medical sciences forum

MDPI

Abstract

In the Heart of Cardio-Oncology: The Targets and Biomarkers of Cardiotoxicity in Anticancer Drugs †

Vera Marisa Costa [1,2]

[1] Associate Laboratory i4HB-Institute for Health and Bioeconomy, Laboratory of Toxicology, Department of Biological Sciences, Faculty of Pharmacy, University of Porto, 4050-313 Porto, Portugal; veramcosta@ff.up.pt
[2] UCIBIO-Applied Molecular Biosciences Unit, REQUIMTE, Laboratory of Toxicology, Department of Biological Sciences, Faculty of Pharmacy, University of Porto, 4050-313 Porto, Portugal

† Presented at the 8th International Electronic Conference on Medicinal Chemistry, 1–30 November 2022; Available online: https://ecmc2022.sciforum.net/.

Abstract: The cardiotoxicity of anticancer drugs is the second leading cause of death in cancer patients. Among other adverse effects, left ventricular ejection fraction decreases or heart failure emerges after anticancer treatments comprising old or new targeted therapies. In the last few years, our group has been trying to unveil the cardiac adverse outcome pathways of classic chemotherapeutic agents, mainly focusing on two topoisomerase inhibitors, mitoxantrone and doxorubicin. Mitoxantrone and doxorubicin both cause cumulative dose cardiotoxicity and were tested in vitro and in pre-clinical models. Results obtained in mice and rats following a clinically relevant dosing scheme were mimicked in vitro, demonstrating that the drugs change cellular redox homeostasis and promote inflammation, although in different biomarkers. Moreover, autophagy and energetic pathways were affected; the first mainly after mitoxantrone and the latter when doxorubicin was used. Thus, these drugs have distinct cardiac fingerprints. In conclusion, although their clinical cardiac effects are similar in humans, mitoxantrone and doxorubicin have different initiating cardiotoxic events. These were revealed taking into account the use of proper experimental models, clinically relevant concentrations, and Omics methods. These data are the essence in terms of promoting drug-specific cardioprotective measures in the future, for patients treated with these drugs.

Keywords: cardio-oncology; mitoxantrone; doxorubicin; adverse outcome pathways

Citation: Costa, V.M. In the Heart of Cardio-Oncology: The Targets and Biomarkers of Cardiotoxicity in Anticancer Drugs. *Med. Sci. Forum* **2022**, *14*, 126. https://doi.org/10.3390/ECMC2022-13157

Academic Editor: Maria Emília Sousa

Published: 1 November 2022

Supplementary Materials: The following are available online at https://www.mdpi.com/article/10.3390/ECMC2022-13157/s1.

Funding: V.M.C. acknowledges funding of the Fundação para a Ciência e Tecnologia (FCT), IP, under Norma Transitória DL57/2016/CP1334/CT0006. This work is funded by project UIDP/04378/2020 of UCIBIO and project LA/P/0140/2020 of i4HB.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The author declares no conflict of interest.