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Reduced graphene oxide absorbed on silk fibroin electrospun mats enhances neurite differentiation of PC12 cells

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Introduction: Silk fibroin and graphene are both promising biomaterials. Hybrid scaffolds combining their properties could be attractive for tissue engineering applications. Specifically, reduced graphene oxide (rGO) is biocompatible and electrical conductor, which is an interesting property for nervous tissue regeneration. PC12 cells further differentiate into nerve cells when stimulated by nerve growth factor (NGF). The aim of this assay was to induce neurite formation on *Bombyx mori* silk fibroin (SF) based biomaterials and in combination with rGO.

Materials & Methods: The PC12 cell line was seeded onto electrospun mats from SF aqueous solutions and electrospun SF mats coated with rGO. The treatment with NGF at 50 ng/ml was used as positive control. Neurite formation and its length were evaluated after 7 days in culture by image analysis.

Results: Cells growing on SF mats showed no differentiation (0%), nevertheless, PC12 cells on SF+rGO mats showed 55.5% (±2.3) of neurite differentiation and statistically similar to 61.1% (±2.1) obtained with NGF stimulation. Although, neurite length of cells growing on SF+rGO mats was lower than those stimulated with NGF.

Conclusion: rGO coating of SF electrospun mats induce *per se* neurite differentiation of PC12 cells, similar to neurite differentiation under stimulation with NGF, while nude SF mats induce no cell differentiation. Thus, the combination of SF with rGO seems to be an interesting biomaterial for nervous tissue engineering.

Biography

Ana Pagán obtained her degree in Biology from University of Murcia. She has completed her PhD from the same University, with a research stay at the Division of Nutrition and Metabolic Diseases, LMU University, Munich, Germany. She works as a Postdoctoral researcher in the Instituto Murciano de Investigación y Desarrollo Agrario y Alimentario (IMIDA, Murcia, Spain), in the Department of Biotechnology, with premier biomaterials in tissue engineering.

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