Poster

Isolation of microorganisms able to degradate pharmaceutical compounds and search of responsible genes

Andújar, A*., Aulestia, M.I., Camacho, E. M. y Flores, A.

Dpto. de Biología Molecular e Ingeniería Bioquímica. Centro Andaluz de Biología del Desarrollo. Universidad Pablo de Olavide, Ctra. Utrera, km. 1,41013 Sevilla, España

Keywords: microorganism; pharmaceutical compounds; Sphingomona sp.

ABSTRACT

Motivation: At present, it has been an increase in the inappropriate use of certain pharmaceutical compounds (phc) due to its easy availability. Some of these phc are not degraded and accumulate contaminating water and soil and it is therefore necessary to search for strategies that allow the elimination of these compounds from the environment [1,2].
This work has to main objectives: (i) the isolation of microorganisms, from contaminated water samples, able to degrade several phc and (ii) the search for clones, from a metagenomic library, that confer to E.coli the ability to degrade these compounds. The phc used are: Ibuprofen, Diclofenac, Ethinylestradiol, Carbamazepine, Clofibric acid, Propranolol and Naproxen.

Methods: To isolate microorganisms able to degrade phc, we have performed enrichment cultures using contaminated water samples from different origins as inoculum and different liquid minimal media containing one of the selected phc as sole carbon source. When differential growth was observed between the control flasks (with no carbon source) and those supplemented with drugs, they were spread on Petri dishes containing the same media to get isolated colonies. To identify the microorganisms growing on these plates, and therefore, able to degrade phc, 16S rDNA was sequenced. Afterwards, we determined their growing rates in culture media with different carbon sources. In order to achieve the second objective, two different metagenomic libraries from petroleum contaminated soils were screened to search for genes involved in the use of these drugs as a source of carbon or nitrogen.

Results and conclusions: In this work, we have isolated a microorganism, from a pharmaceutical waterwaste plant, able to degradate ibuprofen and identified as Sphingomonas sp. This bacterium could be used in bioremediation in the future as an alternative for the decontamination of water and soil. To date, we have not found any microorganism that degrades the other selected phc. The isolated strain is currently being characterized. It has a doubling time of 4 hours in minimal medium with ibuprofen at 30ºC and its growth in media containing sebacic acid, proline, lactic acid and beta-hydroxybutyrate as carbon sources was also evaluated. With regard to the second objective, we have not found any clone able to use phc as carbon or nitrogen source in the screens of the two metagenomic libraries.

REFERENCES

[1] Alonso, J. M. Q., Quero-Pastor, M. J., & Merino, A. A. (2015). Tratamientos avanzados para la eliminación de fármacos en aguas superficiales. Revista de Salud Ambiental, 15, 18-21.

[2] Zhang, Y., Geißen, S. U., & Gal, C. (2008). Carbamazepine and diclofenac: removal in wastewater treatment plants and occurrence in water bodies. Chemosphere, 73(8), 1151-1161..