Development of new drug delivery systems based on polymeric

nanofibers for glioblastoma treatment

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**Abstract:**

Glioblastoma is a type of glioma with a low incidence but a high mortality rate due to its malignancy. Current treatments for glioblastoma focus on surgery followed by chemotherapy; however, systemic administration of antineoplastics damages healthy tissues and cells in the rest of the body, so their local application and controlled release is being investigated1. Their encapsulation in polymeric nanofibers may allow a controlled release and increase their bioavailability2,3. In this work, the electrospinning technique was used to synthesize poly (methyl vinyl ether-*alt*-maleic) (PMVEMA) nanofibers in both ester (Es) and acid (Ac) forms, as a drug delivery system for carmustine (BCNU) and doxorubicin (DOX). For their morphological characterization, field emission scanning electron microscopy (FESEM) was used, observing diameters between 300 and 400 nm for PMVEMA-Ac nanofibers loaded with DOX at a concentration of 1:20 (% w/w) with respect to the polymer and 737 nm for PMVEMA-Es loaded with BCNU at a concentration of 8:25 (% w/w). In addition, the encapsulation efficiency of the loaded nanofibers was 100 % DOX and 70 % BCNU, confirmed by liquid chromatography (HPLC) with a drug fast release of 1h. On the other hand, the presence of DOX in the nanofibers was observed using the confocal microscopy technique. Finally, the antineoplastic effect of the encapsulated drugs was tested with the MTT cell viability assay in glioblastoma cell lines from patients of the Hospital General Universitario de Elche (HGUE). In this assay, a dose-dependent decrease in cell viability was observed at increasing concentrations of the encapsulated drug. Furthermore, our next step is testing the materials in 3D cell models.

**Keywords**: PMVEMA; polymeric nanofibers; carmustine; doxorubicin; electrospinning; glioblastoma.



**Figure 1**: Photographs taken by confocal microscopy of PMVEMA and PMVEMA-Ac/DOX 1% nanofibers. A) Bright field B) Fluorescence C) Merge of A and B. λexc= 475 nm, λem= 590 nm.

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