Transcriptome analysis of Liraglutide effect on bone density in type 1 diabetic mice

Group 6: Paolo Federico (s212975), Lea Jerman Plesec (s220067), Oriol Portell I Vidal (s210419), Oscar Solé I Salgado (s213691), Sergio Esteban Echeverría (s212716) - All members contributed equally

Introduction

- Type 1 diabetes (T1D) is an autoimmune disease that can, among other things, increase bone fragility, which increases bone fracture risk[1,2].
- Does Liraglutide, a glucagon-like peptide-1 receptor (GLP1R) agonist used to treat T1D, affect bone density in T1D mice?

Materials and Methods

- Three RNA samples were extracted from tibia tissue from the three groups: mice with normal glucose tolerance treated with saline (NGT), mice with T1D treated with saline (T1D), or with Liraglutide (LIRA). The samples were sequenced with BGISEQ-500 (see an overview of the workflow Figure 1).

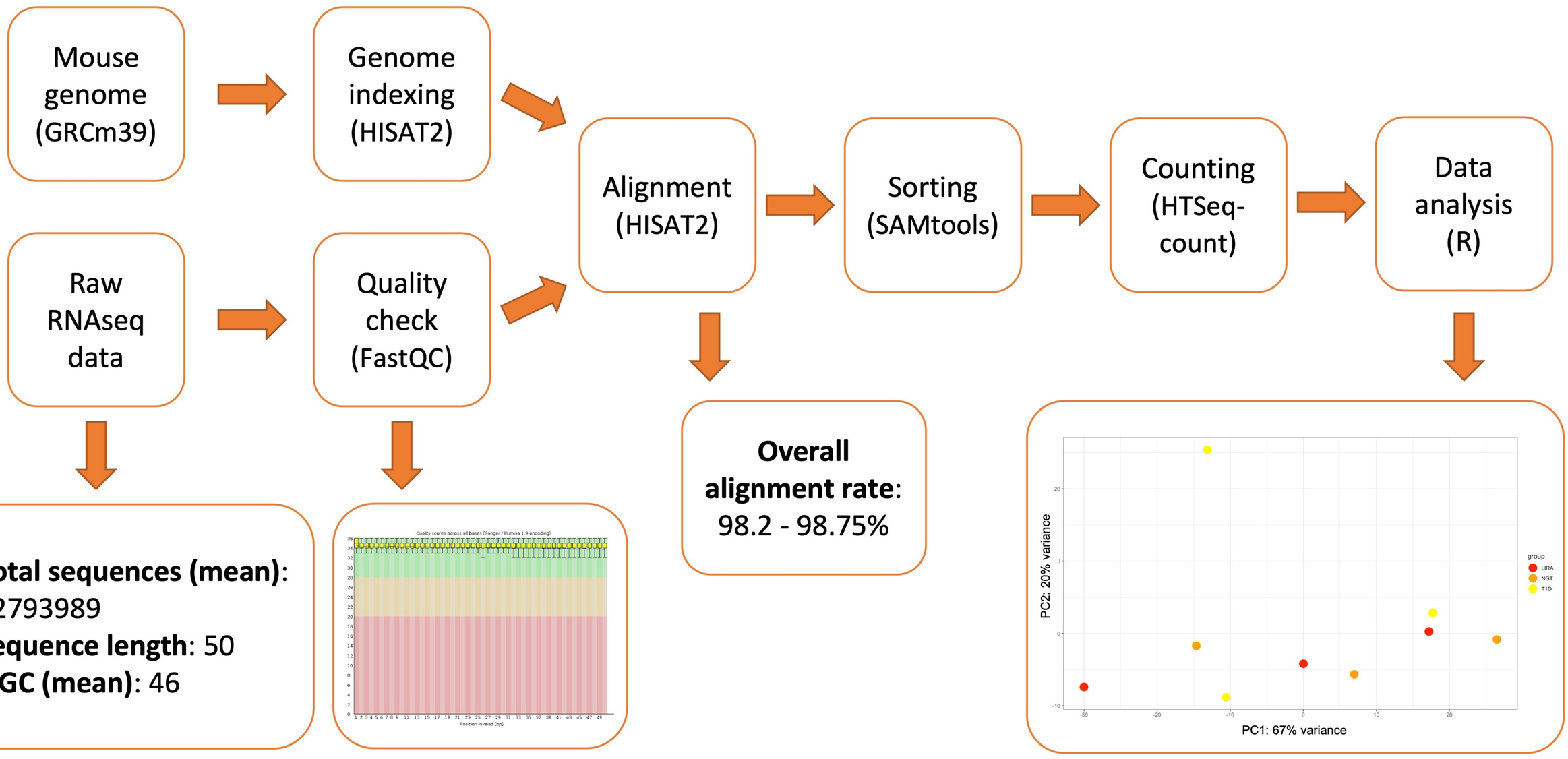

Figure 1: Overview of the workflow followed during the project, detailing the operations performed and the tools employed.

Results

- PCA plot did not reveal any clustering of samples belonging to the same groups (Figure 1).
- The Lymphocyte migration process (GO:0072676) was enriched both in the LIRA vs T1D and NGT vs T1D comparisons (Table 1).

Table 1: Number of significant differentially expressed genes (p-value<0.05, DESeq result) and number of enriched pathways in the comparisons (GO result).

Comparison	Number of significant genes	GO enriched processes
LIRA vs NGT	143	0
LIRA vs T1D	366	1
NGT vs T1D	587	18

Conclusion

- Mice treated with Liraglutide had a lower number of differentially expressed genes than the untreated ones, compared to the healthy mice.
- Osteoclastogenic processes were not enriched in any GO enrichment analysis.
- Our results did not match the ones from the article, which might be due to different tools utilized during the data analysis (e.g., in the alignment).

References

1. Starup-Linde, J., Hygum, K., Harsløf, T., & Langdahl, B. (2019). Type 1 diabetes and bone fragility: links and risks. *Diabetes, metabolic syndrome and obesity: targets and therapy*, *12*, 2539.
2. Yu, J., Shi, Y. C., Ping, F., Li, W., Zhang, H. B., He, S. L., ... & Li, Y. X. (2021). Liraglutide Inhibits Osteoclastogenesis and Improves Bone Loss by Downregulating Trem2 in Female Type 1 Diabetic Mice: Findings From Transcriptomics. *Frontiers in endocrinology*, *12*.