# Tapping as a vibrational stimulus to investigate behavioral alterations in zebrafish embryos

**Norina Pagano[1,2]**, **M. Blanc[2], G. Nilén[2], H. Hollert[1], S.H. Keiter[2]**

[1]Institute for Environmental Research (Biology V), RWTH Aachen University, Worringerweg 1, 52074 Aachen, Germany
[2]MTM-Man Technology Environment Research Centre, Örebro University, Fakultetsgatan, 702 81 Örebro, Sweden

norina.pagano@rwth-aachen.de

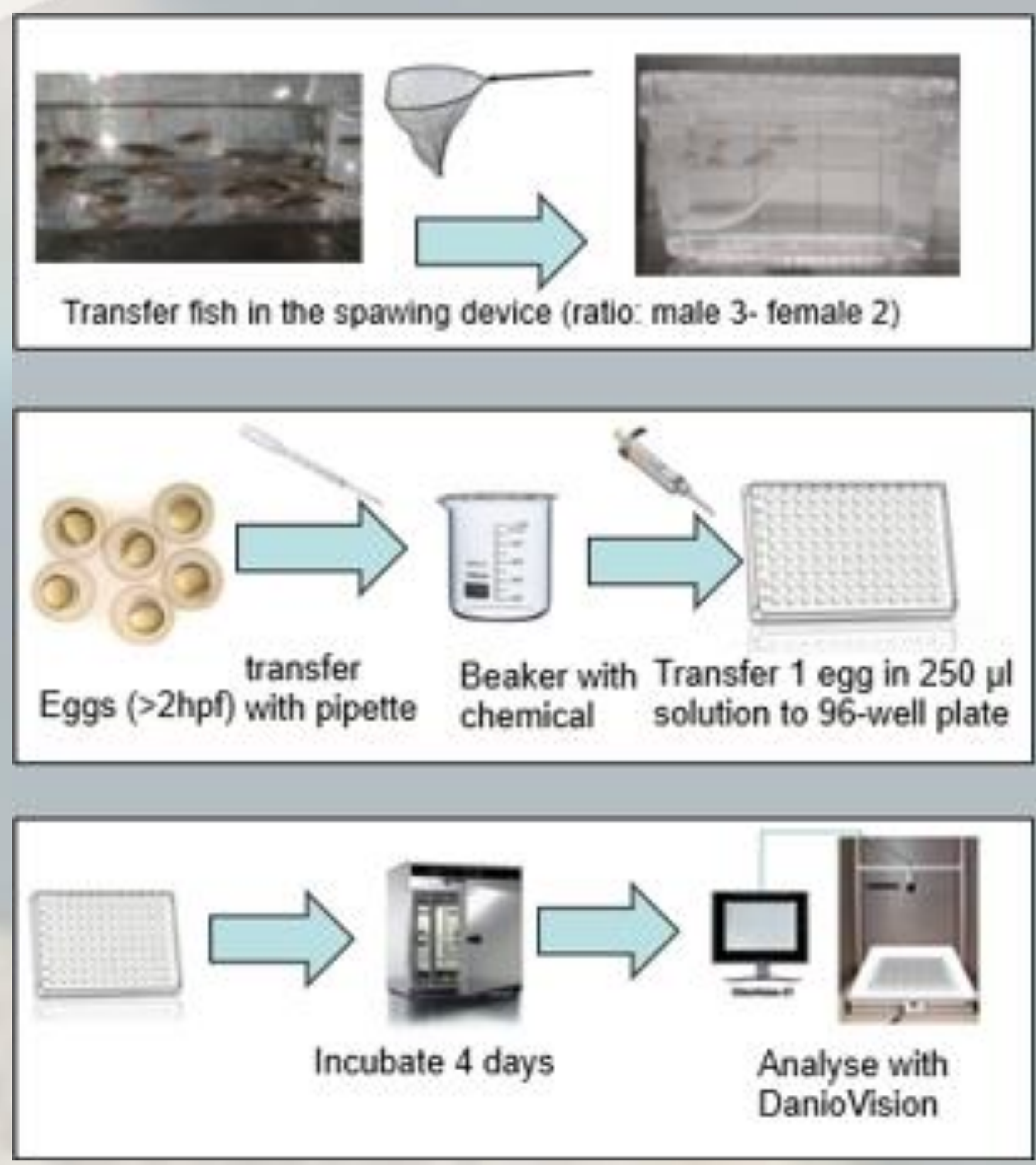
## Background

Changes in behavior can result from neurotoxic effects after treatment with environmental pollutants. Hence, current studies on behavioral alterations of zebrafish embryos focus on their photomotor response with set-ups using different dark-light cycles. Studies on behavioral alterations induced by vibrational stimuli using a tapping device are scarce. Within the present study we compare the locomotor response from zebrafish after exposure to different model compounds using a tapping device as a vibrational stimulus. By that, we aim at determining the time span needed for an equal response between the different stimuli.
These investigations are part of the EnForce Project which aims at tracking and identifying of environmental pollutants and understanding their toxic effects, e.g. behavioral alterations of fish embryos. Photomotor and vibrational behavioral responses involve different mechanisms. Therefore investigations on mechanical stress may provide additional knowledge about effects of chemicals on the behavior of zebrafish embryos, especially on otholith development.

## Methods

Comparing the response of zebrafish after treatment with tapping using different model compounds (vinclozolin, PFOS and permethrin). For now, we tested the negative control (standard ISO water) with 5 different time spans (5, 10, 15, 20 and 25 sec) between the tapping stimuli. The response of the embryos was measured as Delta Distance (cm) which shows the difference between the movement 1 sec after and 1 sec before the tapping. The vibrational stimuli were automatically created within the DanioVision (Noldus).

**Endpoints are:** Distance of motion and velocity. The major aim of this study is to determine the optimal time span between consecutive vibrational stimuli. Based on that, the subsequent step is to test the treatment of different compounds with mechanical stress on zebrafish embryos.




## Results

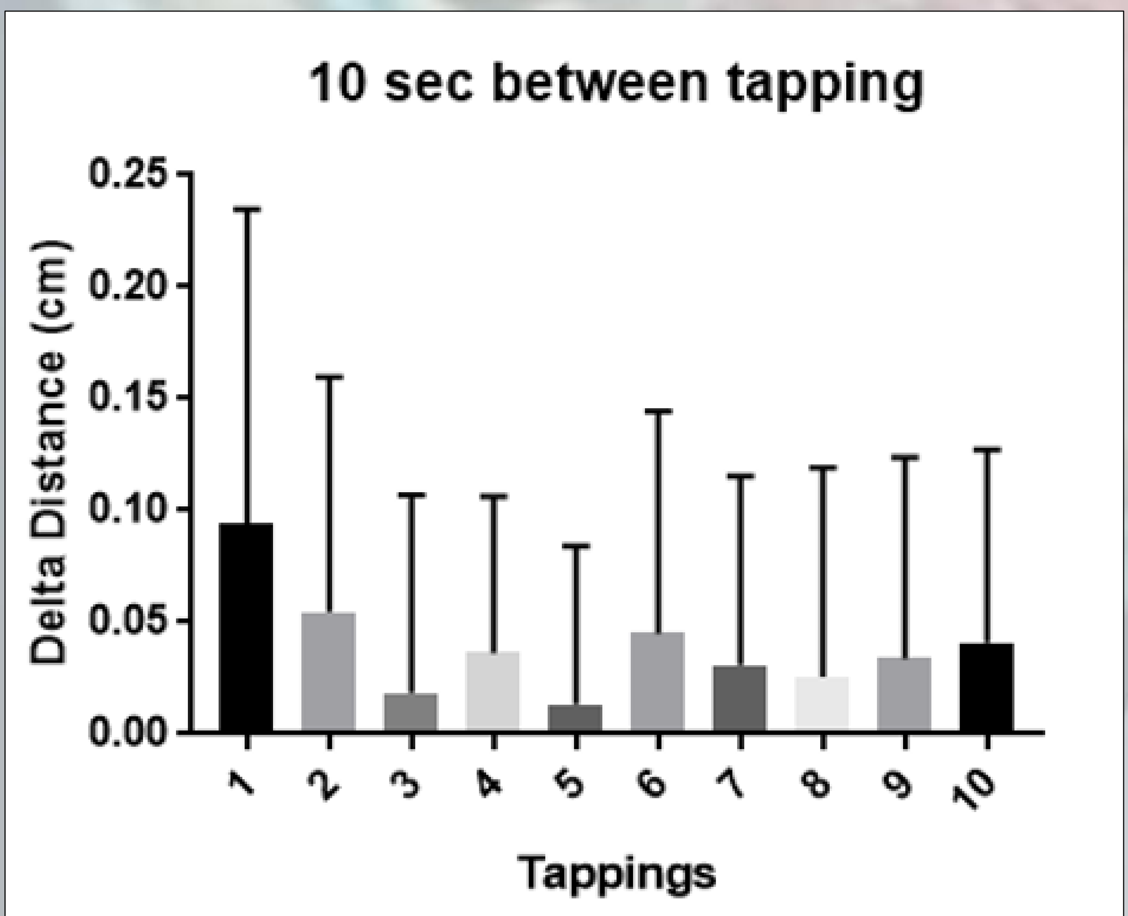



*Figure 1: 10 sec in between tapping, Delta Distance (cm) shows the difference between the movement 1 sec before and 1 sec after the tapping, 10 tappings in total, 2 replicates*

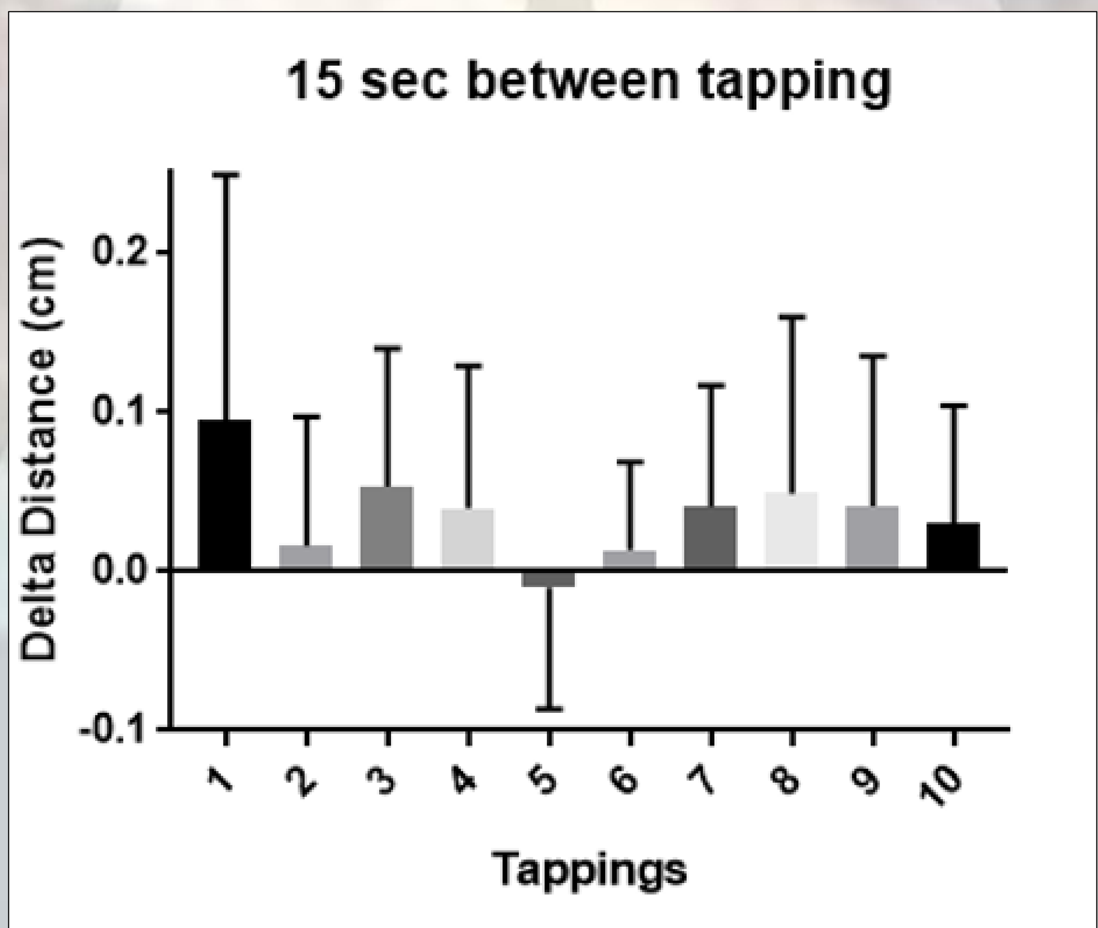



*Figure 2: 15 sec in between tapping, Delta Distance (cm) shows the difference between the movement 1 sec before and 1 sec after the tapping, 10 tappings in total, 2 replicates*

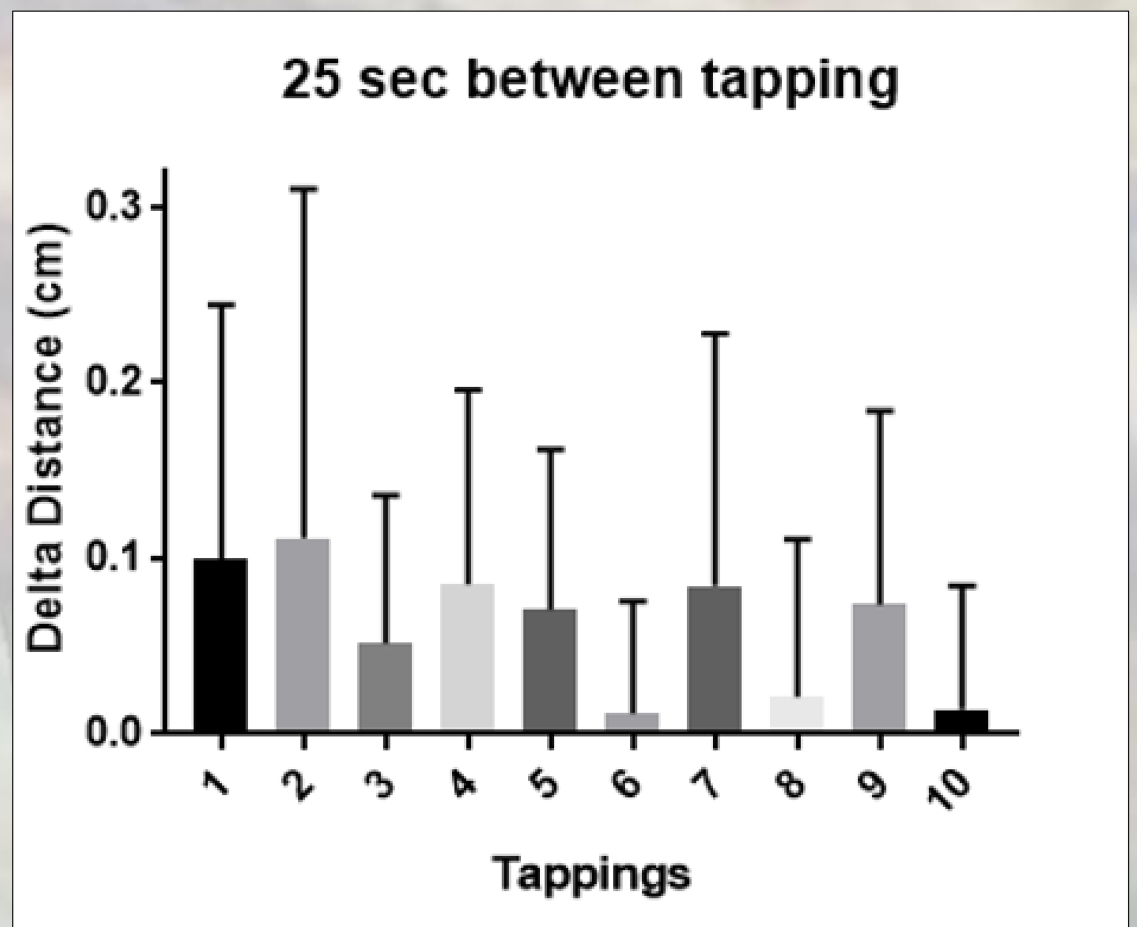



*Figure 3: 25 sec in between tapping, Delta Distance (cm) shows the difference between the movement 1 sec before and 1 sec after the tapping, 10 tappings in total, 2 replicates*

## Conclusion & Outlook

Different time spans show different responses of zebrafish embryos. The shorter the span the faster the fish embryos adapt to the vibrational stimulus. In other words, they get overstimulated and require more time to recover from the last tapping. By now, selected time spans might be too short. Therefore, further experiments will be conducted using longer time spans (e.g. 30, 40, 50 secs) between vibrational stimuli. After this adjustment we will expose zebrafish embryos to different model compounds known to alter their behavior. Finally, this may lead to a standardised protocol to measure behavioral changes by pollutants based on a vibrational stimulus.

## Acknowledgements

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Knowledge Foundation

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