

New insights into designing nanoparticle-mediated delivery for central nervous system diseases: Signaling and gene regulatory networks in epidermal growth factor

Leonardo Barcelos de Paula^{1†}, Bárbara Gimenes de Castro¹, Luandra Aparecida Unten Takahashi¹ and Antonio Claudio Tedesco^{1*}

1) Chemistry Department, Faculty of Philosophy, Sciences and Letters of Ribeirão Preto, University of São Paulo, Ribeirão Preto, São Paulo, Brazil

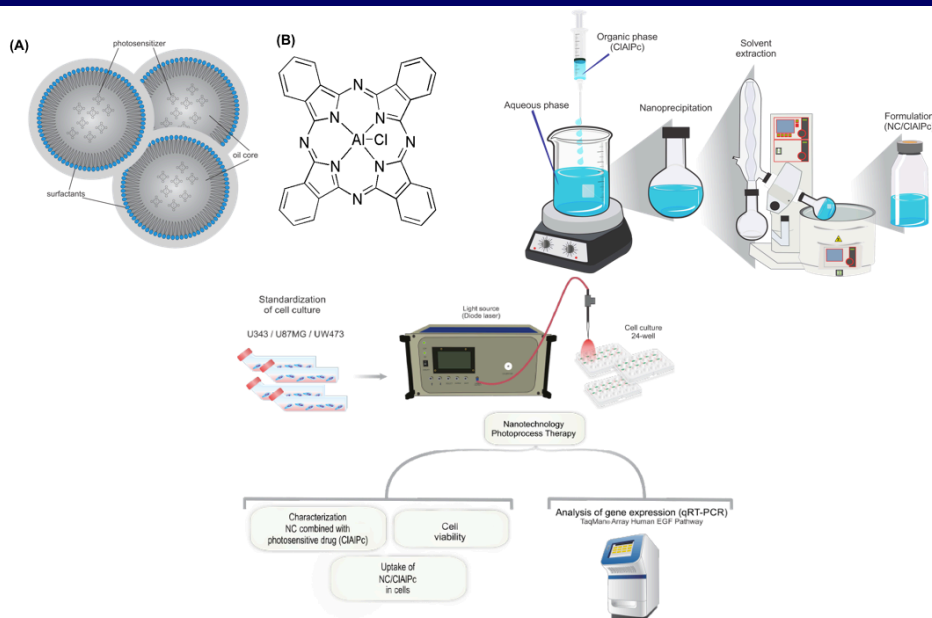
e-mail: [†]barcelos@usp.br / ^{*}atedesco@usp.br

Keywords: brain cancer, EGF pathway, gene expression, apoptosis, nanocarriers.

ABSTRACT

Glioblastoma Multiforme (GBM) can develop rapidly in the absence of clinical, radiological or morphological diagnosis from a less malignant precursor tumor[1]. Medulloblastoma (MB) is a malignant embryonic tumor of the cerebellum, the incidence of which occurs preferentially in children under 7 years of age[2]. The efficiency of Photodynamic Therapy (PDT) consists of the combination of a photosensitive drug and activation by visible light. The present study is to investigate the gene expression profile of signaling the Epidermal Growth Factor (EGF) pathway in GBM lines MB and after PDT treatment. These findings confirm that the engineering of nanocarriers associated with PDT procedures led to the hypoexpression of the genes that are directly involved in the EGF tumor process. Such findings contribute to the development of advanced protocols that may aid in the *in vivo* assays available for clinical oncology.

GRAPHICAL ABSTRACT



ACKNOWLEDGEMENTS

This research was supported by the Foundation for Research Support of the State of São Paulo - FAPESP (Thematic Project # 2013/50181-1, A.C.T. and Postdoctoral Project # 2018/24004-9, L.B.P.).

REFERENCES

- [1] Post, C.C.B.; Kramer, M.C.A.; Smid, E.J.; van der Weide, H.L.; Kleynen, C.E.; Heesters, M.A.A.M.; Verhoeff, J.J.C. Patterns of re-irradiation for recurrent gliomas and validation of a prognostic score. *Radiother. Oncol.*, 2019, 130, 156–163.
- [2] Northcott, P.A.; Robinson, G.W.; Kratz, C.P.; Mabbott, D.J.; Pomeroy, S.L.; Clifford, S.C.; Rutkowski, S.; Ellison, D.W.; Malkin, D.; Taylor, M.D.; Gajjar, A.; Pfister, S.M. Medulloblastoma. *Nat. Rev. Dis. Primers.*, 2019, 5(1), 11.