MG HFD Project: Figure Plans

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Figure 1: snRNA-seq Profiling (Basis)

1. **Experimental Workflow**

2. **UMAP Visualization**
   2.1 By Condition
   2.2 By Cell Type
   2.3 By Duo

3. **Cell Number Changes** (Bar Chart)

4. **Marker Gene Expression**

5. **Correlation Heatmap**

6. **Subtype-specific Marker Genes**
   6.1 Luminal Progenitors
   6.2 Adipocytes
   6.3 Stromal Cells
   6.4 Basal Cells

7. **Subtype-specific Transcription Factors**
   7.1 Luminal Progenitors
   7.2 Adipocytes
   7.3 Stromal Cells
   7.4 Basal Cells

8. **Functional Enrichment Analysis** of Each Cell Type

Figure 2: Overview of Mammary Phenotypic Changes under HFD (What)

1. **Wet-lab Images**: Ductal development under HFD

2. **Data Analysis**
   2.1 Adipocyte Over-differentiation
   2.2 Impaired Development of Luminal Progenitors
   2.3 Major Cell–Cell Communicators with Luminal Progenitors (CellChat)
   2.4 DEGs in Luminal Progenitors, Adipocytes, Stromal Cells, Basal Cells
   2.5 Over-Representation Analysis (ORA) across Diet Conditions
   2.6 Gene Set Enrichment Analysis (GSEA) across Diet Conditions

Figure 3: Pseudotime Analysis of Development under ND vs. HFD (What + Why)

- (To be filled by Yixiang & Yufei)

Figure 4: Cell–Cell Communication in Mammary Gland under ND (What)

- (By Yuchen)

Figure 5: HFD-Induced Changes in Cell–Cell Communication (Why)

- (By Yuchen)

Figure 6: Dysregulation of Regulons under ND vs. HFD (Why)

- **pySCENIC Analysis** (by Yufei)
- **CellCall Analysis** (by Yuchen)

Figure 7: In Silico Validation via GeneFormer Simulation

- (By Yixiang)

Figure 8: Graphical Summary

- Mechanistic Summary of HFD Effects
- (Summarized by Yuchen & Yixiang)