

RESCUEGRAPH project			
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Objectives 🕺
<ul> <li>Innovative technological breakthroughs:</li> <li>To optimize implantable nerve electrodes based on graphene flexible technology for chronic implantation</li> <li>To develop a <u>FES system including a stimulator</u> compliant with graphene electrodes</li> </ul>
<ul> <li>Recovery of gait pattern through peripheral nervestimulation:</li> <li>To develop a <u>FES system that will produce a coordinated locomotion</u> pattern of the hindlimbs in the rat.</li> </ul>
<ul> <li>Preclinical assessments and neural plasticity studies:</li> <li>To apply the FES system in rats after SCI for artificial recovery of walking</li> <li>To study the effects of the chronic use of such FES system in rats after SCI in terms of plastic changes at the spinal cord and at the brain cortex</li> </ul>









## WP3: Chronic implantation of graphene-based electrodes and evaluation of the FES system in the peripheral nerve

- Electrophysiological characterization in vivo for nerve stimulation selectivity and signal recording. ohystochemistry
- Graphene electrodes • implanted and a gait controller to set up a FES systema for locomotion in rats
- Patterned stimulation refined to obtain adequate motion of both hindlimbs (flexors / extensors) in intact and SCI rats
- Optimize the FES controller





PI: X Navarro

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WP5: Assessment of neural plasticity and somatosensory recovery induced by the FES system

- Epidural graphene-based electrodes placed on brain cortex
- Recording of field potentials at S1 in response to tactile and proprioceptive stimuli to the paws
- Changes that may be induced by daily application of FES for locomotion in intact and SCI rats
- Investigate induced neuroplasticity at the cortical and subcortical circuitry



RESCUEGRAPH Project timetable								
		01/22	07/22	01/23	07/23	01/24	07/24	
WP Task	WP and Task Title	M1-6	M7-12	M13-18	M19-24	M25-30	M31-36	
1	Development & production of graphene-based neural electrodes							
1.1	Modelling & design of intraneural and cortical electrodes							
1.2	Fabrication of graphene electrodes (1st generation)							
1.3	Graphene electrodes for long-term implantation (2 <sup>nd</sup> generation)							
2	System for FES of locomotion using intraneural electrodes							
2.1	PG development							
2.2	PG configuration software							
2.3	Gait pattern controller							
3	Chronic implantation of graphene-based electrodes and							
	evaluation of the FES system							
3.1	Functional evaluation of the graphene electrodes in vivo							
3.2	Setup and optimization of the FES system for locomotion							
3.3	Evaluation of the FES system for locomotion in rats							
4	Evaluation of locomotion & spinal plasticity in SCI rats							
4.1	FES system for locomotion in SCI rats and rehabilitation							
4.2	Plasticity in spinal cord circuits by stimulation with FES system							
5	Neural plasticity and somatosensory recovery induced by FES							
5.1	Somatosensory cortical responses of intact and SCI rats							
5.2	Plasticity in S1 cortex induced by FES in intact and SCI rats							
6	Coordination, exploitation and dissemination							
6.1	Coordination							
6.2	Integration of innovation							
6.3	Dissemination							