

POLLUTION AND RISKS IN PAMIRO-TIENSHEN-BURIAL GROUNDS OF URANIUM AND OBSOLETE PESTICIDES

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Abstract

There are huge environmental problems in Central Asia (CA) due to dozens of former USSR uranium tailings and abandoned obsolete pesticides warehouses. 17% of TienShan-Pamir territory (Kyrgyzstan, Tajikistan, Uzbekistan) is considered to be the worst polluted areas. We studied radioactivity in uranium area and radiation absorbed by humans in these areas. We have determined the other harmful toxicants - obsolete pesticides which still being used illegally. It has been concludes that immunity system are very vulnerable to combined harmful impacts mentioned above. Scientific studies were conducted in local settlements - school workshops in local languages including videos, presentations and leaflets.

Keywords: uranium burial ground, obsolete pesticides, immunity, health, radioactivity

I. Introduction

The complex of USSR uranium mines-tailings-dumps includes: Taboshar, Adrasman, former Chkalovsk – Tadjikistan; Cherkesar [1], Jangiabad- Uzbekistan; Sumsar, Shekaftar, and Mailuu-Suu area. Latest one - huge complex consists of 23 tailings and 13 dumps (total volume of 2 million cubic meters, weighing more than 4 million tons).

Taboshar has radiation of 350 μ R/hour in many areas. In addition, there is an artificial lake above the city filled with water and acid from the nearby mines. The level of background radiation there is 200-300 mcr/hour. The acid used is a highly potent underground leaching agent for uranium ore. The main "tailing dump" in the area of Goziyon village. According to experts, there are open highly radioactive sites in this territory, where sanitary-permissible standards are exceeded 10 times. The situation is even more depressing in the storage facility itself, in the Degmay area, where about 20 million tons of uranium ore processing waste has been collected to date. In some parts of the Taboshar, and in Adrasman level of radiation background reaches 1590 microrentgens/hour and even 1700 microrentgens/hour

Outdated technology in the 50s and 60s resulted in the sludge containing high concentrations of uranium. Poorly made tailings beds led to continuous infiltration and washout of uranium into the water of the river - which is the source of drinking water for the inhabitants. The following samples were examined: the content of uranium in open water sources and drinking water in the region and the content of uranium in food products. One of the most dangerous was the water-food route of radionuclides. In some areas of the city and houses, radon exposure was very dangerous.

Obsolete pesticides in Central Asia land are infiltrated from more than 360 warehouses and more than 200 old fly grounds for micro-planes (which had used for DDT pulverizing in 60th-70th). This leads to rise, crop and cotton lands pollution due to the outdated agricultural technologies. Water pollution comes from upper layer (Tien-Shen, Kyrgyzstan) to Uzbekistan. There were several accidents in 2013 on the South-East of Tien-Shen (Kyrgyzstan and Uzbekistan) when many domestic animal died.

The main sources of obsolete POP pollution are: old abandoned warehouse that has been ransacking by inhabitants, additionally POP (include DDT) imported illegally from India and China. There is a huge problem of finding correlation between the level of pollution and health status. Because: a) there are several different (not one) illnesses; b) the illnesses can come out in tenth years after body intake. So, we decided studying essential/basic health status: a) pre-illness state by compliance, b) base-immunity levels (blood cells and CD proteins).

II. Methods

Our study is based on chemical pollution health estimation by original medico-geographical ranking [2] and methods of health-area calculation [3]. Laboratory determination is based on Manual book [4], POP determination is done in accordance with recommendation of EPA US (devices: HP 5890 II Gas Chromatograph, Mass Spectrometer with HP MS Chemstation, etc). Selective determination was done for chromosomal-crash test [5]. Ordinary clinical data: clearance of urine; goiter 4 hormones, ALT/AST liver-mark ferments. We chooses for study most vulnerable groups: women 20-35 years, teenagers 11-16 years.

III. Results

A survey of residents showed that the content of leukocytes in 32% of schoolchildren was reduced due to neutrophils, while toxic granularity of neutrophils was registered in 14%, and thrombocytopenia in 18% - such shifts are characteristic of chronic diseases, including a mild form of radiation sickness. There are a number of other indicators of adolescents that indicate a low basic level of health: weakness of the immune system (IgA, IgG proteins) and a decrease in the functional activity of the thyroid gland.

Table 1: Radiation background rate in Mailusuu uranium area

Place of survey	Radiation rate mCrn/h
In the office premise of the combine	16-40
On the territory of combine	18-22
Tailing dump N8 on average	20-30
On soil cut and on hatch	50- 120
Tailing dump N3 on average	25-30
On soil cut and in the hatch	180 – 120
On 2 abnormal sites at the end of the tailing dump	500
Tailing dump N9 on average	18-40
On soil cut and in the underground water	60
Tailing dump N22, in the adit N51	100 – 240
Inside the adit (7 m)	240
At the entry to adit N1	600
Inside the adit (10 m)	150
“Intourist” hotel	18-22

POP in waters by study 2015-2020. North Tien-Shen Chui river (Kyrgyzstan) the sum of alfa-, beta-, gamma-, delta HCH $8,5 \times 10^{-3}$ mg/litre, Aldrin $1,5 \times 10^{-3}$, sum of DDT-DDE group $13,6 \times 10^{-2}$ mg/l; Board South Tien-Shen and Pamir Vakhsh river, point intern to Amu-Darja - the sum of HCH $1,45 \times 10^{-2}$ mg/l, Aldrin $9,0 \times 10^{-3}$, DDT-DDE group $4,64 \times 10^{-2}$ mg/l.

Woman milk WHO- TEQ values were observed (median: 36.0v44.1 pg/g fat) and the highest PCDD-TEQ was in Jalal-Abad rural region hot spots (Kyrgyzstan). The calculated median daily intake of the total TEQ for breast-fed infants ranged from 391 pg/kg b.w./day in the vulnerable region, but more less in Aravan and Osh regions (117 pg/kg b.w./day). It has been counting daily income of POP, they over permitted level (EU and EPA) 3-5 times. Polyaromatic hydrocarbonates (PAHs) were determining in home dust latest year only. We did previous/screening analysis in several rooms in two areas (previous results: 36 $\mu\text{g}/\text{m}^2$ and 90 $\mu\text{g}/\text{m}^2$).

Health markers

Many inhabitants has answer special questionnaire – complain cardiovascular-breath systems, allergic reaction, etc. There are 10-22% of hepatic disturbance tests in studying groups. Blood analysis of women and teenagers show low level of immune proteins. Ethnic factor did not influence results. Cells immunity of teenagers: phagocytes activity tests from clear area $40,67 \pm 2,23$; fall in to two unfortunate areas $32,06 \pm 1,85$; $33,29 \pm 1,98$. The protein immunity shown in table 2.

Table 2: Teenagers protein immunity in POP polluted area

Indicators	Data of inhabitants in polluted area	Control set
CD3, %	$32,55 \pm 0,89^*$	$45,9 \pm 0,95$
CD4, %	$18,70 \pm 0,51$	$27,1 \pm 0,83$
CD8, %	$17,14 \pm 0,45^*$	$20,1 \pm 0,92$
CD4/CD8	$1,05 \pm 0,08^*$	$1,61 \pm 0,05$
CD19, %	$20,61 \pm 0,30^*$	$15,6 \pm 0,72$
IgA, g/l	$2,23 \pm 0,11$	$2,55 \pm 0,14$
IgM, g/l	$1,08 \pm 0,09^*$	$1,88 \pm 0,22$
IgG, g/l	$11,50 \pm 0,68^*$	$15,02 \pm 0,59$

Foot note: *statistical validity of difference ($P < 0,5$) compare with control set

IV. Discussion

However, few scientific paper on oncology in the polluted areas were published. One of them named “Women uterus cancer level in Kyrgyzstan”. Authors studied the most polluted rural areas of Jalal-Abad oblast – 14,98 /for 100 thousands, second level - Osh oblast 11,8. The authors predict the rise of oncology illnesses [6]. We are completely agree with the authors because there are common impacts of two toxicants should be more dangerous [7;8].

Concerning juridical fields. The Stockholm`s, OPCW`s, Rotterdam`s, Aarhus`s Convention was officially adopter in four CA states. But there are big problems with the implementation of treaties mentioned above. The obstacles are: lack of wide net of points for analyzing, lack of contemporary devices; misunderstanding and confusion by big international documents of people in rural areas, people national features. Short color leaflets and movies (that we had done) are found useful [9]. Our work has been supporting by Swiss Green Cross and IPEN.

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