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Environmental monitoring by using cytochrome P450 of wild voles, *Clethrionomys rufocanus*

Kiyotaka Nakai, Kentaro Sakamoto, Takahiro Aoto, Mayumi Ishizuka, Akio Kazusaka, Shoichi Fujita

Laboratory of Toxicology, Department of Environmental Veterinary Sciences, Graduate School of Veterinary Medicine, Hokkaido University, Japan

Introduction

Clethrionomys rufocanus inhabits broadly in Eurasia such as south of China, Korean peninsula, Sakhalin north of Japan, Hokkaido and so on. They are herbivorous wild rodents. In the previous study, we found that the expression levels of their cytochrome P450 (GYP) isoforms were increased by injection of xenobiotics as the rats' GYP families did. We caught *Clethrionomys rufocanus* in Hokkaido, and investigated the relation between environmental pollution where they lived and metabolic activities of CYP in their livers. The aim of this study is to discuss the utility of CYP2B and 3A family as the biomarker in addition to CYP1A1, which had been used for many studies.

Method

We collected wild voles from three different areas in Hokkaido, Sapporo, Rankoshi and Ishikari, and Nakagawa, respectively. Sapporo is the urban area polluted with car exhaust fumes such poly-aromatic hydrocarbons (PAHs), Rankoshi and Ishikari are the agricultural areas contaminated with agricultural chemicals, and Nakagawa is the forest area suggested as less polluted area. We assayed the enzymatic activities of CYP1A1, 2B and 3A isoforms for ethoxyresorfin-O-deethylation (EROD) and testosterone hydroxylations in the microsomes which were prepared from livers of wild voles.

Results and discussion

Liver microsomes from Sapporo voles had higher etoxyresorufin-O-deethylase activity than those from other areas, and had the much highest value in the activity of testosterone 6beta-hydroxylation that catalyzed by CYP3A2 in rat liver. Samples from Ishikari showed the highest values in testosterone 16alpha and 16beta hydroxylase activities, although we thought both areas as models of agricultural area. The difference of expression levels of GYP families in voles reflected environmental status in each area and we suggested that not only CYP1A1 but also CYP2B and 3A isoforms were useful biomarkers for environmental pollution.