

# MICRO BIOTEC

# 17

CONGRESS OF MICROBIOLOGY  
AND BIOTECHNOLOGY 2017

7<sup>th</sup> - 9<sup>th</sup> DECEMBER 2017  
PORTO, PORTUGAL

BOOK OF ABSTRACTS



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### P-090 - BIODEGRADATION OF CARBAMAZEPINE BY THE BACTERIAL STRAIN LABRYS PORTUCALENSIS F11 – METABOLISM AND TOXICOLOGIC STUDIES

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#### Background

Occurrence of pharmaceuticals in the environment is a topic of concern. Most pharmaceuticals are not completely mineralized and are released on the sewage systems through excretion and by improper elimination and disposal<sup>(1)</sup>. Municipal wastewater treatment plants (WWTPs) are not designed to remove them and they are released into the environment<sup>(2)</sup>. They are classified as persistent microcontaminants due to their continuous release even if at low concentrations<sup>(3)</sup>. Carbamazepine (CBZ) is a widely used anticonvulsant and has been suggested as a molecular marker of contamination in surface water and groundwater<sup>(4)</sup>.

#### Method

Biodegradation of CBZ by the bacterial strain *Labrys portucalensis* F11 was tested as sole carbon and energy source (0.04 mM) and in the presence of acetate as primary carbon source. Transformation products (TPs) were detected and identified by UPLCQTOF/MS/MS. Ecotoxicological effects of CBZ and the TPs resultant from biodegradation were evaluated at different trophic levels, i) zooplankton (*Daphnia magna*) and ii) plants (*Lipidium sativum*). The 24–48 h immobilization of *D. magna* bioassays were performed following the Standard Operational Procedures of Daphtokit F<sup>TM</sup>. The toxicity was measured as the immobilization of *D. magna* according to the procedures OCED Guideline 202<sup>(5)</sup>. The bioassay with *L. sativum* evaluated the potential toxicity considering the root elongation according to OECD Guideline 208<sup>(6)</sup>.

#### Results & Conclusions

Strain F11 was able to degrade 95% of initial CBZ concentration during 30 days experiment. Supplementation with acetate increased degradation to 100% in 24 days. A group of 12 TPs formed in the microbial process were identified; CBZ degradation by strain F11 proceeds mainly by oxidation, hydroxylation and cleavage of the aromatic ring. The effect of whole biodegradation products on root elongation of *L. sativum* was practically neglectable; however the same exhibited toxicity to *D. magna*. Strain *Labrys portucalensis* F11 proved to be able to degrade CBZ and may be potentially useful for biotechnological applications.

#### References & Acknowledgments

- 1) <http://dx.doi.org/10.1146/annurev-environ-052809-161223>
- 2) <http://dx.doi.org/10.1146/annurev-environ-052809-161223>
- 3) <http://dx.doi.org/10.1016/j.chemosphere.2014.01.014>
- 4) <http://dx.doi.org/10.1007/s11356-013-2428-9>
- 5) <http://dx.doi.org/10.1787/9789264069947-en>
- 6) <http://dx.doi.org/10.1787/9789264069947-en>

V.S. Bessa, I.S. Moreira and C. Piccirillo wish to acknowledge research grant from Fundação para a Ciência e Tecnologia (FCT), Portugal (Ref. SFRH/BD/90146/2012, SFRH/BPD/87251/2012 and SFRH/BPD/86483/2012 respectively) and Fundo Social Europeu (Programa Operacional Potencial Humano (POPH), Quadro de Referência Estratégico Nacional (QREN)). This work was supported by FCT through the projects PTDC/EBB-EBI/111699/2009, CEQUIMED-Pest-OE/SAU/UI4040/2014, and PEst-OE/EQB/LA0016/2013, and by a bilateral collaboration between CNR-Italy and Portugal (N. 0022729).

**Keywords:** Carbamazepine, *Labrys portucalensis* F11, Biodegradation, Degradation pathway, Toxicity