

Presence of 2,3,7,8-Tetrachlorodibenzo-p-dioxin in Wildlife Living near Seveso, Italy: A Preliminary Study

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As a consequence of an explosion in a chemical plant near Seveso (Italy), a large inhabited area was contaminated by a number of chemicals including the extremely toxic 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD) (WHO 1977, GREIG et al. 1973). Specific reports on contamination of soil, vegetables and domestic animals have been already published (ABBRUZZI et al. 1978, GARATTINI et al. 1979, MARAZZA & PEZZA 1979) and a continuous monitoring plan is operating to keep the possible exposure of the people living in the polluted zones under control. However, no data on wildlife contamination have appeared in the literature so far. In this paper we present some preliminary findings on TCDD levels in wild animals captured in the contaminated areas. The main objectives of this study were:

- to gain indications about the range of TCDD levels in animals.
- to establish any correlations between environmental contamination and wildlife levels.
- to verify that available analytical methods were suitable for a monitoring program, in terms of sensitivity and specificity.

MATERIALS AND METHODS

All animals except hares were captured in zones where there was considerable environmental contamination. Hares were collected in various places inside and around the contaminated areas. So far the list of animal species analyzed includes the common field mouse (Microtus arvalis), toad, snake, earthworm and hare. All these animals were collected two years after the contaminating event.

Animal tissues were analyzed for TCDD levels after extraction and cleanup according to the method developed in our laboratory (FANELLI et al. 1979), by gas chromatography-low resolution mass fragmentography.

RESULTS AND DISCUSSION

TCDD levels found in animals captured in contaminated areas are reported in Table 1. All field mice were found positive for TCDD with whole body concentrations ranging from 0.070 to 49 ppb (mean value 4.5 ppb; median value 1.2 ppb). Most of

these rodents were collected in a trap placed in an area (6000 m²) where contamination of the top 7 cm of soil varied from 0.010 to 12 ppb (mean value of 23 determinations: 3.5 ppb). These data, although only preliminary, are in agreement with the conclusion of experiments carried out in a test area sprayed with 2,4,5-T herbicide (YOUNG et al. 1979), showing that rodent populations living on polluted soil accumulate TCDD in the body up to concentrations of the same order of magnitude as the soil itself, probably through pelt contamination (AIR FORCE ARMAMENT LABORATORY 1975) and subsequent ingestion of soil particles.

TCDD assays made in hares, toad, snake and earthworms are too few to permit any correlations. However the high TCDD levels found in hare livers are particularly interesting because these animals have a wide habitat radius and constitute one direct route by which humans can be exposed to the toxic substance.

From these preliminary data, it appears that high TCDD levels are accumulating in wildlife exposed to TCDD in the contaminated areas. This represents a unique opportunity to investigate the effects and behaviour of TCDD in wildlife. It should, furthermore, be borne in mind that TCDD could easily be spread to so far uncontaminated places by mobile animals which might have accumulated TCDD through the food chain.

TABLE 1
TCDD Levels in Wildlife

Animal	Number of analyzed samples	Tissue	Positive	TCDD level	
				average	ng/g (ppb) min-max
Field Mouse	14	whole body	14/14	4.5	0.07- 49
Hare	5	liver	3/5	7.7	2.7 - 13
Toad	1	whole body	1/1	0.2	
Snake	1	liver	1/1	2.7	
		adipose tissue	-	16	
Earthworms	2 [^]	whole body	1/2	12	

[^]Each sample represents a pool (5 g) of earthworms.

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