

Supplementary Table 5. IPA-suggested canonical pathways (p<0.05) for significantly mutated genes from T-cell lymphomas from boxer and golden retriever

Boxer

| | p-value | Ratio | Genes |
|---|----------|----------|-------------|
| Ingenuity Canonical Pathways | | | |
| Melanoma Signaling | 6.31E-05 | 4.76E-02 | MAP2K1,PTEN |
| Endometrial Cancer Signaling | 9.77E-05 | 3.85E-02 | MAP2K1,PTEN |
| ErbB2-ErbB3 Signaling | 1.17E-04 | 3.51E-02 | MAP2K1,PTEN |
| IL-17A Signaling in Airway Cells | 1.48E-04 | 3.12E-02 | MAP2K1,PTEN |
| Prostate Cancer Signaling | 2.45E-04 | 2.44E-02 | MAP2K1,PTEN |
| FAK Signaling | 2.75E-04 | 2.30E-02 | MAP2K1,PTEN |
| Neuregulin Signaling | 2.82E-04 | 2.27E-02 | MAP2K1,PTEN |
| Glioma Signaling | 3.31E-04 | 2.11E-02 | MAP2K1,PTEN |
| PTEN Signaling | 5.01E-04 | 1.69E-02 | MAP2K1,PTEN |
| PI3K/AKT Signaling | 5.50E-04 | 1.63E-02 | MAP2K1,PTEN |
| PI3K Signaling in B Lymphocytes | 5.89E-04 | 1.56E-02 | MAP2K1,PTEN |
| Ovarian Cancer Signaling | 6.17E-04 | 1.53E-02 | MAP2K1,PTEN |
| Insulin Receptor Signaling | 6.46E-04 | 1.49E-02 | MAP2K1,PTEN |
| Glioblastoma Multiforme Signaling | 7.76E-04 | 1.37E-02 | MAP2K1,PTEN |
| RAR Activation | 1.12E-03 | 1.14E-02 | MAP2K1,PTEN |
| B Cell Receptor Signaling | 1.12E-03 | 1.14E-02 | MAP2K1,PTEN |
| Sertoli Cell-Sertoli Cell Junction Signaling | 1.15E-03 | 1.12E-02 | MAP2K1,PTEN |
| Integrin Signaling | 1.48E-03 | 9.90E-03 | MAP2K1,PTEN |
| Protein Kinase A Signaling | 5.25E-03 | 5.18E-03 | MAP2K1,PTEN |
| D-myo-inositol (1,3,4)-trisphosphate Biosynthesis | 5.62E-03 | 5.26E-02 | PTEN |
| Superpathway of D-myo-inositol (1,4,5)-trisphosphate Metabolism | 7.08E-03 | 4.17E-02 | PTEN |
| 4-1BB Signaling in T Lymphocytes | 9.12E-03 | 3.23E-02 | MAP2K1 |
| Oncostatin M Signaling | 1.00E-02 | 2.94E-02 | MAP2K1 |
| Thyroid Cancer Signaling | 1.20E-02 | 2.50E-02 | MAP2K1 |
| UVC-Induced MAPK Signaling | 1.26E-02 | 2.38E-02 | MAP2K1 |
| Role of IL-17F in Allergic Inflammatory Airway Diseases | 1.32E-02 | 2.27E-02 | MAP2K1 |
| CD27 Signaling in Lymphocytes | 1.55E-02 | 1.92E-02 | MAP2K1 |
| CNTF Signaling | 1.55E-02 | 1.92E-02 | MAP2K1 |
| UVB-Induced MAPK Signaling | 1.58E-02 | 1.89E-02 | MAP2K1 |
| IL-2 Signaling | 1.58E-02 | 1.89E-02 | MAP2K1 |
| Role of IL-17A in Arthritis | 1.58E-02 | 1.85E-02 | MAP2K1 |
| Thrombopoietin Signaling | 1.62E-02 | 1.82E-02 | MAP2K1 |
| EGF Signaling | 1.66E-02 | 1.79E-02 | MAP2K1 |
| ErbB4 Signaling | 1.78E-02 | 1.67E-02 | MAP2K1 |
| GM-CSF Signaling | 1.82E-02 | 1.61E-02 | MAP2K1 |
| Antiproliferative Role of Somatostatin Receptor 2 | 1.86E-02 | 1.59E-02 | MAP2K1 |
| Pyridoxal 5'-phosphate Salvage Pathway | 1.91E-02 | 1.56E-02 | MAP2K1 |

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| CD40 Signaling | 1.91E-02 | 1.54E-02 | MAP2K1 |
| Non-Small Cell Lung Cancer Signaling | 1.91E-02 | 1.54E-02 | MAP2K1 |
| Hypoxia Signaling in the Cardiovascular System | 1.91E-02 | 1.54E-02 | PTEN |
| IL-15 Signaling | 1.95E-02 | 1.52E-02 | MAP2K1 |
| Role of PI3K/AKT Signaling in the Pathogenesis of Influenza | 1.95E-02 | 1.52E-02 | MAP2K1 |
| Erythropoietin Signaling | 2.00E-02 | 1.49E-02 | MAP2K1 |
| Neurotrophin/TRK Signaling | 2.00E-02 | 1.49E-02 | MAP2K1 |
| Role of MAPK Signaling in the Pathogenesis of Influenza | 2.00E-02 | 1.47E-02 | MAP2K1 |
| GDNF Family Ligand-Receptor Interactions | 2.00E-02 | 1.47E-02 | MAP2K1 |
| Melatonin Signaling | 2.09E-02 | 1.43E-02 | MAP2K1 |
| IL-3 Signaling | 2.09E-02 | 1.41E-02 | MAP2K1 |
| Renal Cell Carcinoma Signaling | 2.09E-02 | 1.41E-02 | MAP2K1 |
| Small Cell Lung Cancer Signaling | 2.09E-02 | 1.41E-02 | PTEN |
| Chemokine Signaling | 2.09E-02 | 1.41E-02 | MAP2K1 |
| IL-17 Signaling | 2.14E-02 | 1.39E-02 | MAP2K1 |
| JAK/Stat Signaling | 2.14E-02 | 1.39E-02 | MAP2K1 |
| LPS-stimulated MAPK Signaling | 2.14E-02 | 1.37E-02 | MAP2K1 |
| Prolactin Signaling | 2.14E-02 | 1.37E-02 | MAP2K1 |
| STAT3 Pathway | 2.14E-02 | 1.37E-02 | MAP2K1 |
| FLT3 Signaling in Hematopoietic Progenitor Cells | 2.19E-02 | 1.35E-02 | MAP2K1 |
| Leptin Signaling in Obesity | 2.19E-02 | 1.35E-02 | MAP2K1 |
| TREM1 Signaling | 2.24E-02 | 1.33E-02 | NLRP14 |
| VEGF Family Ligand-Receptor Interactions | 2.24E-02 | 1.32E-02 | MAP2K1 |
| BMP signaling pathway | 2.24E-02 | 1.32E-02 | MAP2K1 |
| Acute Myeloid Leukemia Signaling | 2.29E-02 | 1.30E-02 | MAP2K1 |
| PDGF Signaling | 2.29E-02 | 1.30E-02 | MAP2K1 |
| Regulation of IL-2 Expression in Activated and Anergic T Lymphocytes | 2.34E-02 | 1.27E-02 | MAP2K1 |
| Ceramide Signaling | 2.34E-02 | 1.25E-02 | MAP2K1 |
| Melanocyte Development and Pigmentation Signaling | 2.45E-02 | 1.19E-02 | MAP2K1 |
| FGF Signaling | 2.51E-02 | 1.18E-02 | MAP2K1 |
| ErbB Signaling | 2.51E-02 | 1.16E-02 | MAP2K1 |
| α -Adrenergic Signaling | 2.57E-02 | 1.15E-02 | MAP2K1 |
| Bladder Cancer Signaling | 2.57E-02 | 1.15E-02 | MAP2K1 |
| TGF- β Signaling | 2.57E-02 | 1.15E-02 | MAP2K1 |
| RANK Signaling in Osteoclasts | 2.57E-02 | 1.14E-02 | MAP2K1 |
| PAK Signaling | 2.63E-02 | 1.12E-02 | MAP2K1 |
| Apoptosis Signaling | 2.63E-02 | 1.12E-02 | MAP2K1 |
| VEGF Signaling | 2.69E-02 | 1.10E-02 | MAP2K1 |

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| Fcγ Receptor-mediated Phagocytosis in Macrophages and Monocytes | 2.75E-02 | 1.08E-02 | <i>PTEN</i> |
| Chronic Myeloid Leukemia Signaling | 2.75E-02 | 1.08E-02 | <i>MAP2K1</i> |
| PPAR Signaling | 2.75E-02 | 1.06E-02 | <i>MAP2K1</i> |
| Mouse Embryonic Stem Cell Pluripotency | 2.82E-02 | 1.05E-02 | <i>MAP2K1</i> |
| Salvage Pathways of Pyrimidine Ribonucleotides | 2.82E-02 | 1.05E-02 | <i>MAP2K1</i> |
| IGF-1 Signaling | 2.88E-02 | 1.03E-02 | <i>MAP2K1</i> |
| T Cell Receptor Signaling | 2.88E-02 | 1.03E-02 | <i>MAP2K1</i> |
| p53 Signaling | 2.88E-02 | 1.02E-02 | <i>PTEN</i> |
| CDK5 Signaling | 2.95E-02 | 1.01E-02 | <i>MAP2K1</i> |
| Telomerase Signaling | 2.95E-02 | 1.01E-02 | <i>MAP2K1</i> |
| Nitric Oxide Signaling in the Cardiovascular System | 2.95E-02 | 1.01E-02 | <i>MAP2K1</i> |
| Cholecystokinin/Gastrin-mediated Signaling | 2.95E-02 | 9.90E-03 | <i>MAP2K1</i> |
| Rac Signaling | 3.09E-02 | 9.62E-03 | <i>MAP2K1</i> |
| HGF Signaling | 3.09E-02 | 9.52E-03 | <i>MAP2K1</i> |
| Pancreatic Adenocarcinoma Signaling | 3.09E-02 | 9.43E-03 | <i>MAP2K1</i> |
| NGF Signaling | 3.16E-02 | 9.35E-03 | <i>MAP2K1</i> |
| fMLP Signaling in Neutrophils | 3.16E-02 | 9.26E-03 | <i>MAP2K1</i> |
| iCOS-iCOSL Signaling in T Helper Cells | 3.16E-02 | 9.26E-03 | <i>PTEN</i> |
| Fc Epsilon RI Signaling | 3.24E-02 | 9.17E-03 | <i>MAP2K1</i> |
| Renin-Angiotensin Signaling | 3.24E-02 | 9.17E-03 | <i>MAP2K1</i> |
| Gαs Signaling | 3.24E-02 | 9.17E-03 | <i>MAP2K1</i> |
| Natural Killer Cell Signaling | 3.24E-02 | 9.09E-03 | <i>MAP2K1</i> |
| Role of Tissue Factor in Cancer | 3.24E-02 | 9.09E-03 | <i>PTEN</i> |
| Corticotropin Releasing Hormone Signaling | 3.24E-02 | 9.01E-03 | <i>MAP2K1</i> |
| Role of NANOG in Mammalian Embryonic Stem Cell Pluripotency | 3.24E-02 | 9.01E-03 | <i>MAP2K1</i> |
| Hereditary Breast Cancer Signaling | 3.39E-02 | 8.70E-03 | <i>PTEN</i> |
| IL-6 Signaling | 3.39E-02 | 8.62E-03 | <i>MAP2K1</i> |
| 14-3-3-mediated Signaling | 3.47E-02 | 8.55E-03 | <i>MAP2K1</i> |
| CCR3 Signaling in Eosinophils | 3.47E-02 | 8.55E-03 | <i>MAP2K1</i> |
| Gα12/13 Signaling | 3.47E-02 | 8.55E-03 | <i>MAP2K1</i> |
| CD28 Signaling in T Helper Cells | 3.47E-02 | 8.47E-03 | <i>MAP2K1</i> |
| Synaptic Long Term Potentiation | 3.47E-02 | 8.40E-03 | <i>MAP2K1</i> |
| p70S6K Signaling | 3.47E-02 | 8.40E-03 | <i>MAP2K1</i> |
| P2Y Purigenic Receptor Signaling Pathway | 3.47E-02 | 8.40E-03 | <i>MAP2K1</i> |
| HMGB1 Signaling | 3.55E-02 | 8.33E-03 | <i>MAP2K1</i> |
| D-myo-inositol (1,4,5,6)-Tetrakisphosphate Biosynthesis | 3.72E-02 | 7.87E-03 | <i>PTEN</i> |
| D-myo-inositol (3,4,5,6)-tetrakisphosphate Biosynthesis | 3.72E-02 | 7.87E-03 | <i>PTEN</i> |

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| Estrogen Receptor Signaling | 3.72E-02 | 7.87E-03 | MAP2K1 |
| GNRH Signaling | 3.80E-02 | 7.75E-03 | MAP2K1 |
| IL-12 Signaling and Production in Macrophages | 3.98E-02 | 7.41E-03 | MAP2K1 |
| Relaxin Signaling | 3.98E-02 | 7.41E-03 | MAP2K1 |
| Synaptic Long Term Depression | 4.17E-02 | 7.09E-03 | MAP2K1 |
| D-myo-inositol-5-phosphate Metabolism | 4.17E-02 | 6.99E-03 | PTEN |
| 3-phosphoinositide Degradation | 4.27E-02 | 6.94E-03 | PTEN |
| Regulation of eIF4 and p70S6K Signaling | 4.27E-02 | 6.85E-03 | MAP2K1 |
| Epithelial Adherens Junction Signaling | 4.27E-02 | 6.85E-03 | PTEN |
| Gαq Signaling | 4.27E-02 | 6.80E-03 | MAP2K1 |
| CXCR4 Signaling | 4.47E-02 | 6.58E-03 | MAP2K1 |
| Aldosterone Signaling in Epithelial Cells | 4.47E-02 | 6.58E-03 | MAP2K1 |
| Gap Junction Signaling | 4.57E-02 | 6.45E-03 | MAP2K1 |
| 3-phosphoinositide Biosynthesis | 4.57E-02 | 6.45E-03 | PTEN |
| Germ Cell-Sertoli Cell Junction Signaling | 4.68E-02 | 6.25E-03 | MAP2K1 |
| Tight Junction Signaling | 4.90E-02 | 5.99E-03 | PTEN |
| Acute Phase Response Signaling | 4.90E-02 | 5.92E-03 | MAP2K1 |

Golden retriever

| | p-value | Ratio | Genes |
|--|----------|----------|--------------|
| Ingenuity Canonical Pathways | | | |
| Glutamate Biosynthesis II | 1.70E-03 | 5.00E-01 | GLUD2 |
| Glutamate Degradation X | 1.70E-03 | 5.00E-01 | GLUD2 |
| Oxidative Phosphorylation | 3.80E-03 | 1.83E-02 | ATP5H,COX8A |
| Arginine Biosynthesis IV | 5.01E-03 | 1.67E-01 | GLUD2 |
| Mitochondrial Dysfunction | 8.91E-03 | 1.17E-02 | ATP5H,COX8A |
| EIF2 Signaling | 1.05E-02 | 1.08E-02 | RPL11,RPL23A |
| Leukotriene Biosynthesis | 1.26E-02 | 6.67E-02 | LTA4H |
| Pyrimidine Deoxyribonucleotides De Novo Biosynthesis I | 1.86E-02 | 4.55E-02 | NME7 |
| Protein Ubiquitination Pathway | 1.91E-02 | 7.84E-03 | FBXW7,PSMA1 |
| Role of JAK1, JAK2 and TYK2 in Interferon Signaling | 2.00E-02 | 4.17E-02 | PTPN6 |
| Pyrimidine Ribonucleotides Interconversion | 2.24E-02 | 3.70E-02 | NME7 |
| Pyrimidine Ribonucleotides De Novo Biosynthesis | 2.40E-02 | 3.45E-02 | NME7 |
| Role of JAK2 in Hormone-like Cytokine Signaling | 2.95E-02 | 2.86E-02 | PTPN6 |