medical sciences forum

MDPI

Abstract

Coelenterazine Derivatives as Potential Drugs for Photodynamic Therapy †

Daiane Nascimento Maronde [1,*], Ivo E. Sampaio-Dias [1], Luís Pinto da Silva [2], Leandro M. O. Lourenço [3] and José E. Rodríguez-Borges [1]

[1] Associated Laboratory for Green Chemistry of the Network of Chemistry and Technology (LAQV/REQUIMTE), Department of Chemistry and Biochemistry, Faculty of Sciences, University of Porto, 4169-007 Porto, Portugal
[2] Chemistry Research Unit (CIQUP), Institute of Molecular Sciences (IMS), Department of Geosciences, Environment and Territorial Planning, Faculty of Science, University of Porto, 4169-007 Porto, Portugal
[3] Associated Laboratory for Green Chemistry of the Network of Chemistry and Technology (LAQV/REQUIMTE), Department of Chemistry, University of Aveiro, 3810-193 Aveiro, Portugal
* Correspondence: dnascimentomaronde@gmail.com
† Presented at the 8th International Electronic Conference on Medicinal Chemistry, 1–30 November 2022; Available online: https://ecmc2022.sciforum.net/.

Abstract: Cancer is one of the main leading causes of death worldwide, and its treatment is highly complex and known to cause serious side effects for patients. Photodynamic therapy (PDT) has gained a worldwide impact as a promising alternative strategy to overcome or minimize these potential side effects observed in conventional therapeutical approaches. This therapy is a minimally invasive treatment that combines a photosensitizer (PS), visible light, and molecular oxygen ($^3O_2$). When excited, the PS interacts with $^3O_2$ to generate reactive oxygen species (ROS), mainly as singlet oxygen ($^1O_2$) which, in turn, induces cytotoxic effects in cancer cells. In a recent study led by our research group, coelenterazine (Clz) analogues have shown relevant cell-selective toxicity in different cancer cell lines, such as breast, liver, prostate, and neuroblastoma, without cytotoxic effects in the corresponding non-tumoral cells. Based on these results, this work aims to synthesize a new series of Clz-inspired PS derived from pyrazine scaffold, a common precursor for the synthesis of Clz and its structure-related analogues. Herein, we describe some methodological approaches for the synthesis of pyrazine-based precursors with high chemical yields and their chemical characterization for the assembly of Clz analogues. Currently, these compounds are being studied for the assembly of new PS with potential application for PDT.

Keywords: cancer; coelenterazine (Clz); photodynamic therapy (PDT); photosensitizer (PS)

check for updates

Citation: Maronde, D.N.; Sampaio-Dias, I.E.; Pinto da Silva, L.; Lourenço, L.M.O.; Rodríguez-Borges, J.E. Coelenterazine Derivatives as Potential Drugs for Photodynamic Therapy. *Med. Sci. Forum* **2022**, *14*, 25. https://doi.org/10.3390/ECMC2022-13447

Academic Editor: Maria Emília Sousa

Published: 1 November 2022

Supplementary Materials: The following are available online at https://www.mdpi.com/article/10.3390/ECMC2022-13447/s1.

Author Contributions: Conceptualization, J.E.R.-B., L.M.O.L. and L.P.d.S.; methodology, D.N.M.; formal analysis, I.E.S.-D., J.E.R.-B., L.M.O.L., L.P.d.S. and D.N.M.; investigation, D.N.M.; resources J.E.R.-B., L.M.O.L. and L.P.d.S.; data curation, I.E.S.-D., J.E.R.-B., L.M.O.L., L.P.d.S. and D.N.M.; writing—original draft preparation, D.N.M.; writing—review and editing, I.E.S.-D., J.E.R.-B., L.M.O.L., L.P.d.S. and D.N.M.; supervision, J.E.R.-B., L.M.O.L. and L.P.d.S.; project administration, J.E.R.-B., L.M.O.L. and L.P.d.S.; funding acquisition, J.E.R.-B., L.M.O.L. and L.P.d.S.; All authors have read and agreed to the published version of the manuscript.

Funding: This work received financial support from PT national funds (FCT/MCTES, Fundação para a Ciência e a Tecnologia and Ministério da Ciência, Tecnologia e Ensino Superior) through projects UIDB/50006/2020 and PTDC/QUI-QFI/2870/2020. The financial support to CIQUP (UIDB/000081/2020),

Associated Laboratory IMS (LA/P/0056/2020), and LAQV-REQUIMTE (UIDB/50006/2020) research unities, and (P2020-PTDC/QUI-QOR/31770/2017), through national funds (PIDDAC) and where applicable co-financed by the FEDER-Operational Thematic Program for Competitiveness and Internationalization-COMPETE 2020, within the PT2020 Partnership Agreement. DNM (UI/BD/153613/2022) thanks FCT for her PhD scholarship, while IES-D (2020.02311.CEECIND/CP1596/CT0004) and LPdS (CEECINST/0069/2021) thank the funding through the Individual/Institutional Call to Scientific Employment Stimulus, respectively.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.