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On the Stimulant Effect of Benzedrine Sulphate.

ELDON M. BOYD.

From the Department of Pharmacology, Queen's University, Kingston, Canada.

Benzedrine sulphate has been reported as having a stimulant effect in certain types of patients with mental and physical fatigue and exhaustion. It has been found of value in arousing patients with narcolepsy,[1-3] chronic exhaustion,[4-6] and simple depression,[5] occasionally of value in depressed types of psychoneuroses[5, 7] but of little use in catatonic dementia praecox.[7, 8] Blackburn[9] believes that it raises the intelligence quotient in these patients. Experiments herein reported revealed that benzedrine sulphate does not stimulate spinal reflexes or skeletal muscle directly and that it is not depressant toward respiration as is epinephrine. This evidence supports the view that the stimulant action of benzedrine is entirely cerebral.

The time required for hind limb flexion after stimulating the pad of the foot with dilute (1-5000 to 1-1000) sulphuric acid in 20 brain-only pithed frogs was increased an average of 172% and in 85% of animals following the injection into the dorsal lymph sac of 0.05 mg. of benzedrine sulphate in 0.5 cc. of distilled water. The same dose of epinephrine hydrochloride or meta-synephrine hydrochloride had no consistent effect on the reflex time which on the average was slightly increased. Mean changes in the reflex time are shown in Fig. 1. In larger doses epinephrine also depressed the spinal reflex, an effect previously known but not generally recognized.[10] In relatively large doses benzedrine is thus even more depressant than epinephrine on the spinal reflexes of frogs.

The application of 0.001% benzedrine sulphate to the excised gastrocnemius muscle of 17 frogs produced a weaker and shorter contraction when the muscle was stimulated by a galvanic current.

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3 Shapiro, M. J., *Minnesota Med.*, 1937, **20**, 28.

4 Myerson, A., *Arch. Neurol. and Psychiat.*, 1936, **36**, 816.

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6 Nathanson, M. H., *J. Am. Med. Assn.*, 1937, **108**, 528.

7 Davidoff, E., *Psychiat. Quart.*, 1936, **10**, 652.

8 Carlisle, C. L., *Med. Bull. Veteran's Administration*, 1937, **13**, 224.

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A decrease in the height of contraction occurred in 94% of experiments, the average decrease was 39% and the standard deviation of the average decrease was 18%. A similar decrease occurred in 94% of corresponding experiments with epinephrine hydrochloride, the average decrease being 28%, with a standard deviation of .15%. These experiments demonstrated that benzedrine sulphate like epinephrine hydrochloride is depressant to skeletal muscle *in vitro*.

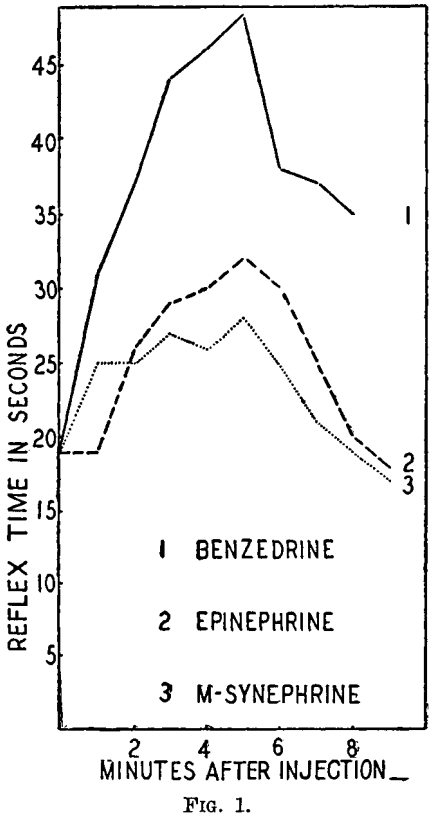

FIG. 1.
The effect of benzedrine, epinephrine, and meta-synephrine on the reflex time of frogs. Ordinate, reflex time in seconds; abscissa, minutes after injection.

Detrick, *et al.*,[11] obtained evidence that benzedrine may stimulate the respiratory center in experimental animals. This work was repeated in 8 rabbits anesthetized by urethane and ether with a Brodie tambour connected with the trachea. Fifteen to 20 intravenous injections of 0.05 to 1.0 mg. of benzedrine sulphate produced no sig-

[11] Detrick, L. E., Millikan, R., Modern, F. S., and Thienes, C. H., *J. Pharm. and Exp. Therap.*, 1937, **60**, 56.

nificant change in respirations while corresponding doses of epinephrine hydrochloride depressed respirations in 95% of experiments and the average depression of the depth was 54%. Under corresponding conditions, therefore, benzedrine does not depress respirations of rabbits as does epinephrine.

Conclusion. Benzedrine sulphate was found to depress spinal reflexes in brain-pithed frogs and to depress skeletal muscle *in vitro*. In doses at which epinephrine depresses respiration, benzedrine had no depressant effect.

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Nutritive Value of Lactalbumin versus Casein.*

M. C. KIK. (Introduced by Barnett Sure.)

From the Department of Agricultural Chemistry, University of Arkansas, Fayetteville.

In this report a summary is given of the results of studies on growth, nitrogen storage, metabolism and composition of gains of rats on diets containing 8% and 12% lactalbumin and casein.

Growth Experiments. A total of 2 series of animals was used consisting of 3 groups. The rats of the same group were litter mates and of the same sex and weight, and all rats were confined in individual cages. One series of 9 animals was fed a diet containing 8% protein and another series was fed 12% protein. The animals were weighed every other day and accurate food consumption records were kept. The experimental period lasted 70 days. The average results of these growth experiments showed that the gain in body weight per gram of protein intake was 1.65 gm. for 3 animals fed a diet containing 8% casein, and 2.14 gm. for 6 animals on an 8% lactalbumin diet.

On a 12% level of protein these figures were 1.60 and 1.86 for casein and lactalbumin, respectively. Nitrogen storage was determined in the rats of the growth experiments described above. In each group a fourth rat, litter mate of the same sex and weight, was sacrificed at the beginning of the experiment and the carcass was analyzed for nitrogen. These rats served as controls. After the feeding period of 70 days all animals were sacrificed. The percentage of total food nitrogen stored on each ration was computed by sub-

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