Background Information:
Atomic Bombs on Hiroshima and Nagasaki – Health Effects of Radiation

On 6 and 9 August 2005 it will be 60 years that the atomic bombs were dropped on Hiroshima and Nagasaki. Large parts of both cities were almost completely destroyed at the time and those who were near the hypocentres at the time of the explosions had little chance to survive. Current estimates assume that about 200,000 of those affected died of the acute effects of the explosions by the end of 1945. These acute effects included not only injuries due to the pressure wave and the heat of the explosions, but also acute diseases due to exposure to high doses of ionising gamma and neutron radiation.

Those responsible for dropping the atomic bombs had originally only thought of the effect of the pressure of the explosion and the heat and had not expected any health effects of the radiation to occur later. But in the early fifties physicians already found that cases of cataract and leukaemia were more frequent among the survivors of the atomic bombs. In specific cases it is unfortunately not yet possible to apply diagnostic or molecular biology methods to determine whether leukaemia or cancer is induced by radiation or by any other unknown factors. Therefore, any assessment of additional cases of a disease caused by previous exposure to radiation is based on the comparison of the frequency among the irradiated and virtually unirradiated groups of patients exclusively.

Since 1950 approx. 120,000 survivors from both cities have been monitored by physicians, and biostatic and dosimetric tests have been conducted in a joint Japanese-American study. “In the first few years of these investigations the high frequency of leukaemia was particularly striking,” reports Dr. Werner Rühm from the GSF – Research Centre for Environment and Health. During the following years the frequency of leukaemia gradually returned to normal. “Throughout the observation period from 1950 to 2000, 296 deaths as a result of leukaemia occurred among approx. 87,000 survivors covered by the study, 93 of which are now attributed to the ionising radiation due to the atomic bomb explosions,” explains the radiation protection expert, who was also involved in the neutron dosimetric investigations. For cancer the situation is different. In the same period a total of 10,127 deaths due to cancer were observed in the same group of survivors. In an unirradiated reference group 9,648 deaths would be expected, so that it is currently assumed that 479 additional deaths by cancer have been caused by the radiation of the atomic bombs so far. However, radiation-induced occurrence of cancer – as opposed to leukaemia – is still clearly higher among the survivors 60 years after the explosions, and it is expected that at least another 500 additional radiation-induced cancers will be seen among the survivors.

Recent results also indicate that non-cancerous diseases, such as cardiovascular diseases, may be more frequent among the survivors of the atomic bombs. Little is known as yet about the mechanisms of how ionising radiation may cause such diseases. Therefore, it is urgently required that these studies of the survivors be continued for just this one reason.
“As opposed to common views – an increased frequency of genetic defects as a result of radiation has **not** been established despite extensive studies of children and grandchildren of the survivors of the atomic bombs,” says Rühm. This, however, does not prove that there is no increase in this type of damage. Since there is currently no way to distinguish between radiation-induced and spontaneous genetic defects, it is quite possible that the contribution of the radiation of the bombs has as yet remained concealed by the statistical fluctuations of genetic defects occurring in normal conditions.

A distinction must be made between genetic defects and malformations caused by prenatal exposure to radiation of an embryo or foetus in the womb. It was only about 20 years ago that it was shown that, e.g., approx. 30 cases of severe mental retardation in children exposed to radiation before they were born in Hiroshima and Nagasaki were caused by radiation. The central nervous system – in particular the developing brain from the 9th to the 15th week of pregnancy – is the organ having the highest susceptibility to radiation.

Thus, against wide-spread opinions, the studies conducted in Japan show that neither the number of the radiation-related deaths due to **cancer** among the atomic bomb survivors observed amounts to thousands or even tens of thousands, nor is, for example, a higher frequency of genetic defects observed in the subsequent generation (the third generation is already being studied, and no indications of radiation-induced genetic defects have been found). “Yet the observations of the atomic bomb survivors have to be continued even 60 years after the tragic events over Hiroshima and Nagasaki,” Rühm emphasises, “because – with the exception of leukaemia - the increase in cancer rates can only now become clear in the mortality rates of those who were exposed to radiation during infancy. Our knowledge of the late effects caused in humans by ionising radiation is already largely based on these studies which have been conducted on the survivors of the atomic bomb explosions in Hiroshima and Nagasaki for 55 years.”

**Literature for Background Information Hiroshima - Nagasaki**

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