Bull. Environ. Contam. Toxicol. (1986) 36:176–180

Environmental Contamination and Toxicology

Effect of Substituted Phenols on Transaminase Activity in the Fish, *Leuciscus idus melanotus* L.

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As generally known, there exists a dependence between the increase in transaminase activity and the influence of various toxicants in fish. This connection has been proved for carbon tetrachloride (Racicot et al. 1975, Pfeifer et al. 1979), copper (Mc Kim et al. 1970), dieldrin (Lane and Scura 1970),bromobenzene (Bell 1968), phenol (Kristofferson et al. 1974) and ammoniumions (Wieser and Hinterleitner 1980).Moreover, Wieser and Hinterleitner suggested the measurement of transaminases as indicator enzymes for different types of organic water pollutants.

The aim of this study was to investigate whether this generalisation holds for six different substituted phenols. The investigations were carried out on the Goldenorfe ide (Leuciscus idus melanotus L.) as this is used as the test fish in assessing the toxicity of water pollutants in standard LC 50 tests.

MATERIALS AND METHODS

The condition and handling of the test fish and the preparation of the synthetic test water complied with the DIN-Vorschrift 38412 section 20 of the German standard methods of examination of water, waste water and sludge (1981).
The activity of the transaminases GOT (EC 2.6.1.) and GPT (EC 2.6.1.2) was determined by UV-test after Bergmeyer and Bernt (1974). By doubling the concentration of α-ketoglutarate the conditions of GPT-determination were optimized for the serum of Leuciscus idus.

After decapitation, blood samples were taken from the aorta descendens using heparinized 100 μl capillary tubes and centrifuged. The samples were stored at -20° C for at most two weeks before enzyme activities

Table 1. Changes in SGOT and SGPT activity in serum after a four hour treatment with six phenol derivatives

Tested substances		SGOT	SGPT
Phenol			
	0,5 mg/l	o	o
	1	+	+
	2	o	-
	3	o	-
	4	++	o
	8	+	+
	12	++	++
p-Chlorophenol			
	0,5 mg/l	o	o
	1	o	++
	2	o	o
	3	o	+
	5	+	++
2,4-Dichlorophenol			
	2 mg/l	o	-
Pentachlorophenol			
	0,1 mg/l	o	o
	0,2	o	o
p-Cresol			
	2 mg/l	o	o
	4	o	o
	5	+	+
	8	o	o
	10	+	+
	12	++	++
Dinitro-ortho-cresol			
	0,5 mg/l	-	-
	0,75	o	o
	4	o	o

- decrease + increase $0,05 > p > 0,005$
o no change ++ increase $p < 0,005$

were measured. Haemolysed samples were discarded. The duration of the experiment was set at four hours since maximum enzyme activity is attained at this point.

Phenol, p-chlorophenol, 2,4-dichlorophenol, pentachlorophenol, p-cresol and 4,6-dinitro-ortho-cresol were test substances. Phenol and 2,4-dichlorophenol were added to the water as aqueous solutions, the others dissolved in acetone. The concentration of toxicants in the test water was kept constant by photometric measurement.

RESULTS AND DISCUSSION

Table 1 shows that only phenol, p-chlorophenol and p-cresol are able to increase the activity of SGOT and SGPT in fish serum, though it is known that all six phenols investigated accumulate in the liver.
Therefore the changes in transaminase activity can not be taken as a general indicator for the presence of water pollutants.
A definite correlation between the concentration of toxicants in the medium and enzyme activity could not be established.

Goldenorfe ide (Leuciscus idus melanotus L.) was chosen as the fish model since this fish is used in standard LC 50 tests.
During the investigations, considerable objections to the use of Leuciscus idus melanotus as the test fish were raised. The level of SGOT and SGPT activity in the control fish had shown considerable variation during the year.
A significant increase in transaminase levels was found especially in June and July, which suggests deterioration of the health of the test fish (Fig.1). The growth of these fish had been restricted by reducing feeding to a minimum to satisfy the standard conditions of the fish test until new spawn was produced in September. Moreover, in the test months March, June and July infections due to Ichthyosporidium, Trichodina spec. and Dactylogyrus spec. occurred with greater frequency, an observation which had also been made by Becker-Birck and Havemeister (1980). Gronow (1974) observed, in particular, increased susceptibility to infection in Goldenorfe ide in reaction to stress arising from reducing feeding to a minimum.
The considerable fluctuation in the health of Goldenorfe ide makes them unsuitable as test fish.

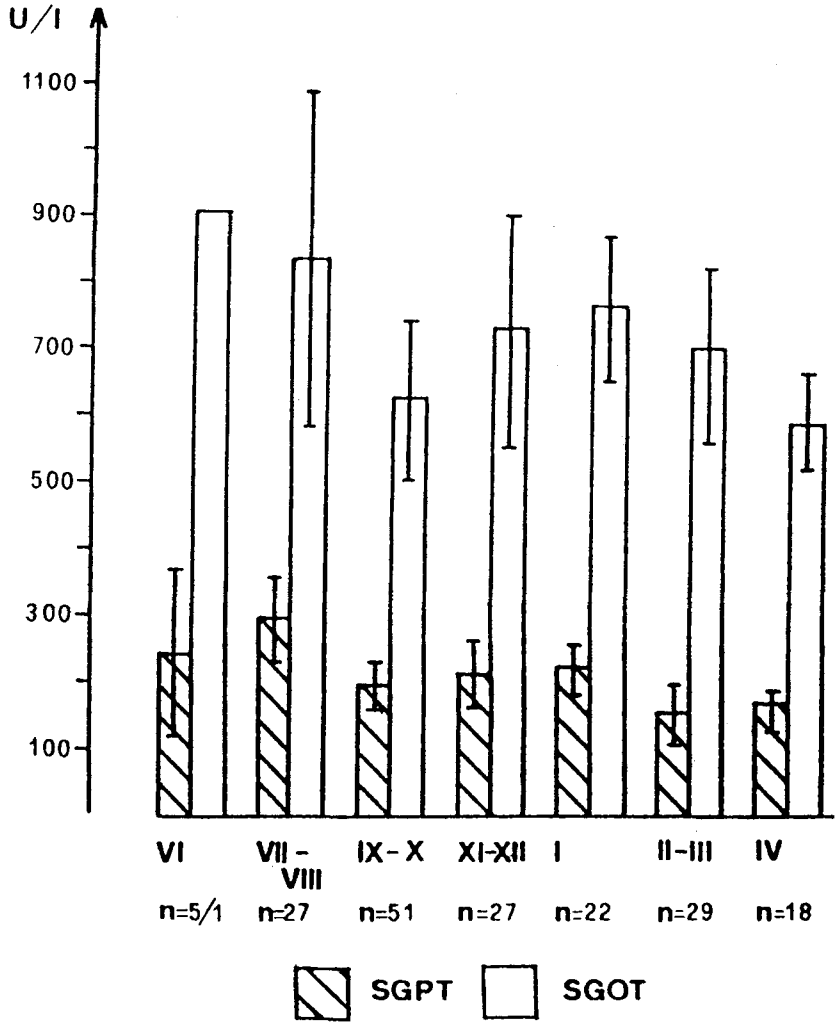

Fig.1 : Activity of SGOT and SGPT during the year, subdivided according to fish supplies. Average of n tests with standard error, I-XII months.

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Received May 13, 1985; accepted June 3, 1985.