



Aug 29, 2024

Genetic interaction analysis using ERGs in *D. melanogaster*

DOI

dx.doi.org/10.17504/protocols.io.x54v9256pl3e/v1

Natalie Kaempf¹, Ayse Kilic¹, Patrik Verstreken¹

¹VIB-KU Leuven Center for Brain & Disease Research, 3000 Leuven, Belgium.



Natalie Kaempf

VIB KU Leuven

Create & collaborate more with a free account

Edit and publish protocols, collaborate in communities, share insights through comments, and track progress with run records.

Create free account

OPEN  ACCESS



DOI: <https://dx.doi.org/10.17504/protocols.io.x54v9256pl3e/v1>

Protocol Citation: Natalie Kaempf, Ayse Kilic, Patrik Verstreken 2024. Genetic interaction analysis using ERGs in *D. melanogaster*. **protocols.io** <https://dx.doi.org/10.17504/protocols.io.x54v9256pl3e/v1>

License: This is an open access protocol distributed under the terms of the **Creative Commons Attribution License**, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited

Protocol status: Working

We use this protocol and it's working

Created: August 27, 2024



Last Modified: August 29, 2024

Protocol Integer ID: 106494

Keywords: ASAPCRN, genetic interaction, Drosophila melanogaster, ERG, fly mutant, genetic interaction analysis, calculation of genetic interaction, genetic interaction, electroretinogram, using erg, recording of electroretinogram, erg, transheterozygous screen

Funders Acknowledgements:

Aligning Science Across Parkinson's

Grant ID: ASAP-000430

EMBO long-term postdoctoral fellowship

Grant ID: ALTF_299-2019

Research project, FWO Vlaanderen

Grant ID: G0A5219N

Research project, FWO Vlaanderen

Grant ID: G0B8119N

Methusalem project

Grant ID: METH/21/05 (3M210778)

Research project, KU Leuven Parkinson Fonds

Grant ID: EQZ-PARFON-O2010

Opening the Future grant, Leuven Universiteitsfonds (LUF)

Grant ID: EQZ-OPTFUP-O2010

Research project, FWO Vlaanderen


Grant ID: G031324N

Abstract

This protocols describes the recording of electroretinograms (ERGs) and calculation of genetic interactions of fly mutants for a transheterozygous screen.

Troubleshooting

Electroretinograms (ERGs)

- 1 For every measurement male flies are collected (including the control) 4 ± 1 d after eclosion from the transheterozygous crosses reared in a temperature and light-controlled incubator at  25 °C and 12-hour light-dark cycle
- 2 Flies are sedated with CO₂ and immobilized on glass microscope slides using double-sided tape
- 3 Filamented glass micropipettes are used to generate electrodes using the Laser-pipette-puller P2000.
- 4 Glass electrodes (borosilicate, 1.5 mm outer diameter) filled with 3 M NaCl are placed in the thorax as a reference and on the fly eye for recordings
- 5 The flies are exposed to darkness for 3 seconds, followed by 1 second of LED light illumination inside a Faraday Cage.
- 6 This is repeated 4 times for each fly (5 times in total).
- 7 Light-evoked signals are amplified by a DC amplifier and the amplified signal is processed by a data acquisition device (Clampex) and Axoscope 10.7, connected to a PC running Clampfit 10.7 software (Molecular Devices).
- 8 First control flies are recorded to assess whether the recording is stable and conditions are comparable to previous recordings
- 9 ERG traces are analyzed for depolarisation amplitude and On/Off peaks in IGOR Pro 6.37 (WaveMetrics) using a custom-made macro.

Analysis for genetic interaction using non-interacting model

- 10 For all ERGs the depolarization amplitude is determined and normalized to the mean depolarization amplitude of the control of the individual experiment.
- 11 The expected depolarization amplitude for every gene pair is calculated by multiplying the normalized mean depolarization amplitude of the single heterozygous mutants.



- 12 The genetic interaction strength is calculated by subtracting the modelled expected depolarization (step 9) from the individual observed depolarization amplitude of double heterozygous gene pairs