A NEW COPPER(II) COMPLEX-LOADED EUDRAGIT® NANOPARTICLES AGAINST TRIPLE-NEGATIVE BREAST CANCER CELLS

Tugce Boztepe,[1,2] **Aldana Sólimo,**[3,4] **Tatiana Goldberg,**[3] **Lucía Santa Maria de la Parra**,[1] **German Islán,**[2] **Mariana Callero,**[3,4] **Ignacio León** [1,5]

[1]CEQUINOR (UNLP, CCT-CONICET La Plata, Asociado a CIC), Departamento de Química, Facultad de Ciencias Exactas, Universidad Nacional de La Plata, La Plata 1900, Argentina; [2]Laboratorio de Nanobiomateriales, CINDEFI—Departamento de Química, Facultad de Ciencias Exactas, Universidad Nacional de La Plata-CONICET, La Plata B1900, Argentina; [3]Universidad de Buenos Aires, Instituto de Oncología Ángel H.Roffo, Área Investigaciones; [4]Consejo Nacional de Investigaciones Científicas y Técnicas, CONICET; Cátedra de Fisiopatología, Departamento de Ciencias Biológicas, Facultad de Ciencias Exactas, Universidad Nacional de La Plata, La Plata 1900, Argentina

Correo electrónico de contacto: tugceboztepe@gmail.com

Platinum-based drugs are commonly used due to their effectiveness and ability to target various types of cancers. However, over time, cancer cells can develop drug resistance, making the treatment less effective [1]. Additionally, these drugs can have high toxicity and cause harmful side effects in patients. On the other hand, copper-based complexes have attracted attention as potential alternatives. Early in vitro and in vivo studies have shown that they may have promising antitumor activities, offering a potentially effective and less toxic option for cancer treatment [2]. Drug delivery systems offer significant benefits in cancer treatment by enhancing the delivery of therapeutics, reducing side effects, and improving drug efficacy and bioavailability at tumor sites [1]. Eudragit polymers are widely used in drug delivery systems due to their versatility in controlling the release profile of drugs, offering protection to active compounds, and enhancing targeted delivery to specific areas of the body [3]. Our group has previously synthesized and reported a novel copper [Cu(N−N−Fur)(NO3)(H2O)] complex (CuL1) that exhibited anticancer activity against osteosarcoma cells [4]. Nanoparticles composed of Eudragit® E100 and S100 loaded with CuL1 (ES-CuL1) were produced using the nanoprecipitation method followed by ultrasonication. The results indicated that ES-CuL1 exhibited significantly greater cytotoxicity against MDA-MB-231, 4T1, and Hs 578T TNBC cells compared to free CuL1 at 0.75 µM (4T1:67±10% ES-CuL1 vs. 94±4% CuL1; Hs 578T:84±5% vs. 109±6%, $p<0.05$) and at 2 µM on MDA-MB-231:41±6% vs. 60±3%). Additionally, ES-CuL1 resulted in a higher number of apoptotic cells than free CuL1 in all cell lines. Clonogenic assays also demonstrated a significant reduction in clonogenic capacity with the ES-CuL1 compared to free CuL1 at 0.5 µM in MDA-MB-231, 4T1, and Hs 578T cells (MDA-MB-231:0.01±0 ES-CuL1 vs. 0.87±0.06 CuL1; 4T1:0.72±0.07 vs. 0.93±0.08; Hs 578T:0.90±0.06 vs 70.4±0.03 $p<0.05$). These findings indicated that the ES-CuL1 nanoformulation may be a more effective treatment for TNBC compared to free CuL1.

References

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