

# EVALUATION OF ACTUAL LEVEL OF $^{90}\text{Sr}$ AND $^{137}\text{Cs}$ IN URINE AS INDICATOR FOR INTERNAL CONTAMINATION OF HUMAN BODY IN THE CASE OF NUCLEAR ACCIDENT

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## ABSTRACT

In this work it was determined the urinary contamination with  $^{90}\text{Sr}$  and  $^{137}\text{Cs}$  as indicator of the exposure of population from Bechet zone to the risk of nuclear accident, created by C.N.E. Koslodui-Bulgaria. Two lots of persons were selected, the first from Bechet zone, situated within 30 km area from Koslodui, and the second from a central zone, Melinesti, situated far at 200-300km from Koslodui. Every lot was formed by 35 healthy persons, males and females, and was structured in this way: of 7 to 9 years old, of 13 to 14 years old, of 17 to 18 years old and after 25 years old. The results obtained and the conclusions that can be drawn about the distribution of these isotopes in urinary daily excretion function by age, sex or distance from C.N.E. Koslodui are presented below.

## INTRODUCTION

The twenty years fonction of Nuclear Power Station Koslodui - Bulgaria, situated within 30 km from Bechet - Romania zone, determines a permanent risk of nuclear accident, for the population who lives there (1).

That is why in april 1994, our laboratory was recolted total daily urines samples, from two selected lots of population, one from Bechet zone and the second from the Melinesti control zone, situated far from Koslodui and were determined by radiochemical analysis (2),(3), the daily urinary level of  $^{90}\text{Sr}$  and  $^{137}\text{Cs}$ , as indicator for internal contamination of human body (4),(5).

## RESULTS AND DISCUSSION

It's known, the human internal contamination is a result of environmental contamination, that is why we must specify the Chernobyl major nuclear accident (april 1986) who affected our country, Melinesti zone higher and Bechet zone lower.

In this circumstances, the human body contamination and also the urinary contamination with  $^{90}\text{Sr}$  and  $^{137}\text{Cs}$  must have a same direction in case Nuclear Power Station Koslodui - Bulgaria, was not poluante and Bechet zone was not affected.

Indeed, the results of the determinations presented in table 1 + 4, proves the same report exested after Chernobyl, the urinary contamination with Sr-90 and Cs-137 in the lot of population from Melinesti zone, was higher comparatively with the lot of population from Bechet zone.

So, the ponderate mean value for Sr-90 was in Melinesti population 0,123 Bq/day for female and 0,084 Bq/day for male, comparatively with Bechet population 0,071 Bq/day for female and 0,075 Bq/day for male.

For Cs-137, the ponderate mean value was, in Melinesti population 0,505 Bq/day for female and 0,364 Bq/day for male, comparatively with Bechet population; 0,291 Bq/day for female and 0,207 Bq/day for male.

Also, at all the group of age, the urinary levels of Sr-90 and Cs-137 was higher at Melinesti zone comparatively with Bechet zone.

Table 1: Urinary daily excretion level of <sup>90</sup>Sr from the lot of Bechet.

Group of age (years)	<sup>90</sup> Sr - urinary excretion (Bq/day)					
	Female			Male		
	Subjects number	Mean	Variation interval	Subjects number	Mean	Variation interval
7 - 9	2	<b>0,070</b>	0,043-0,090	4	<b>0,044</b>	0,036-0,046
13 - 14	6	<b>0,050</b>	0,010-0,120	2	<b>0,070</b>	0,019-0,123
17 - 18	5	<b>0,070</b>	0,031-0,120	5	<b>0,110</b>	0,047-0,170
total teenagers 7 - 18	13	<b>0,061*</b>	0,010-0,120	11	<b>0,078*</b>	0,019-0,170
adults 31 - 66	4	<b>0,102</b>	0,048 -0,200	5	<b>0,087</b>	0,045-0,130
Total lot 7 - 66	17	<b>0,071*</b>	0,010-0,200	16	<b>0,075*</b>	0,042-0,170

Table 2: Urinary daily excretion level of <sup>90</sup>Sr from the lot of Melinesti.

Group of age (years)	<sup>90</sup> Sr - urinary excretion (Bq/day)					
	Female			Male		
	Subjects number	Mean	Variation interval	Subjects number	Mean	Variation interval
7 - 9	1	<b>0,190</b>	-	3	<b>0,095</b>	0,035-0,160
13 - 14	3	<b>0,078</b>	0,060-0,093	4	<b>0,073</b>	0,029-0,097
17 - 18	4	<b>0,169</b>	0,116-0,290	4	<b>0,081</b>	0,049-0,136
total teenagers 7 - 18	8	<b>0,138*</b>	0,060-0,290	11	<b>0,082*</b>	0,029-0,160
adults 31 - 56	2	<b>0,065</b>	0,051-0,078	2	<b>0,095</b>	0,090-0,095
total lot 7 - 56	10	<b>0,123*</b>	0,051-0,290	13	<b>0,084*</b>	0,029-0,160

Table 3: Urinary daily excretion level of <sup>137</sup>Cs from the lot of Bechet.

Group of age (years)	<sup>137</sup> Cs - urinary excretion (Bq/day)					
	Female			Male		
	Subjects number	Mean	Variation interval	Subjects number	Mean	Variation interval
7 - 9	2	<b>0,330</b>	0,014-0,510	4	<b>0,196</b>	0,049-0,130
13 - 14	6	<b>0,310</b>	0,104-0,530	2	<b>0,255</b>	0,170-0,340
17 - 18	5	<b>0,365</b>	0,075-0,690	5	<b>0,224</b>	0,044-0,360
total teenagers 7 - 18	13	<b>0,334*</b>	0,075-0,690	11	<b>0,219*</b>	0,044-0,360
adults 31 - 56	5	<b>0,224</b>	0,090-0,540	5	<b>0,180</b>	0,090-0,261
total lot 7 - 56	18	<b>0,291*</b>	0,075-0,690	16	<b>0,207*</b>	0,044-0,360

\*Note: The value is ponderate mean.

Table 4: Urinary daily excretion level of <sup>137</sup>Cs from the lot of Melinesti.

Group of age (years)	<sup>137</sup> Cs - urinary excretion (Bq/day)					
	Female			Male		
	Subjects number	Mean	Variation interval	Subjects number	Mean	Variation interval
7 - 9	2	<b>0,830</b>	0,650-1,01	4	<b>0,377</b>	0,097-1,120
13 - 14	4	<b>0,265</b>	0,140-0,450	4	<b>0,293</b>	0,140-0,400
17 - 18	4	<b>0,684</b>	0,175-1,800	4	<b>0,448</b>	0,140-0,960
total teenagers 7 - 18	10	<b>0,546*</b>	0,140-1,800	12	<b>0,352*</b>	0,097-1,120
adults 31 - 56	3	<b>0,370</b>	0,150-0,630	3	<b>0,410</b>	0,240-0,520
total lot 7 - 56	13	<b>0,505*</b>	0,140-1,800	15	<b>0,364*</b>	0,097-1,120

\* Note: The value is ponderate mean.

## CONCLUSIONS

The conclusion of the work is, the function of C.N.E. Koslodui - Bulgaria, was not modified significant the human body contamination with <sup>90</sup>Sr and <sup>137</sup>Cs, the urinary level of these isotopes, proved it.

But, also we consider it is necessary to establish a permanent supervise program, determine the urinary contamination with Sr-90 and Cs-137 in Bechet population, special in young people and in children, as indicator for internal contamination of human body, parallel to food and drinking water program.

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