

Update of Findings about Radiation-induced Chronic Lymphocytic Leukemia

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Table 1 Findings about radiation-induced CLL

Exposed cohort and reference	
Hiroshima/Nagasaki, NIC group Ichimaru et al. 1977	Size of collective 26,508 Obs./Exp. = 28/19 RR=1.5
5 Nuclear Facilities USA Schubauer-Berigan et al. 2007	94,500 occupied persons case-control study 43 CLL deaths ERR=20 per Sv
Liquidators Chernobyl Gluzman 2006 Abramenko et al. 2007 Kesminiene et al. 2008 Romanenko et al. 2008 Gluzman this conference	„CLL most frequent form of leukemia in clean-up workers“ ERR=4.7 per Gy (Median dose 13 mGy)* ERR=4.1 per Gy (Mean dose 76 mGy)*
Uranium miners Czech Republic Rericha et al. 2006	Size of collective 23,043 Obs./Exp. = 42/21.2 RR=2.0
Uranium miners Germany Möhner et al. 2010	Case-control study, cases 377 RR=2.0 per Gy*

*) Bone marrow dose

“Tracheobronchial lymph nodes tend to be the site of greatest concentration for inhaled uranium and thorium” (Archer et al. 1973)

Shown by autopsy in men:

Goldin et al.: Thorotrast patients. Health Physics 22 (1972)471

Mausner: Inhalation exposures thorium refinery. Health Physics 42(1982)231

Keane, Polednak: Uranium in the chest. Health Physics 44 (1983)391

Singh et al.: U and Th in miners & millers. Health Physics 53 (1987)261

Several experimental studies e.g.

Mitchel, R.E. et al.: Inhaled uranium ore dust and lung cancer risk in rats. Health Physics 76 (1999) 145-155

Experiments in rats, inhalation of natural uranium ore dust, after 400 days accumulation of uranium in bronchial lymph nodes was up to 100-fold higher than in the lung tissue.

Abramenko, I., Bilous, N., Chumak, A., Davidova, E., Kryachok, I., Martina, Z., Nechaev, S., Dyagil, I., Bazyka, D., Bebesko, V.: Chronic lymphocytic leukemia patients exposed to ionizing radiation due to the Chernobyl NPP accident—With focus on immunoglobulin heavy chain gene analysis. *Leukemia Research* 32 (2008) 535-545

Archer, V.E., Wagoner, J.K., Lundin, F.E.: Cancer mortality among uranium mill workers. *J. Occup. Med.* 15 (1973) 11-14

Gluzman, D., Imamura, N., Sklyarenko, L., Nadgornaya, V., Zavelevich, M., Machilo, V.: Patterns of hematological malignancies in Chernobyl clean-up workers (1996-2005). *Exp. Oncol.* 28 (2006) 60-63

Ichimaru, M., Ishimaru, T., Belsky, J.L. et al.: Incidence of leukemia in atomic bomb survivors, Hiroshima & Nagasaki 1950-71. Radiation Effects Research Foundation, Technical Report RERF 10-76, Hiroshima 1977

Kesminiene, A., Evrard, A.-S., Ivanov, V.K., Malakhova, I., Kurtinaitis, J., Stengrevics, A. et al.: Risk of hematological malignancies among Chernobyl liquidators. *Radiat. Res.* 170 (2008) 721-735

Möhner, M., Gellissen J., Marsh, J.W., Gregoratto, D.: Occupational and diagnostic exposure to ionizing radiation and leukemia risk among German uranium miners. *Health Phys.* 99 (2010) 314-321

Rericha, V., Kulich, M., Rericha, R., Shore, D.L., Sandler, D.P.: Incidence of leukemia, lymphoma, and multiple myeloma in Czech uranium miners: a case-cohort study. *Environ. Health Persp.* 114 (2006) 818-822

Richardson, D.B., Wing, S., Schroeder, J., Schmitz-Feuerhake, I., Hoffmann, W.: Ionizing radiation and chronic lymphocytic leukemia. *Environm. Health Persp.* 113, 2005, 1-5

Romanenko, A.Ye., Finch, S.C., Hatsch, M., Lubin, J.H., Bebesko, V.G., Bazuka, D.A. et al.: The Ukrainian-American study of leukemia and related disorders among Chornobyl cleanup workers from Ukraine: III. Radiation risks. *Radiat. Res.* 170 (2008) 711-720

Schubauer-Berigan, M.K., Daniels, R.D., Fleming, D.A., Markey, A.M., Couch, J.R., Ahrenholz, S.H., Burphy, J.S., Anderson, J.L., Tseng, C.Y.: Chronic lymphocytic leukaemia and radiation: findings among workers at five US nuclear facilities and a review of the recent literature. *Br. J. Haematol.* 139 (2007) 799-808