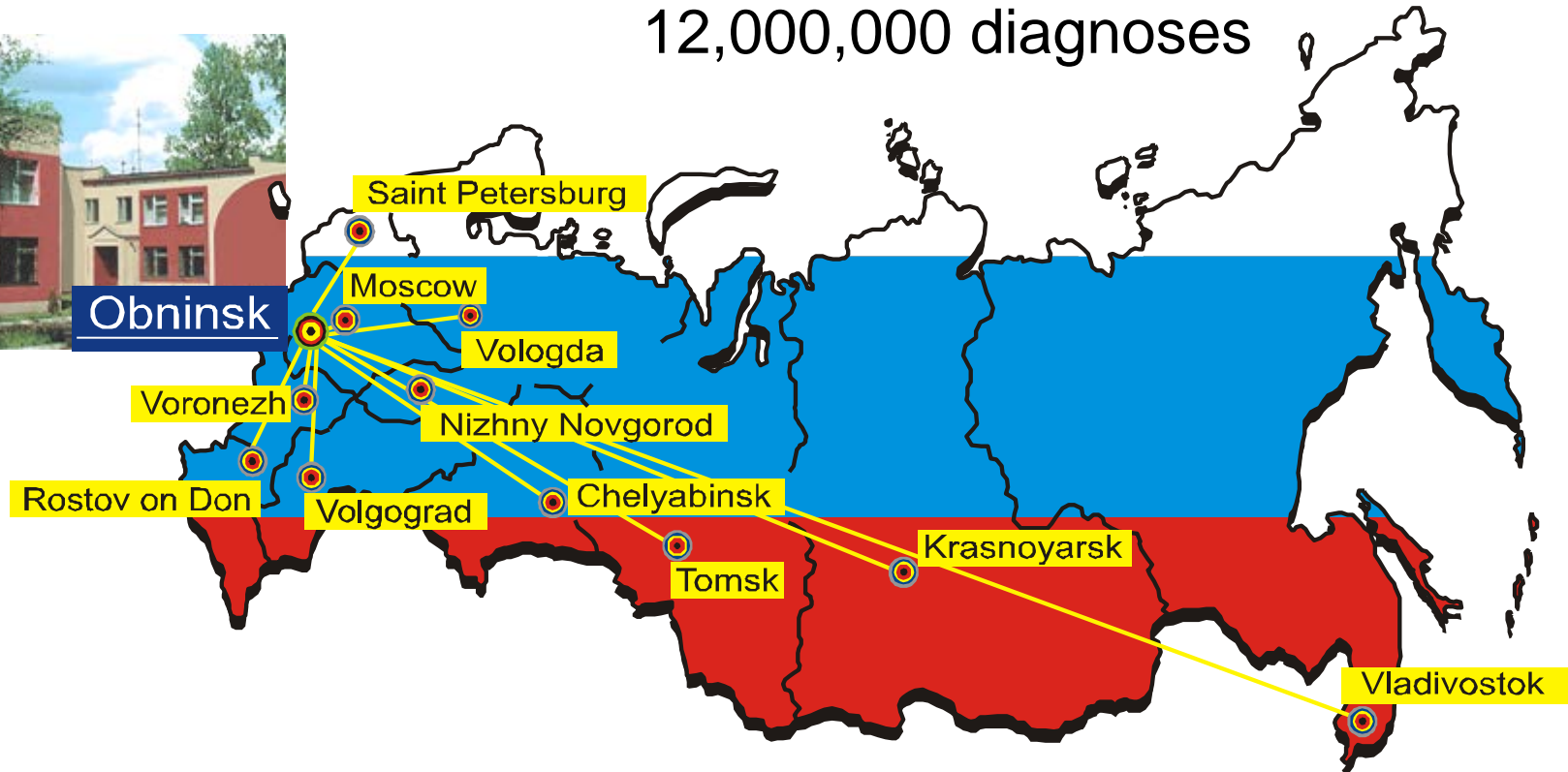


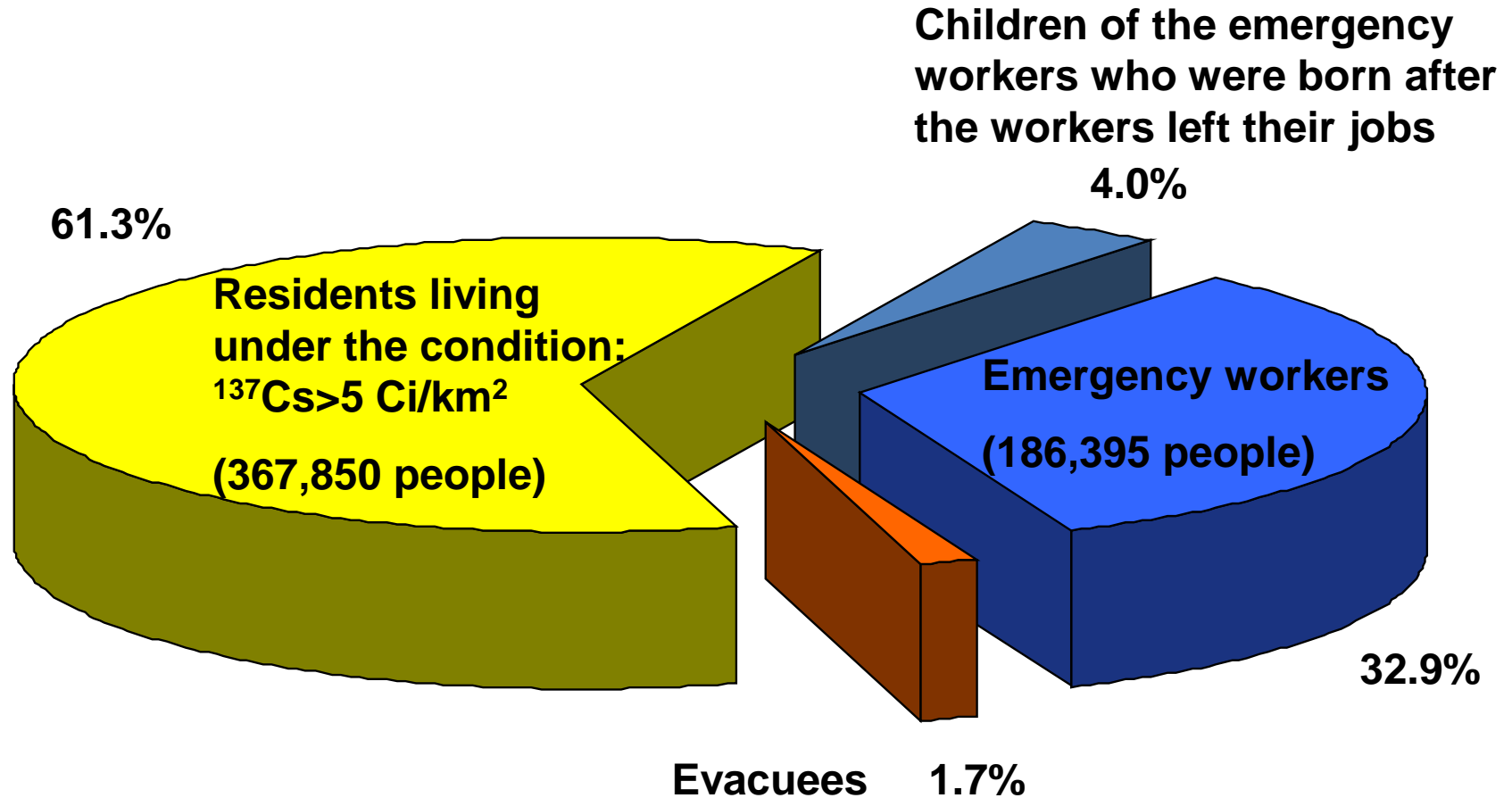
# Epidemiological registration by the Russian Federation of residents in the vicinity of Chernobyl and accident-related workers

Reference 8

20 district centers  
4,000 hospitals and clinics  
368,000 registrants  
12,000,000 diagnoses

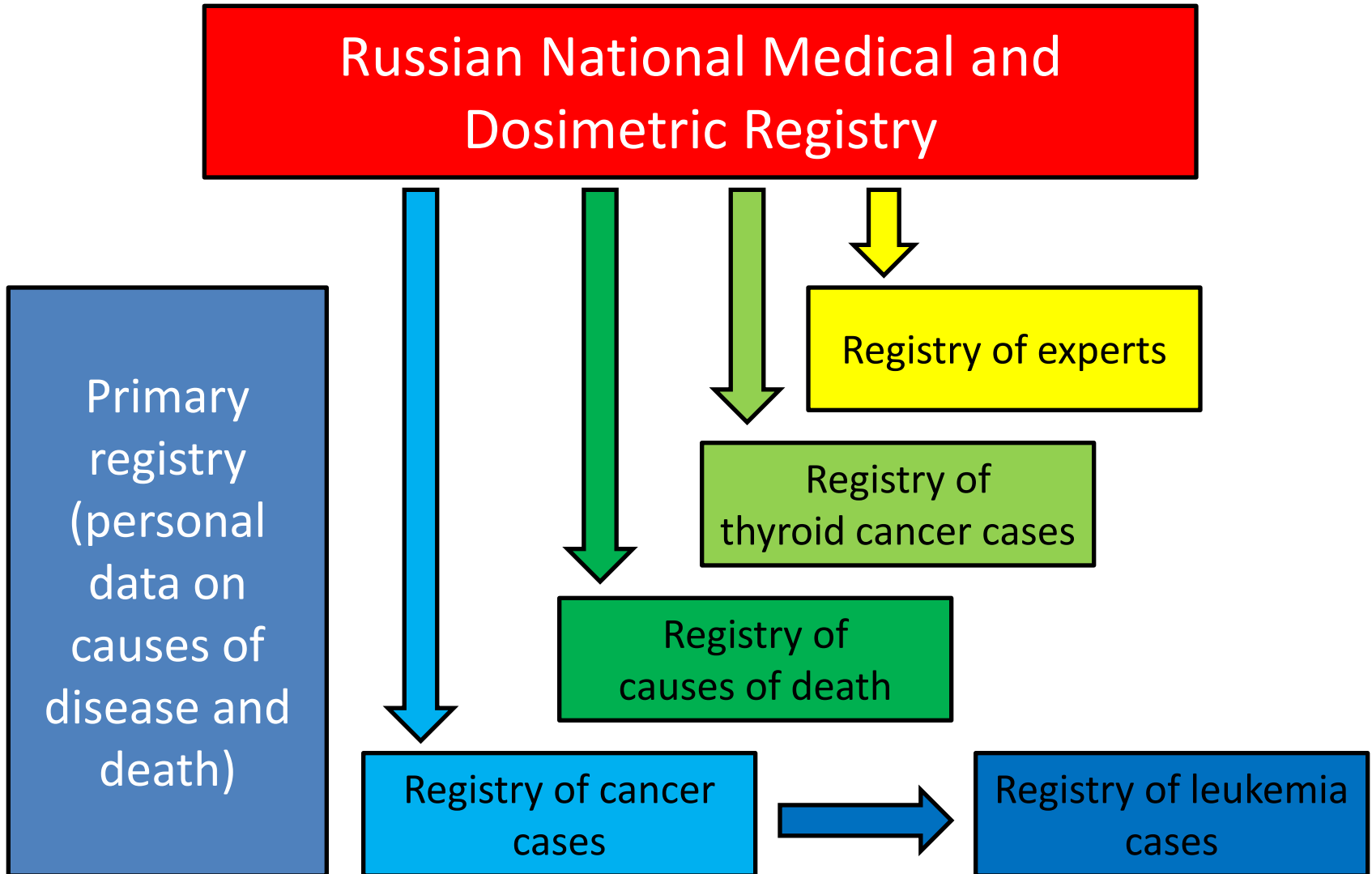


# Breakdown of registrants

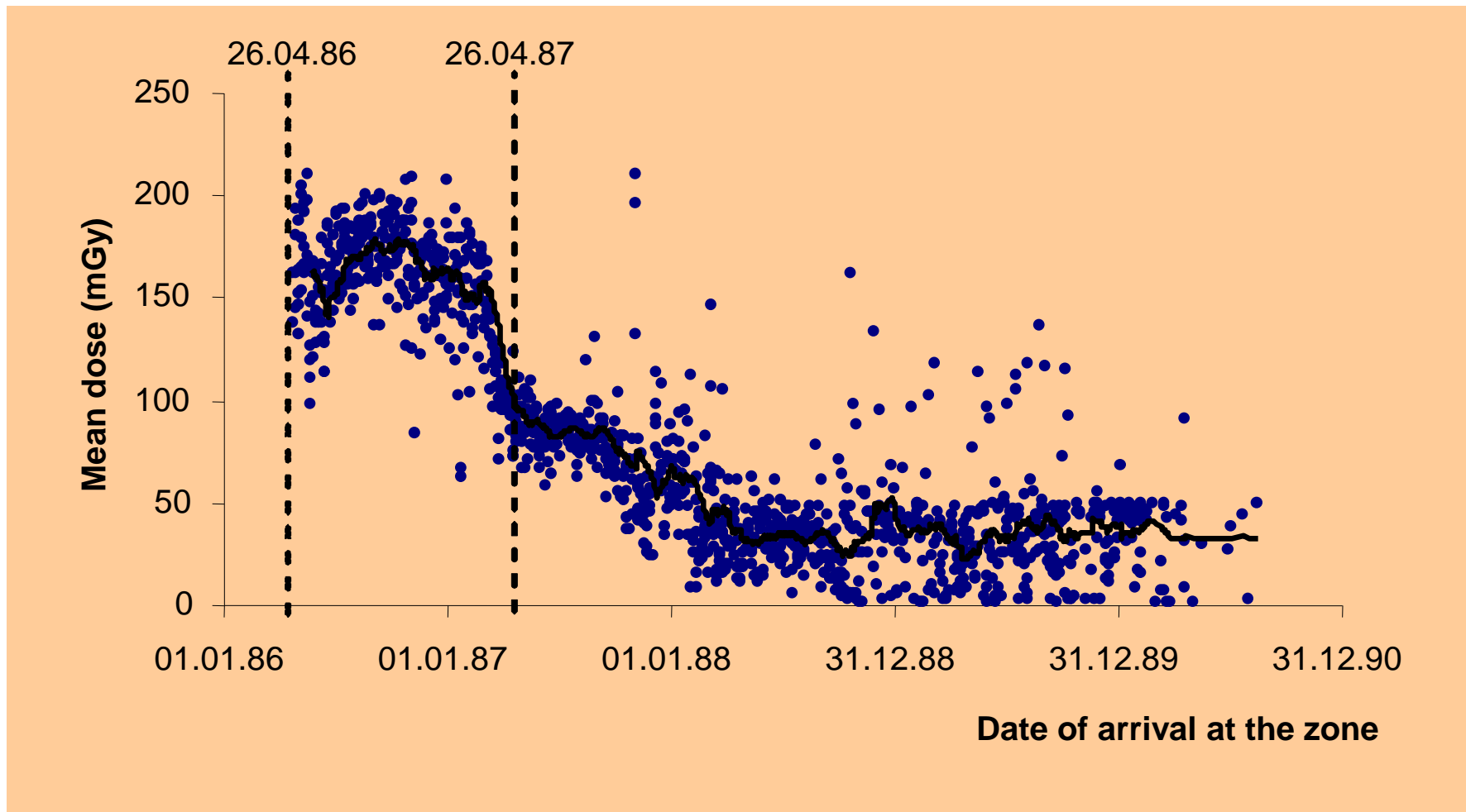


Emergency workers: about 180,000 workers (of which about 60,000 had worked between 1986 and 1987, and received medical checkups annually; the rest of the workers received checkups once every two years).

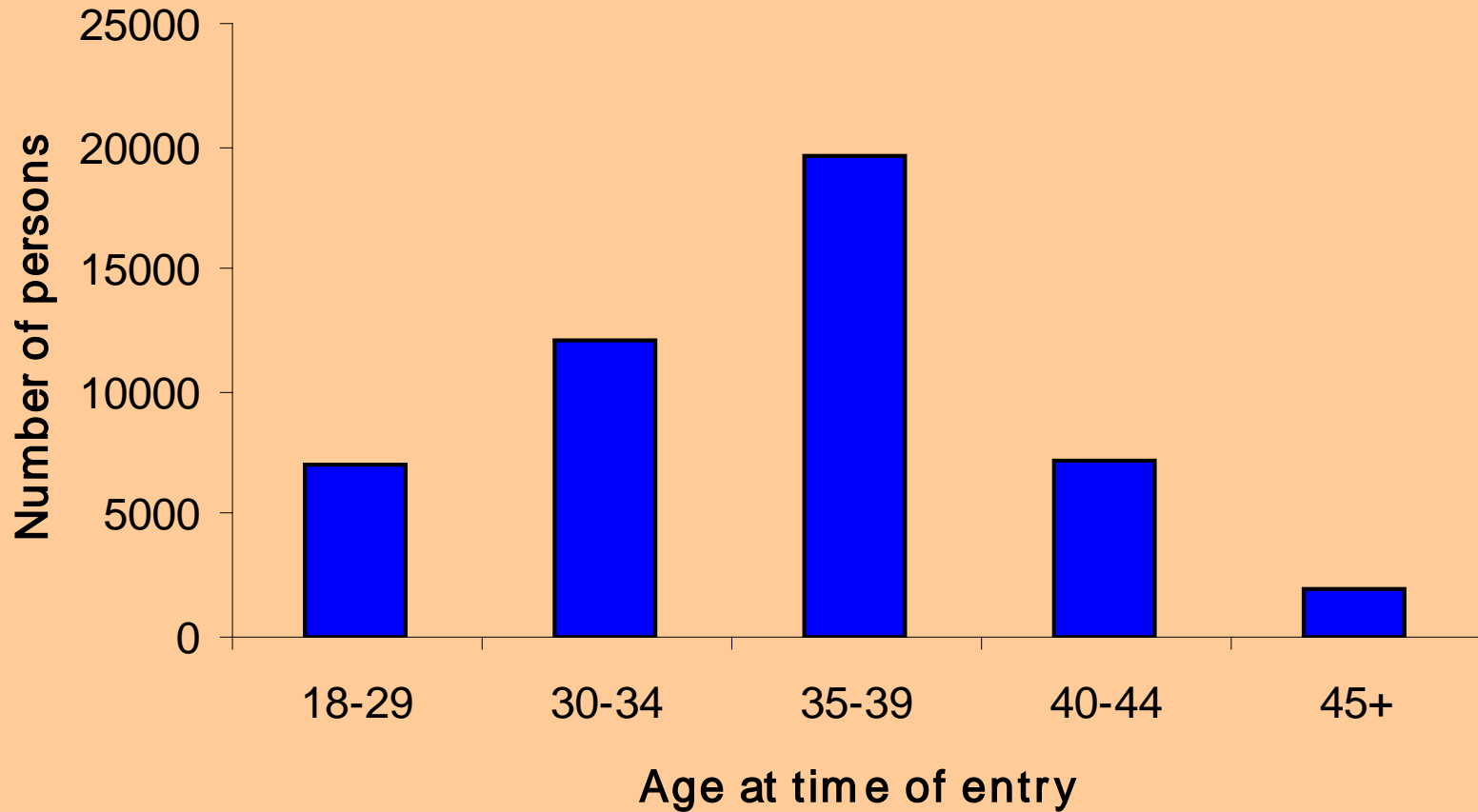
# Russia's primary and sub registries



# Doses to which emergency workers were exposed and the dates of their arrival at the 30-km zone

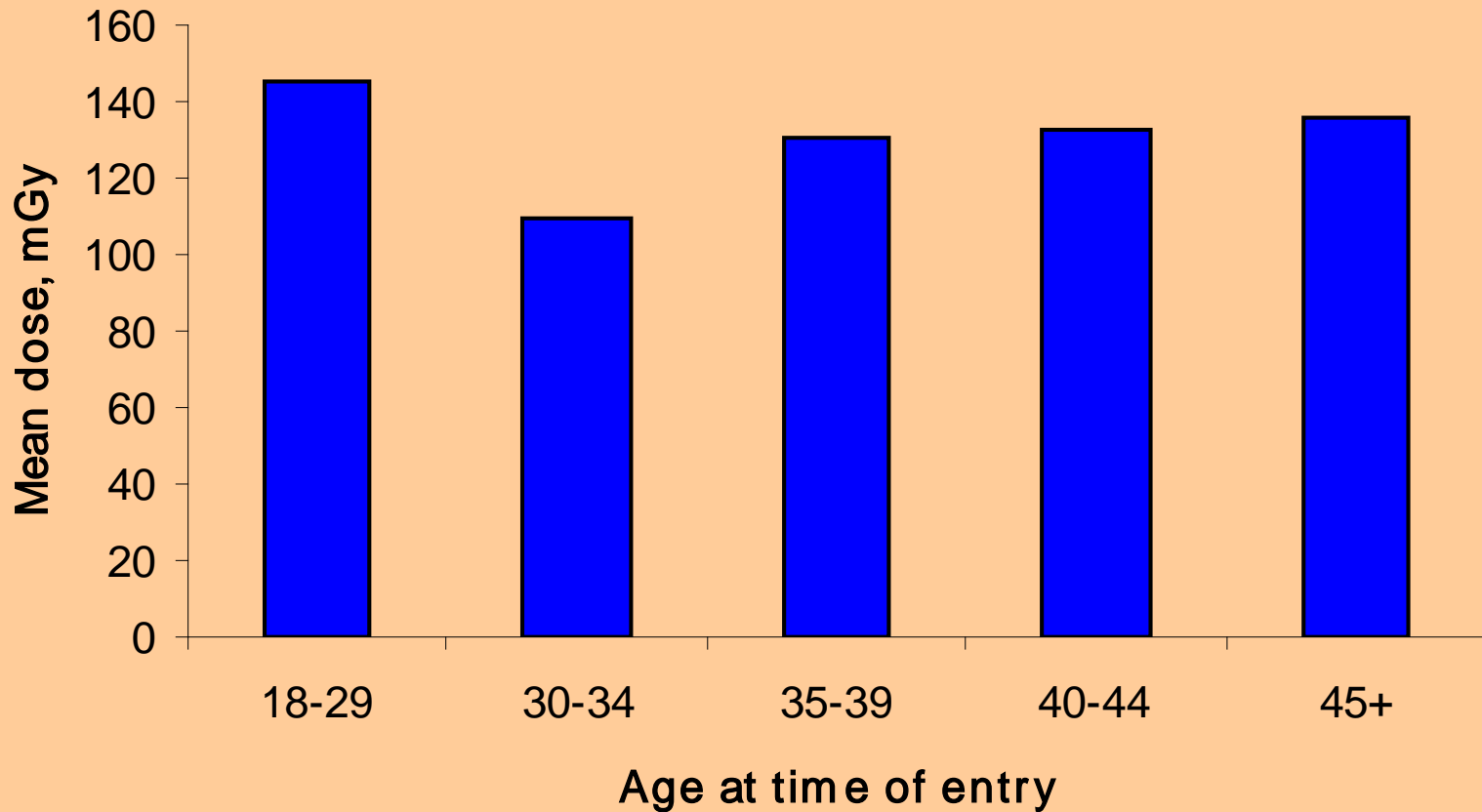


# Age distribution of emergency workers

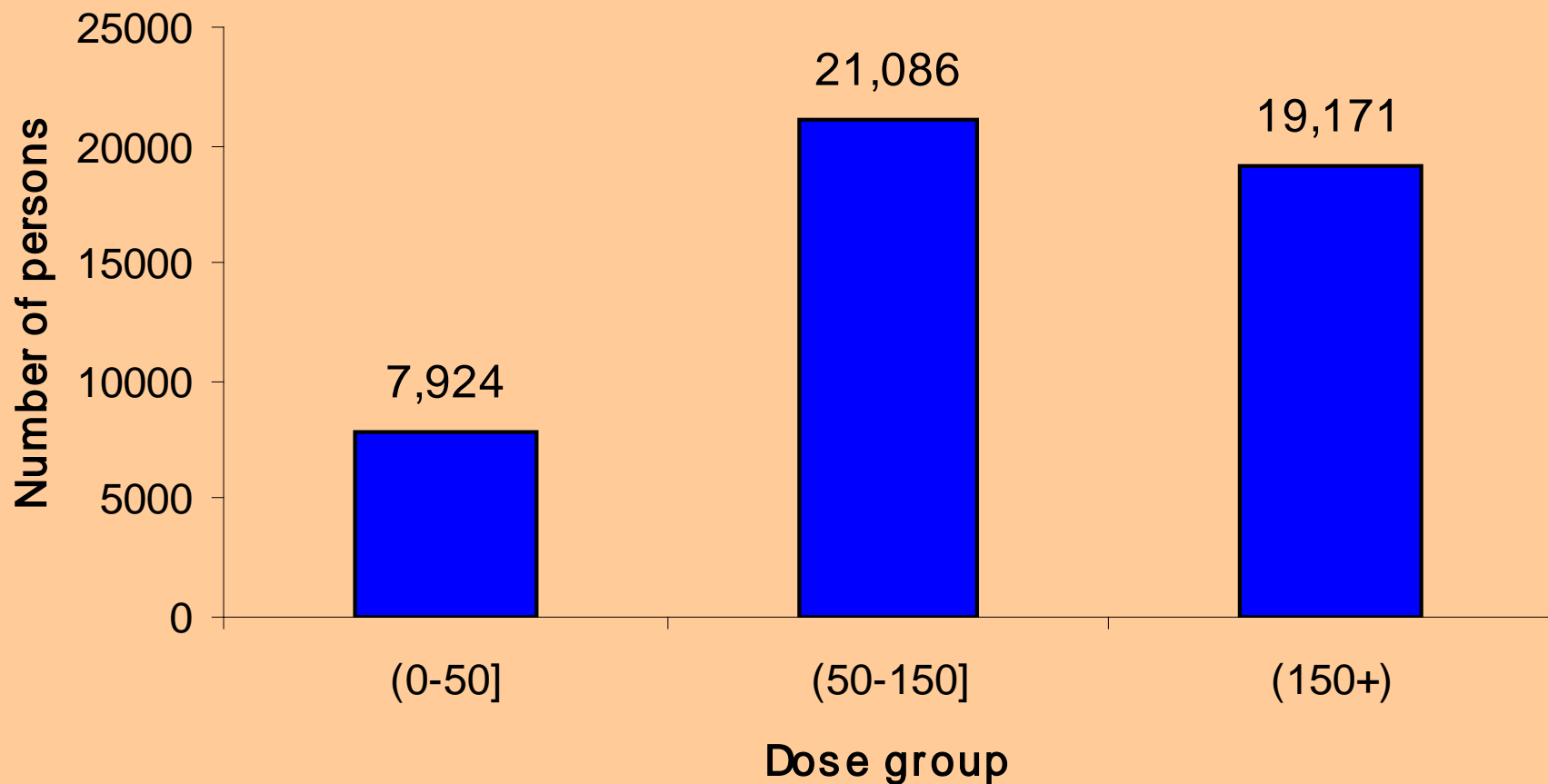


# Mean exposure doses by age group

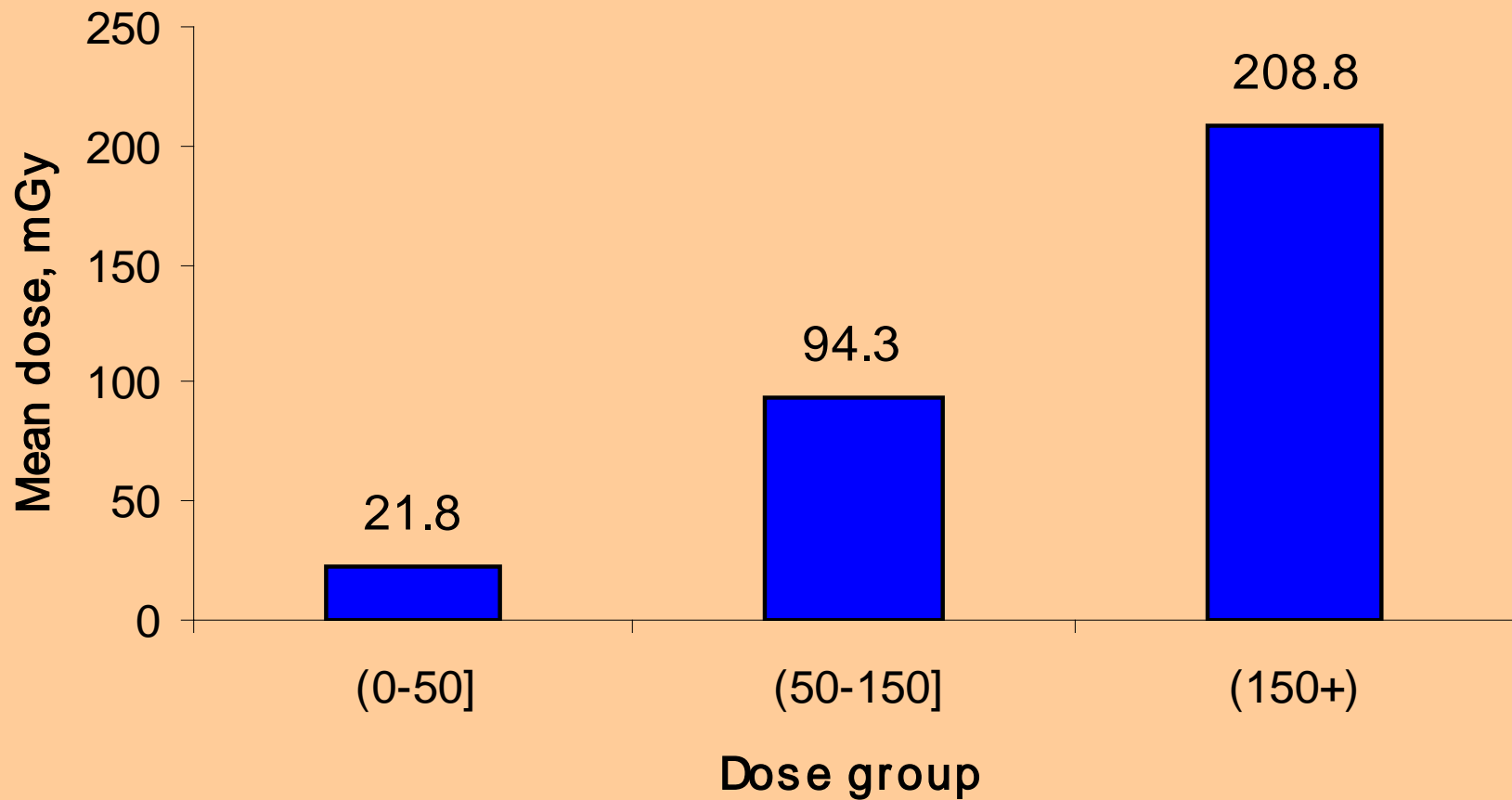
**Mean dose – 128 mGy**



# Number of exposed workers by dose group



# Mean exposure doses in each dose group





# Description of cohorts

	Year registered	Year in which they started working	Number of workers	Mean dose (mGy)	Follow-up period	Study focus
A	1992	1986-90	61,017	110	1986-2000	Non-cancer morbidity
B	1992	1986-87 (First one year)	29,003	160	1986-2000	Non-cancer morbidity
C1	1999	1986-90	65,905	110	1991-98	Malignant neoplasm mortality
C2	2002	1986-87	55,718	130	1991-2000	Solid cancer morbidity
C3	2004	1986-90	71,870	110	1986-2003	Leukemia morbidity

# Causes of death among emergency workers (1)

<b>Disease class</b>	<b>ICD-10</b>	<b>Number of cases</b>	<b>%</b>
<b>Total number of deaths</b>		<b>10,896</b>	<b>100</b>
<b>Infectious diseases (including parasites)</b>	<b>A, B</b>	<b>272</b>	<b>2.5</b>
<b>Malignant neoplasms (solid tumors)</b>	<b>C00-C80</b>	<b>1,393</b>	<b>12.8</b>
<b>Cardiovascular diseases</b>	<b>I</b>	<b>4,306</b>	<b>39.5</b>
<b>Respiratory diseases</b>	<b>J</b>	<b>623</b>	<b>5.7</b>
<b>Digestive diseases</b>	<b>K</b>	<b>729</b>	<b>6.7</b>
<b>External injuries, poisoning</b>	<b>S, T</b>	<b>2,782</b>	<b>25.5</b>
<b>Others</b>		<b>791</b>	<b>7.3</b>

## Causes of death among emergency workers (2)

<b>Disease class</b>	<b>ICD-10</b>	<b>Number of cases</b>	<b>%</b>
<b>Stomach cancer</b>	<b>C16</b>	<b>181</b>	<b>1.7</b>
<b>Lung cancer, bronchial cancer</b>	<b>C34</b>	<b>485</b>	<b>4.5</b>
<b>Acute myocardial infarction</b>	<b>I 21</b>	<b>233</b>	<b>2.1</b>
<b>Other acute ischemic heart diseases</b>	<b>I 24</b>	<b>225</b>	<b>2.1</b>
<b>Chronic ischemic heart diseases</b>	<b>I 25</b>	<b>1,763</b>	<b>16.2</b>
<b>Cardiomyopathy</b>	<b>I 42</b>	<b>339</b>	<b>3.1</b>
<b>Heart failure</b>	<b>I 50</b>	<b>237</b>	<b>2.2</b>
<b>Cerebrovascular diseases</b>	<b>I 60-I 69</b>	<b>695</b>	<b>6.4</b>

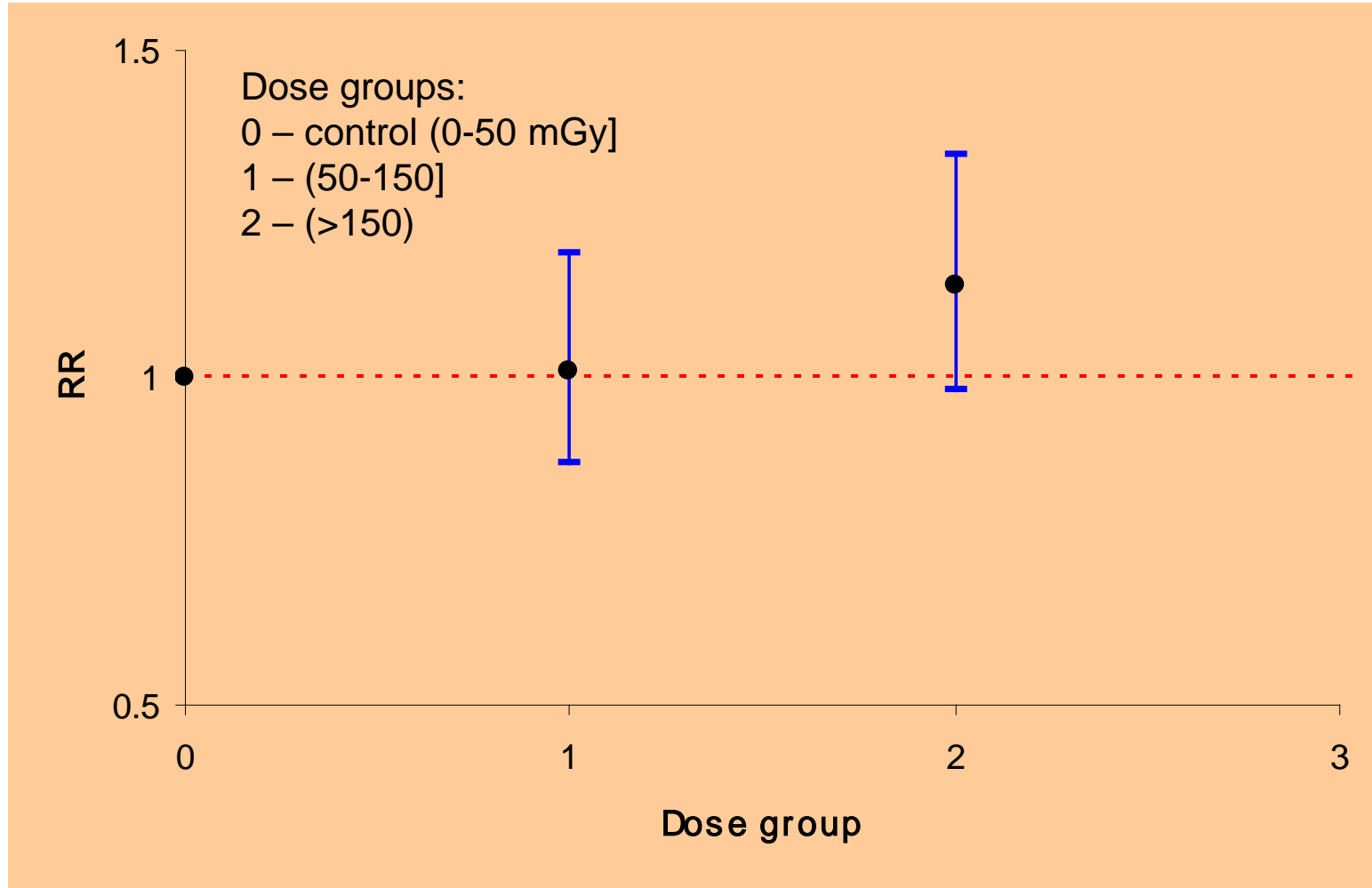
# Risk of emergency workers dying from different diseases

<b>Disease class</b>	<b>ICD-10</b>	<b>p</b>	<b>ERR Gy<sup>-1</sup> (95% CI)</b>
<b>Total</b>		<b>0.003</b>	<b>0.42 (0.14; 0.72)</b>
<b>Infectious diseases (including parasites)</b>	<b>A, B</b>	<b>0.37</b>	<b>0.86 (-0.83; 3.57)</b>
<b>Solid tumors</b>	<b>C00-C80</b>	<b>0.06</b>	<b>0.74 (0.03; 1.76)</b>
<b>Cardiovascular diseases</b>	<b>I</b>	<b>&lt; 0.001</b>	<b>1.01 (0.51; 1.57)</b>
<b>Respiratory diseases</b>	<b>J</b>	<b>0.10</b>	<b>-0.80 (-1.52; 0.18)</b>
<b>Digestive diseases</b>	<b>K</b>	<b>&gt; 0.5</b>	<b>0.35 (-0.65; 1.68)</b>
<b>External injuries, poisoning</b>	<b>S, T</b>	<b>&gt; 0.5</b>	<b>-0.09 (-0.57; 0.46)</b>

# Causes of death among emergency workers

<b>Disease</b>	<b>ICD-10</b>	<b>p</b>	<b>ERR Gy<sup>-1</sup> (95% CI)</b>
<b>Stomach cancer</b>	<b>C16</b>	<b>0.33</b>	<b>1.08 (-0.86; 4.43)</b>
<b>Respiratory cancer (lung, bronchi)</b>	<b>C34</b>	<b>0.42</b>	<b>0.53 (-0.65; 2.16)</b>
<b>Acute myocardial infarction</b>	<b>I 21</b>	<b>0.15</b>	<b>1.59 (-0.47; 5.15)</b>
<b>Other acute ischemic heart diseases</b>	<b>I 24</b>	<b>&gt; 0.5</b>	<b>-0.27 (-1.63; 1.90)</b>
<b>Chronic ischemic heart diseases</b>	<b>I 25</b>	<b>0.09</b>	<b>0.62 (-0.08; 1.45)</b>
<b>Cardiomyopathy</b>	<b>I 42</b>	<b>&gt; 0.5</b>	<b>-0.43 (-1.43; 1.00)</b>
<b>Heart failure</b>	<b>I 50</b>	<b>0.20</b>	<b>1.29 (-0.54; 4.30)</b>
<b>Cardiovascular diseases</b>	<b>I 60-I 69</b>	<b>0.009</b>	<b>1.67 (0.35; 3.47)</b>

# Relative risk of solid cancer by dose group



Points: RR=1.01 for the mean dose of 94.3 mGy and  
RR=1.14 for the mean dose of 210 mGy

# Risk of leukemia among emergency workers

Follow-up period	1986–1996				1997–2003			
Radiation dose (mGy)	0-	45-	90-	150-300	0-	45-	90-	150-300
Mean dose (mGy)	17	66	106	215	17	65	106	215
Number of leukemia cases	11	3	5	22	9	7	5	9
Relative risk (90% CI)	1.0 -	0.4 (0.1, 1.0)	0.4 (0.1, 1.0)	1.4 (0.8, 2.6)	1.0 -	1.1 (0.5, 2.6)	0.6 (0.2, 1.5)	0.9 (0.3, 1.8)
Relative risk (comparison between two groups) (90% CI)	1 -			2.2 (1.3, 3.8)	1 -			0.9 (0.5, 1.5)
Excessive relative risk (per 1 Gy, 90% CI)	4.4 (0.0, 16.4)				-1.0 (-3.0, 3.6)			

# Reference: UNSCEAR report (2011)

- Among Russian recovery operation workers with higher doses there is emerging evidence of some increase in the incidence of leukemia. However, based on other studies, the annual incidence of radiation-induced leukemia would be expected to fall within a few decades after exposure. In addition, recent studies of the recovery operation workers indicate that opacities of the eye lens might be caused by relatively low radiation doses.

## References cited:

1. Ivanov V. et al. Radiation and epidemiological analysis for solid cancer incidence among nuclear workers who participated in recovery operations following the accident at the Chernobyl NPP. *J Rad Res.* 45; 41-4, 2004.
2. Ivanov V. Late cancer and noncancer risks among Chernobyl emergency workers of Russia. *Health Phys.* 93(5); 470-9, 2007.
3. Ivanov V. et al. Latent period in induction of radiogenic solid tumors in the cohort of emergency workers. *Radiat Environ Biophys.* 48; 247-52, 2009.
4. The Chernobyl accident. UNSCEAR's assessments of the radiation effects, 2011.