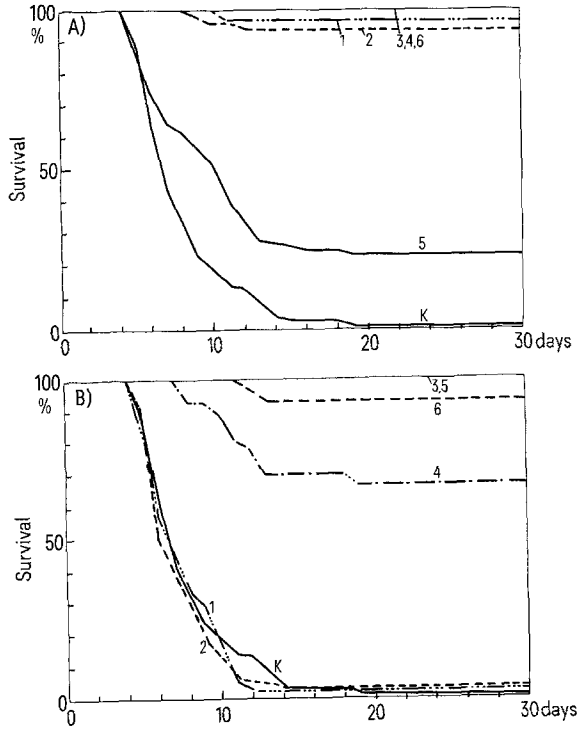
The Radioprotective Effect of Solcoseryl

Recently some observations have been made about advantageous effects of Solcoseryl® on radiation-induced damage of skin, mucosa and eyes[1]. These findings suggest that Solcoseryl could exert protection against ionizing irradiation in irradiated whole organisms. An investigation carried out by another research group[2] demonstrated a therapeutic effect of Solcoseryl in mice after irradiation with a sublethal dose of X-rays. However, no investigation exists concerning prophylactic effects, if we neglect two papers whose results remain entirely unclear[3]. We took up this question in order to link it with our earlier investigations on radioprotection by means of psychotropic drugs[4].



Percentage survival of male GP-Swiss and HaICR mice (ordinate) after γ-irradiation (once with 912 rad) within 30 days (abscissa). Untreated control series (K) and animals pretreated with several doses of Solcoseryl. A) i.p. pretreated mice; B) p.o. pretreated mice. The denotation of the curves corresponds to the following doses: 1 = 0,6 mg/30 g; 2 = 6 mg; 3 = 12 mg; 4 = 20 mg; 5 = 30 mg; 6 = 40 mg/30 g. The detailed statistical evaluation according to the χ^2-test will be presented in a full paper elsewhere (in Nuklearmedizin).

Solcoseryl[5] contains, in hypertonic solution of pH 7.1, a low-molecular compound extracted from deproteinized blood of young calves; 1 ml of this solution corresponds to 40 mg dry substance. 688 mice (adult male GP-Swiss and HaICR, weight 30 g) were pretreated once, either by i.p. injection or perorally (p.o.) by means of probang. The doses administered ranged from 0.6 mg to 40 mg per animal, corresponding to 0.015 ml to 1 ml/30 g. Whole body irradiation was carried out with γ-rays of a ^{60}Co-source; the single dose applied was 912 ($\pm$ 5%) rad/10 min. The interval between the application of Solcoseryl and the beginning of the irradiation was 60 min. As criterion for the radioprotective effect we took the change in percentage survival of the animals after 30 days following irradiation.

The results are depicted in the Figure, with animals pretreated i.p. (A) or p.o. (B). The control series shows practically no survival after 30 days. In contrast to this, all the doses applied i.p. (except 30 mg) bring about an approx. 100% protective effect. After p.o. administration, the lower doses of Solcoseryl are ineffective and only the higher doses (except 20 mg) lead to a practically 100% protection. Because of the exceptions mentioned, the percentage survivors vs. dose curves show, after both kinds of administration, a 2-phasic behaviour.

Although it is well known that, with irradiation of complex cellular systems and organisms, the dose vs. effect curves can be composed of several parts (phases)[6], it is possible that the observed slight deviations with certain dose are simply due to different distribution patterns of several doses of Solcoseryl within the body. It has been reported that Solcoseryl enhances the O_2-consumption of tissue homogenates (rat liver[7]). In preliminary experiments with the O_2-consumption of mice Solcoseryl showed no metabolic effect. This is not in agreement with our previous findings of radioprotective effects of psychotropic drugs, which depended on the diminution of metabolism[4,8]. Therefore it may be concluded that radioprotection due to Solcoseryl involves another mechanism.

Zusammenfassung. Solcoseryl® ruft bei Mäusen 1 h vor Bestrahlung mit letalen Dosen von γ-Strahlen, i.p. oder p.o. appliziert, ein fast durchwegs 100%iges Überleben im Zeitraum von 30 Tagen hervor.

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