| Gene | Expressed allele | Gene function | Mouse phenotype | Putative role in hematopoiesis or hematopoietic malignancy | Refs |
|---|---|---|---|---|---|
| **Cdkn1c** | Maternal | Encodes p57( Kip2), a cyclin-dependent kinase inhibitor. In vitro evidence suggests that p57 inhibits the activity of specific cyclin/CDK complexes. Additional functions include regulation of the cytoskeleton and promotion of apoptosis. | KO: Multiple malformations, neonatal lethal | Highly expressed in quiescent LT-HSCs but downregulated in proliferative short-term HSCs. In human CD34+ cord blood cells, *CDKN1C* is induced by TGF-beta and is critical for TGF-beta dependent cell cycle arrest. | [1,2,3,4,5,6] |
| **Dlk1 (Pref1)** | Paternal | Encodes a delta-like ligand that can be either soluble or membrane bound. It is thought to inhibit Notch signaling and plays a role in regulating differentiation of adipocytes and mesenchymal stem cells. | KO: Growth restriction, accelerated adiposity<br>OE: "Callipyge" phenotype | Expressed in human $CD34^{+}$ hematopoietic stem cells and upregulated in some cases of hematopoietic malignancy, particularly myelodysplasia and myeloid leukemia. Expressed by stromal cells that support hematopoiesis, suggesting that it plays a role in the interactions between stem cells and their niche. | [7,8,9,10,11,12,13] |
| **Grb10** | Maternal | Adapter protein for receptor tyrosine kinases, with roles in insulin and insulin-like growth factor signaling. Conflicting reports regarding repression or enhancement of receptor signaling, likely dependent on cellular context. | KO: Overgrowth, increased muscle mass / reduced adiposity, altered glucose homeostasis | Binds to the chimeric BCR-ABL tyrosine kinase expressed in chronic myelogenous leukemia. May be involved signaling from the c-Kit tyrosine kinase receptor. | [14,15,16,17,18] |
| **Gtl2 (Meg3)** | Maternal | Non-coding RNA that harbors two miRNA clusters and a snoRNA cluster. Part of a large reciprocally imprinted domain including *Dlk1*, *anti-Rtl1*, and *Dio3*. Several miRNAs from this cluster are downregulated in ovarian cancer, suggesting a possible tumor suppressor role. | KO: Depends on parent of origin | ? | [19,20,21,22,23,24] |
| **H19** | Maternal | Non-coding RNA that harbors miR-675. The precise targets are unclear. Likely functions as a tumor suppressor, but conflicting reports. H19 transcript is upregulated during cell proliferation (possibly due to reduced miRNA processing). | KO: Confounded by effects on Igf2 expression;<br>OE: Repressed growth | Downregulated in CD34+/CD33- bone marrow cells from patients with Polycythemia vera and downregulated in several different leukemias and myeloproliferative disorders. | [25,26,27,28,29,30,31,32,33] |
| **Igf2** | Paternal | Secreted growth factor that promotes fetal growth. Likely involved in both paracrine/endocrine signaling. Upregulated in many different cancers, in many cases due to loss of imprinting. | KO: Growth restriction, complicated by effects on placental function<br>OE: Overgrowth, multiple malformations | Growth factor for fetal hematopoietic stem cells. Downregulated in several different leukemias. | [33,34,35,36,37,38,39] |
| **Mest (Peg1)** | Paternal | Expressed in embryonic mesoderm, mesodermal derivatives, and the central nervous system. May have enzymatic function as an epoxide hydrolase based on protein homology. Upregulated in obese adipose tissue. | KO: Intrauterine growth restriction | ? | [40,41,42] |
| **Ndn** | Paternal | MAGE protein, initially discovered in post-mitotic neurons thought to arrest growth and regulate apoptosis. Multiple biochemical interactions. Implicated in differentiation of neuronal and mesenchymal tissues. | KO: Conflicting data, early post-natal lethality due to respiratory failure, possible strain differences | Likely transcriptional target of p53 and plays modest role in regulating HSC quiescence, primarily during regeneration. | [43,44,45,46,47,48,49,50,51,52] |
| **Peg3 (Pw1)** | Paternal | Zinc-finger transcription factor expressed in the embryonic mesoderm and brain, plays a role in TNF-alpha/NF-kB signaling and p53-mediated apoptosis. Implicated in muscle stem cell function. | KO: Intrauterine growth restriction | ? | [53,54,55,56,57] |
| **Plagl1 (Zac1 / Lot1)** | Paternal | Zinc-finger transcription factor that inhibits the growth of tumor cells in vitro through repression of cell cycle and induction of apoptosis. Frequently deleted or down-regulated in cancer, co-regulates p53-responsive promoters. | KO: Intrauterine growth restriction | ? | [58,59,60,61,62,63] |

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