

Photodynamic Cancer Therapy With Carbon Dot Loaded Exosomes

Omur Besbinar^{1,2}

Emel Kirbas Cilingir³, Jose Luis Hueso⁴, Ana Martín Pardillos⁵, Roger M. Leblanc³, Jesus Santamaria⁴, Açelya Yilmazer Aktuna^{2,6}

¹ The Graduate School of Health Sciences, Ankara University, Ankara, TURKEY

² Stem Cell Institute, Ankara University, Ankara, TURKEY

³ University of Miami, Coral Gables, UNITED STATES

⁴ CSIC-Universidad de Zaragoza, Zaragoza, SPAIN

⁵ Unidad de Investigación Traslacional (UIT), Zaragoza, SPAIN

⁶ Department of Biomedical Engineering, Ankara University, Ankara, TURKEY

obesbinar@ankara.edu.tr

Abstract

Carbon dots (CDs) produced from chlorophyll, are novel nanomaterials with bio-compatible, non-toxic, and 600-700 nm emission properties [1]. In addition to being strong candidates with all these features in drug delivery, imaging, and diagnostic strategies, their significant PDT response puts them at the forefront of promising nanomaterials in nanomedicine studies [2]. In this study, the photodynamic therapy (PDT) activity of CDs transported via mesenchymal stem cell (MSC)-derived exosomes was investigated. The exosomes or CD-loaded exosomes were first isolated from MSCs and characterized by nanoparticle tracking analysis (NTA), MACSPlex Exosome Marker Assay, and, TEM. Cellular internalization of CDs and CD-loaded exosomes were confirmed by flow cytometry (Figure 1). Treatment with CD-loaded exosomes and light irradiation significantly reduced the viability of cancer cells (Figure 1B). Results showed that CDs can be delivered successfully via MSC-derived exosomes and can exhibit efficient PDT activity in cancer cells.

References

[1] Wang P, Yan Y, Zhang Y, Gao T, Ji H, Guo S, Wang K, Xing J, Dong Y, *Int J Nanomedicine.*, 2021, 16:2045-2058.

[2] Liu, R., Zhang, L., Zhao, J., Hou, C., Huang, Y., Huang, Z. and Zhao, S., *Adv. Therap.*, 2019, 2: 1900011.

Figures

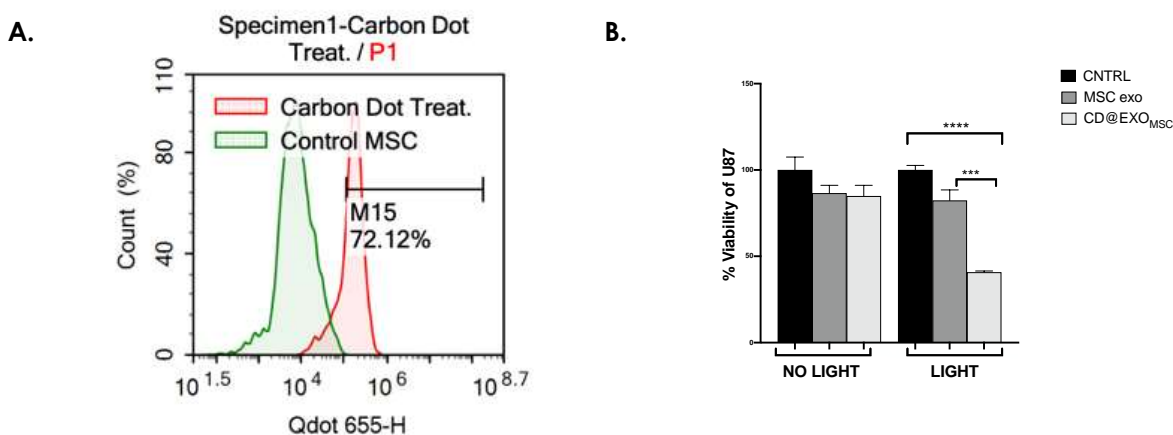


Figure 1: A) Flow cytometry analysis and B) PDT activity of CD loaded exosomes