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Data Article

Freezing activity brief data from a new FUS mutant zebrafish line

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ABSTRACT

The data presented in this paper are related to the research article "Functional characterization of a FUS mutant zebrafish line as a novel genetic model for ALS". In this model the lack of *fus* causes reduced lifespan as well as impaired motor abilities associated with a decrease of motor neurons axons lenght and an increase of neuromuscular junctions fragmentation.

Data in this article describes the global locomotor activity data at 3, 4 and 5 days post fertilization in WT, fus heterozygous ($fus^{+/-}$) and fus homozygous ($fus^{-/-}$) zebrafish embryos as a response to visual light stimulation, with particular attention on the *freezing respose*.

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Specifications Table

Subject	Neuroscience (General)
Specific subject area	Behavioural neuroscience
Type of data	Graph Figure
How data were acquired	The aquisition was made with ZebraBox (Viewpoint Life Sciences, Lyon, France). Total swim activity was analysed using ZebraLab V3 software (Viewpoint Life Sciences, Lyon, France).
Data format	Raw and Analyzed
Parameters for data collection	3 dpf-zebrafish larvae were maintained in a 96-well plate and assayed for total locomotor activity in ZebraBox. The embryos were tested for 10 min in a 5 min dark, 2 min light, 3 min dark paradigm, repeated 3 times. The experiment was done on the same fish at 4 and 5 dpf.
Description of data collection	Tracking of zebrafish movements in an automated paradigm which uses light/darkness change as stimulus. In particular we looked at the behavior immediately after light stimulation, called freezing.
Data source location	Imagine Institute, 75,015, Paris, France.
Data accessibility	Data are supplied with this article Mendeley Dataset: campanari, Maria-Letizia (2020), "Freezing activity in a new FUS mutant zebrafish line ", Mendeley Data, v1 http://dx.doi.org/10.17632/wyy6drwgwy.1
Related research article	Annis-Rayan Bourefis, Maria-Letizia Campanari, Valerie Buee-Scherrer and Edor Kabashi· Functional characterization of a FUS mutant zebrafish line as a novel genetic model for ALS. Neurobiology of disease. In press.

Value of the Data

- These data provides a protocol for locomotor behavior in an automatized system
- These data are useful for those interested to test zebrafish behavior during development.
- These results provides insights about zebrafish locomotor behavior in association with visual system development, essential for zebrafish survival. It can be applied to study mutations and/or drug treatments important for locomotion. The advantage of this technique is the simultaneous registration of the peripheral and central nervous responses.

1. Data Description

Zebrafish are diurnal animals, meaning that they are particularly active during light exposition [1]. It means that their visual system is refined and essential for their proper behavior development and survival [2]. For these reasons light stimuli tests are widely used in

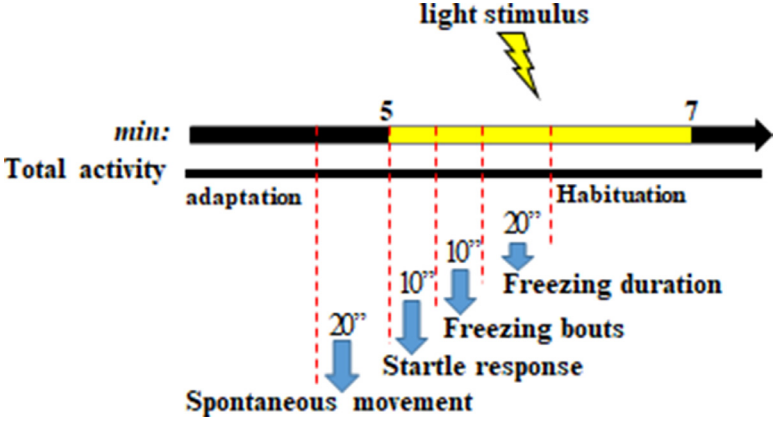

Fig. 1. Automatized protocol used at the Viewpoint Zebrabox system.

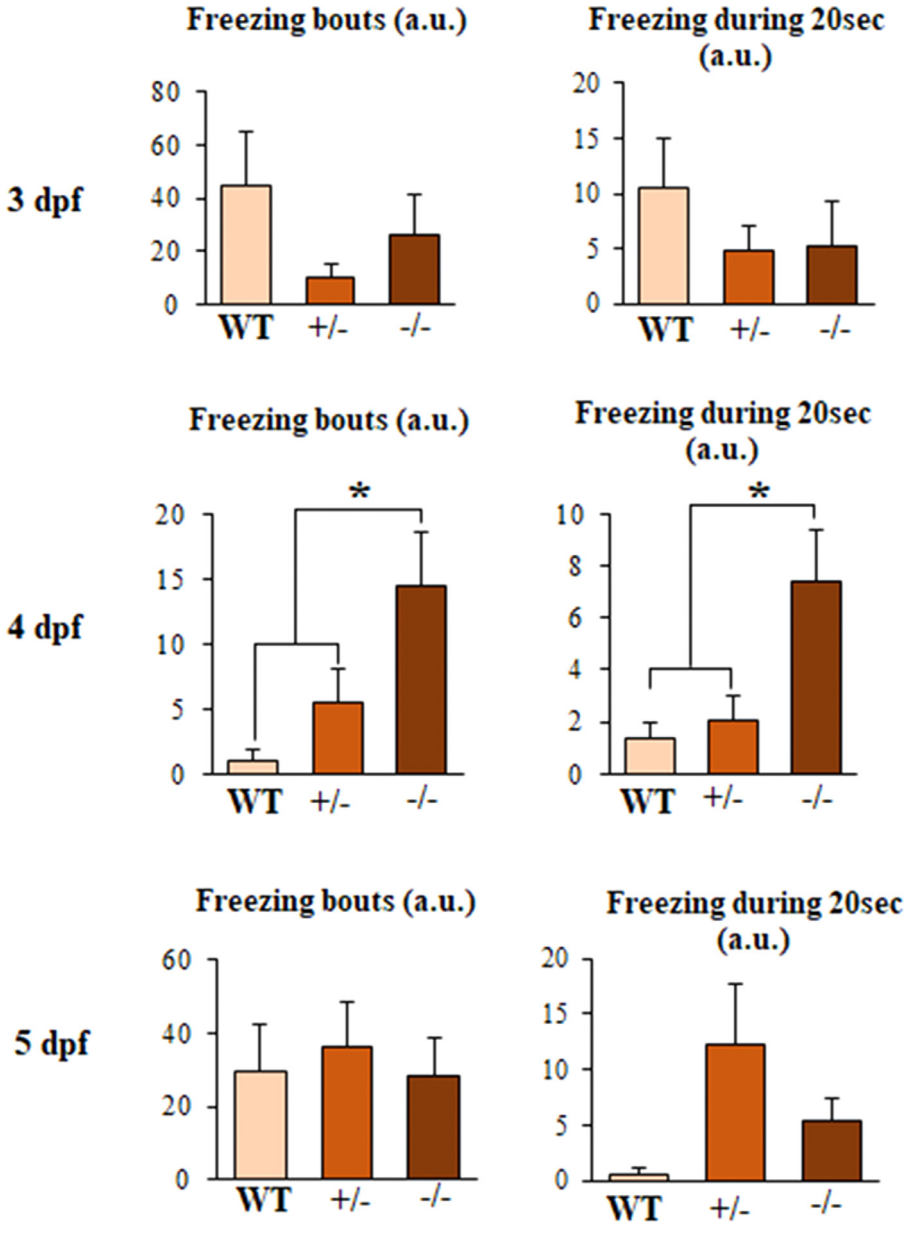

Fig. 2. Freezing activity after light stimulation in WT, *fus*$^{+/-}$ and *fus*$^{-/-}$ embryos.

zebrafish research to assess their motor performances independently from vision defects [2,3] (Figs. 1 and 2).

For each light/darkness condition there is a specific swimming behavior response. During the first 5 min of darkness the fish adapts to its condition, it is quite and moves randomly in the well, *spontaneous behavior*. After the abrupt stimulation by light a *startle response* appears, in other words the fish reacts to light with a strong swimming behavior. The increased anxiety brings to a final reduction of locomotion, known as *freezing response,* which is characterized by

a rapid fall of activity (*freezing bouts*) which is maintained over time (*freezing duration*). Normally it is followed by a habituation response, where anxiety decreases and movements are reestablished.

In [4] we determined the motor impairment in a new model for FUS loss of function in zebrafish respect to heterozygous and WT fish, at 3, 4 and 5 dpf before and during light stimulation. Here, we show the motor behavior during the *freezing* response. This reaction requires specific areas of the brain (as the basolateral amygdala and the hippocampus). Thus, the registration of this behavior confirms the presence or the absence of developmental defects as consequence of our mutation in those regions.

The three panels are quantifications for swimming activity during freezing bouts and duration at 3, 4 and 5 dpf. The abrupt stimulation by light leads to a *startle response* [4] **(**figure 3) where the locomotion activity significantly increases. However, this behavior is followed by an increase of the anxiety which is characterized by rapid decrease of motor activity in the well (freezing bouts). At 4dpf, the freezing response is severely compromised in $fus^{-/-}$ respect to heterozygous and WT fish, in fact it still move (One-way ANOVA with Bonferroni post-hoc test. *Freezing bouts:* $n = 24, 36, 36$; $F = 4.10$; *Freezing duration:* $n = 24, 36, 36$; $F = 4.80$. $^{*}p < 0, 05$). However, this deficit is not maintained over time, as we can see at 5dpf.

To have more information about the global locomotor activity at each periods considered during our protocol in WT, $fus^{+/-}$ and $fus^{-/-}$ embryos, please refer to the article [4]**,** figure 3, C, D, E.

2. Experimental design, materials, and methods

2.1. Animal care

Adult and larval zebrafish (Danio rerio) were maintained at the ICM (Institut du Cerveau et de la Moelle épinière, Paris) zebrafish facility and bred according to the National and European Guidelines for AnimalWelfare. All procedures were approved by the Institutional Ethics Committees at the Research Centers of ICM and Imagine.

Screening of mutant lines: refer to [4]**.**

2.2. Locomotion assessment

3 dpf-zebrafish larvae were maintained in a 96-well plate and assayed for total locomotor activity in ZebraBox (Viewpoint Life Sciences, Lyon, France). The embryos were tested for 10 min in a 5 min dark, 2 min light (100%), 3 min dark paradigm, repeated 3 times. The experiment was done on the same fish at 4 and 5 dpf. Total swim activity was analysed using ZebraLab V3 software (Viewpoint Life Sciences, Lyon, France).

2.3. Statistical analysis

All data values for the zebrafish experiments are represented as average standard error of mean (SEM) with significance determined using one-way ANOVAs. Differences between groups were identified via post hoc comparisons, specified in the legend of the Figure. All analyses were performed using Prism 5.0 (Graph Pad, CA).

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships which have, or could be perceived to have, influenced the work reported in this article.

Acknowledgment

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