ASSESSMENT OF ENDOCRINE DISRUPTING CHEMICALS IN COMPANION ANIMALS

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INTRODUCTION

Endocrine disrupting chemicals (EDC) can interfere with hormone signalling, posing a significant risk to animal and human health. Usually, EDC are environmental pollutants and, due to their lipophilic nature, can accumulate in fat tissues, leading to chronic exposure and serious health issues such as endocrine-related neoplasia [1]. Companion animals, particularly dogs and cats, are frequently exposed to higher exposure rates to EDC than their owners, owing to their proximity to the ground and behaviours. Despite increasing concern regarding EDC exposure, most biomonitoring studies to date focused on humans and livestock, with limited attention given to pets [2]. This study aimed to assess the presence of EDCs, namely synthetic musks (SMs), organochlorine and organophosphate pesticides (OCPs and OPPs) in the adipose tissue of female dogs and cats diagnosed with mammary neoplasms.

EXPERIMENTAL

Adipose tissue was collected from animals with and without neoplasia (i.e. control group) at veterinary care centres across the North of Portugal, along clinical and pathological data. A broad range of persistent and emerging EDC were isolated with ultrasound assisted extraction (UAE) method and quantified in a triple quadrupole gas chromatograph mass spectrometer (GC-MS/MS) (Figure 1) [3].

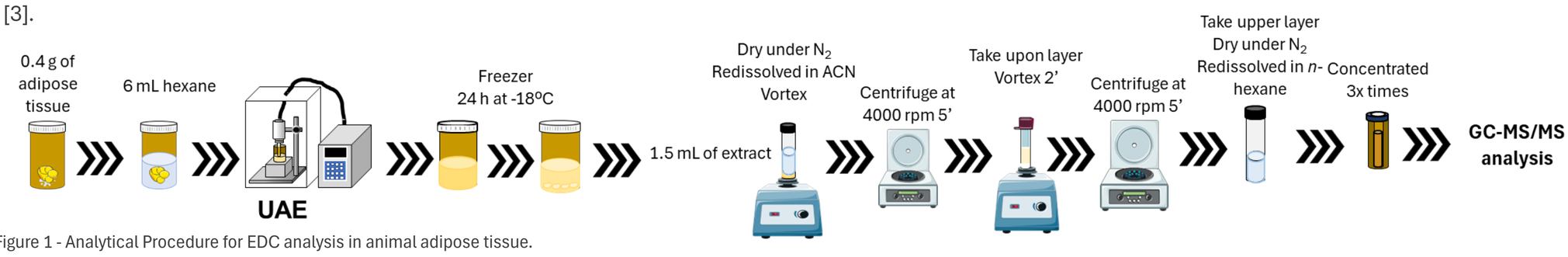

Figure 1 - Analytical Procedure for EDC analysis in animal adipose tissue.

RESULTS

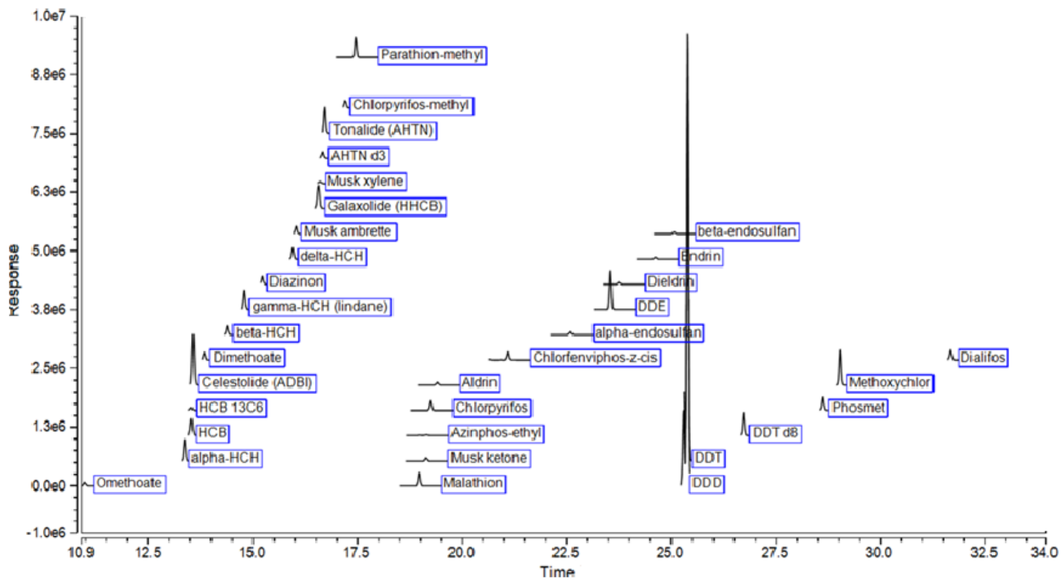

Figure 2 – GC-MS/MS chromatogram for EDC standard mixture.

Table 1 – Average concentrations (µg/g) of EDC in adipose tissue of female dogs and cats diagnosed with mammary neoplasms (cases) and controls.

		Female dog					Female cat				
	EDC	Control (n=10)		Cases (n=13)		t test *p*	Control (n=10)		Cases (n=8)		t test *p*
		Average	SD	Average	SD		Average	SD	Average	SD	
OPP	Omethoate	nd		nd			nd		nd		
	Dimethoate	nd		nd			nd		nd		
	Diazinon	nd		nd			nd		nd		
	Chlorpyrifos-methyl	nd		nd			nd		nd		
	Parathion-methyl	nd		nd			nd		nd		
	Malathion	nd		nd			nd		nd		
	Azinphos-ethyl	nd		nd			nd		nd		
	Chlorpyrifos	<0.004		nd			<0.004		<0.004		
	Chlorfenviphos-z-cis	nd		nd			nd		nd		
	Phosmet	nd		nd			nd		nd		
	Dialifos	nd		nd			nd		nd		
	∑OPPs	**<0.004**		**nd**		-	**<0.004**		**<0.004**		-
OCP	α-HCH	nd		nd			nd		nd		
	HCB	<0.006		<0.006			<0.006		<0.006		
	β-HCH	<0.008		<0.008			nd		<0.008		
	γ-HCH	<0.006		<0.006			<0.006		<0.006		
	ζ-HCH	nd		nd			nd		nd		
	Aldrin	nd		nd			nd		nd		
	α-endosulfan	<0.004		<0.004			<0.004		nd		
	p,p'-DDE	<0.002		<0.002			0.017	0.001	0.039	0.007	
	Dieldrin	nd		nd			nd		nd		
	β- endosulfan	nd		nd			nd		nd		
	Endrin	nd		nd			nd		nd		
	p,p'-DDD	nd		nd			nd		nd		
	o,p'-DDT	nd		nd			nd		nd		
	Methoxychlor	nd		nd			nd		nd		
	∑OCPs	**0.010**	**0.005**	**0.008**	**0.003**	0.32	**0.02**	**0.02**	**0.04**	**0.03**	0.06
SM	Celestolide	nd		nd			nd		nd		
	Musk ambrette	nd		nd			nd		nd		
	Galaxolide	0.17	0.06	0.20	0.05		0.29	0.08	0.21	0.05	
	Musk xylene	nd		nd			nd		nd		
	Tonalide	<0.006		<0.006			<0.006		<0.006		
	Musk ketone	nd		nd			nd		nd		
	∑SMs	**0.18**	**0.10**	**0.18**	**0.15**	0.99	**0.21**	**0.18**	**0.22**	**0.14**	0.94

nd – not detected; SD – standard deviation

CONCLUSIONS

SMs, OCPs and OPPs were detected in the adipose tissue of female dogs and cats. Galaxolide and tonalide are found in cosmetic and household product were found in all the samples analysed and despite being long banned the persistent pesticides HCB, γ-HCH and DDE were found in more than 90%. Moreover, although no significant differences were observed between animals diagnosed with mammary neoplasms and the control group. Yet, this preliminary study shows that companion animals are exposed to an assorted of EDC highlighting the need of more biomonitoring studies.

References

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