This analysis investigates the cellular differences between male and female subjects by examining gene expression and cell distribution patterns. The findings reveal subtle distinctions in gene expression levels and distribution of cell clusters, which may contribute to understanding physiological and potentially pathological differences across genders.

1. Gene Expression Differences by Sex

According to “Q2_Figure_2”, certain genes exhibit significantly different expression levels between male and female subjects. The top 10 genes with the largest expression differences highlight a trend of higher expression in males for most of these genes. For example, *ENSG00000176728* shows the most considerable expression difference, with an approximate 1.2 higher expression level in males. Additionally, *ENSG00000165246* and *ENSG00000114374* also display notable male-biased expression, while the remaining genes show smaller but still male-dominant expression differences.

These results suggest a potential influence of gender on gene regulation, with specific genes more actively expressed in males. This differential expression could underlie physiological distinctions or contribute to understanding gender-specific vulnerabilities in disease pathways, particularly in conditions like Alzheimer’s where cellular functions and gene expression may play a role.

2. Distribution Patterns of Male and Female Cells

UMAP plots in “Q6_Figure_all”, “Q6_Figure_Female”, and “Q6_Figure_Male” illustrate the spatial distribution of male and female cells within the cellular landscape. Female cells (shown in purple) and male cells (shown in green) both occupy similar clusters within the UMAP space, indicating that core cell types or functional categories remain consistent across genders. However, closer examination reveals subtle differences in cluster density and specific locations between the male and female cell groups.

These variations could suggest minor distinctions in cellular composition or clustering patterns related to sex. While both genders display broadly similar distributions, the subtle density differences might hint at gender-based nuances in cellular behavior or susceptibility to stress factors associated with neurodegenerative diseases like Alzheimer’s.

Overall Interpretation

In summary, the findings indicate that gender may influence both gene expression and cellular distribution patterns. Certain genes exhibit male-biased expression, while slight differences in cell clustering density suggest gender-based distinctions at the cellular level. These differences, though subtle, point to a potential link between gender and cellular dynamics, which could be relevant in understanding disease mechanisms or developing gender-specific therapeutic approaches for neurodegenerative conditions.