**Supplementary Table S1. Gene function and ontogeny**

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| --- | --- | --- | --- | --- |
| **Gene** | **GO Function** | **KEGG pathway** | **Disease-gene association** | **Biological role** |
| *NFIX* | GO:0003676  Nucleic acid binding  GO:0003899  DNA-directed 5-3 RNA polymerase activity | hsa03020  RNA polymerase  hsa04623  Cytosolic DNA-sensing pathway |  |  |
| *CEMIP2* | GO:0030214  Hyaluronan catabolic process  GO:0004415  Hyalurononglucosaminidase activity  GO:0004553  Hydrolase activity, hydrolyzing o-glycosyl compounds | hsa00531  Glycosaminoglycan degradation  hsa04142  Lysosome | DOID:0050809  Mucopolysaccharidosis ix  DOID:3211  Lysosomal storage disease |  |
| ADAMTSL4 | GO:0004222  Metalloendopeptidase activity  GO:0008233  Peptidase activity  GO:0031012  Extracellular matrix |  | DOID:0080201  Peters plus syndrome  DOID:0050475  Weill-Marchesani syndrome  DOID:0111148  Isolated ectopia lentis  DOID:0111243  Acromicric dysplasia  DOID:0111724  Geleophysic dysplasia | ADAMTS-like proteins reside in the extracellular matrix and regulate its assembly |
| *KLRG2* |  |  |  | Killer cell lectin-like receptor subfamily g member 2; |
| *SCNN1A* | GO:1903288  Positive regulation of potassium ion import across plasma membrane  GO:0070294  Renal sodium ion absorption  GO:0015280  Ligand-gated sodium channel activity  GO:0017081  Chloride channel regulator activity | hsa04960  Aldosterone-regulated sodium reabsorption  hsa04742  Taste transduction | DOID:0050477  Liddle syndrome  DOID:0111607  Distal arthrogryposis type 3  DOID:0060855  Autosomal dominant pseudohypoaldosteronism type 1 | Amiloride-sensitive sodium channel subunit alpha; Plays an essential role in electrolyte and blood pressure homeostasis, but also in airway surface liquid homeostasis, which is important for proper clearance of mucus. Controls the reabsorption of sodium in kidney, colon, lung and eccrine sweat glands. Also plays a role in taste perception |
| *ARHGAP31* | GO:0030027  Lamellipodium  GO:0031252  Cell leading edge |  | DOID:0060227  Adams-Oliver syndrome | Rho GTPase-activating protein, Required for cell spreading, polarized lamellipodia formation and cell migration |
| *ARHGAP5* | GO:0071803  Positive regulation of podosome assembly  GO:0051894  Positive regulation of focal adhesion assembly  GO:0043149  Stress fiber assembly  GO:0045453  Bone resorption | hsa05219  Bladder cancer  hsa04670  Leukocyte transendothelial migration  hsa04370  VEGF signaling pathway  hsa04611  Platelet activation | DOID:162  Cancer | Rho GTPase-activating protein |
| *RHOH* | GO:0031295  T cell costimulation  GO:0007266  Rho protein signal transduction  GO:0030217  T cell differentiation  GO:0050870  Positive regulation of t cell activation  GO:0001772  Immunological synapse | hsa05340  Primary immunodeficiency  hsa04660  T cell receptor signaling pathway  hsa04722  Neurotrophin signaling pathway  hsa05235  PD-L1 expression and PD-1 checkpoint pathway in cancer | DOID:162  Cancer | Rho-related GTP-binding protein is a hematopoietic system-specific GTPase; Negative regulator of hematopoietic progenitor cell proliferation, survival and migration. Critical regulator of thymocyte development and T-cell antigen receptor (TCR) signaling |