15% glycerol and micropatterned to obtain the well-established gratings (GR) and the improved asymmetric pattern with scalene triangles (SCA), both able to induce directional stimuli to cells. Moreover, the controlled release of phosphodiesterase inhibitors (PDEI) was designed to chemically promote nerve regeneration and functional recovery. The results of *in vitro* and *ex vivo* direct cultures on microstructured chitosan membranes suggest that the substrates are useful for the oriented growth of neurons, a very important step in making regeneration more effective. The *in vitro* protocol for the administration of PDEI (sildenafil-PDE5I and rolipram-PDE4I) was developed and for both stimulations an interesting gene regulation linked to the neuroprotective brain-derived neurotrophic factor (BDNF) and the proangiogenic Vascular endothelial growth factor (VEGF) in immortalized cultures of sensory and motor neurons was observed. In glial cell cultures, the administration of PDEI resulted in up-regulation of the transcription factor Krox20, which can positively influence the expression of myelin genes and in a decrease cell migration. Furthermore, the administration of Rolipram has been shown to induce an increase in neuritic extension in neuronal populations. Further investigations are underway to deepen the study of the effect of PDEI administration on organotypic cultures (dorsal root ganglia and autonomic ganglia), where neuronal and glial cells co-exist, *ex vivo* models more similar to what happens *in vivo*.

## THALAMIC MORPHO-FUNCTIONAL CHANGES FOLLOWING ELECTRICAL STIMULATION OF THE AXOTOMIZED TRIGEMINAL NERVE

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To understand the morpho-functional changes of the thalamic nuclei following stimulation of the transected infraorbital branch of trigeminal nerve. Continuous electric stimulation was applied to the proximal stump of axotomized left infraorbital branch of trigeminal nerve, 12h/day for four weeks. Brain sections were immunostained for cytochrome oxidase (CyO), paravalbumin (Pv) and calbindin (Cb) and quantified in the ventral posteromedial o (VPM), posterior o (PO) and reticular (Rt) thalamic nuclei. Intragroup comparisons between left and right sides and intergroup comparisons between control, axotomized and stimulated-axotomized animals were performed. Axotomization of trigeminal nerve reduced the number of positive Pv and Cb cells in the Rt and the CyO density in all the analyzed thalamic nuclei. Electrical stimulation of the proximal nerve stump restored the cellular density in the Rt and the CyO density. Trigeminal nerve transection induces morpho-functional changes in the thalamus that might trigger chronic neuropathic trigeminal pain. These maladaptive changes are rescued by peripheral electric stimulation, that might represent a potential therapeutic strategy.

## ACETYLCHOLINE PRECURSORS ATTENUATE NEUROINFLAMMATION IN LPS-STIMULATED BV2 CELLS

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Choline-containing phospholipids, choline alphoscerate (α-GPC), and cytidine 5′-diphosphocholine (CDP-choline) are both acetylcholine precursors crossing the blood-brain barrier. As procholinergic nootropic agents, studies have provided their neuroprotective effects. Currently, there is a limited number of studies concerning whether they have a similar effect in treating cognitive impairment. Indeed, contradictory results have been reported in their mechanisms of action on the neurovascular units. Since microglia play a crucial role in neuronal damage and protection, this study investigated the effects of α-GPC and CDP-choline on the inflammatory response in activated microglia using an immortalized murine microglial cell line (BV-2) stimulated with lipopolysaccharide (LPS). BV2 microglia were treated with or without LPS and were incubated with LPS and different concentrations of both acetylcholine precursors for 24 h. MTT assay, immunocytochemistry, and Western blotting methods were utilized. MTT assay did not show significant changes in cell viability after treatments at different concentrations. Here, we report no differences in untreated cells. On the contrary, morphological changes and an increase in ionized calcium-binding adapter molecule 1 (Iba1) expression were found in LPS-stimulated BV-2 cells. In addition, the nuclear translocation of nuclear factor-kappa B (NF-κB) and the up-regulation of inflammatory interleukin-1β (IL-1β) were accompanied by an increase in oxidative state proteins and lipid peroxidation in LPS-treated BV2 cells. These alterations were reversed after the treatments with both α-GPC and CDP-choline. Our data demonstrate that these compounds attenuate equally LPS-induced neuroinflammatory responses and suggest insights to explain their therapeutic role in brain disorders characterized by vascular impairment.

## STRATEGIES TO IMPROVE PROSTATIC NERVE REGENERATION AFTER RADICAL PROSTATECTOMY

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Prostate cancer is the most frequent cancer among males surpassing the lung and the colorectal cancers, representing the second cause of cancer mortality in industrialized countries. The current treatment of localized prostate cancer in patients with a life-expectancy >10 years is radical prostatectomy (RP). Unfortunately, in patients who undergo RP, frequently iatrogenic