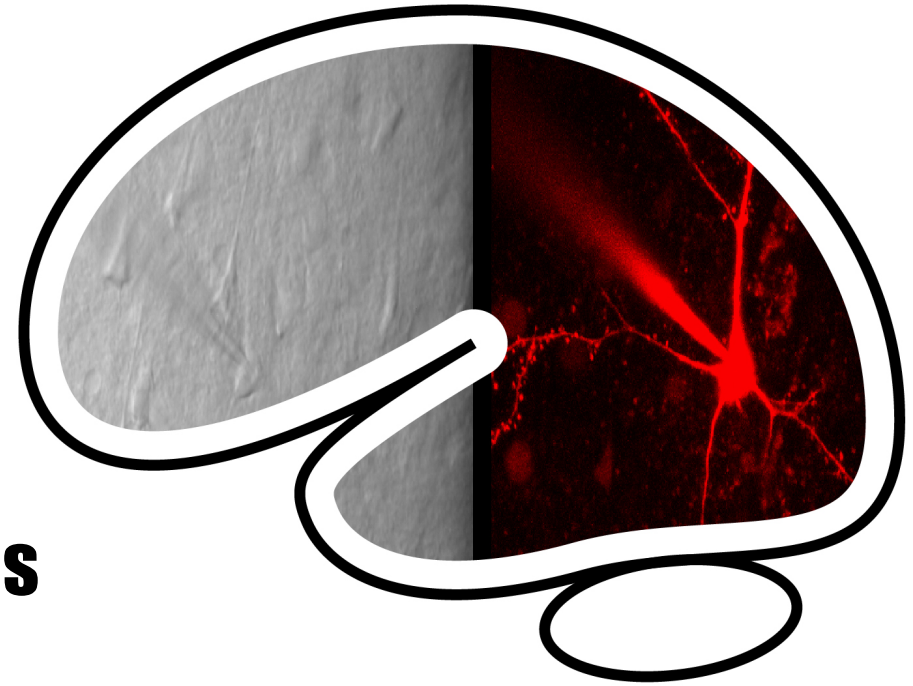
ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE



2.5 Whole-cell recordings

Cellular Mechanisms of Brain Function

Prof. Carl Petersen

Semihcan Sermet

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Whole-cell recordings from brain slices *in vitro*

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Preparing brain slices

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1. Anesthetise mouse

2. Carefully extract brain

3. Place in ice-cold slicing solution containing (in mM):

   87 NaCl, 25 $NaHCO_3$, 25 D-glucose, 2.5 KCl, 1.25 NaH_2PO_4,
   0.5 $CaCl_2$, 7 $MgCl_2$ and 75 Sucrose (aerated with 95% O_2 + 5% CO_2)

Preparing brain slices

Slicing video

Visualising neurons in brain slices

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1. Slices incubated at 35 Celsius for ~30 minutes in slicing solution

2. Slices are transferred to room temperature artificial cerebrospinal fluid (ACSF) containing (in mM):

   125 NaCl, 25 $NaHCO_3$, 25 D-glucose, 2.5 KCl, 1.25 NaH_2PO_4, 2 $CaCl_2$ and 1 $MgCl_2$ (aerated with 95% O_2 + 5% CO_2)

3. A selected slice is placed in the microscope and superfused with artificial cerebrospinal fluid (ACSF) at 35 Celsius.

Visualising neurons in brain slices

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Imaging video

Making glass patch-clamp recording electrodes

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Pipette video

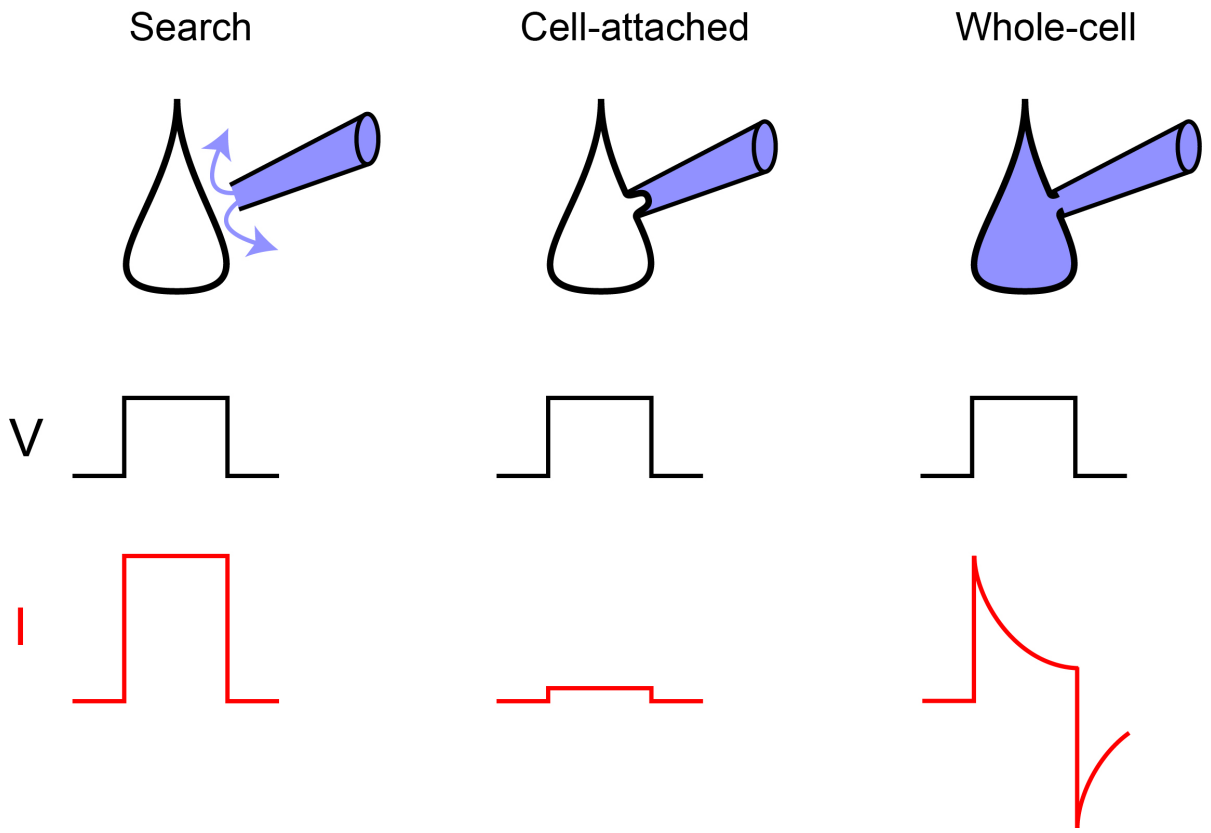
Whole-cell recording

The recording electrode is filled with intracellular solution containing (in mM):

135 K-gluconate, 4 KCl, 4 Mg-ATP, 10 Na_2-phosphocreatine, 0.3 Na-GTP and 10 HEPES (pH 7.3, 280 mOsmol/l).

Alexa-594 dye (10 µM) was added to the intracellular solution.

Whole-cell recording



Whole-cell recording

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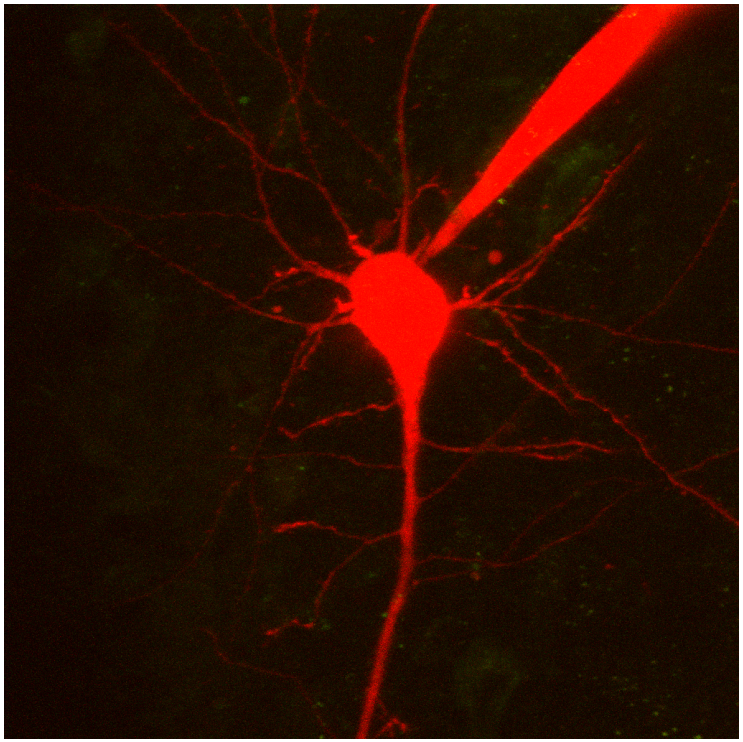
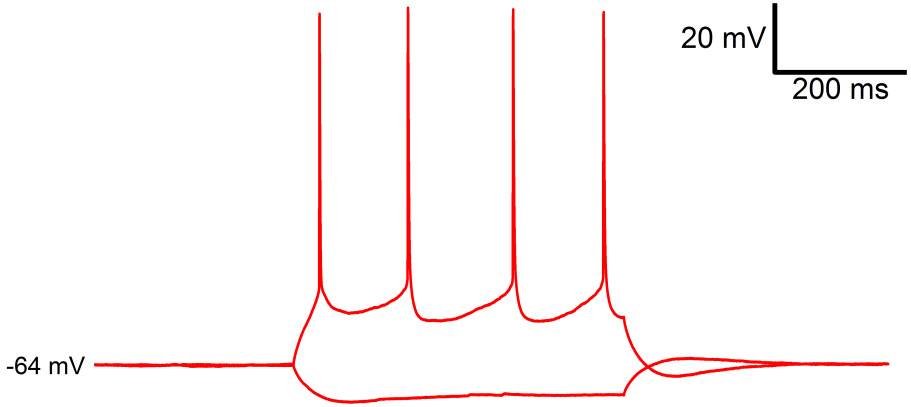
Patching video

Structure and function





Whole-cell recordings from brain slices *in vitro*

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- The mammalian brain can be cut into thin (300 µm) slices, and the neurons remain viable.
- Neurons can be visualised through high-contrast infrared video microscopy, allowing *in vitro* whole-cell patch-clamp recordings of membrane potential.