon Induction and Antiviral Response	4.07E-03	5.00E-02	<i>TP53,TRAF3</i>
B Cell Activating Factor Signaling	4.07E-03	5.00E-02	<i>MAP3K14,TRAF3</i>
Melanoma Signaling	4.57E-03	4.76E-02	<i>TP53,MITF</i>
Role of Oct4 in Mammalian Embryonic Stem Cell Pluripotency	5.37E-03	4.35E-02	<i>TP53,PHC3</i>
Endometrial Cancer Signaling	6.92E-03	3.85E-02	<i>TP53,MYC</i>
Lymphotoxin β Receptor Signaling	7.41E-03	3.70E-02	<i>MAP3K14,TRAF3</i>
Acute Phase Response Signaling	7.59E-03	1.78E-02	<i>MAP3K14,SOCS2,HRG</i>
Wnt/ β -catenin Signaling	7.59E-03	1.78E-02	<i>SOX17,TP53,MYC</i>
NF- κ B Signaling	8.13E-03	1.73E-02	<i>MAP3K14,TRAF3,NTRK1</i>
Myc Mediated Apoptosis Signaling	8.51E-03	3.45E-02	<i>TP53,MYC</i>
Induction of Apoptosis by HIV1	9.12E-03	3.33E-02	<i>TP53,MAP3K14</i>
ERK5 Signaling	1.00E-02	3.17E-02	<i>MYC,NTRK1</i>
Cell Cycle: G1/S Checkpoint Regulation	1.02E-02	3.12E-02	<i>TP53,MYC</i>
CD40 Signaling	1.05E-02	3.08E-02	<i>MAP3K14,TRAF3</i>
Prolactin Signaling	1.32E-02	2.74E-02	<i>MYC,SOCS2</i>
Bladder Cancer Signaling	1.82E-02	2.30E-02	<i>TP53,MYC</i>
Altered T Cell and B Cell Signaling in Rheumatoid Arthritis	1.86E-02	2.27E-02	<i>MAP3K14,TRAF3</i>
RANK Signaling in Osteoclasts	1.86E-02	2.27E-02	<i>MAP3K14,MITF</i>
Apoptosis Signaling	1.91E-02	2.25E-02	<i>TP53,MAP3K14</i>
Chronic Myeloid Leukemia Signaling	2.09E-02	2.15E-02	<i>TP53,MYC</i>
Assembly of RNA Polymerase I Complex	2.14E-02	1.11E-01	<i>TAF1C</i>
Mouse Embryonic Stem Cell Pluripotency	2.19E-02	2.11E-02	<i>TP53,MYC</i>
p53 Signaling	2.29E-02	2.04E-02	<i>TP53,ST13</i>
Type I Diabetes Mellitus Signaling	2.82E-02	1.82E-02	<i>MAP3K14,SOCS2</i>
Type II Diabetes Mellitus Signaling	3.16E-02	1.71E-02	<i>MAP3K14,SOCS2</i>
p38 MAPK Signaling	3.16E-02	1.71E-02	<i>TP53,MYC</i>

Role of Macrophages, Fibroblasts and Endothelial Cells in Rheumatoid Arthritis	3.39E-02	1.01E-02	<i>MYC,MAP3K14,TRAF3</i>
Telomere Extension by Telomerase	3.55E-02	6.67E-02	<i>POT1</i>
Adipogenesis pathway	3.72E-02	1.57E-02	<i>TP53,FBXW7</i>
RAN Signaling	3.98E-02	5.88E-02	<i>KPNA2</i>
Aryl Hydrocarbon Receptor Signaling	4.37E-02	1.43E-02	<i>TP53,MYC</i>
GADD45 Signaling	4.47E-02	5.26E-02	<i>TP53</i>
DNA damage-induced 14-3-3 σ Signaling	4.47E-02	5.26E-02	<i>TP53</i>
Glioblastoma Multiforme Signaling	4.79E-02	1.37E-02	<i>TP53,MYC</i>

