UBERON:0000922 embryo

(Unique DEGs among top-100 found by the distance-based method, 34 genes)
6 genes are specifically directly related to embryo
3 additional genes are related to embryo

ifi208: interferon activated gene 208.

gm3139: predicted gene 3139.

gm3286: predicted gene 3286.

ly6c2: lymphocyte antigen 6 complex, locus C2.

hbb-bs: hemoglobin, beta adult s chain:

This gene encodes **a beta polypeptide chain found in adult hemoglobin**, which consists of a tetramer of two alpha chains and two beta chains, and which **functions in the transport of oxygen to various peripheral tissues**. This gene is one of a cluster of beta-hemoglobin genes that are distally regulated by a locus control region, and which are organized along the chromosome in the order of their developmental expression. In mouse, two major strain-specific haplotypes of the beta-globin gene cluster are found - a "single" haplotype found in C57BL/-type strains, which includes two highly similar adult beta-globin genes, beta s and beta t, and a "diffuse" haplotype found in strains such as BALB/c and 129Sv, which includes two somewhat diverse adult beta-globin genes, beta-major and beta-minor. This gene represents the beta s adult gene found in the "single" haplotype. Primary chromosome 7 of the mouse reference genome assembly, which is derived from C57BL/6 strain mice, represents the "single" haplotype, while the "diffuse" haplotype is represented in the reference genome collection by the BALB/c strain alternate contig, NT_095534.1

gbp6: guanylate binding protein 6.

hepacam2: HEPACAM family member 2:

Required during prometaphase for centrosome maturation. Following poly-ADP-ribosylation (PARsylation) by TNKS, translocates from the Golgi apparatus to mitotic centrosomes and **plays a key role in the formation of robust microtubules** for prompt movement of chromosomes- anchors AKAP9/CG-NAP, a scaffold protein of the gamma-tubulin ring complex and **promotes centrosome maturation**.

hbb-bt: hemoglobin, beta adult major chain:

This gene encodes a **beta polypeptide chain found in adult hemoglobin**, which consists of a tetramer of two alpha chains and two beta chains, and which **functions in the transport of oxygen to various peripheral tissues**. This gene is one of a cluster of beta-hemoglobin genes that are distally regulated by a locus control region, and which are organized along the chromosome in the order of their developmental expression. In mouse, two major strain-specific haplotypes of the beta-globin gene cluster are found - a "single"

haplotype found in C57BL/-type strains, which includes two highly similar adult beta-globin genes, beta s and beta t, and a "diffuse" haplotype found in strains such as BALB/c and 129Sv, which includes two somewhat diverse adult beta-globin genes, beta-major and beta-minor. This gene represents the beta-major adult gene found in the "diffuse" haplotype. Primary chromosome 7 of the mouse reference genome assembly, which is derived from C57BL/6 strain mice, represents the "single" haplotype, while the "diffuse" haplotype is represented in the reference genome collection by the BALB/c strain alternate contig, NT_095534.1.
Involved in **oxygen transport from the lung to the various peripheral tissues**.

snx25: sorting nexin 25:
May be involved in several stages of intracellular trafficking.

cyp4v3: cytochrome P450, family 4, subfamily v, polypeptide 3:
Omega-hydroxylase that **oxidizes medium-chain saturated fatty acids and polyunsaturated omega-3 fatty acids**, and which **plays a role in fatty acid and steroid metabolism in the eye**. Catalyzes the omega-hydroxylation of medium-chain saturated fatty acids such as laurate, myristate and palmitate in an NADPH- dependent pathway. The substrate specificity is higher for myristate > laurate > palmitate (C14>C16>C12). Acts as a polyunsaturated omega-3 fatty acids hydroxylase by mediating oxidation of docosahexaenoate (DHA) to 22-hydroxydocos.

gpc5: glypican 5:
Cell surface proteoglycan that bears heparan sulfate.

ces1d: carboxylesterase 1D:
Major lipase in white adipose tissue. Involved in the **metabolism of xenobiotics and of natural substrates**. Hydrolyzes triacylglycerols and monoacylglycerols, with a preference for monoacylglycerols. The susceptibility of the substrate increases with decreasing acyl chain length of the fatty acid moiety. **Catalyzes the synthesis of fatty acid ethyl esters**.

zc3h7a: zinc finger CCCH type containing 7 A.

rab31: RAB31, member RAS oncogene family:
The small GTPases Rab are **key regulators of intracellular membrane trafficking**, **from the formation of transport vesicles to their fusion with membranes**. Rabs cycle between an inactive GDP-bound form and an active GTP-bound form that is able to recruit to membranes different set of downstream effectors directly responsible for vesicle formation, movement, tethering and fusion. Required for **the integrity and for normal function of the Golgi apparatus and the trans-Golgi network**. **Plays a role in insulin-stimulated translocation of GLUT4 to the cell membrane**.

sf3b4: splicing factor 3b, subunit 4:
This gene **encodes one of the subunits of splicing factor 3B**. A similar gene in human encodes a protein that cross-links to a region in the pre-mRNA immediately upstream of the branchpoint sequence in pre-mRNA in the prespliceosomal complex A. It also may be

involved in the assembly of the B, C and E spliceosomal complexes, and also belongs with the minor U12-dependent spliceosome.

fermt3: fermitin family member 3:
Plays a central role in cell adhesion in hematopoietic cells. Acts by activating the integrin beta-1-3 (ITGB1, ITGB2 and ITGB3). **Required for integrin- mediated platelet adhesion and leukocyte adhesion to endothelial cells**. Required for activation of integrin beta- 2 (ITGB2) in polymorphonuclear granulocytes.

epsti1: epithelial stromal interaction 1 (breast).

ccdc86: coiled-coil domain containing 86.

tbc1d10c: TBC1 domain family, member 10c.

sp110: Sp110 nuclear body protein:
May act as a transcription factor. **Plays a role in the innate immunity against intracellular pathogens**. Required for resistance to M.tuberculosis and L.monocytogenes. Promotes apoptosis of infected cells.

npy: neuropeptide Y:
This gene encodes **a neuropeptide that plays a pivotal role in many physiological functions such as food intake, energy homeostasis, circadian rhythm, and cognition**. The encoded protein precursor undergoes proteolytic processing to generate the biologically active peptide. Mice lacking the encoded protein exhibit mild seizures occasionally and become hyperphagic following food deprivation. A deficiency of the encoded protein partially prevents mice lacking leptin from becoming obese.
NPY is implicated **in the control of feeding and in secretion of gonadotrophin-release hormone**.

h2-q6: histocompatibility 2, Q region locus 6:
Involved in the presentation of foreign antigens to the immune system.

lims1: LIM and senescent cell antigen-like domains 1:
Adapter protein in a cytoplasmic complex linking beta- integrins to the actin cytoskeleton, bridges the complex to cell surface receptor tyrosine kinases and **growth factor receptors**. **Involved in the regulation of cell survival, cell proliferation and cell differentiation**.

npnt: nephronectin:
Functional ligand of integrin alpha-8/beta-1 **in kidney development**. Regulates the expression of GDNF with integrin alpha- 8/beta-1 **which is essential for kidney development**. May also **play a role in the development and function of various tissues**, regulating cell adhesion, spreading and survival through the binding of several integrins.

acox1: acyl-Coenzyme A oxidase 1, palmitoyl:

Catalyzes the desaturation of acyl-CoAs to 2-trans- enoyl-CoAs. Isoform 1 shows highest activity against medium-chain fatty acyl-CoAs and activity decreases with increasing chain length. Isoform 2 is active against a much broader range of substrates and shows activity towards very long-chain acyl-CoAs.

acvr2a: activin receptor IIA:

On ligand binding, **forms a receptor complex consisting of two type II and two type I transmembrane serine/threonine kinases**. Type II receptors phosphorylate and activate type I receptors which autophosphorylate, then bind and activate SMAD transcriptional regulators. Receptor for activin A, activin B and inhibin A. **Mediates induction of adipogenesis by GDF6**.

cygb: cytoglobin:

May **have a protective function during conditions of oxidative stress**. May be **involved in intracellular oxygen storage or transfer**.

adam12: a disintegrin and metallopeptidase domain 12:

This gene encodes a member of a disintegrin and metalloprotease (ADAM) family of endoproteases that **play important roles in various biological processes including cell signaling, adhesion and migration**. The encoded preproprotein undergoes proteolytic processing to generate a mature, functional protein that localizes to the cell surface. About a third of the mice lacking the encoded protein die before weaning. Overexpression of the encoded protein in a mouse model of Duchenne muscular dystrophy alleviates the muscle pathology by preventing cell necrosis and inflammation.
Involved in skeletal muscle regeneration, **specifically at the onset of cell fusion**. Also involved in macrophage-derived giant cells (MGC) and osteoclast formation from mononuclear precursors.

adam9: a disintegrin and metallopeptidase domain 9 (meltrin gamma):

Probable zinc protease. May **mediate cell-cell or cell- matrix interactions**.

add1: adducin 1 (alpha):

Membrane-cytoskeleton-associated protein that **promotes the assembly of the spectrin-actin network.** Binds to calmodulin.

adss: adenylosuccinate synthetase, non muscle:

Plays an **important role in the de novo pathway and in the salvage pathway of purine nucleotide biosynthesis**. Catalyzes the first committed step in the biosynthesis of AMP from IMP.

angpt1: angiopoietin 1p:

This gene **encodes a secreted glycoprotein that belongs to the angiopoietin family of vascular growth factors**. The encoded protein is a ligand in the vascular tyrosine kinase signaling pathway and **regulates the formation and stabilization of blood vessels**. This protein also **functions in striated muscles by promoting proliferation, migration and**

differentiation of skeletal myoblasts and plays an essential role in the vascular response to tissue injury.
Binds and activates TEK/TIE2 receptor by inducing its dimerization and tyrosine phosphorylation. Plays an important role in the regulation of angiogenesis, endothelial cell survival, proliferation, migration, adhesion and cell spreading, reorganization of the actin cytoskeleton, but also maintenance of vascular quiescence. **Required for normal angiogenesis and heart development during embryogenesis**. After birth, activates or inhibits angiogenesis, depending on the context. Inhibits angiogenesis and promotes vascular stability in quiescent vessels, where endothelial cells.

alk: anaplastic lymphoma kinase:
Neuronal orphan receptor tyrosine kinase that is essentially and transiently expressed in specific regions of the central and peripheral nervous systems and **plays an important role in the genesis and differentiation of the nervous system**. Transduces signals from ligands at the cell surface, through specific activation of the mitogen-activated protein kinase (MAPK) pathway. Phosphorylates almost exclusively at the first tyrosine of the Y-x-x-x-Y-Y motif. Following activation by ligand, ALK induces tyrosine phosphorylation of CBL, FRS2, IRS1 and SHC1.

alox5ap: arachidonate 5-lipoxygenase activating protein:
Required for leukotriene biosynthesis by ALOX5 (5- lipoxygenase). Anchors ALOX5 to the membrane. Binds arachidonic acid, and could play an essential role in the transfer of arachidonic acid to ALOX5. Binds to MK-886, a compound that blocks the biosynthesis of leukotrienes.