



INDIVIDUAL DOSES ESTIMATION FOR THE SEMIPALATINSK HISTORICAL COHORT

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1. Background and Purpose The Semipalatinsk Nuclear Test Site (SNTS) was officially closed in 1991. Neither individual dosimetry at the time of the nuclear tests, no retrospective estimation of individual doses for the residents lived near the SNTS have been made (excepting several scientific studies concerning some settlements). At present scientists from Russia, Japan, the U.S. and Kazakhstan take part in an international scientific research on reconstruction of individual doses for the population of 10 settlements: Dolon, Kanonerka, Mostik, Cheremushki, Znamenka, Kainar, Karaul, Sarzhal, Kaskabulak and Kundyzhdy, included in the so-called Semipalatinsk historical cohort (about 20,000 persons). **The purpose of the paper** is to present the preliminary results.

2. Materials and Methods The most significant nuclear test, in terms of radioactive contamination and exposure to the residents, was chosen for every settlement listed above (Figure 1, Table 1). All the calculations are conducted in accordance with a joint U.S.-Russian methodology. Such input data as date of birth, ethnicity, place of residence and so on are used for individual dose assessment. These data are available in the register of the residents who lived on the territory of local radioactive fallout due to the nuclear tests at the SNTS. This register was created by the scientists in both Kazakhstan and Japan. The scheme of the research is presented in Figure 2. Behavior pattern and dietary habits (consumption rates of cow's and mare's milk) depending on age and ethnicity are also taken into account.

Trajectories of the radioactive clouds related to the most significant events



Figure 1

Table 1. The most significant nuclear tests in terms of radioactive contamination and exposure to the residents

SETTLEMENT	MAIN NUCLEAR TEST
Cheremushki	#1 (August 29, 1949)
Dolon	
Kanonerka	
Mostik	
Kainar	#2 (September 24, 1951)
Sarzhal	#4 (August 12, 1953)
Karaul	
Kundyzhdy	
Kaskabulak	#18 (October 30, 1954)
Znamenka	#28 (August 24, 1956)

3. Basic assumptions:

- Permanent residence since the most significant test;
- Behavior pattern and dietary habits of the inhabitants of ethnicity other than Russians or Kazakhs were identical to those of Russians;
- Behavior pattern and dietary habits doesn't depend on gender;
- Residents of Kainar, Karaul, Kaskabulak, Kundyzhdy, Sarzhal and Znamenka used to live in adobe houses. In turn, in Cheremushki, Dolon, Kanonerka and Mostik Kazakhs used to live in adobe houses and residents of other ethnicities – in wooden houses;
- Only Kazakhs consumed koumiss (mare's milk product).

4. Results and Discussion Preliminary estimates of individual doses (whole body dose and thyroid dose) have been assessed for more than 11,000 subjects of the Semipalatinsk historical cohort, used to live in the listed above settlements at the time of the nuclear test at the SNTS (Table 2).

The maximum whole body dose (260 mGy) was received by adult non Kazakh residents of Dolon.

The maximum thyroid dose (310 mGy) was received by 3-7 years old Kazakh residents of Kainar.

The scheme of the research

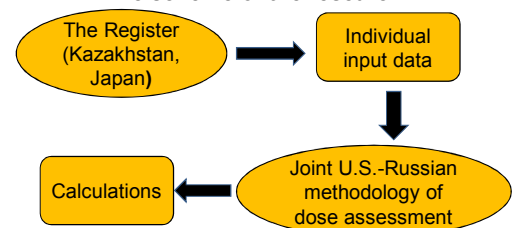


Figure 2

Table 2. Range of preliminary estimates of individual doses: whole body dose from external irradiation and dose to thyroid from internal irradiation to ¹³¹I and ¹³³I, depending on the settlement and ethnicity (K – Kazakh, O – other ethnicities)

Settlement	Whole Body Dose Range, mGy				Thyroid Dose Range, mGy			
	K		O		K		O	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
Cheremushki	28	140	86	160	4.2	24	2.03	12
Dolon	47	240	140	260	14	83	6.9	42
Kanonerka	24	120	73	140	14	79	6.6	40
Mostik	15	76	46	86	2.8	16	1.4	8.1
Kainar	13	66	11	66	53	310	26	150
Sarzhal	21	110	18	110	0.11	0.70	0.055	0.32
Karaul	35	130	31	130	1.5	10	0.79	4.5
Kundyzhdy	1.1	5.5	3.6	5.5	0.23	1.4	0.11	0.68
Kaskabulak	0.55	2.7	0.78	2.7	11	63	5.2	31
Znamenka	21	21	23	38	2.5	2.5	0.21	1.3