Answer sheet for RIKEN-Karolinska workshop assignment 1

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25.9.2025

Task 1 - Literature

1.2a: Medical Relevant insights

This paper analyses the development of Oligodendrocyte precursor cells (OPC) in human embryos at post-conception weeks 8-10. Oligodendrocytes play a vital role in the proper function of the human brain, as they are responsible for forming the myelin sheath around myelinated axons. It is important to fully understand the characteristics of OPCs as a deficiency can lead to developmental errors as well as diseases later in life such as multiple sclerosis. In this paper, the authors found a "wave" of OPC development that was known in mice but not in humans and indicates an earlier development of OPCs than previously assumed.

1.2b: genomic technologies:

The main technologies of this paper are single-cell RNA sequencing, single-cell ATAC-seq, and in-situ sequencing/hybridization. With this data they can inferments of the developmental trajectory of OPCs and other cell types in the brain.

1.3a: extending the analysis To extend the analysis, I would like to look at following three points:

A: How exactly is the chromatin remodeled prior to oligodendrogenesis?

B: How are the developmental "waves" triggered, and what determines their timing?

C: How are errors in this developmental stage related to diseases later in life?

1.3b: As the chromatin remodeling would occur previous to the timepoint of the data analysis of the paper, the responsible proteins are likely not expressed anymore. To overcome this, maybe the protein activity could be plotted from mouse data first, and see if there are any remodelers that are still expressed even after the pre-oligodendrogenesis preparation is completed. Those proteins could then be looked for in the scRNA data of the human cells. A similar process where mouse data is consulted first could be used for elucidating the wave triggers. As for disease causing errors, public databases such as UKbiobank could be consulted to see if there is a correlation with mutations in the transcription factors detected in this study with disorders.