

**Supplemental Table 6. Genes possessing disruptive INDEL variants whose mouse orthologs, when disrupted, cause phenotypes.**

| GENE SYMBOL     | No. Of likely disruptive INDEL Alleles | Known disease associations   | Mouse Homozygous Disruption Phenotype   | Mouse Heterozygous Disruption Phenotype |
|-----------------|--|--|---|---|
| <i>ABCC1</i>    | 1                                      | No OMIM  | homeostasis/metabolism, cardiovascular system, immune system  | Not known                               |
| <i>ADAMTS20</i> | 1                                      | No OMIM  | pigmentation, skin/coat/nails   | Not known                               |
| <i>ALDH3A1</i>  | 1                                      | No OMIM  | normal  |   |
| <i>AP3B2</i>    | 1                                      | No OMIM  | nervous system, behavior/neurological   | Not known                               |
| <i>ARNT</i>     | 3                                      | Leukemia, acute myeloblastic   | Tumorigenesis, normal, nervous system, renal/urinary system, liver/biliary system, lethality-prenatal/perinatal, homeostasis/metabolism, growth/size, endocrine/exocrine gland, embryogenesis, craniofacial, cellular, cardiovascular system, immune system, reproductive system, skin/coat/nails, hematopoietic system | Normal                                  |
| <i>ATP8B1</i>   | 1                                      | Cholestasis, progressive familial intrahepatic 1; Cholestasis, benign recurrent intrahepatic | Liver/biliary system, homeostasis/metabolism, growth/size   | Not known                               |
| <i>AURKC</i>    | 1                                      | Male infertility with large-headed, multiflagellar, polyploid spermatozoa                    | Reproductive system   | Not known                               |
| <i>BACH1</i>    | 2                                      | No OMIM  | muscle, homeostasis/metabolism, cardiovascular system   | Not known                               |
| <i>BRWD1</i>    | 1                                      | No OMIM  | reproductive system   | Not known                               |
| <i>BUB1</i>     | 1                                      | Colorectal cancer with chromosomal instability   | Tumorigenesis, lethality-prenatal/perinatal, homeostasis/metabolism, growth/size, endocrine/exocrine gland, cellular, reproductive system   | Tumorigenesis, cellular                 |
| <i>C11orf73</i> | 1                                      | No OMIM  | lethality-prenatal/perinatal  | Not known                               |
| <i>C16orf35</i> | 1                                      | No OMIM  | liver/biliary system, lethality-prenatal/perinatal, skin/coat/nails, hematopoietic system   | hematopoietic system                    |
| <i>C20orf19</i> | 1                                      | No OMIM  | normal  |   |
| <i>CACNA1F</i>  | 1                                      | Night blindness, congenital  | Nervous system, vision/eye  | Nervous system, vision/eye.             |

|                |   |   |   |                                       |
|----------------|---|---|---|---------------------------------------|
|                |   | stationary, X-linked, type 2A; Cone-rod dystrophy, X-linked; Aland Island eye disease                                       |   | Human disease model.                  |
| <i>CALB1</i>   | 2 | No OMIM   | nervous system, behavior/neurological   | nervous system, behavior/neurological |
| <i>CAMKK1</i>  | 1 | No OMIM   | behavior/neurological   | Not known                             |
| <i>CCNB2</i>   | 1 | No OMIM   | lethality-prenatal/perinatal, growth/size, immune system, reproductive system, hematopoietic system   | Not known                             |
| <i>CD207</i>   | 1 | No OMIM   | immune system, hematopoietic system   | Not known                             |
| <i>CEL</i>     | 2 | Maturity-onset diabetes of the young, type VIII   | Liver/biliary system, adipose tissue, homeostasis/metabolism, growth/size, digestive/alimentary   | Not known                             |
| <i>CEP290</i>  | 1 | Joubert syndrome 5; Senior-Loken syndrome 6;Leber congenital amaurosis 10; Meckel syndrome type 4; Bardet-Biedl syndrome 14 | Pigmentation, nervous system, vision/eye  | Not known                             |
| <i>CLCN3</i>   | 1 | Ceroid Lipofuscinosis, Neuronal, 3;   | nervous system, liver/biliary system, life span-post-weaning/aging, lethality-postnatal, adipose tissue, homeostasis/metabolism, growth/size, digestive/alimentary, behavior/neurological, immune system, reproductive system, skeleton, vision/eye | Not known                             |
| <i>COL4A2</i>  | 2 | No OMIM   | lethality-prenatal/perinatal, growth/size, cardiovascular system, embryogenesis, nervous system   | Not known                             |
| <i>COL7A1</i>  | 2 | Epidermolysis bullosa dystrophica   | Normal, limbs/digits/tail, life span-post-weaning/aging, lethality-postnatal, growth/size, digestive/alimentary, skeleton, skin/coat/nails  | Not known                             |
| <i>CROCC</i>   | 1 | No OMIM   | nervous system, immune system, respiratory system, vision/eye   | Not known                             |
| <i>CSNK2A2</i> | 1 | Globozoospermia   | reproductive system   | Not known                             |
| <i>CYP27A1</i> | 1 | Cerebrotendinous xanthomatosis  | Liver/biliary system, homeostasis/metabolism  | Not known                             |

|               |   |  |   |  |
|---------------|---|--|---|--|
| <i>DAB2</i>   | 1 | No OMIM  | renal/urinary system, lethality-prenatal/perinatal, homeostasis/metabolism, growth/size, embryogenesis  | Not known  |
| <i>DICER1</i> | 1 | No OMIM  | liver/biliary system, limbs/digits/tail, life span-post-weaning/aging, lethality-postnatal, lethality-prenatal/perinatal, homeostasis/metabolism, growth/size, embryogenesis, cellular, cardiovascular system, behavior/neurological, immune system, respiratory system, skeleton, touch/vibrissae, skin/coat/nails, hematopoietic system | Not known  |
| <i>DLL3</i>   | 1 | Spondylocostal dysostosis, autosomal recessive | nervous system, muscle, limbs/digits/tail, lethality-postnatal, hearing/vestibular/ear, growth/size, embryogenesis, craniofacial, behavior/neurological, reproductive system, skeleton, vision/eye  | Not known  |
| <i>DOCK1</i>  | 1 | No OMIM  | muscle, lethality-postnatal, lethality-prenatal/perinatal, homeostasis/metabolism, growth/size, embryogenesis   | Not known  |
| <i>DSCAM</i>  | 6 | No OMIM  | nervous system, life span-post-weaning/aging, behavior/neurological, skeleton, vision/eye, respiratory  | respiratory, nervous system, reproductive system |
| <i>EP400</i>  | 4 | No OMIM  | nervous system, lethality-prenatal/perinatal, embryogenesis, hematopoietic system   | Not known  |
| <i>ERC2</i>   | 1 | No OMIM  | nervous system  | Not known  |
| <i>ESAM</i>   | 1 | No OMIM  | growth/size, cardiovascular system, immune system   | Not known  |
| <i>ESX1</i>   | 1 | No OMIM  | growth/size, embryogenesis  | growth/size, embryogenesis                       |
| <i>F7</i>     | 1 | Factor VII deficiency                          | Normal, lethality-prenatal/perinatal, homeostasis/metabolism, cardiovascular system   | Normal   |
| <i>FAM48A</i> | 1 | No OMIM  | pigmentation, nervous system, lethality-prenatal/perinatal, growth/size, embryogenesis, cellular, vision/eye  | Not known  |
| <i>FNI</i>    | 2 | Glomerulopathy with fibronectin deposits 2     | tumorigenesis, normal, nervous system, muscle, life span-post-weaning/aging, lethality-prenatal/perinatal, homeostasis/metabolism, growth/size, embryogenesis, cellular,  | Not known  |

|               |   |  |   |  |
|---------------|---|--|---|--|
|               |   |  | cardiovascular system, immune system, reproductive system, skeleton, other, hematopoietic system  |  |
| <i>GBA</i>    | 2 | Gaucher disease; Parkinson's disease   | Nervous system, liver/biliary system, life span-post-weaning/aging, lethality-postnatal, lethality-prenatal/perinatal, homeostasis/metabolism, growth/size, cardiovascular system, behavior/neurological, immune system, respiratory system, skeleton, skin/coat/nails, hematopoietic system  | Homeostasis/metabolism   |
| <i>GLT8D1</i> | 1 | No OMIM  | normal  |  |
| <i>GPHB5</i>  | 1 | No OMIM  | normal  |  |
| <i>GRIN3B</i> | 1 | No OMIM  | growth/size, behavior/neurological  | Not known  |
| <i>GRIP2</i>  | 2 | No OMIM  | normal  |  |
| <i>HADHB</i>  | 2 | Trifunctional protein deficiency   | muscle, liver/biliary system, life span-post-weaning/aging, adipose tissue, homeostasis/metabolism, growth/size, cardiovascular system  | Not known  |
| <i>INSR</i>   | 1 | Leprechaunism; Rabson-Mendenhall syndrome; Diabetes mellitus, insulin-resistant, with acanthosis nigricans; Hyperinsulinemic hypoglycemia, familial, 5 | Nervous system, renal/urinary system, muscle, liver/biliary system, life span-post-weaning/aging, lethality-postnatal, adipose tissue, Homeostasis/metabolism, growth/size, endocrine/exocrine gland, digestive/alimentary, cellular, cardiovascular system, behavior/neurological, respiratory system, reproductive system, hematopoietic system | Homeostasis/metabolism, digestive/alimentary, endocrine/exocrine |
| <i>IRAK3</i>  | 1 | Asthma susceptibility  | Limbs/digits/tail, growth/size, immune system, skeleton, hematopoietic system   | Not known  |
| <i>KLF4</i>   | 1 | No OMIM  | tumorigenesis, lethality-prenatal/perinatal, homeostasis/metabolism, digestive/alimentary, behavior/neurological, skin/coat/nails   | Not known  |
| <i>KRT14</i>  | 7 | Epidermolysis bullosa simplex; Naegeli-Franceschetti-Jadassohn syndrome; Dermatopathia pigmentosa reticularis,   | Pigmentation, tumorigenesis, life span-post-weaning/aging, lethality-postnatal, digestive/alimentary, respiratory system, reproductive system, vision/eye, skin/coat/nails  | Not known  |

|                |   |  |   |  |
|----------------|---|--|---|--|
| <i>LHB</i>     | 1 | Hypogonadism, hypergonadotropic; Male pseudohermaphroditism  | homeostasis/metabolism, endocrine/exocrine gland, reproductive system   | Not known  |
| <i>LRP2</i>    | 1 | Donnai-Barrow syndrome   | Nervous system, renal/urinary system, lethality-prenatal/perinatal, homeostasis/metabolism, hearing/vestibular/ear, growth/size, endocrine/exocrine gland, embryogenesis, craniofacial, cellular, respiratory system, reproductive system, skeleton, vision/eye             | Hearing/vestibular/ear   |
| <i>MAP3K14</i> | 1 | No OMIM  | immune system   | Not known  |
| <i>MAP7</i>    | 1 | No OMIM  | endocrine/exocrine gland, reproductive system   | Not known  |
| <i>MAPK7</i>   | 1 | No OMIM  | nervous system, muscle, life span-post-weaning/aging, lethality-prenatal/perinatal, homeostasis/metabolism, hearing/vestibular/ear, growth/size, embryogenesis, digestive/alimentary, craniofacial, cellular, cardiovascular system, behavior/neurological, skin/coat/nails | Not known  |
| <i>MLL3</i>    | 1 | No OMIM  | growth/size, cellular, reproductive system, vision/eye  | Not known  |
| <i>MMP12</i>   | 2 | No OMIM  | nervous system, homeostasis/metabolism, immune system, reproductive system  | Not known  |
| <i>MYO6</i>    | 1 | Deafness, autosomal dominant 22; Deafness, autosomal recessive 37; Deafness, sensorineural, with hypertrophic cardiomyopathy | Nervous system, hearing/vestibular/ear, growth/size, behavior/neurological, reproductive system, vision/eye   | Hearing/vestibular/ear   |
| <i>MYT1</i>    | 1 | No OMIM  | muscle, lethality-prenatal/perinatal, homeostasis/metabolism, endocrine/exocrine gland, digestive/alimentary  | Not known  |
| <i>NBN</i>     | 2 | Nijmegen breakage syndrome; Leukemia, acute lymphoblastic  | tumorigenesis, nervous system, life span-post-weaning/aging, lethality-prenatal/perinatal, growth/size, endocrine/exocrine gland, embryogenesis, cellular, behavior/neurological, immune system, reproductive system, hematopoietic system                                  | Cellular, life span-post-weaning/aging, tumorigenesis.<br>Human disease model. |

|                 |   |   |   |                      |
|-----------------|---|---|---|----------------------|
| <i>NCOA3</i>    | 2 | No OMIM   | lethality-postnatal, homeostasis/metabolism, hearing/vestibular/ear, growth/size, endocrine/exocrine gland, embryogenesis, craniofacial, cellular, reproductive system, skin/coat/nails | Not known            |
| <i>NEFM</i>     | 1 | No OMIM   | nervous system  | Not known            |
| <i>NR2E3</i>    | 1 | Enhanced S-cone syndrome; Retinitis pigmentosa-37 | Nervous system, vision/eye  | Not known            |
| <i>NTSR1</i>    | 1 | No OMIM   | nervous system, adipose tissue, homeostasis/metabolism, growth/size, digestive/alimentary, behavior/neurological, touch/vibrissae   | digestive/alimentary |
| <i>PADI6</i>    | 1 | No OMIM   | embryogenesis, reproductive system  | Not known            |
| <i>PATZ1</i>    | 1 | No OMIM   | endocrine/exocrine gland, reproductive system   | Not known            |
| <i>PCDH8</i>    | 1 | No OMIM   | normal  |                      |
| <i>PERP</i>     | 1 | No OMIM   | lethality-postnatal, cellular   | Not known            |
| <i>PFN2</i>     | 1 | No OMIM   | nervous system, cellular, behavior/neurological   | Not known            |
| <i>PIM2</i>     | 1 | No OMIM   | immune system, hematopoietic system   | Not known            |
| <i>PKD1L3</i>   | 1 | No OMIM   | Normal  |                      |
| <i>PNLIPRP2</i> | 2 | No OMIM   | homeostasis/metabolism, growth/size, digestive/alimentary, immune system  | Not known            |
| <i>PNO</i>      | 1 | No OMIM   | homeostasis/metabolism, behavior/neurological, touch/vibrissae  | Not known            |
| <i>PNPLA2</i>   | 1 | Neutral lipid storage disease with myopathy       | muscle, liver/biliary system, life span-post-weaning/aging, adipose tissue, homeostasis/metabolism, growth/size, cardiovascular system  | Not known            |
| <i>POU2F1</i>   | 1 | No OMIM   | lethality-prenatal/perinatal, vision/eye, hematopoietic system  | Not known            |
| <i>PPP1R9B</i>  | 2 | No OMIM   | nervous system, homeostasis/metabolism, growth/size, behavior/neurological  | Not known            |
| <i>PRKCH</i>    | 1 | Cerebral infarction susceptibility                | Tumorigenesis, homeostasis/metabolism, skin/coat/nails  | Not known            |
| <i>PRKDC</i>    | 2 | No OMIM   | tumorigenesis, life span-post-weaning/aging, homeostasis/metabolism, endocrine/exocrine gland, digestive/alimentary, cellular, immune   | Not known            |

|                |   |  |   |   |
|----------------|---|--|---|---|
|                |   |  | system, hematopoietic system  |   |
| <i>PTK7</i>    | 1 | No OMIM  | nervous system, renal/urinary system, limbs/digits/tail, lethality-prenatal/perinatal, hearing/vestibular/ear, embryogenesis  | Not known   |
| <i>RAB3IP</i>  | 1 | No OMIM  | normal  |   |
| <i>REC8</i>    | 1 | No OMIM  | lethality-prenatal/perinatal, growth/size, endocrine/exocrine gland, reproductive system  | Not known   |
| <i>RECQL4</i>  | 1 | Rothmund-Thomson syndrome; RAPADILINO syndrome; Baller-Gerold syndrome | Pigmentation, tumorigenesis, limbs/digits/tail, life span-post-weaning/aging, lethality-postnatal, lethality-prenatal/perinatal, growth/size, embryogenesis, digestive/alimentary, craniofacial, cellular, immune system, skeleton, vision/eye, skin/coat/nails, hematopoietic system | Not known   |
| <i>RETNLB</i>  | 2 | No OMIM  | life span-post-weaning/aging, homeostasis/metabolism, digestive/alimentary, immune system   | Not known   |
| <i>RHBG</i>    | 1 | No OMIM  | normal  |   |
| <i>RIPK2</i>   | 1 | No OMIM  | immune system, hematopoietic system   | Not known   |
| <i>RP1</i>     | 1 | Retinitis pigmentosa-1   | Nervous system, vision/eye  | Vision/eye  |
| <i>RYR3</i>    | 1 | No OMIM  | nervous system, muscle, behavior/neurological   | behavior/neurological   |
| <i>SARM1</i>   | 4 | No OMIM  | cellular  | Not known   |
| <i>SEBOX</i>   | 1 | No OMIM  | Normal  |   |
| <i>SETD8</i>   | 1 | No OMIM  | lethality-prenatal/perinatal  | Not known   |
| <i>SFRS1</i>   | 1 | No OMIM  | lethality-prenatal/perinatal  | Not known   |
| <i>SLC18A1</i> | 1 | No OMIM  | normal  |   |
| <i>SOX6</i>    | 1 | No OMIM  | normal, limbs/digits/tail, lethality-postnatal, lethality-prenatal/perinatal, growth/size, respiratory system, skeleton   | Not known   |
| <i>ST3GAL1</i> | 1 | No OMIM  | Immune system   | Not known   |
| <i>STK17B</i>  | 1 | No OMIM  | immune system, hematopoietic system   | Not known   |
| <i>TAP2</i>    | 1 | Bare lymphocyte syndrome, type I; Wegener-like granulomatosis          | Immune system, hematopoietic system   | Not known   |
| <i>TCOF1</i>   | 1 | Treacher Collins mandibulofacial dysostosis                            | Nervous system, lethality-prenatal/perinatal, hearing/vestibular/ear, growth/size, endocrine/exocrine gland, embryogenesis,   | Nervous system, lethality-prenatal/perinatal, hearing/vestibular/ear, |

|              |   |                                       |  |   |
|--------------|---|---------------------------------------|--|---|
|              |   |                                       | digestive/alimentary, craniofacial, cellular, respiratory system, skeleton, vision/eye, taste/olfaction  | growth/size, endocrine/exocrine gland, embryogenesis, digestive/alimentary, craniofacial, cellular, respiratory system, skeleton, vision/eye, taste/olfaction. Human disease model. |
| <i>TEKT4</i> | 6 | No OMIM                               | reproductive system  | Not known   |
| <i>THBS2</i> | 1 | Lumbar disc herniation susceptibility | Tumorigenesis, muscle, limbs/digits/tail, life span-post-weaning/aging, lethality-prenatal/perinatal, homeostasis/metabolism, cellular, cardiovascular system, behavior/neurological, immune system, respiratory system, skeleton, skin/coat/nails, hematopoietic system | Not known   |
| <i>THBS4</i> | 1 | No OMIM                               | normal   |   |
| <i>TYRO3</i> | 1 | No OMIM                               | nervous system, behavior/neurological  | Not known   |
| <i>ZFX</i>   | 2 | No OMIM                               | lethality-postnatal, lethality-prenatal/perinatal, growth/size, endocrine/exocrine gland, embryogenesis, behavior/neurological, reproductive system  | lethality-postnatal, lethality-prenatal/perinatal, reproductive system  |
| <i>ZPBP</i>  | 1 | No OMIM                               | endocrine/exocrine gland, reproductive system  | reproductive system   |