

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/308696376>

# Abstrakt PAHs interactions 09 2016

Data · September 2016

CITATIONS

0

READS

17

7 authors, including:



**Joanna Gdula-Argasińska**  
Jagiellonian University

152 PUBLICATIONS 697 CITATIONS

[SEE PROFILE](#)



**Jacek Czepiel**  
Jagiellonian University

101 PUBLICATIONS 753 CITATIONS

[SEE PROFILE](#)



**Justyna Toton-Żurańska**  
Jagiellonian University

50 PUBLICATIONS 341 CITATIONS

[SEE PROFILE](#)



**William Perucki**

23 PUBLICATIONS 266 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Multiple myeloma [View project](#)



Renal tumors [View project](#)

JOSEPH DIETL

MALOPOLSKA HIGHER SCHOOL IN CRACOW

An abstract graphic consisting of several blue, semi-transparent spheres of varying sizes, connected by thin blue lines. The spheres are arranged in a network-like pattern, with one large sphere in the center and others around it. The background is white with a light blue gradient at the bottom.

**THE XXV INTERNATIONAL SYMPOSIUM  
MOLECULAR AND PHSIOLOGICAL ASPECTS  
OF REGULATORY PROCESSES IN THE  
ORGANISM**

---

Edited by  
Prof. dr hab. Henryk Lach

Cracow 2016

## 6.

**PAHs and fatty acids interactions in the in vitro models**

**Joanna Gdula-Argasińska<sup>1</sup>, Jacek Czepiel<sup>2</sup>, Justyna Totoń-Żurańska<sup>3,4</sup>, Paweł Wołkow<sup>3,4</sup>, William Perucki<sup>5</sup>, Ayla Batu<sup>6</sup> and Tadeusz Librowski<sup>1</sup>**

*<sup>1</sup>Department of Radioligands, Faculty of Pharmacy, Jagiellonian University, Medical College, Kraków, Poland; <sup>2</sup>Department of Infectious Diseases, Faculty of Medicine, Jagiellonian University Medical College, Kraków, Poland; <sup>3</sup>Department of Pharmacology, Faculty of Medicine, Jagiellonian University Medical College, Kraków, Poland; <sup>4</sup>Center for Medical Genomics – OMICRON, Jagiellonian University Medical College, Krakow, Poland; <sup>5</sup>Department of Medicine, University of Connecticut Health Center, Farmington, Connecticut, USA; <sup>6</sup>Department of Histology and Embryology, Mersin University, Mersin, Turkey*

Polycyclic aromatic hydrocarbons (PAHs) are a large family of toxic compounds generated from the combustion of organic materials, diesel exhaust and industrial waste (1-3). The beneficial effects of n-3 PUFAs were proven in several observational and experimental studies. PUFAs and their eicosanoid derivatives may play a significant role in modulating the inflammatory response. Lipid mediator metabolomics of self-resolving inflammatory exudates recently highlighted a new family of potent anti-inflammatory and pro-resolving mediators (1-7).

The aim of this study was to evaluate the impact of docosahexaenoic (DHA) and eicosapentaenoic (EPA) acids on the human lung epithelial carcinoma cells (A549), human primary umbilical vein endothelial cells (HUVEC) and murine macrophages RAW 264.7 cells exposed to polycyclic aromatic hydrocarbons.

We analysed the influence of DHA, EPA and/or benzo(a)pyrene (BaP), chrysene (Chr), fluoranthene (Flu) and benzo(a)anthracene (Baa), benzo(b)fluoranthene (Bbf), benzo(k)fluoranthene and pyrene (Pyr) treatment on the fatty acids (FAs) profile of the cells membrane and the formation of eicosanoids, isoprostanes as well as endocannabinoids. We studied the cyclooxygenase-2, prostaglandin E2 synthase, aryl hydrocarbon receptor (AHR), transcription factor Nrf2, glutathione-S-transferase (GSTM1), FP-receptor, peroxisome proliferator-activated receptors PPAR $\delta$  and PPAR $\gamma$ , transcription factor NF- $\kappa$ B p50 and p65 expression by Western blot, phospholipase A2 (cPLA2) activity, as well as AHR, cytochrome P450 (CYP1A1), phospholipase A2 (PLA-

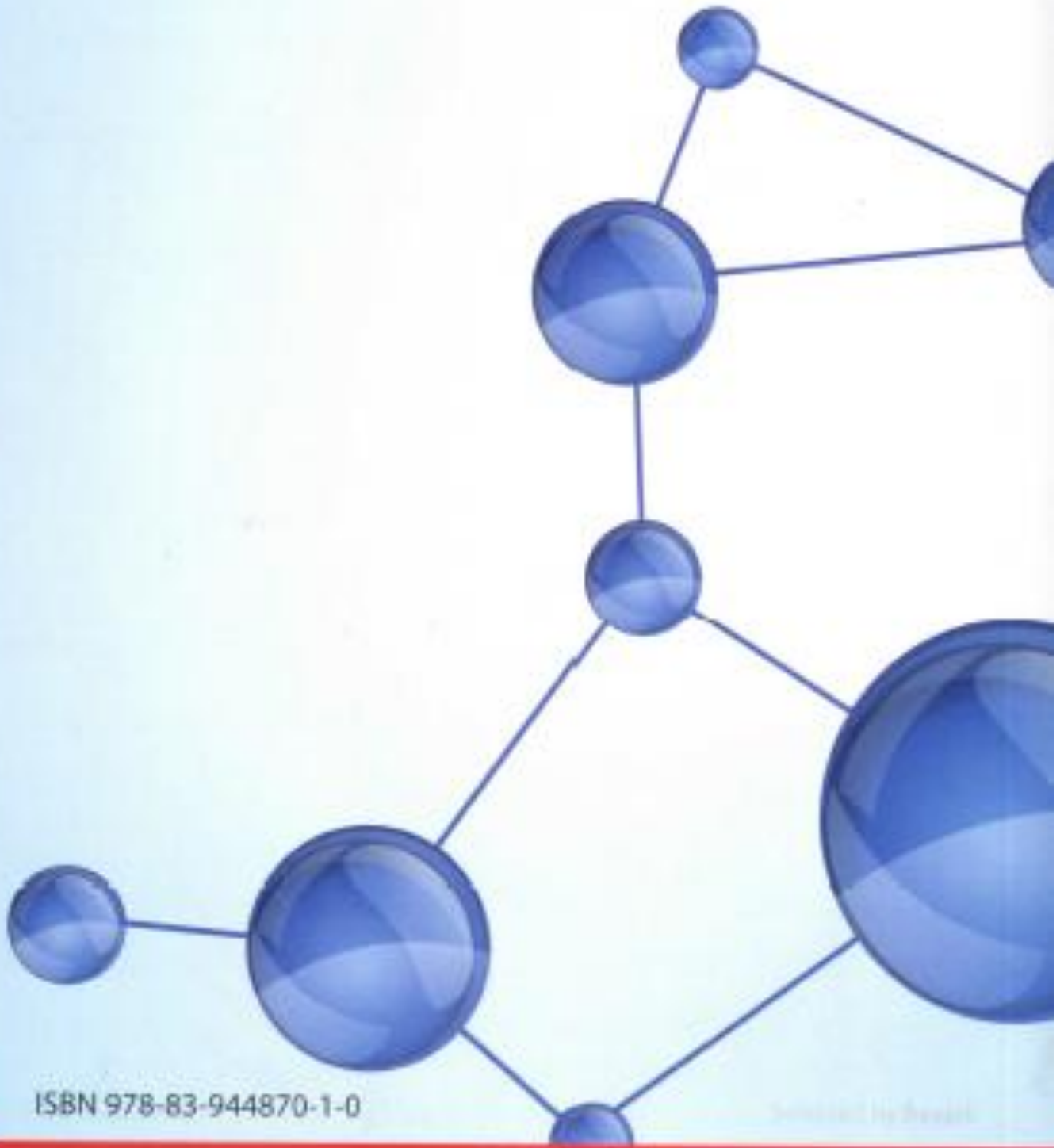
2G4A) and prostaglandin synthase 2 (PTGS2) gene expression by qRT-PCR.

Supplementation with n-3 FAs resulted in changes of inflammatory-state related genes in the lung epithelial, endothelial cells and macrophages exposed to PAHs. The altered profile of lipid mediators from n-3 FA as well as repression of the COX-2 protein by n-3 PUFAs in A549, HUVEC and RAW 264.7 cells incubated with PAHs suggests anti-inflammatory and pro-resolving properties of DHA and EPA.

It remains to be shown whether these pleiotropic and protective actions of n-3 FAs contribute to fish oil's therapeutic effect in inflammatory-state diseases, like atherosclerosis and asthma.

### Reference:

1. Gdula-Argasińska J, Garbacik A, Woźniakiewicz M, Paśko P, Czepiel J. Identification of lipid derivatives in Hep G2 cells. *Acta Biochimica Polonica* 2013; 60(4): 811–5.
2. Gdula-Argasińska J, Czepiel J, Woźniakiewicz A, Wojtoń K, Grzywacz A, Woźniakiewicz M, Jurczyszyn A, Perucki W, Librowski T. n-3 Fatty acids as resolvents of inflammation in the A549 cells. *Pharmacological Reports* 2015; 67(3): 610–5.
3. Gdula-Argasińska J, Czepiel J, Toton-Zurańska J, Jurczyszyn A, Perucki W, Wołkow P. Docosahexaenoic acid regulates gene expression in HUVEC cells treated with polycyclic aromatic hydrocarbons. *Toxicology Letters* 2015; 236(2): 75–81.
4. Gdula-Argasińska J, Woźniakiewicz A, Woźniakiewicz M, Lipkowska A, Olbert M, Grzywacz A, Sałat K, Podkowińska A, Librowski T. Resolvin D2 plays a protective role in RAW 264.7 cells treated with polycyclic aromatic hydrocarbons. *Acta Biologica Cracoviensis, Series Zoologia* 2015; 57, 61–7.
5. Gdula-Argasińska J, Czepiel J, Toton-Zurańska J, Wołkow P, Librowski T, Czapkiewicz A, Perucki W, Woźniakiewicz M, Woźniakiewicz A. n-3 Fatty acids regulate the inflammatory-state related genes in the lung epithelial cells exposed to polycyclic aromatic hydrocarbons. *Pharmacological Reports* 2016; 68(2): 319–28.
6. Gdula-Argasińska J, Czepiel J, Toton-Zurańska J, Jurczyszyn A, Wołkow, Tadeusz Librowski, William Perucki. Resolvin D1 down-regulates CYP1A1 and PTGS2 gene in the HUVEC cells treated with benzo(a)pyrene. *Pharmacological Reports* 2016; 68(5): 939–44.
7. Gdula-Argasińska J, Bystrowska B. Docosahexaenoic acid attenuates in endocannabinoid synthesis in RAW 264.7 macrophages activated with benzo(a)pyrene and lipopolysaccharide. *Toxicology Letters* 2016; 258: 93–100.



ISBN 978-83-944870-1-0

Designed by Design

---

# Dietl.