8871 C

Acute Toxicity of Certain Sugar Alcohols and Their Anhydrides.*

FRANCES F. BECK, C. JELLEFF CARR AND JOHN C. KRANTZ, JR.

From the Department of Pharmacology, School of Medicine, University of Maryland.

The narcotic effect of the sugar alcohols as a series was studied by Macht.[1] Recently the authors[2, 3, 4, 5] have studied the fate of these substances and their anhydrides in the animal body and in bacterial culture media. In these communications, the chemical identity of the materials is established. The differences observed between the metabolism of the alcohols and their respective anhydrides prompted a study of their acute toxicities.

White mice (15 to 25 gm.) were employed. The compounds were prepared in solutions of the concentrations shown in Table I, and a total volume of not more than one cc. was injected intraperitoneally. That dose which killed one-half of the animals within a

TABLE I.

Substance	Toxic Dose gm./100 gm.	% Solution	Mol Fraction x 10^{-4}	Character of Action
Methyl Alcohol	1.2-1.4	40	406	Depression
Ethylene Glycol	1.7-1.9	40	291	"
Glycerin	0.7-0.9	40	87	Convulsion
Erythritol	0.7-0.9	40	65	"
Adonitol	1.0-1.2	40	72	"
Mannitol	1.4-1.6	30	83	"
Sorbitol	1.5-1.7	40	87	"
Glucose (control)	< 1.8	40	—	"
Sucrose (")	> 2.0	40	—	"
Ethylene Oxide	0.01-0.05	1	7	Depression
Epihydrin Alcohol	0.05-0.10	5	10	"
Erythritan	1.7-1.9	40	173	Convulsion
Mannitan	1.6-1.8	40	104	"
Isomannide	1.5-1.7	40	109	"

* The expense of this investigation was defrayed in part by a grant from the committee on Therapeutic Research of the Council on Pharmacy and Chemistry of the American Medical Association.

1 Macht, D. I., and Gin Ching Ting, *Am. J. Physiol.*, 1922, **60**, 496.

2 Carr, C. J., Musser, R., Schmidt, J., and Krantz, J. C., Jr., *J. Biol. Chem.*, 1933, **102**, 721.

3 Krantz, J. C., Jr., Evans, W. E., and Carr, C. J., *Quart. J. Pharm. and Pharmacol.*, 1935, **8**, 213.

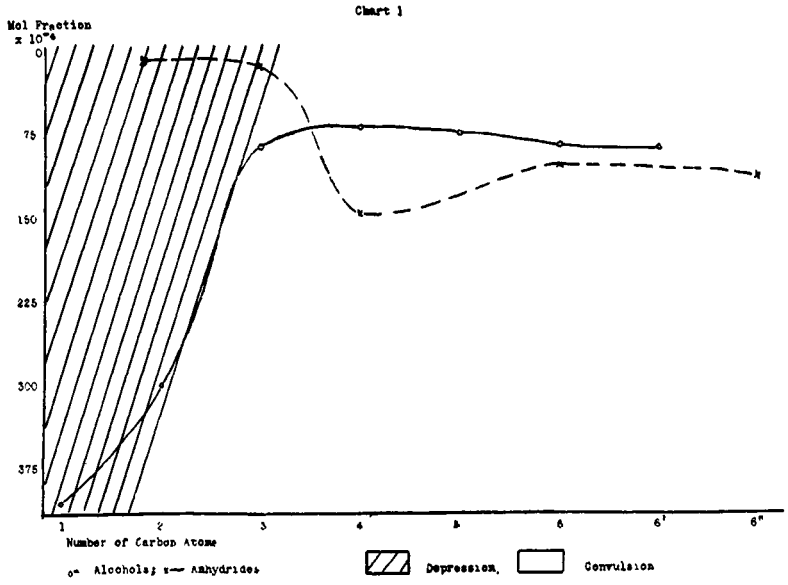
4 Beck, F. F., Master's Thesis, University of Maryland, 1936.

5 Dozois, K. P., Hachtel, F., Carr, C. J., and Krantz, J. C., Jr., *Am. J. Bact.*, 1935, **30**, 189.

period of 2 hours at 29° ± 1° was considered the acute toxic dose. For each substance 15 to 30 mice were used.

The sugar alcohols of higher molecular weight and their anhydrides probably do not kill by specific action. They are toxic, possibly, only by virtue of the osmotic pressure changes which they induce, as the sugars, glucose and sucrose, are toxic in these concentrations.

A summary of the toxicities is shown in Chart 1.



Summary. A direct relationship exists between the molecular weight and the toxicity of the alcohols up to that with 4 carbon atoms: the relationship is inverse with their anhydrides.

The first 2 anhydrides are more toxic than their corresponding alcohols, while the anhydrides of the higher homologues are less toxic, or possess about the same degree of toxicity as their precursors.