High calcium concentrations shift the mode of exocytosis to the kiss-and-run mechanism

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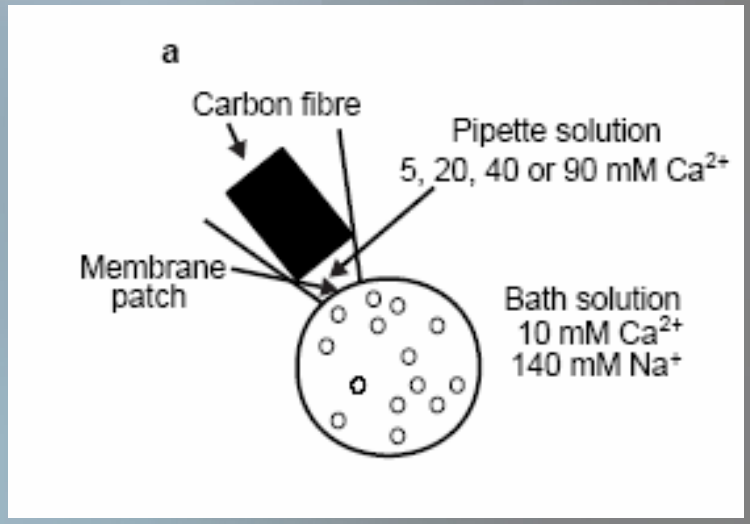
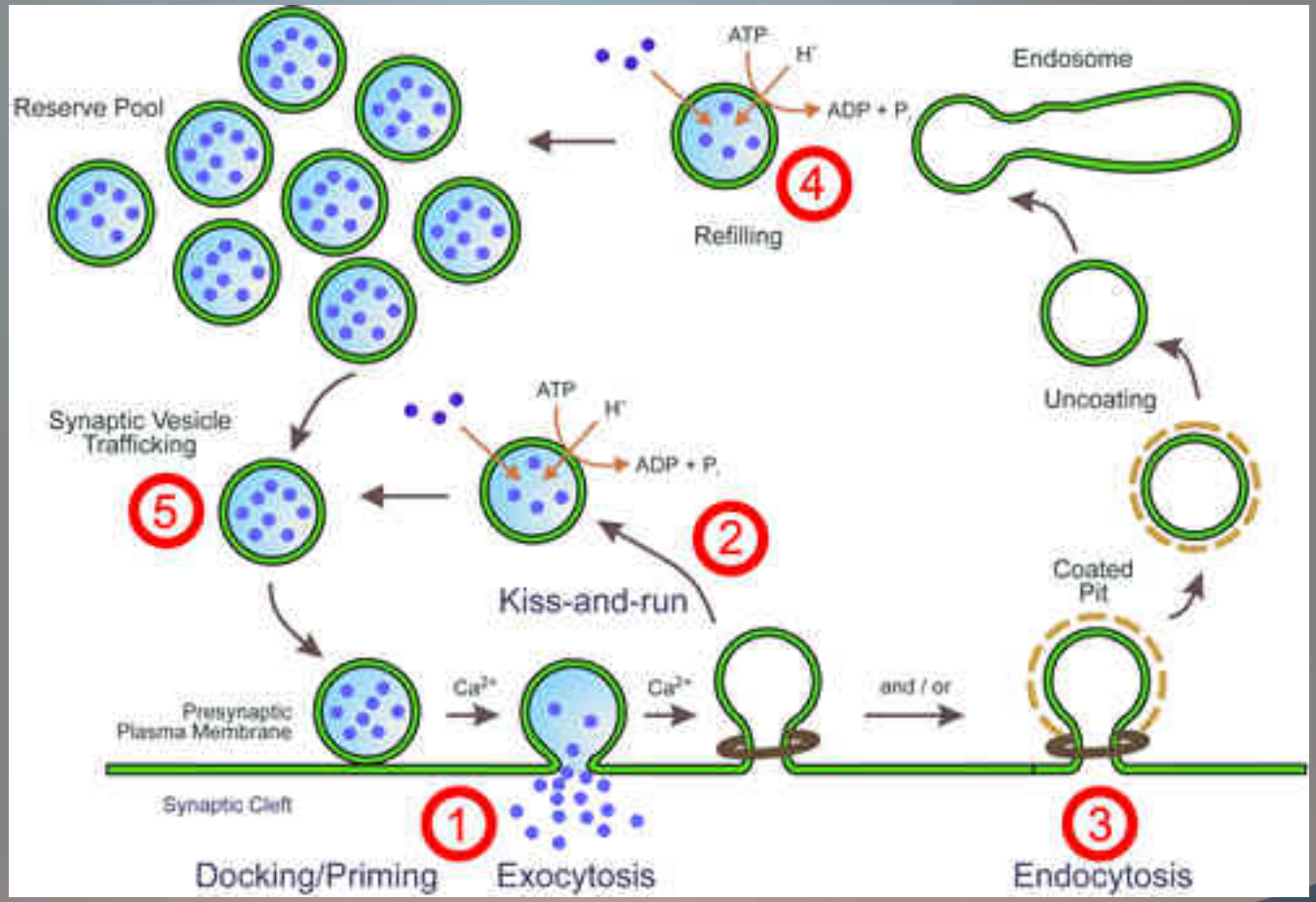
Outline

- Overview
- Purpose
- Procedure
- Result



Kiss-and-Run Mechanism

- Kiss-and-Run Animation

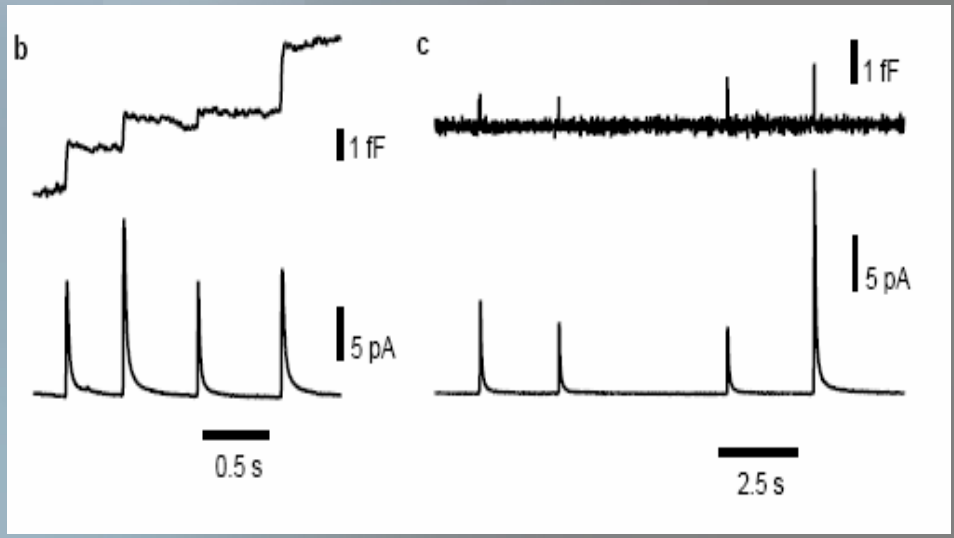


Purpose

- Observing single secretory vesicles after fusion with plasma membrane
- Exocytosis dependent upon calcium concentration synapses
  - Ca^{2+} higher- tried to mimic environment of synapse in chromaffin cells

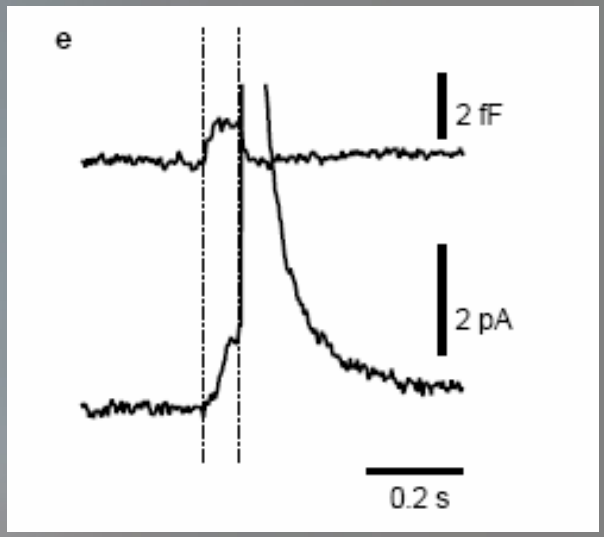
Procedure

- Catecholamine release – permanent & fast kiss-and-run events
- Fig. B: 5mM Ca^{2+}
- Fig. C: 90mM Ca^{2+}



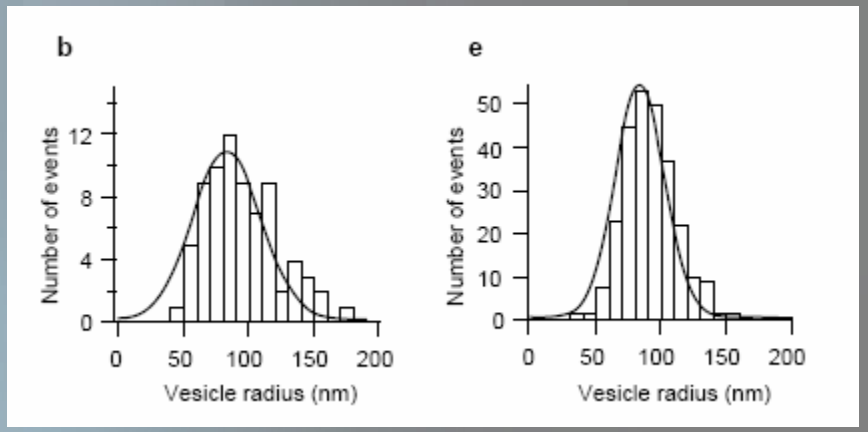
Results-Transmitter Release

- 2 Stages:
  - Amperometric foot signal
  - Amperometric Spike
- Conclusions: during fast kiss-and-run events, fusion pore expands briefly



Results-Similarities –Vesicle Size

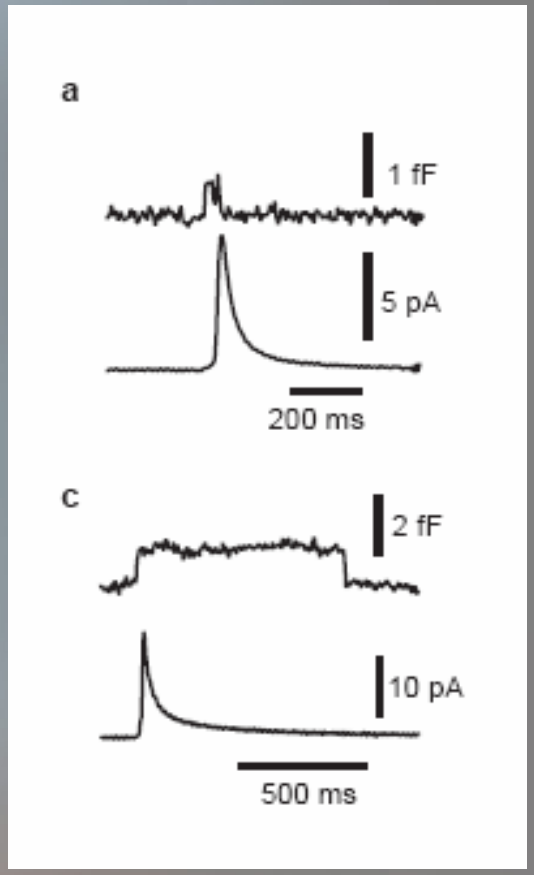
- Fig. b: fast kiss-and-run 94±28nm
- Fig. e: permanent 92±22nm



Sizes of vesicles releasing neurotransmitter by kiss-and-run method indistinguishable from size of vesicles undergoing permanent fusion

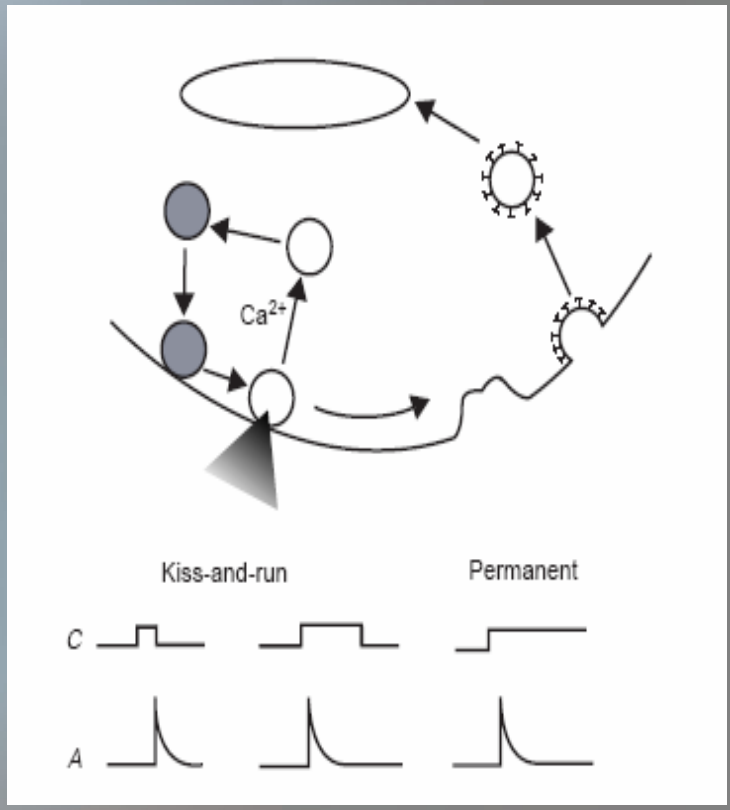
Results

- Fusion pore closes rapidly at increased Ca^{2+} concentrations
  - Fig. a: 90mM Ca^{2+}
  - Fig. c: 40mM Ca^{2+}
- Lower amount of Ca^{2+}, re-closure of pore unlikely & vesicles incorporate into plasma membrane



Summary

- Results- Ca^{2+} regulates rate of fusion pore closing
- Kiss-and-run (left): fast reloading of neurotransmitter
- Permanent (right): full merging of vesicle



Further Roles- Ca^{2+}

- Endocytosis
- Mimicking active zone of synapse
- External side- prevent swelling of chromaffin granules
- Ensure rapid recycling & replacement of used vesicles