

Reduced graphene oxide scaffolds for neural repair at the injured spinal cord, progress from the Piezo4Spine project

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Piezo4Spine is a multidisciplinary European PathFinder project devoted to the development of effective therapeutics for neural repair after spinal cord injury (SCI) [1]. Over fifteen million of people live and deal with the devastating consequences of SCI worldwide, being the cure for these patients still a mirage [2]. In the Piezo4Spine project, we intend to build a 3D therapeutic mesh able to deliver multiple pro-regenerative signals to the injured spinal tissue to overcome inhibitory processes and activate tissue repair. One of the main building blocks for this theramesh include reduced graphene oxide scaffolds [3,4]. Motor training routines are included to synergistically potentiate the benefits of this biomaterial [5]. These scaffolds have been exhaustively explored *in vivo* in cervical hemisectioned and thoracic transected rats. This talk will provide a journey through some of the most relevant findings of this research.

Results from our laboratory demonstrate the ability of rGO foams to promote reparative features including vascularization and colonization of the lesion site by myelinated neurites (**Figure 1**). Importantly, the mechanical compliance of these foams, together with their stabilization function, support a more homogeneous distribution of both blood vessels and neurites within the injury, thus benefitting the recovery of functions in chronic paralyzed rats. Some of these regrown neurites were proved to originate in the reticular formation and the vestibular nuclei. Behavioral tests also demonstrated a higher trunk stability and a larger movement range in rGO-implanted rats. These findings corroborate the enormous neuro-reparative potential of these porous rGO scaffolds and boost their interest for enabling the development of a new generation of neural therapeutics.

References

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Figures

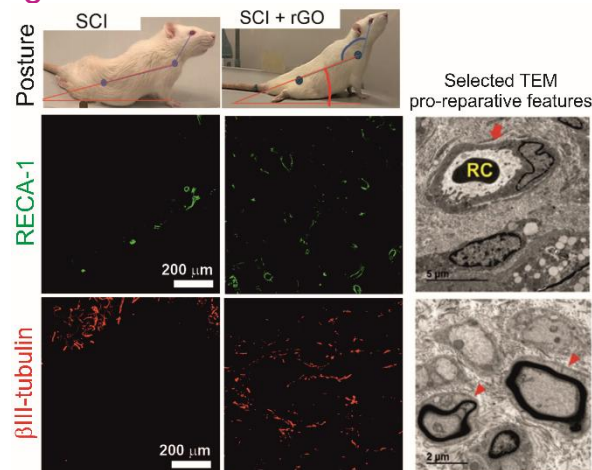


Figure 1. Representative images of reparative features found in chronic paraplegic rats.

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