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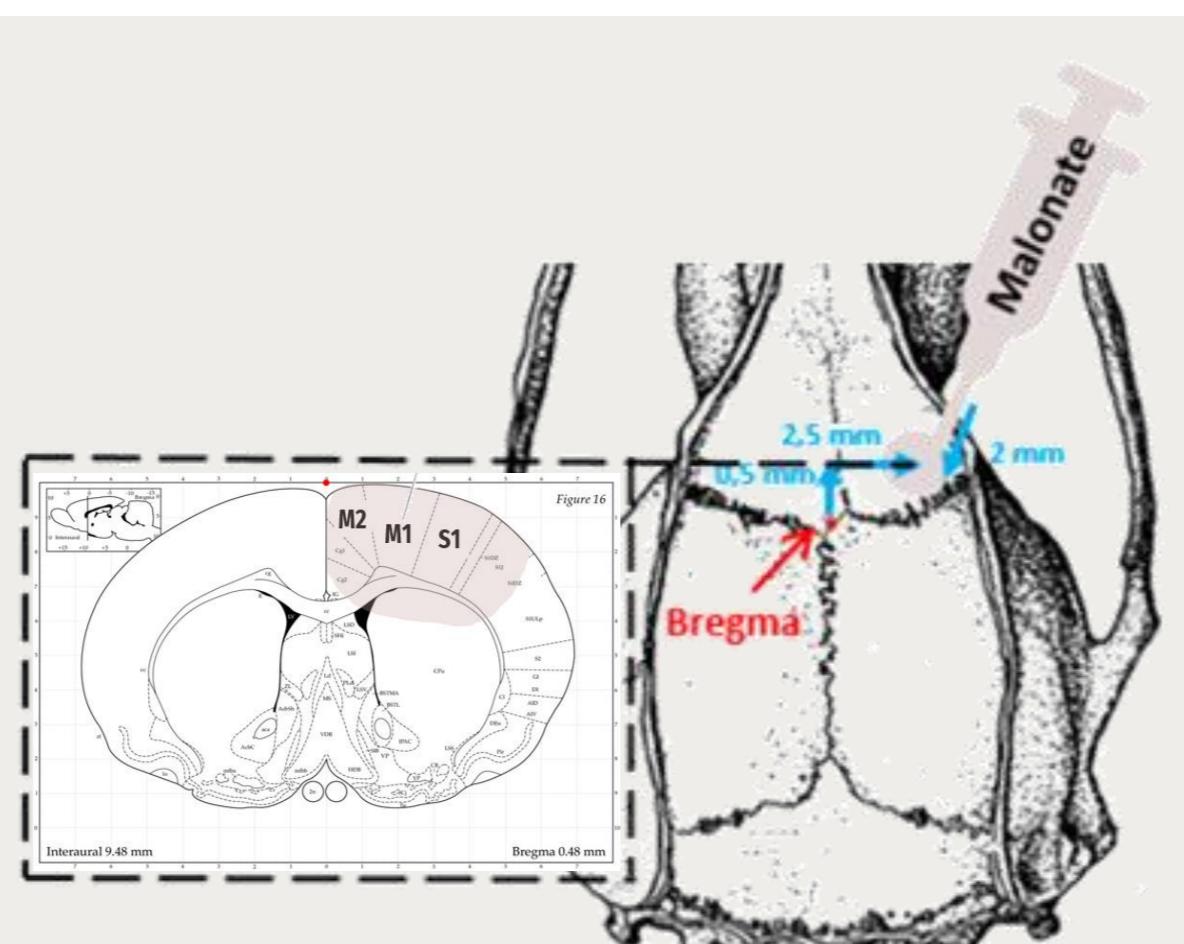
Introduction

- Stroke and severe head trauma are two pathologies involving acute brain damage. In particular, lesions in the primary motor cortex are very invalidating for patients.
- Brain plasticity and neurogenesis can initiate self-repair of brain tissue and participate in patient recovery. Unfortunately, the probability of cell survival within this neotissue remains very low.
- Therapeutic interest in developing scaffold mimicking the extracellular matrix and allowing the growth of new cells is growing.

Materials and Methods

Brain lesion : injection of malonate in the motor cortex

- Targeting of specific brain regions
- Extent of lesion proportional to volume injected
- Reproducibility of lesion size



Training motor tests

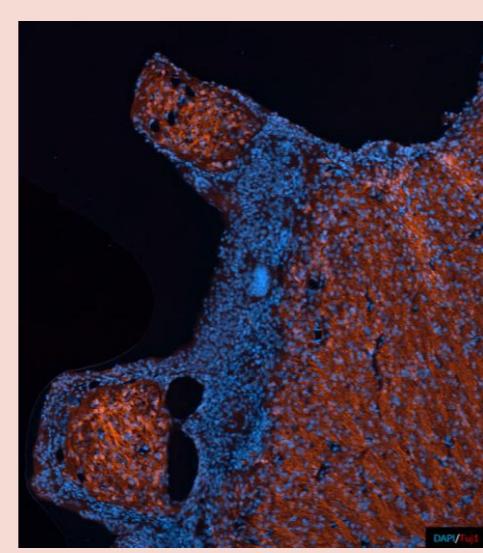
Motor tests are used to monitor the health and recovery of rats throughout the study.

- Neurological Severity Score
- Grip strength test
- Open Field
- String Pulling



Three T2-weighted TurboRare sequences / rat: post-lesion, post-implantation and pre-sacrifice (7 Tesla MRI)

- Immunohistochemistry
 - Hematoxyline-eosine staining/Nissl staining
 - GFAP : astrocytes
- Immunofluorescence
 - DCX : neural progenitors
 - β 3 tubulin : immature neurons



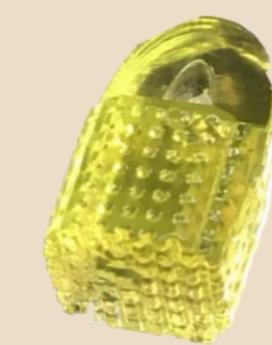
Injury surgery

- Implantation in the brain 8 days after injury
- Two biomaterials with specific characteristics :

- No toxicity
- Biocompatibility
- Slow degradation
- 3D bioprintable

Implant surgery

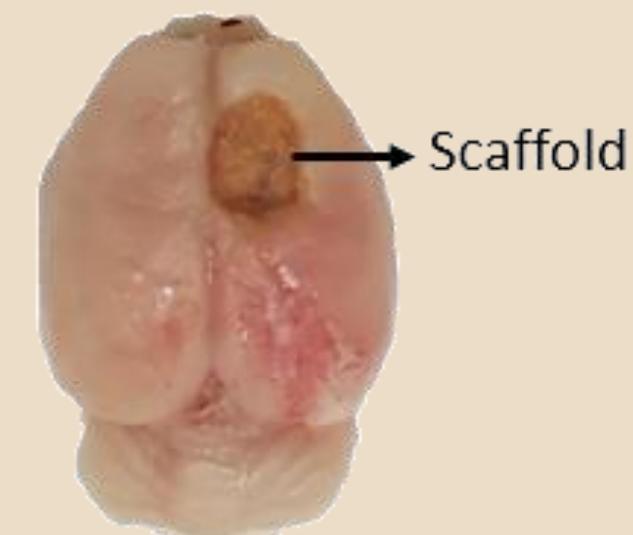
Scaffold architecture :



- PEGDA-GelMA scaffold

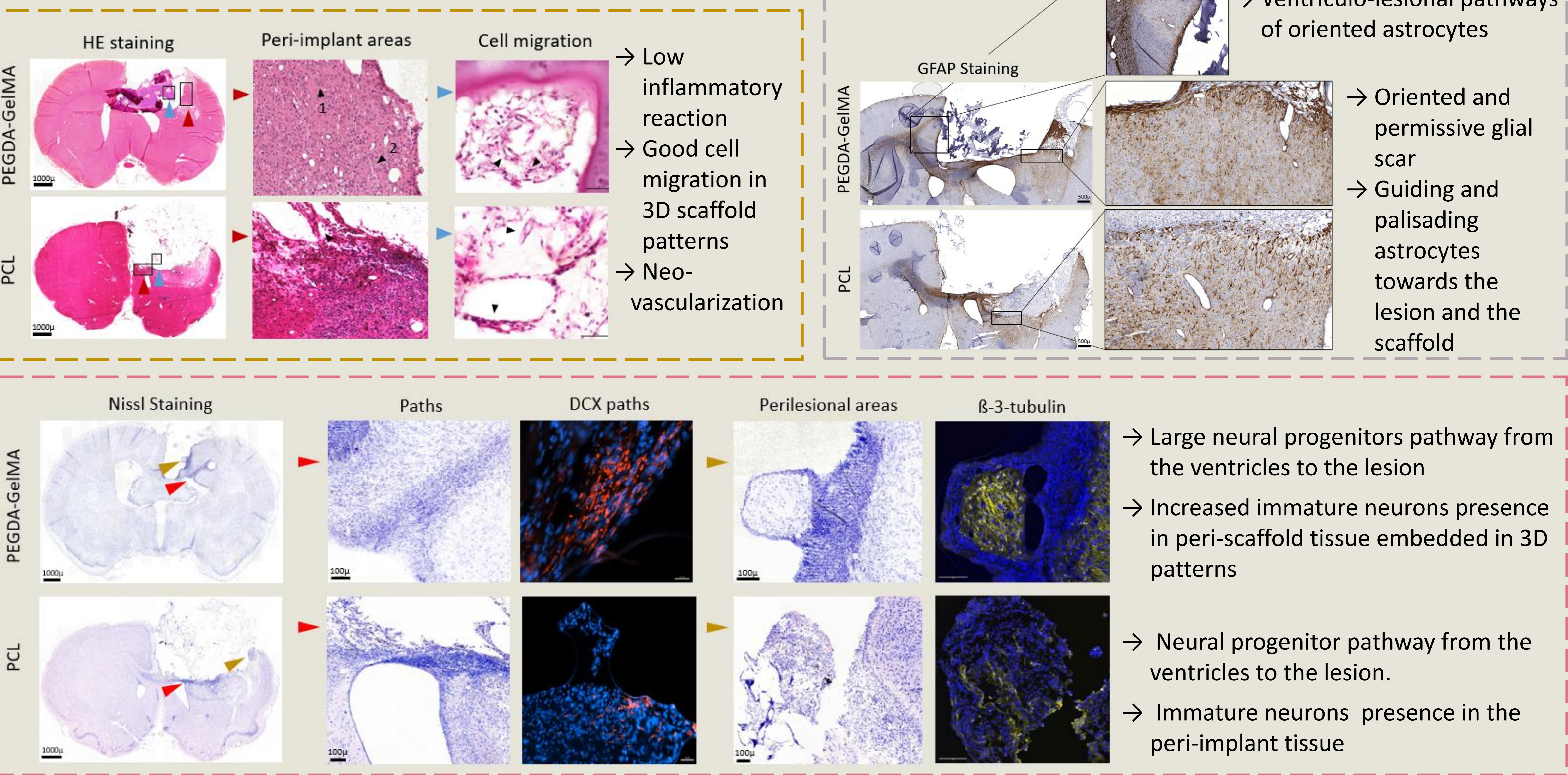


- PCL scaffold

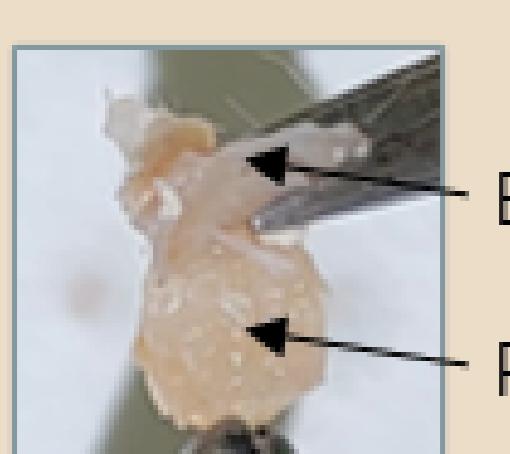


Histology

Results



Discussion



- PCL adheres more favorably to the bone
- PCL allows a less complex 3D architecture
- PCL generates a stronger fibrosis reaction than PEGDA-GelMA (not shown here)

Conclusion

- PEGDA-GelMA appears to be a good biomaterial tolerated by the brain that initiates low inflammatory and tissue reconstruction with cell migration in the 3D scaffold patterns and presence of various neural progenitor cells around the scaffold.