respirations often change considerably as a result of the pain of the test. More prolonged or "active" expirations or shift of the chest to a more expiratory position tend to engorge the venous vessels of the head skin. These effects will obscure a simultaneous slight constriction in this area. Decrease in the amplitude of the volume pulse may result from increased intrathoracic pressure as well as from arterial constriction so that in those instances where the pulse decreased (the changes were slight) this cannot be considered as evidence of constriction. It is, therefore, suggested that in normal subjects the skin vessels of the head participate only slightly (if they do at all) and to a much less extent than is true for the finger vessels, in the vasoconstrictor response to the cold pressor test.

## 9961 P

## Effect of Potassium Chloride on the Normal and Denervated Iris.

L. D. SEAGER. (Introduced by John Auer.)

*From the Department of Pharmacology, St. Louis University School of Medicine, St. Louis, Missouri.*

Camp and Higgins[1] have called attention to the similarity of the actions of epinephrin and the potassium salts on various organs and have advanced the hypothesis that epinephrin acts by liberating potassium; no reference was made by them to the action of potassium on the iris.

Experiments were carried out using intact and excised bulbi of frogs and intact normal and denervated eyes of living rabbits. Forty-four excised frog bulbi placed in 0.6% KCl, and observed 90 to 150 minutes, resulted in 32 constrictions, 1 dilation, and 11 showing no change. Control eyes placed in 0.6% NaCl gave similar results.

In another sseries of experiments, the cerebra of frogs were pithed or lightly crushed and 0.25 to 1 cc 0.6% KCl injected intracardially or into the aorta. Of 66 eyes observed, 18 showed no change; 41 constricted and 7 dilated. The dilatations were slight or moderate, the maximum being 1 mm. Control injections of 0.6% NaCl produced constriction or no change.

Large doses of KCl, *i. e.*, 1 to 2 cc of a 4.0% solution injected intraärterially into 12 frogs produced constriction in all cases. During the constricted state 0.25 to 0.5 cc epinephrin 1:10,000 was in-

[1] Camp, W. J. R., and Higgins, J. A., *J. Pharm. Exp. Therap.*, 1936, **57**, 376.

jected intracardially or into the aorta; in all cases the pupils markedly dilated.

Seventeen excised bulbi from frogs previously injected with 1-2 cc 1.0% KCl showed no greater sensitivity to dilute solution of epinephrin than 18 control eyes from frogs injected with similar amounts of NaCl.

Three series of experiments were carried out on living rabbits having one iris sympathectomized, by removing the superior cervical ganglion.

In the first series, 11 experiments on 6 rabbits, 1.0 cc of a 4.1% solution of NaCl was injected subconjunctivally in both eyes. There were no changes except for a few transitory constrictions.

In a second series, 11 experiments on 5 animals, 1.0 cc of sterile 5.0% KCl was injected subconjunctivally in both eyes. Marked constriction occurred in both eyes in all cases, with approximate return to normal in 70-80 minutes. In one experiment, the pupils remained constricted for over 2 hours. At no time in any of the experiments was there definite dilatation above normal.

In the third series, 14 experiments on 6 rabbits, 1.0 cc sterile 5.0% KCl was injected subconjunctivally into both eyes. Early during the constricted state, 0.5 cc epinephrin (1:10,000) per kilo body weight was injected intramuscularly. In all, except one experiment, there was a definite dilation on the sympathectomized side. On the normal side, no definite dilatations were noted; the pupils returned gradually from a constricted state to normal.

Control injections of epinephrin 1:10,000 intramuscularly produced dilatations on the sympathectomized sides with no apparent effect on the normal sides; the dilatations were no greater than in the KCl-epinephrin series.

In none of the experiments on frogs or rabbits was any similarity found between the actions of potassium and epinephrin. KCl in the concentrations used constricts the pupil of intact and excised eyes of frogs and the normal and sympathectomized iris of rabbits. Epinephrin overcame the constrictions so produced even when the dosages of potassium were excessive. If KCl exerts an epinephrin-like effect only at certain concentrations, one would expect the optimum concentration to be obtained at some time during the absorptive process.

The above observations do not support the hypothesis that epinephrin acts by liberating potassium.