

Exposure to effluent from pharmaceutical industry induced cytogenotoxicity, hematological and histopathological alterations in *Clarias gariepinus* (Burchell, 1822)

[Article - PDF](#)[Article - HTML](#)[Article - XML](#)

Published Feb 6, 2019

DOI <https://doi.org/10.17179/excli2018-1916>**Chibuisi G. Alimba**

Cell Biology and Genetics Unit, Department of Zoology, University of Ibadan, Nigeria; Tel.: +234 8034 084 415; Currently Alexander von Humboldt-Stiftung postdoctoral fellow at Department of Toxicology, Leibniz Research Centre for Working Environment and Human Factors (IfADo), Technical University of Dortmund, Germany, e-mail: cg.alimba@ui.edu.ng, chivoptera@yahoo.com

Khalid O. Adekoya

Department of Cell Biology and Genetics, University of Lagos, Akoka, Lagos, Nigeria

Olufemi O. Soyinka

Department of Marine Sciences, University of Lagos, Akoka, Lagos, Nigeria

Abstract

Repeated administration of hepatotoxicants is usually accompanied by liver fibrosis. However, the difference in response as a result of repeated exposures of acetaminophen (APAP) compared to a single dose is not well-studied. Therefore, in the current study, the liver response after a second dose of APAP was investigated. Adult fasted Balb/C mice were exposed to two toxic doses of 300 mg/kg APAP, which were administered 72 h apart from each other. Subsequently, blood and liver from the treated mice were collected 24 h and 72 h after both APAP administrations. Liver transaminase, i.e. alanine amino transferase (ALT) and aspartate amino transferase (AST) levels revealed that the fulminant liver damage was reduced after the second APAP administration compared to that observed at the same time point after the first treatment. These results correlated with the necrotic areas as indicated by histological analyses. Surprisingly, Picro Sirius Red (PSR) staining showed that the accumulation of extracellular matrix after the second dose coincides with the upregulation of some fibrogenic signatures, e.g., alpha smooth muscle actin. Non-targeted liver tissue metabolic profiling indicates that most alterations occur 24 h after the first dose of APAP. However, the levels of most metabolites recover to basal values over time. This organ adaptation process is also confirmed by the upregulation of antioxidative systems like e.g. superoxide dismutase and catalase. From the results, it can be concluded that there is a different response of the liver to APAP toxic doses, if the liver has already been exposed to APAP. A necroinflammatory process followed by a liver regeneration was observed after the first APAP exposure. However, fibrogenesis through the accumulation of extracellular matrix is observed after a second challenge. Therefore, further studies are required to mechanistically understand the so called "liver memory".

How to Cite

Alimba, C. G., Adekoya, K. O., & Soyinka, O. O. (2019). Exposure to effluent from pharmaceutical industry induced cytogenotoxicity, hematological and histopathological alterations in *Clarias gariepinus* (Burchell, 1822). *EXCLI Journal*, 18, 63-78. <https://doi.org/10.17179/excli2018-1916>

[More Citation Formats ▾](#)

Issue

Vol 18 (2019)

Section

Original articles



This work is licensed under a [Creative Commons Attribution 4.0 International License](#).

Authors who publish in this journal agree to the following terms:

- The authors keep the copyright and grant the journal the right of first publication under the terms of the Creative Commons Attribution license, [CC BY 4.0](#). This licence permits unrestricted use, distribution and reproduction in any medium, provided that the original work is properly cited.
- The use of general descriptive names, trade names, trademarks, and so forth in this publication, even if not specifically identified, does not imply that these names are not protected by the relevant laws and regulations.
- Because the advice and information in this journal are believed to be true and accurate at the time of publication, neither the authors, the editors, nor the publisher accept any legal responsibility for any errors or omissions presented in the publication. The publisher makes no guarantee, express or implied, with respect to the material contained herein.
- The authors can enter into additional contracts for the non-exclusive distribution of the journal's published version by citing the initial publication in this journal (e.g. publishing in an institutional repository or in a book).

Powered by



LEIBNIZ RESEARCH CENTRE
FOR WORKING ENVIRONMENT
AND HUMAN FACTORS

[Make a Submission](#)

USER

Username

Password

☐ Remember me

[Login](#)

JOURNAL CONTENT

Search

Search Scope

All

[Search](#)

BROWSE

[By Issue](#)

EXCLI Journal has been added to

Directory of Open Access Journals (DOAJ)

Electronic Journals Library (EZB)

Web of Science

SCOPUS

Pubmed Central

Pubmed

EBSCO Academic Search

SCImago

LIVIVO

BASE

Impact Factor

2013: 0.728

2014: 0.857

2015: 1.292

2016: 1.462

2017: 2.424

EXCLI Journal is a platinum open access journal. There are neither fees for authors submitting their papers nor fees for readers accessing PDFs of the published papers.

Articles published in EXCLI Journal are licensed under a [Creative Commons Attribution 4.0 International License](#).

