STABLE ELEMENT DISTRIBUTION STUDY IN MEDITERRANEAN TUNA BY NAA METHODS

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Instrumental neutron activation analysis (INAA) and γ-spectrometry, as well as fast radiochemical separation methods have been used for the determination of Cr, Ag, Sc, Co, V, Cs, Zn and As in bluefin tuna (*Thunnus thynnus thynnus*) from the Mediterranean Sea. The distribution of the elements was examined in muscle, liver and gut content of this pelagic fish. The stable trace elements investigated possess corresponding fission and/or neutron induced radionuclides, and some of these elements are of known biological significance for marine organisms. It was found that most of elements determined in tuna are concentrated in the liver of the fish.

Neutron activation analysis have been applied succesfully to date for the determination of many stable elements in various marine species (PAPADOPOULOU, 1992; BERNHARD, 1978). It is known that stable elements and radionuclides of anthropogenic origin entering into the oceans are accumulated by different marine organisms. The work done with tuna has been mainly related to the estimation of Hg and Se although certain other elements have been reported (IDOE 1972, FAO/UNEP 1986). To the best of our knowledge there is relatively little information as regards the distribution of stable trace elements in organs and tissues of tuna. In this paper we report concentrations of Cr, Ag, Sc, Co, V, Cs, Zn and As in tuna from five areas of the Mediterranean, determined by NAA methods. This work has been done in the frame work of UNEP/IAEA Project 1998 EP. Tuna fish samples (N=13) were collected in 1977 off the French Mediterranean coast. Sample identification and separation were done according to FAO Fisheries technical reports. From each fish, muscle, liver and gut content were separated. Moreover kidney, intestine tract and genital organs from two individual fish were also taken. The samples were lyophilised and homogenised prior to analysis. INAA and γ-spectrometry were applied for the determination of Cr, Ag, Co, Sc, Cs, and Zn while fast radiochemical separation based on solvent extraction and NAA methods were used for the determination of As and V (PAPADOPOULOU, 1972; PAPADOPOULOU *et al.*,1973 & 1978). The results obtained from this study are listed in Table 1. The values of trace element content given in this Table represent the mean value from 2-3 individuals from each sampling area.

Comparison of the element-distribution patterns in muscle and liver showed that these are mostly localised in the liver with the exception of Cs where higher values were found in muscle tissue. The high values of the elements found in gut content are most likely related to the food consumed by the fish. Taking in concideration that tuna is a pelagic fish of economical interest, it is of importance to protect the population from undesirable effects which might be caused, eventually, by the incorporation of toxic and/or radioactive trace elements entering the ocean. The baseline data reported herein could be useful for comparison with future information on the state of pollution of these areas in the Mediterranean.

TABLE 1. Stable element content in Bluefin tuna from the Mediterranean Sea

SAMPLING AREA (FRANCE) Tissues	Cr	Ag	Sc	Co	V	Cs	Zn	As
			(ng/g dry weight)				(£g/g d.w.)	
MENTON								
Muscle	92	8.7	0.30	10	48	60	17	6.3
Liver	210	130	0.67	230	130	70	85	23
Gut cont.	920	120	39	82	540	63	92	44
ANTIBES								
Muscle	75	11	0.46	9.4	6.1	140	177	8
Liver	140	230	0.64	220	110	67	100	48
Gut cont	660	120	21	52	350	370	130	28
MONACO								
Muscle	130	8.6	0.16	9.0	30	160	17	10
Liver	260	50	0.36	300	110	40	100	38
Gut cont.	510	15	3.1	47	980	250	140	11
BAY DES ANGES								
Muscle	130	8.7	0.29	13	26	140	12	7.1
Liver	150	200	4.0	270	73	86	110	20
Gut cont.	470	9 4	23	45	640	84	44	6.5
CANNES								
Muscle	87	12	0.35	4.8	20	140	9.0	10
Liver	250	260	3.5	310	170	89	130	18
Gut cont.	290	260	12	58	350	40	290	38

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