

Relationships Between Organochlorine Concentrations in Liver and Muscle of Otters

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The European otter (Lutra lutra) is now threatened or endangered over much of its European range (Mason and Macdonald 1986). The decline, which has taken place mainly during the past three decades, has been attributed to the toxic effects of organochlorine residues, with emphasis being placed on dieldrin (Chanin and Jeffries 1978) or PCBs (Olsson et al., 1981). Few otters were analyzed for organochlorines during the main period of decline but there is now considerable interest in the species. Material for analysis derives mainly from accidental mortality such as traffic accidents or drowning in fishing gear and comes mostly from those areas where otters are still thriving.

Experiments with ranch mink (Mustela vison) have shown that reproductive failure occurs when PCB concentrations in thigh muscle approach 50 mg kg⁻¹ lipid (Jensen et al., 1977). Because otters are closely related and have similar habits this value is becoming widely used to interpret the potential significance of PCB concentrations determined in otters (Olsson et al., 1981, Mason et al., 1986, Broekhuizen and De Ruiter-Dijkman 1988). Furthermore, although the mink data refer to concentrations in muscle, interpretations of concentrations in otters have frequently been based on analyses of livers (e.g. Broekhuizen and De Ruiter-Dijkman 1988). Because of the diverse sources of material in Europe, only limited tissues may be made available for analysis, while costs may also prohibit the analysis of several tissues from a single carcase. The relationship between concentrations of organochlorines in muscle and liver tissues in otters has not been determined. This is the purpose of the present communication.

MATERIALS AND METHODS

Of 40 otters from the British otters analyzed for organochlorine residues (Mason et al., 1986, Mason 1988 and unpublished), determinations on both liver and thigh muscle tissue were made for 16 individuals. Analytical methods are given in Mason et al., (1986) and Mason (1988). The relationship between organochlorines in liver and muscle were examined by linear regression.

RESULTS AND DISCUSSION

The relationships between concentrations of organochlorine residues (mg kg^{-1} lipid) in muscle (y) and liver (x) were as follows:-

PCBs	$y = 1.09 x - 2.75$	$r = 0.94$	$P < 0.001$
Dieldrin	$y = 0.54 x + 7.20$	$r = 0.94$	$P < 0.001$
Total DDTs	$y = 0.60 x + 0.21$	$r = 0.87$	$P < 0.001$
Lindane	$y = 1.34 x - 0.33$	$r = 0.74$	$P < 0.001$

Interpolating a value of 50 mg kg^{-1} lipid in liver into the above equations would predict the following concentrations in muscle:-

PCBs, 51.8 ; dieldrin, 34.2 ; total DDTs, 30.2 ; lindane, 66.7.

Thus concentrations of PCBs in liver and muscle are very similar and levels in either tissue can be used to compare with the critical value of 50 mg kg^{-1} lipid in muscle which inhibits reproduction in mink. Concentrations of dieldrin and DDT residues are lower in muscle than liver, while concentrations of lindane are higher in muscle than liver.

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