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A note on the use of the isolated stomach preparation of the Syrian golden hamster

E. MIKOŚ

The sensitivity of the isolated stomach strip of the Syrian golden hamster to some neurohormones has been assessed. Acetylcholine (5×10^{-9} g/ml), histamine (10^{-8} g/ml), bradykinin (10^{-9} g/ml) and angiotensin (10^{-9} g/ml) contracted the preparation. The action of bradykinin and angiotensin was probably direct although some results for angiotensin suggested a neurogenic component. The sensitivity of this preparation to angiotensin or bradykinin is only a little less than that of the ascending or descending colon of the rat.

THE Syrian golden hamster (*Cricetus, Mesocricetus auratus*) is widely used in bacteriological and virological work. I have explored the possibility of its use for pharmacodynamic purposes.

A preliminary investigation of the isolated stomach of the Syrian golden hamster showed it to be sensitive to some pharmacologically active drugs (Mikoś, 1966). This paper reports the sensitivity of the dose response curve of this preparation to some neurohormones.

Methods

Syrian golden hamsters of either sex were killed by a blow on the head. The stomach was dissected from the abdomen and the fundus was prepared (Vane, 1957). The fundus strip was suspended in a bath of 10 ml capacity filled with Tyrode or Krebs solution at a temperature of 35–36° and gassed with oxygen 95% and carbon dioxide 5%. The movements of the stomach strip were recorded on smoked paper using a frontal writing auxotonic lever (Paton, 1957) with 16:1 magnification and a load on the tissue of 1·5–2 g. The drugs were dissolved in nutrient fluid and added to the bath in volumes of 0·1–0·2 ml, for 60–90 sec; the bath was then washed out three times. A cycle of 3–5 min was used.

The stomach strips usually showed small spontaneous movements in Tyrode or Krebs solution. Constant responses to drugs were obtained about 1 hr after setting up the preparation.

Drugs

Drugs used were: acetylcholine bromide, adrenaline hydrochloride, hyoscine bromide, histamine acid phosphate, nicotine tartrate, morphine sulphate (all BDH), bradykinin, synthetic vasopressin (Sandoz), hexamethonium bromide, 5-hydroxytryptamine creatinine sulphate, noradrenaline tartrate (all M & B), angiotensin (Ciba), oxytocin (Richter; Parke Davis), phenasoline (Polfa).

Results

Acetylcholine, histamine, bradykinin or angiotensin contracted the stomach strips in the concentrations shown in Table 1. 5-Hydroxytryptamine (5-HT), 10^{-9}–10^{-4} g/ml, sometimes contracted the stomach strips, but the contraction was small and did not increase with the increase in concentration of drug. Sometimes the stomach was completely insensitive to 5-HT. Oxytocin sometimes caused contraction in a concentration

From the Department of Pharmacology, Medical Academy of Kraków, ul. Grzegórzecka, 16, Kraków, Poland.

TABLE 1. THE INFLUENCE OF DRUGS ON THE ISOLATED STOMACH STRIP OF THE SYRIAN GOLDEN HAMSTER

Drug	Conc. g/ml	Conc. causing contraction (c) or relaxation (r)	Antagonistic action to:
Acetylcholine bromide	10^{-9}–10^{-4}	5×10^{-9} (c)	—
Adrenaline hydrochloride	10^{-10}–10^{-4}	10^{-8} (r)	10^{-8}–10^{-6} to all contracting drugs
Hyoscine bromide	10^{-7}	—	10^{-7} to acetylcholine
Histamine acid phosphate	10^{-9}–10^{-4}	10^{-8} (c)	—
Bradykinin	10^{-9}–10^{-6}	10^{-9} (c)	—
Hexamethonium bromide	10^{-5}	—	—
5-Hydroxytryptamine creatinine sulphate	10^{-9}–10^{-4}	10^{-8}–10^{-4} (c) not always	—
Angiotensin-hypertensin	10^{-10}–10^{-7}	10^{-9} (c)	—
Noradrenaline bitartrate	10^{-10}–10^{-4}	10^{-8} (r)	10^{-7}–10^{-6} to all contracting drugs
Nicotine bitartrate	10^{-5}	—	—
Morphine sulphate	10^{-6}	—	—
Oxytocin	1 mU–1 U	0·1 U–1 U (c or r)	—
Phenasoline	10^{-7}–10^{-5}	—	2×10^{-5} –$5 \times 10^{-}$ to histamine
Vasopressin (synthetic)	1 mU–1 U/ml	0·02 U (c)	

of 0·1–1 units/ml, synthetic oxytocin (Parke Davis) never caused a contraction, though in a concentration of 1 unit/ml a small relaxation occurred probably due to chlorbutol in the injection. Vasopressin in a concentration of 0·02 unit/ml to 1 unit/ml did not always cause a contraction.

The contractions caused by acetylcholine or histamine were quick and monophasic, taking up to 1 min to reach a maximum and returning rapidly to the baseline. The contractions caused by bradykinin or angiotensin were slower, gradually increasing and taking up to 1 min to reach a maximum (Fig. 1*A*).

Dose response curves for acetylcholine, histamine, bradykinin, or angiotensin, were constructed (Fig. 1*B*).

Histamine and acetylcholine contractions were antagonised by atropine, hyoscine or phenasoline. Adrenaline and noradrenaline antagonised contractions to all the drugs used (Table 1).

The mode of action of angiotensin and bradykinin was investigated in the presence of some blocking agents.

Hyoscine in concentrations of 10^{-7} g/ml and morphine, 10^{-6} g/ml, did not block or diminish the response to bradykinin or angiotensin. Hexamethonium or nicotine, 10^{-5} g/ml, did not reduce the effect of bradykinin, but in 50% of the experiments diminished the response of angiotensin.

Discussion

The site of action of bradykinin and angiotensin in different preparations is not clear. Wiegershaussen, Stopp & Eichstädt (1964) working on the

guinea-pig isolated ileum found that the contraction of bradykinin could be diminished by atropine and morphine and increased by eserine. They suggested that bradykinin, besides having a direct action on muscle, also had an indirect action involving release of acetylcholine.

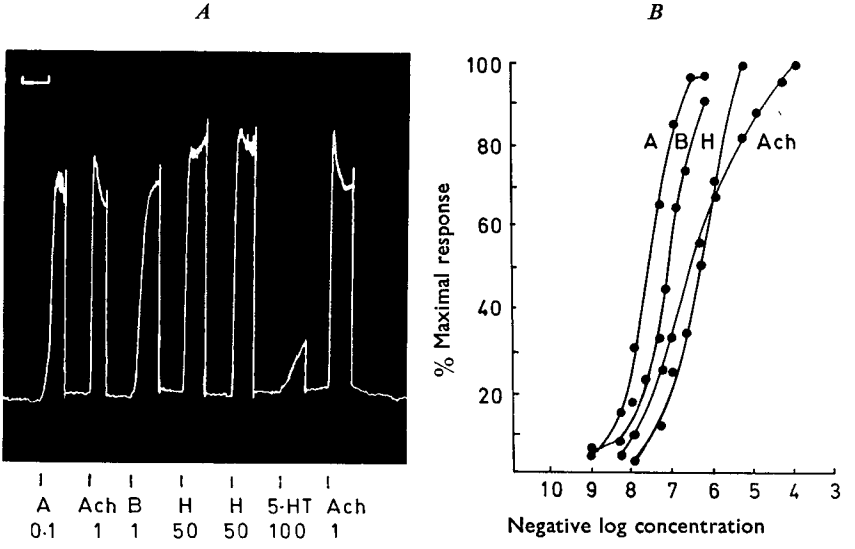

FIG. 1. Isolated stomach strip of Syrian golden hamster, *A* showing contractions and *B* dose response curves caused by angiotensin (A), acetylcholine (Ach), bradykinin (B), histamine (H) and 5-hydroxytryptamine (5-HT). Drug concentrations in μg to 10 ml bath. Drug contact time 1 min. The drugs were injected every 3 min. Time scale = 5 min.

On the hamster stomach the effect of bradykinin was not changed by hyoscine, morphine, hexamethonium or nicotine. Thus bradykinin probably acts directly, as observed by Khairallach & Page (1961) on the guinea-pig ileum. In the present investigation the response to angiotensin was slightly diminished by hexamethonium and nicotine in half of the experiments, but hyoscine or morphine were without effect. Thus angiotensin probably has a direct action on this tissue. The diminution of the response by hexamethonium or nicotine in some experiments suggests a small neurogenic component.

The sensitivity of this preparation to angiotensin or bradykinin is only a little less than that of the ascending or descending colon of the rat.

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