The glycogen content and its fraction in rat liver after 10 days' administration of compound II, cortisol-acetate, and their combination. The differences are significant at $P < 0.05$

Group	No. of animals	Total glycogen µg/100 mg tissue	Significance	Insoluble glycogen µg/100 mg tissue	Significance	Soluble glycogen µg/100 mg tissue	Significance
A – oil	9	452 ± 103	A < C	131 ± 48		325 ± 85	A < C
B – compound II	8	396 ± 111	B < C and D	125 ± 32	∅	279 ± 94	B < C and D
C – cortisol	9	1959 ± 666	C > D	165 ± 34	∅	1794 ± 634	C > D
D – cortisol and compound II	9	757 ± 243		128 ± 29	∅	634 ± 237	

stan-17-one[6]; 1,2α-oxido-2β-brom-5α-androstan-3,17-dione; 1,2α-oxido-2β-chlor-5α-androstan-3,17-dione; and 1,2α-oxido-2β-chlorandrosta-4,6-dien-3,17-dione[6].

The 4 groups of rats received daily doses (A) of 0.4 ml olive oil, (B) 2 mg of tested substance p.o, (C) 2 mg of cortisol s.c., and (D) 2 mg both of compound studied and cortisol (all per 100 g body weight) for 10 consecutive days. The compounds were dissolved in oil, the used volume of which was equal for all the groups including controls (A). 24 h after the last injection and after 24 h of starvation, the animals were decapitated. Cholesterol[7], total lipemia and glucose level in the serum, and total glycogen and its fractions in the liver were determined as before[8]. The statistical evaluation was accomplished as previously[8]. The fiducial limits of the means are always mentioned.

From the above-mentioned steroids only compound II produced a positive effect. The Table shows that cortisol caused a marked increase in the total glycogen in the liver, mostly in its soluble fraction. This increase was inhibited by a simultaneous administration of compound II. In repeated experiments (4 times) a decrease in hypercholesterolemia, hyperglycemia and hyperlipemia in serum was observed in the groups treated with cortisol and compound II (D), which was not always statistically significant. Compound II alone did not affect the parameters followed. In the test according to HERSBERGER et al.[9], this steroid did not produce any androgenic-anabolic effect. The results reveal that compound II appears to be less active than compound I. Compound I alone decreased the soluble glycogen fraction in the liver, and in interaction with cortisol even the insoluble fraction was decreased[1].

On the basis of the fact that from the steroids studied only 2 compounds were active in interaction with cortisol, one may presume that this effect is connected with a rather specific structure and that it does not depend on the androgenic-anabolic activity. The transfer of oxide from position 1,2α or the introduction of chlorine and bromine in position 2β adversely affect this effect[10].

Zusammenfassung. Auf der Basis von Struktur-Aktivitätsuntersuchungen verschiedener Epoxyden der Androstanreihe konnte gezeigt werden, dass die Antiglucocorticoid-Eigenschaften solcher Verbindungen von einer besonders spezifischen Struktur abhängig sind.

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An Effect of DMSO on Post-Irradiation Saccharin Avoidance in Mice

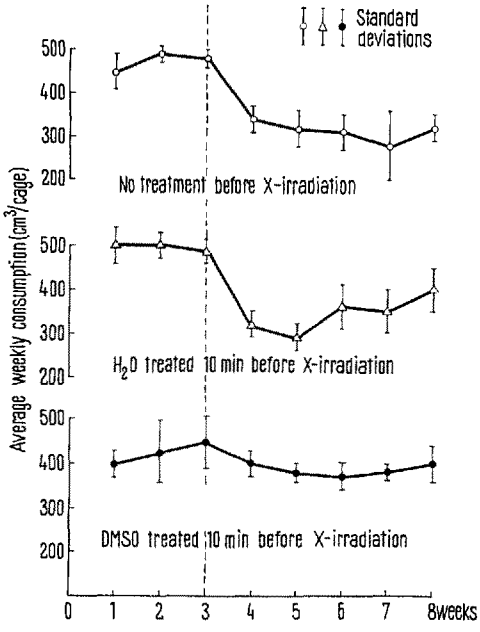
Some interesting results were reported recently by Moos[1] regarding the protective effect of dimethyl sulfoxide (DMSO) against X-radiation in mice. The animals were treated with DMSO 5–10 min before exposure by immersing the major part of their tails in anhydrous DMSO for various lengths of time. One observed that when the subjects were exposed to total body irradiation with doses ranging between 700 and 760 R, 75–95% of the experimental animals survived over 30 days compared to 25–45% survivors in the water-treated control group. We also studied different aspects of the post-irradiation aversion to sodium saccharin in mice[2,3] during the time of this experiment. Though numerous experimental results have been published regarding this avoidance behavior[4–8], none has offered any satisfactory answers regarding the mechanism of these changes. LEVAN treated a group of mice with DMSO as described above, and then, subjecting these animals to the post-irradiation saccharin-water preference test, surprisingly found that the animals continued to prefer sodium saccharin solution to water after whole-body exposure to a total dosage of 450 R. This

pilot study was followed up by further experiments and the results are presented in this paper. No explanations can be offered at present except the facts obtained from our experimental data.

Method. The experiment involved 180 male CFW mice, 50–60 days old, divided randomly into 3 groups. The mice were offered both water and sodium saccharin (1% per weight) for 3 weeks to establish the level of saccharin preference. Amounts of saccharin and water intake were recorded daily and tabulated into weekly consumptions. The 2 drinking bottles used for each cage were alternated daily to compensate for any positional preference that was normally observed. After taste-preference was established, the first group containing 90 subjects was treated with anhydrous DMSO for 10 min as described in reference [1], and then exposed to whole-body X-irradiation (450 R at a dose rate of 50 R/min). The irradiation techniques were thoroughly described in references [2] and [3]. The second group, with 60 mice, was treated with water in the same manner, and the third group, with 30 mice, served as control and received no treatment before irradiation.

After receiving 450 R of X-irradiation the mice were removed from the radiation room and returned to their original cages. Sodium saccharin solution and water were offered in the same way as before the treatment. Average weekly consumption of liquids was recorded and plotted (cm^3/cage vs. per week) for each group.

Results and discussion. The Figure shows the average saccharin consumption curves for each experimental group. Data plotted were computed from the number of cages in each group. Each cage contained 10 animals. During the pre-irradiation period it was observed that the average weekly water intake was about 60% of that of sodium saccharin solution. After the mice were treated with DMSO and exposed to 450 R of X-irradiation, the weekly saccharin consumption for this DMSO-treated group dropped about 8% during the first week in contrast to the amount recorded during the week preceding the irradiation. This drop increased to 18% after the third post-irradiation week before recovery was observed. Data recorded in our previous experiments for animals exposed to *only* 150 R at the same dose rate, showed the drop in saccharin consumption to be quite small. The post-irradiation increase in average weekly water intake was quite negligible when compared with previous data for a group receiving no DMSO treatment and exposed to 150 R.



Average weekly saccharin consumption curves for 3 experimental groups.

For the water-treated group, weekly saccharin consumption dropped to about 66% of the pre-exposure level in the first week and continued in this direction to about 58% of the pre-irradiation consumption in the second week before recovery. The drop in the control (no treatment) group in the first week was about 32% as compared with the pre-irradiation level and increased to a maximum of 42% in the 4th week. Weekly water intake of these 2 groups increased significantly, as was expected.

PFAFFMANN[9], after using the electrophysiological method to study the afferent code in sensory nerves and taste stimulation, concluded that the control of behavior was motivated by information provided by the quality and quantity of diverse chemical stimuli on the tongue. The mechanism of saccharin avoidance behavior in mice has not, however, been explained satisfactorily as yet by investigators in this field. Recently, BOHUS and DE WIED[10] reported that 2 closely related peptides, differing only in the position of the phenylalanine molecule, alter the extinction of a conditioned avoidance response in opposite ways. The site of action of these peptides is in the central nervous system, according to these authors; however, whether this action is due to an autonomic nervous transmission, or by direct chemical activation on nerve cells is not known.

At this time we have no reasonably acceptable hypothesis to explain the direct or indirect connection between the radioprotective effect of DMSO and sodium saccharin preference of mice[11,12].

Zusammenfassung. Ein Dimethylsulfoxyd (DMSO)-Effekt wird beschrieben: bei Nachbestrahlung vermeiden Mäuse Sodium-Saccharin. Mit DMSO vorbehandelte Tiere (Eintauchen der Schwänze in diese Substanz kurz vor Bestrahlung) bevorzugen wie unbehandelte Mäuse Saccharin-Sodium.

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