

### Genes from clustering graphs (UMAP1 vs UMAP2)

Opcml: <https://www.ncbi.nlm.nih.gov/gene/4978>

- opioid binding protein/cell adhesion molecule
- Humans
- Expressed in mostly brain but also kidney

Pcp4: <https://www.ncbi.nlm.nih.gov/gene?Db=gene&Cmd=DetailsSearch&Term=25510>

- Purkinje cell protein 4
- Regulates histone synthesis (DNA wraps around histones to condense itself)
- Expressed in mostly brain but also uterus
- Norway rat
- Note: if you look at the link, there is a section titled expression which has a graph where this gene is highly expressed in the organism across its development

Gria2: <https://www.ncbi.nlm.nih.gov/gene?Db=gene&Cmd=DetailsSearch&Term=2891>

- Glutamate ionotropic AMPA receptor
  - AMPA mediates fast synaptic transmission in CNS
  - Glutamate is an excitatory neurotransmitter
  - Contribute to depolarization
  - Ligand-gated cation channels → meaning the glutamate will bind to the channel before it can open, which allows sodium ions to flow into the cell and cause an Excitatory postsynaptic potential → depolarization
- Humas
- Expressed mainly in the brain

Hmgb2: <https://www.ncbi.nlm.nih.gov/gene/3148>

- Humans
- “proteins of this family are chromatin-associated and ubiquitously distributed in the nucleus of higher eukaryotic cells”
- This protein can bend DNA and form circles
  - Promotes DNA flexibility
- Involved in DNA ligation, which seals gaps in newly synthesized DNA
- Expressed in bone marrow and lymph node

Fabp7: <https://www.ncbi.nlm.nih.gov/gene?Db=gene&Cmd=DetailsSearch&Term=2173>

- Fatty acid binding protein
- Humans
- “important in the establishment of the radial glial fiber in the developing brain”
  - Glial cells are the supporting cells within the nervous systems. They are not electrically excitable. They are often referred to as the ‘glue’ in the brain.
- Expressed mainly in the brain but also in the skin

Ppp2r2b: <https://www.ncbi.nlm.nih.gov/gene/5521>

- “protein phosphatase 2 regulatory subunit Bbeta”
- Humans
- “Protein phosphatase 2 is one of the four major Ser/Thr phosphatases”
  - Ser and Thr are amino acids that are made from codon sequences from tRNA

- “Defects in this gene cause autosomal dominant spinocerebellar ataxia 12 (SCA12), a disease caused by degeneration of the cerebellum, sometimes involving the brainstem and spinal cord, and in resulting in poor coordination of speech and body movements.”
- Expressed mainly in brain but also in testis

Meg3: <https://www.ncbi.nlm.nih.gov/gene?Db=gene&Cmd=DetailsSearch&Term=55384>

- Maternally expressed imprinted gene
- Humans
- Long non-coding RNAs
  - >200 nucleotides
  - Can recruit proteins
- “expression is lost in multiple cancer cell lines of various tissue origins”
- Long non-coding tumor suppressor
- Expressed in placenta and adrenal

Reln: <https://www.ncbi.nlm.nih.gov/gene?Db=gene&Cmd=DetailsSearch&Term=5649>

- Humans
- “This gene encodes a large secreted extracellular matrix protein thought to control cell-cell interactions critical for cell positioning and neuronal migration during brain development.”
- May be involved in: “schizophrenia, autism, bipolar disorder, major depression and in migration defects associated with temporal lobe epilepsy.”
- Expressed mainly in liver and somewhat in adrenal

#### Genes from Standardized Variance Plot

Rgs5: <https://www.ncbi.nlm.nih.gov/gene/8490>

- Regulator of G protein signal
  - G protein coupled receptors (GPCRs) can modulate ion channels
  - Can amplify a signal and cause a signaling cascade → increases the intensity of the signal through networks of intracellular reactions
- Expressed highly in adrenal and thyroid
- humans

Fabp7: see above

Tac2: <https://www.ncbi.nlm.nih.gov/gene?Db=gene&Cmd=DetailsSearch&Term=21334>

- House mouse
- “This gene encodes a member of the tachykinin family of signaling peptides that is widely expressed in the central nervous system and plays a role in diverse processes such as water homeostasis, pulmonary inflammation, cognition, fear memory consolidation and preeclampsia.”
- Generates mature neuropeptides
  - Neuropeptides can act on GPCRs and modulate synaptic transmission
- Expressed in liver

Igfbp7: <https://www.ncbi.nlm.nih.gov/gene?Db=gene&Cmd=DetailsSearch&Term=3490>

- Humans
- insulin like growth factor binding protein
- Regulates the insulin-like growth factor (IGF) availability

- Stimulates cell adhesion
- Expressed in kidney and gall bladder

Alas2: <https://www.ncbi.nlm.nih.gov/gene?Db=gene&Cmd=DetailsSearch&Term=11656>

- aminolevulinic acid synthase 2
- House mouse
- “Involved in erythrocyte differentiation; heme biosynthetic process; and hemoglobin biosynthetic process”
- Located in mitochondria
- Expressed in liver

Reln: see above

Hbb-bt: <https://www.ncbi.nlm.nih.gov/gene/101488143>

- House mouse
- hemoglobin, beta adult t chain
- Encodes a polypeptide chain found in adult hemoglobin
  - Polypeptide chains are amino acids joined by peptide bonds
- Transports oxygen to various peripheral tissues
- “regulated by a locus control region, and which are organized along the chromosome in the order of their developmental expression”
  - Locus control region enhances expression of linked genes at distal chromatin sites
    - linked genes are close to each other on chromosomes, which make them likely to be inherited together
- Expressed in adult spleen and adult heart
- *Negative RPKM in liver on graph*

Hbb-bs: <https://www.ncbi.nlm.nih.gov/gene/100503605>

- Same as above
- This is beta adult s chain

Hba-a2: <https://www.ncbi.nlm.nih.gov/gene/110257>

- Human
- Hemoglobin subunit alpha 2
- “The alpha-2 (HBA2) and alpha-1 (HBA1) coding sequences are identical. These genes differ slightly over the 5’ untranslated regions and the introns, but they differ significantly over the 3’ untranslated regions.”
- “2 alpha chains plus 2 beta chains constitute HbA, which in normal adult life comprises about 97% of the total hemoglobin.”
- Expressed mainly in bone marrow

Hba-a1

- Same as above