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Electrophysiological characterization and functionality of neurons in murine cerebral organoids / Curia, G., Ren, E., Bardoni, R., Decimo, I., Ciarpella, F., Zamfir, R.g., Campanelli, A.. - (2021). [10.5281/zenodo.7600194]

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18/11/2026 12:24

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Electrophysiological characterization and functionality of neurons in murine cerebral organoids

doi: 10.5281/zenodo.7600194

GENERAL INFORMATION

- Organoids: Brain organoids were obtained starting from E14.5 murine-derived Neural Stem Cells (NSCs). Organoids at different stages of development (11-13 DIV: intermediate; 19-26 DIV: early mature; 33-38 DIV: mature) have been used.
- Extracellular solution, artificial cerebrospinal fluid (ACSF), (in mM): NaCl (115.0), KCl (2.0), KH_2PO_4 (1.25), $MgSO_4$ (1.0), $CaCl_2$ (2.0), D-Glucose (25.0), and $NaHCO_3$ (26.0), and bubbled in carbogen (95% O_2 and 5% CO_2). When indicated, tetrodotoxin (TTX) applied was 1 µM (protocols 0003 and 0004).
- Intracellular solution (in mM): K-Gluconate (120.0), NaCl (5), HEPES (10.0), EGTA (10.0), $MgCl_2$ (2.0), $CaCl_2$ (1.0), ATP-Na_2 (2.0), and GTP-Na (0.4), osmolality was adjusted at 285 mOsm with 10 mM sucrose.
- Acquisition system: data were acquired in whole-cell configuration with an Axopatch 1D amplifier and Digidata 1322, using pClamp 10.6 software (all from Molecular Devices, USA).
- For voltage-clamp (VC) recordings, membrane potential was held at -70 mV and positive voltage steps (500 ms) were applied from -70 mV to +100 mV (Δ_V=10 mV).
- Current-clamp (CC) activity was recorded at resting membrane potential and evoked by 500 ms current pulses from -10 pA to +10 pA (Δ_A =10 pA).

DATASET FORMAT

The experiments folders are compressed in *.zip format.
Below summarized the file formats and the software with which they can be opened:

File format	Required software
.abf	pClamp or Clampfit software (Molecular Devices, USA)

DATASET STRUCTURE

- main folder [Organoidi XX-XX DIV]
  - Organoid folder [Organoide XX DIV_DD.MM.YYYY]
    - *.abf recording files including voltage-clamp (VC) and current-clamp (CC) protocols:
      - 0000 VC step in ACSF
      - 0001 CC step in ACSF
      - 0002 CC step in ACSF at Rheo base
      - 0003 VC step in ACSF+TTX
      - 0004 CC step in ACSF+TTX

Funded by European Union's Horizon 2020
FETPROACT-2018-2020 - **GA n. 824164**

FILE NAMING STRUCTURE

Date [YYYYMMDD]_Cell number [CellXX]_Organoid number [OrganoidXX]_Protocol [XXXX]

- e.g.: 20191217_Cell03_Organoid01_0000.abf: experiment performed on December 17th 2019, cell number 3 recorded from organoid number 1, protocol VC step in ACSF.

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