ALOE VERA GEL AND HYBRID NANOFIBERS OF ALOE VERA ARE PERMISSIVE SUBSTRATES FOR NEURITE OUTGROWTH OF RAT DRG NEURONS IN VITRO

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Introduction: Aloe vera is a medicine plant that promotes wound healing. The nervous tissue is present in all the body organs and systems and regulates the conditions of health, the inflammation and the healing process. Nerve regrowth and proper reinervation of target tissues are important topics for the recovery of tissue homeostasis and restoration of functions. In addition, natural and synthetic materials mimetizing the microscopic structural organization of the extracelular matrix in healthy tissues can provide suitable bioscaffolds for cell growth and tissue regeneration. Our purpose is to study the neuritogenesis response of dorsal root ganglion (DRG) neurons in culture media containing different commercially available products of Canarian Aloe vera gel as well as electrospun hybrid nanofibers of Aloe vera.

Materials and Methods. Rat DRG neurons were cultured in DMEM/F12 (1:1) media (control group) and in the same media containing four commercial Aloe vera products at two dilutions (1/50 and 1/75) for 6 days. Commercial Aloe vera products were selected according to different composition of barbaloin (ranged between 2-180 ppm) and acemannan (ranged between 100-2000 mg/l). In addition, electrospun nanofibers containing only PHBV and a mixture of PHBV/Aloe vera were compared as scaffolds for neurite outgrowth in vitro. At the seveth day, the neuritogenesis response was detected using anti-neurofilament immunostaining. Data from the control group and the eight experimental groups were quantified using the image-J software (NIH, USA) and analysed statistically. Comparison of media and standard deviations was considered significant at $p < 0.05$.

Results: The neuritogenesis response was as high in control conditions as in presence of Aloe vera products containing high acemannan and/or low barbaloin composition, with independence of the dilution used. Moreover, neurite outgrowth was higher in presence of nanofibers of PHBV/Aloe vera than in presence of nanofibers of only PHBV.

Conclusions: We conclude that the concentration of acemannan and barbaloin are key factors involved in the permissiveness of the Aloe vera gel as substrate for the axonal outgrowth. Hybrid nanofibers containing Aloe vera are interesting resources for tissue engineering applications (patent ES P201600173; PCT ES 2017000029).

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