

DECONTAMINATION OF WOUNDS AND PROBLEMS OF DIFFERENTIAL DIAGNOSIS AT EXTERNAL IRRADIATION

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In praxis, we found very often the associated problems, bound for performance of external decontamination and determination of the characteristic changes, caused by occupationally exposure to ionizing radiation.

The decontamination treatment presents, in any case, the most effective medico-prophylactic procedure, and the basic problem in praxis was an unadequate evaluation of the effect, because the decontamination was reduced on phenomenological observation. The relevant evaluation of decontamination efficiency made by use of different procedures and means, was possible in experimental conditions, and that is what makes the problems of extrapolation on people.

In cases of occupationally exposure to radiation, one from the very important and insufficient analysed and defined problems, was the differential diagnosis in the frame of the postradiation effects and changes caused by other harmful factors.

METHODS

Methodology includes the experimental study and the analysis of epidemiological data taken from the human praxis.

Experimental: The experiments were performed on the white male rats, narcotized with urethane. Each experimental group counted fifteen animals. On the shaved region between scapulae was excised skin with a special circular perforator, but the thermal burn was made by use of Deschery thermocautery at temperature of 600°C. Contamination was carried out by applying on the damaged surface (2cm²) of solution ⁸⁵SrCl₂ (pH = 6.0) or NaI¹³¹ (pH = 7.0) with radioactivity off 1,85 MBq. Treatment of radiomixte based on rinsing action by use of vacuum system with 20 ml chosen solution for decontamination.

Human examination: Observations were selected according to occupation, sex, age, character of exposition, film badges and thermoluminescent dosimeters data of the received doses. The investigations at 30 radiation workers (production of radioiodine in the Boris Kidrič Institute and applications in radiation research) included: (a) the clinical checkup towards to the physiological systems (skin, eyes, cardiovascular system, neuro-endocrine system, haematopoietic tissue; (b) biochemical analyses (cholesterol, glucose, SGOT, SGPT, hepatogram and other; (c) radio-immunological analyses of hormones (triiodothyronine, thyroxine and other); (d) haematological examinations (numerical variations of the peripheral blood cells, incidence of cytomorphological aberration, changes in values of haemoglobine, haematocryte, bleeding and clotting time).

RESULTS

Experimental data concernig the effects of decontamination of radiomixte on contamination with single radionuclide are shown in

TABLE I. EFFECT OF DECONTAMINATION OF THE RADIOIOMIXTE
(in per cent of radioactivity applied)

Injury	Radio- nuclide	t (min)	Means for decontamination	Body burden	Radioactivity decontaminated area	Decontamination efficiency
A	⁸⁵ Sr	10	Undecontaminated	21,60 ± 6,09	-	-
			Saline	16,67 ± 4,04	24,94 ± 9,06	58,39 ± 9,06
		30	1% Cetavlon	16,79 ± 6,71	15,96 ± 9,06	57,75 ± 9,06
			Undecontaminated	62,18 ± 8,71	-	-
	¹³¹ I	10	Saline	58,78 ± 8,19	25,01 ± 6,40	16,21 ± 8,19
			1% Cetavlon	57,88 ± 10,40	15,21 ± 9,55	26,91 ± 10,40
		30	Undecontaminated	28,40 ± 7,42	-	-
			Saline	40,82 ± 11,14	14,13 ± 3,71	45,05 ± 11,14
	⁸⁵ Sr	10	0,5% iodine tincture	26,92 ± 6,35	14,92 ± 3,68	58,16 ± 6,35
			Undecontaminated	74,92 ± 10,15	-	-
		30	Saline	82,86 ± 3,87	11,00 ± 1,91	6,14 ± 3,87
			0,5% iodine tincture	74,80 ± 4,82	8,81 ± 1,89	16,39 ± 4,82
B	⁸⁵ Sr	10	Undecontaminated	0,01 ± 0,005	-	-
			Saline	0,03 ± 0,02	51,11 ± 7,56	48,86 ± 7,56
		30	10/oo Soap	0,08 ± 0,07	59,69 ± 9,71	40,23 ± 9,71
			Undecontaminated	0,18 ± 0,12	-	-
	¹³¹ I	10	Saline	0,22 ± 0,07	85,07 ± 7,35	14,71 ± 7,35
			10/oo Soap	0,24 ± 0,14	80,57 ± 7,96	19,19 ± 7,96
		30	Undecontaminated	1,62 ± 0,68	-	-
			Saline	5,92 ± 2,13	62,27 ± 10,88	31,81 ± 10,88
	⁸⁵ Sr	10	10/oo Soap	4,93 ± 1,65	51,52 ± 5,37	43,55 ± 5,37
			Undecontaminated	18,52 ± 6,65	-	-
		30	Saline	27,97 ± 5,99	55,45 ± 4,65	16,58 ± 5,99
			10/oo Soap	32,98 ± 5,58	42,50 ± 6,93	24,52 ± 6,93

A - Excised skin wound

B - Thermal burn of the skin

Table I. In conditions of contamination of the excised skin wound and thermal burn of the skin, the penetrated quantities into organism depended on sort of contaminant, duration time of contamination i.e. time of beginning treatment and sorts of the applied means for decontamination (1).

Human data in the frame of the observed changes in the peripheral blood (deviations and diseases) of the supervised persons in dependence of working exposition is given in Table II.

TABLE II - HAEMATOLOGICAL CHANGES AT SUPERVISED PERSONS

Working exposure (years)	Numerical	Morphological	Anaemia
1 - 10			1
10 - 20	2		2
over 20	5	3	1

The problems of differential diagnosis have been also contemplated according to medical results in relation to all the states and diseases that could give the similar deviations and changes together with importance of effect of the other harmful factors, influence of tobacco, alcohol, medicaments etc. (2).

CONCLUSIONS

At decontamination of the excised skin wound contaminated with different single radionuclide, the effect of decontamination conditioned more by body burden of the penetrated radionuclide, but at thermal burn of the skin preponderant the effect depending of level residual radioactivity in decontaminated region.

In the case of contamination excised skin wound and thermal burn of the skin with radiostrontium the efficiency of decontamination was to 70%, until with radioiodine did not exceed 60% from the initial contamination level.

Human examination showed that the majority of data falls into the normal limits, on the basis of which is possible to make the evaluation of the state of the health of radiation workers.

An early discovery of changes in some radiosensitive systems, observation of the evolution of changes and influence of factors which favoured the progression of some changes and the problems specificity and characteristics of some states and diseases, increasing the importance of differential diagnosis in pathology of irradiation.

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