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Efficacy of DOPE/DC-cholesterol liposomes and GCPQ micelles as AZD6244 nanocarriers in a 3D colorectal cancer *in-vitro* model

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Background: Colorectal cancer therapy shows very low response rates, leaving room for improvement. One of the most popular approaches to overcome this limitation is the use of organic nanocarriers to improve drug delivery.

Methods: In this work, we used cationic DOPE/DC-cholesterol liposomes and GCPQ micelles to deliver AZD6244, an inhibitor of the MAPK pathway, to colorectal cancer cells. HCT116 cells were cultured in monolayers and in collagen-based 3D models (tumouroids), and treated with different concentrations of AZD6244 as a free drug as well as in micelle and liposome nano-formulations. Fluorescent nanoparticles were used to track the penetration of these nanocarriers into the tumouroids.

Results: Nanoparticle-mediated drug delivery proved to be very superior to the free drug in monolayers, while the low diffusion of the nanoparticles through the dense collagen mass hindered their therapeutic effect in tumouroids. Contrary to this, the free drug was significantly more efficient in tumouroids than in monolayers, suggesting very different cellular behaviour between these models.

Conclusions: These results highlight the role of nanoparticles in improving drug delivery and the need to include 3D models in early phases of drug development, particularly in the case of nano-formulations.

Biography

Victor Lopez Davila is a PhD candidate at University College London, UK, in the field of Nano-medicine and Tissue Engineering. He completed his MSc in Nano-medicine in Cranfield University, UK, and his BSc in Biotechnology in Lleida University, Spain in 2011. He also works part-time as a Biobank Technician for Tissue Access for Patient's Benefit (TAPB), and as a Perfusionist at the Royal Free Organ Retrieval Team in London.

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