ACTION OF ESERINE, HEXAMETHONIUM AND ATROPINE ON OUTFLOW RESISTANCE OF MONKEY EYES INDICATING THAT ESERINE RELEASES ACETYLCHOLINE BEIDES PROTECTING IT

by

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In view of the importance of cholinesterase inhibitors in glaucoma therapy it seems of interest to ascertain what releases the acetylcholine which they protect when used clinically.

It has previously been reported quite briefly (BÁRÁNY, 1963) that in the deeply anaesthetized vervet monkey Cercopithecus ethiops, which shows a dependable and marked reaction of outflow resistance to cholinergics, intracameral injection of eserine still decreases outflow resistance after ganglionic blockade by the very heavy dose of 15-30 mg/kg hexamethonium bromide. The decrease is of the same order of magnitude as without ganglionic blockade. This indicates either (1) that eserine has an action of its own on structures responsible for outflow resistance or (2) that it acts by protecting acetylcholine released spontaneously within the eye without the aid of nerve impulses, or (3) that eserine itself liberates acetylcholine from nerve endings and then protects it. In the present experiments the effect of a sizeable dose of atropine on outflow resistance was studied in monkeys under ganglionic blockade. If any appreciable spontaneous release of acetylcholine occurred, atropine would increase outflow resistance. No such effect was found. Experiments demonstrating the eserine effect before and after ganglionic block are also described.

METHODS

25 young cynomolgus monkeys, Macaca irus, of both sexes were used. Each contributed one eye only to the experiments under discussion. They were deeply

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anaesthetized with intravenous pentobarbital. The modified two-level constant-pressure infusion technique was used for determination of outflow resistance (Bárány, 1966). The infusion fluid and the need for calculating successive means have been described (Bárány, 1964). After a pre-period in which a starting value for resistance was obtained, hexamethonium bromide was given i.v. in a dose of 25 mg/kg, the measurements continued for about 24 mins and then 0.5 mg/kg atropine sulphate injected i.v. Measurements were then continued for another 24 mins.

The vervet experiments, on adult animals, had been done very similarly but by the original method (Bárány, 1962, 1964). The needle in the anterior chamber was of the branched variety and 10 µg eserine salicylate in 10 µl perfusion fluid was injected at one stage of the experiment. The control eyes (in fig. 3) received perfusion fluid only. The dose of atropine was 1 mg/kg, which is too much for the cynomolgus monkey but well tolerated by the vervet.

![Graph](image)

Fig. 1

The effect on outflow resistance $R$ in mm Hg per µl/min and outflow facility $C$ in µl/min per mm Hg in the cynomolgus monkey of 25 mg/kg hexamethonium bromide i.v. (HEX) and a subsequent injection of 0.5 mg/kg atropine sulphate i.v. (ATR). Values of $R$ and $C$ were calculated for each individual eye and then averaged. Each monkey contributes one eye only.