α-cell Response to Low Glucose

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Background
- Islet of Langerhans is made up of α-, β- and other cells
  - the pancreas
  - the islet
  - the β-cell
- Islet plays a role in glucose homeostasis
- α-cell response to glucose is poorly understood
- Studying NAD(P)H and calcium oscillations

Ca²⁺ oscillations
- Measured at 0.1, 0.5, 1 and 5 mM glucose
- Active cells: Cells that are oscillating or showing steady increase in calcium
- Fluo4-AM: cell permeable calcium indicator dye

NAD(P)H
- Dose response from 0.01 mM to 5 mM glucose
- NAD(P)H is autofluorescent

Equipment
- Mouse model
  - Sacrificed at ~8 weeks
  - tdRFP under control of the glucagon promoter
  - Enzymatic digestion of acinar tissue to isolate islets
- Microfluidic device
- Confocal microscope

Dose response from 0.01 mM to 5 mM glucose
NAD(P)H is autofluorescent

Figure 1: Islet composition.
Figure 2: Glucose homeostasis cycle.

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Summary
- Minimal activity at low levels of glucose
- Increases as glucose concentration increases
- Suggests left-ward shift compared to β-cells
- Next steps:
  - Glucagon secretion
  - Lower levels of glucose (0.01 mM)

References

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