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Comparative Depressant Action of Pentothal and Thioethamyl.

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For short operations in both civil[1] and military[2] practice, intravenous barbiturate anesthesia is becoming increasingly more popular. Rapidly metabolized barbiturates or thiobarbiturates are employed for this purpose. Of the thiobarbiturates, those used include sodium ethyl-l-methylbutyl thiobarbiturate ('pentothal') and sodium isoamylethyl thiobarbiturate ('thioethamyl'). The former was reported as an useful intravenous anesthetic agent by Lundy and Tovell and the latter by Cullen and Rovenstein and from the point of view of the anesthetist there appears to be little to choose between the two.[1] Chemically the two compounds are almost identical. Most pharmacological studies have been concerned with their relative anesthetic power, toxicity and effect on blood pressure and respiration, again with results similar in the two drugs.[3] The present report describes a study of the effect of equal doses of 'pentothal' and 'thioethamyl' on several other organs.

The methods employed were the more or less standardized pharmacological procedures similar to those described in Jackson's Experimental Pharmacology. Increasing doses of one or other thiobarbiturate were administered until a dose was reached which produced a definite depression of the system under investigation. The effect of this dose of the two thiobarbiturates was then compared. The systems studied and the doses employed in each case were as follows: (a) the hind limb flexor reflex time in brain-pithed frogs given 2 mg of the drugs into the dorsal lymph sac; (b) the suspended frog heart bathed with a 0.1% solution in buffered Ringer's solution of the drugs; (c) the isolated frog gastrocnemius muscle assembled on a Starling myograph and bathed with a 0.1% solution of the drugs in buffered Ringer; (d) the respiratory rate and depth in tracheal cannulated urethanized rabbits given 15 mg of the drugs intravenously; (e) isolated rabbit small bowel segments assembled in a Magnus bath containing 0.01% of the drugs in Locke's solution;

1 Tovell, R. M., and Garofalo, M., *N. Y. State J. Med.*, 1939, **39**, 2036.

2 British Army: Jeffrey, J. S., *Edin. Med. J.*, 1940, **47**, 727; German Army: Krabbel, M., *Med. Klin.*, 1939, **35**, 1591.

3 Gruhzit, O. M., Dox, A. W., Rowe, L. W., and Dodd, M. C., *J. Pharm. and Exp. Therap.*, 1937, **60**, 125.

TABLE I.
Depressant Effect of Pentothal and Thioethamyl.

Function	% depression (Mean ± standard error)	
	Pentothal	Thioethamyl
Spinal Reflex, Frog	90 ± 16	85 ± 13
Skeletal Muscle Contraction, Frog	53 ± 6	46 ± 5
Cardiac Rate, Frog	42 ± 5	29 ± 3
Respiratory Rate, Rabbit	21 ± 6	10 ± 6
Respiratory Depth, Rabbit	11 ± 11	18 ± 10
Isolated Bowel Tonus, Rabbit	14 ± 9	7 ± 8
do. Strength of Contractions	65 ± 7	41 ± 7
Isolated Uterus Tonus, Guinea Pig	34 ± 9	25 ± 7
Urine Volume, Rabbit and Cat	33 ± 9	28 ± 5
"Grand Mean Depression"	40 ± 9	32 ± 7

(f) isolated guinea pig uterine horns assembled in a Magnus bath containing 0.01% of the drugs in Locke's solution; (g) urine volume per minute in bladder cannulated, urethanized rabbits and cats given 2 mg of the drugs intravenously. Fifteen to 20 animal experiments were performed in each case except in (d) and (g) in which 8 to 10 experiments were done. The percentage depression of the reaction being studied was determined, then the mean percentage depression of all experiments of the group, its standard deviation and standard error.

The results have been summarized in Table I. The depressant effect of thioethamyl was found to be of the same order as that of pentothal in all cases. In 8 out of the 9 comparisons made, pentothal proved to be slightly more depressant on the average than thioethamyl but the differences were not marked for measurements of this type. In no case was there a statistically significant difference between the means. These experiments therefore indicate that thioethamyl and pentothal have similar depressant effects in corresponding doses upon spinal cord reflexes, skeletal muscle, the heart, respirations, small intestine, uterus and urine formation.