GALANTAMINE MICROPARTICLES REDUCE INFLAMMATION AND OXIDATIVE STRESS AFTER ACUTE SPINAL CORD INJURY IN RATS

Fernanda Stapenhorst França [1]
Marcelo Garrido dos Santos [2]
Cristian Euzébio Teixeira [3]
Luiz Carlos Sommer[4]
João Pedro da Rocha Prestes[5]
Patrick Turck[6]
Cristina Campo Carraro [7]
Laura Elena Sperling [8]
Adriane Belló Klein[9]
Patricia Pranke [10]

SUMMARY

Spinal cord injury (SCI) is a debilitating condition with no effective treatment. One of the greatest difficulties for treatment arises from the inflammation process. Previous studies from our group have indicated that galantamine improves recovery after SCI, and literature shows its anti-inflammatory and antioxidant effects, as well as its neuroprotective properties. Polymeric nanoparticles, due to their diminished side

[1] Doutoranda em Ciências Biológicas: Fisiologia, Universidade Federal do Rio Grande do Sul-UFRGS, fernanda.stapenhorst@gmail.com;
[2] Graduando do Curso de Biomedicina da Universidade Federal de Ciências da Saúde de Porto Alegre - UFCSPA, marcelogs@ufcspa.edu.br;
[3]Graduando do Curso de Enfermagem da Universidade Federal do Rio Grande do Sul-UFRGS, cristian.euzebiot@gmail.com;
[4]Graduando pelo Curso de Odontologia da Universidade Federal do Rio Grande do Sul-UFRGS, luizsommer@live.com;
[5] Graduando pelo Curso de Biomedicina da Universidade Federal do Rio Grande do Sul-UFRGS, jpedro20091@gmail.com;
[6] Pós doutorando da Universidade Federal do Rio Grande do Sul - UFRGS, p.turck@gmail.com
[7]Pós doutoranda da Universidade Federal do Rio Grande do Sul - UFRGS, cristinacamposcarraro@gmail.com;
[8] Pós doutoranda da Universidade Federal do Rio Grande do Sul - UFRGS, laura.sperling@gmail.com;;
[9] Professora doutora em Ciências biológicas: Fisiologia, Departamento de Fisiologia - UFRGS,
[10] Professora orientadora: doutora em Genética e Biologia Molecular, Faculdade de Farmácia, Universidade Federal do Rio Grande do Sul - UFRGS, patriciapranke@ufrgs.br.

effects and improved drug release characteristics, present a good possibility for treatment. This study aims to use nanoparticles loaded with galantamine to mitigate SCI consequences in terms of inflammation and oxidative stress. The microparticles were electrospun with 2.5% of galantamine in a 4% PLGA solution or 4% PLGA alone. The diameter and zeta potential of the particles were measured by dynamic light scattering. Wistar rats were submitted to a contusion injury at the thoracic spinal cord (CEUA 35781). The animals were divided into 5 groups: laminectomy; SCI; SCI with galantamine; SCI with PLGA particles; and SCI with PLGA-galantamine particles (PG). Three days after the injury, the animals were euthanized and the spinal cords were collected. The levels of IL-1β and IL-6 were evaluated by ELISA. The production of reactive oxygen species (ROS) was assessed by measuring the oxidation of 2′, 7′-Dichlorofluorescin diacetate (DCF) and levels of lipid peroxidation were analyzed by measuring thiobarbituric acid reactive substances (TBARS). The average particle diameter was 3247,6±1490,4nm for the 4% PLGA particles and 568,3±199,2nm for the PG particles. The zeta potential of the particles was -50,05±11.89mV for the 4% PLGA particles and -23,59±5.27mV for the PG particles. The group treated with PG showed significantly decreased IL-1β levels when compared to the injury group. Interestingly, the PLGA group presented decreased IL-6 levels compared to the injury and laminectomy groups. However, only the animals treated with PG showed decreased ROS production, whereas the PG and galantamine groups showed decreased levels of lipid peroxidation. Thus, the use of PG particles is a promising approach for spinal cord injury regeneration, considering its effects in both the decrease of inflammatory cytokines and oxidative stress markers.

Acknowledgments: MCTIC, FINEP, CNPq, CAPES, FAPERGS and Stem Cell Research Institute (IPCT).