

Rational Design of 3D Printed Gastroretentive Device for Niclosamide Polymeric Nanoparticles Administration with Potential Applications in Gastric Cancer [†]

Daniel Andrés Real ^{1,2,*}, Marcelo Kogan ^{1,2}

¹ Departamento de Química Farmacológica y Toxicológica, Facultad de Ciencias Químicas y Farmacéuticas, Universidad de Chile, Santos Dumont 964, Independencia, Santiago 8380494, Chile

² Advanced Center for Chronic Diseases, ACCDiS, Santiago, Chile

* Correspondence: daniel.real@ciq.uchile.cl (D.A.R.);

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Abstract: Selective administration of antineoplastic drugs is important to reduce side effects and avoid premature release from formulation at non-specific sites. 3D-printing methods allow adapting formulations to local release strategies, such as gastroretention. This work aimed to improve the biopharmaceutical characteristics of Niclosamide through the formulation of Eudragit® E polymeric nanoparticles by nanoprecipitation, and the design and characterization of floating gastroretentive capsules produced by 3D printing (by fused deposition modeling technique), to allow the controlled release of nanosystems in the stomach. A Central Composite design was carried out to optimize the critical factors involved in the characteristics of the Niclosamide- Eudragit® NPs. NPs with a Size of 76 nm, PDI of 0.18, ZP of 41.3 mV, and dissolution of 85 and 95% at 10 and 60 minutes, respectively, were obtained. Additionally, a collection of six capsule geometries was designed for a screening study to optimize *in vitro* gastroretention and controlled release of nanocarriers. The devices floated up to 24 h, and a controlled release in the simulated gastric fluid was observed. The designed device could be applied to the gastric release of nanosystems loaded with different class II drugs, and its advantages could be used to address pathologies such as gastric cancer.

Keywords: 3D printing; Gastroretentive; Niclosamide; Gastric cancer

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Conflicts of Interest

The authors declare no conflict of interest.