

by this procedure and the results compared with those obtained by the direct method.<sup>1</sup> These included patients with and without cardiac disease. An obese patient, whose veins were not visible above the surface of the skin, is included in this series. The table shows that a high degree of accuracy is possible when the results of our indirect method are compared with those obtained by the direct method.

We are presenting this preliminary report for the purpose of describing a new principle in the estimation of venous pressure. We believe that further experimentation will lead to improvements in the instrument and simplification of technic so that the method may be adopted for general clinical use. The advantages over other indirect methods are its greater accuracy, the simplicity of the apparatus, the absence of haste in reading the end-point, and the possibility of its use in obese and other patients where other indirect or direct procedures may fail.

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### A Note of the Corneal Anesthesia Produced by Pilocarpine Administration.

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(Introduced by C. I. Reed.)

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The mydriasis which the administration of pilocarpine causes in the rat (Waddell,<sup>1</sup> Koppanyi<sup>2</sup>) is one of the numerous paradoxical responses elicited by this drug. During the course of an investigation on the nature of iris sphincter tone in this animal, it was noticed that the topical or subcutaneous administration of pilocarpine resulted in corneal anesthesia. Inasmuch as it has been shown that substances capable of acting as surface anesthetics would cause the pupil of the rat to dilate (Barnard<sup>3</sup>) it was thought, at first, that we held the key to the explanation of the pilocarpine mydriasis. Certain facts, however, indicate that pilocarpine does not owe its pupillo-dilator properties to the corneal anesthesia following its ad-

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<sup>1</sup> Katz, L. N., Hamburger, W. W., and Rubinfeld, S. H. Observations on Oxygen Therapy. II. Measurements of Respiration and Circulation. In press.

<sup>2</sup> Waddell, J. A., *J. Pharm. Exp. Therap.*, 1926, **27**, 247.

<sup>3</sup> Koppanyi, T., and Sun, K. H., *Am. J. Physiol.*, 1926, **78**, 358.

<sup>3</sup> Barnard, R. D., *Am. J. Physiol.*, 1928, **74**, 407.

ministration. The mydriasis is of a greater extent than that following the application of some local anesthetic. Furthermore, pilocarpine constricts the pupil of the mouse, whereas local anesthetics such as hexylresorcinol and butyn dilate the pupil in this animal as they do in the rat (Heidgen and Barnard<sup>4</sup>).

Using graduated hairs for stimulation of the cornea, and accepting an absence of the winking reflex as a criterion for anesthesia, the effect of subcutaneous administration of pilocarpine was determined.

The number of experimental animals was, 34 albino rats, 9 albino mice, 5 guinea pigs, and 2 rabbits. Before the administration of pilocarpine the application of a pledget of cotton to the cornea would result in a closing of the eye, it being sufficient merely to touch the cornea very lightly. All animals were thus tested both before the administration of pilocarpine and after the removal of the pilocarpine anesthesia by atropinization. This constituted the control.

No definite number of stimuli were applied to the cornea in any instance, the usual procedure being to start the stimulus with the finest hair (one which would always produce winking in the non-pilocarpinized animal) and if this proved ineffective a coarser hair was used until an effective stimulus was obtained. As a rule, 5 hairs were used and this would therefore constitute 5 stimuli, applied however at a sufficiently great interval to render the possibility of summation remote.

In every instance, the administration of the drug resulted in an abolition of the corneal reflex within 5 to 60 minutes, depending on the dosage. That the failure to respond to the stimulation of the cornea was not due to paralysis of the extrinsic ocular muscles was evident from the fact that the animals would frequently wink spontaneously during the interval between impotent stimuli.

The pilocarpine anesthesia is removed by the subsequent administration of atropine (0.5 mg.-kilo) and is ineffective in causing corneal insensibility when given to an atropinized animal.

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<sup>4</sup> Heidgen, M. F., and Barnard, R. D., *Am. J. Physiol.*, 1931, **92**, 276.