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Radiation Effects after Low Dose Chronic Long-Term Exposure

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Preliminary remarks

Medical doctors who have to treat patients after a possibly chronic- or protracted long term radiation exposure should be able to decide quickly if there is the suspicion of unusual exposure and what will be the optimal diagnostic and therapeutic regime for a special patient

Chronic long term radiation exposure from the epidemiological point of view is not going to be the subject of the presented article - even if the statistical determination of late effects is very important. In addition, the evaluation of exposure quantity and quality as the main objective of radiation protection is also important. However, this topic should also not be the basis of this overview.

Medical doctors should keep in mind that a pathophysiological model is important from which the principle mechanisms of chronic long term exposure at different biological levels can be derived and elucidated (Fig.1). In limits these physiological based mechanisms enables the organism to adapt to unusual radiation fields without direct clinical health impairment The details of such a model have been discussed elsewhere [1].

The key problem for the medical personnel in charge is, which diagnostic methods and therapeutic techniques are available and meaningful to recognize a chronic radiation exposure, to treat the patient in an optimal way and prevent secondary effects?

Examples for low dose chronic exposure

In the scientific literature at least three accidents have been described concerning people accidentally exposed to chronic irradiation and becoming ill after a long symptom free period

The oldest accident to be to referred to occurred in Mexico on Feb. 21, 1962 [2]. A 10 year old boy found a stainless steel capsule of about 1 5 cm and put it in his pocket without knowing that it contained ^{60}Co After 7 days his mother found the capsule and put it on the kitchen shelf. In the resultant radiation field all family members were exposed. 24 days after the beginning of the radiation exposure the little boy (E.E.P) was hospitalized and diagnosed as suffering from the signs and symptoms of a severe aplastic anemia of unknown etiology. He died due to panmyelopathy 12 days later His 2 $^1/_2$ year old sister, mother and grandmother also died after being in and out of the accidental radiation field for 120, 115 and 90 days, respectively (Table 1) Only after the grandmothers death the authorities took notice, discover and seize