Nothobranchius furzeri organotypic cultures: towards a model of ex vivo brain aging

Letizia Brogi[1], Sara Bagnoli[1], Eva Terzibasi Tozzini[2], Alessandro Cellerino[1,3]

1 Scuola Normale Superiore, Pisa

2 Stazione Zoologica Anton Dohrn, Napoli

3 Leibniz institute on Aging, Jena

1. Introduction

- **Cultures of brain slices** are an ex-vivo technique used to investigate long-term neuronal survival. Cultured brain slices maintain a three-dimensional organization and mimic the in vivo development of cells and synapses. The absence of the blood-brain barrier allows direct access of small molecules to the culture. Also, cultured brain slides allow to study the effects of age on brain in isolation without the influence of the systemic milieu.

- The short-lived annual fish ***Nothobranchius furzeri*** shows extremely short lifespan and accelerated expression of age markers.

A long-term culture system would enable the study of brain aging ex-vivo

2. Method

- Brain extraction from MZCS-222 fish of 5, 12, 30 weeks after hatching;
- brains were cut into 500 µm slices;
- brain slices were incubated on porous membranes in an ad-hoc medium.

3. Applications

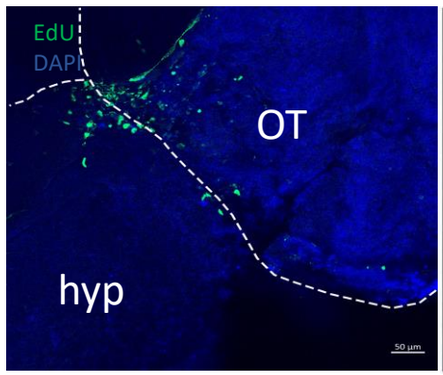
Slices were used for immunochemistry analysis.

- Slices were incubated with EdU for the first three days to label new-borns cells;
- Slices were labelled with TH stain.

4. Results

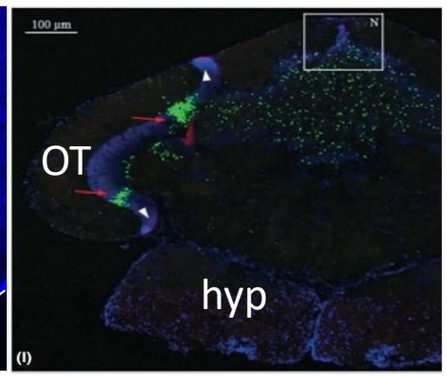
Adult neurogenesis maintained in ex vivo as in vivo both in young and old fish

Optic tectum or OT (30 WPH*)



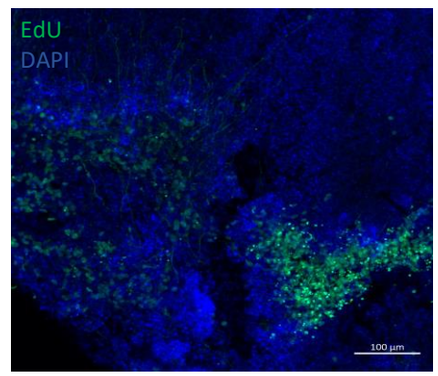
Acquistion at 20x

In vivo



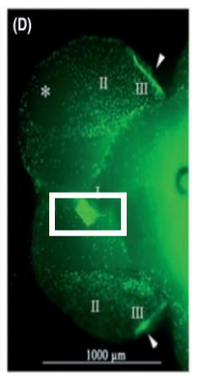
Sourced Tozzini et al., 2012

Telencephalon (30 WPH*)



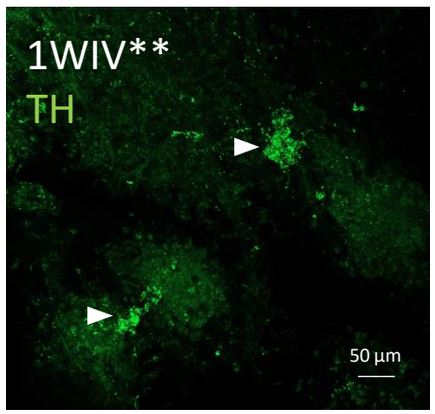
Acquistion at 10x

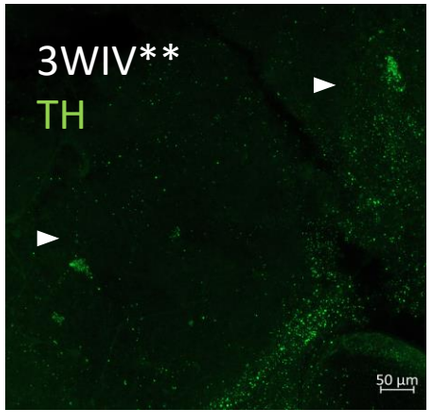
In vivo

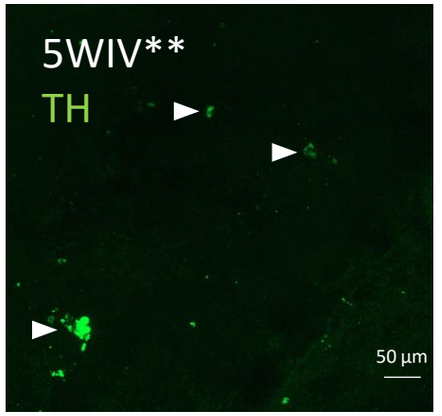


Sourced Tozzini et al., 2012

Noradrenergic neurons persist for at least five weeks in ex-vivo







Acquistion at 20x

* WPH= Weeks Post Hatching, **WIV= Weeks In Vitro

5. Conclusions

Our future aims are to prolong the culture period to test whether brain aging markers become expressed in ex-vivo and finally test drugs and nutraceutical compound.