Mean values (±s.d.) from 22 experiments were as follows: renal plasma flow (RPF) was 5.57 ± 2.00 ml min kg^{-1}: LFR 4.14 ± 1.40 µl min kg^{-1}: renin activity of renal venous plasma (9.6 ± 7.2) was not different ($P>0.1$) from that of systemic arterial plasma (9.3 ± 6.4), but renin activity of lymph was invariably greater, averaging 17.7 ± 10.8. Measurements of these values were repeated after 1 h and none had changed significantly ($P>0.1$).

In 13 experiments, infusion of $MgCl_2$ solutions into the blood supplying the experimental kidney to raise its plasma magnesium concentration by 0.1 to 1.5 m mole l^{-1} increased both RPF and LFR. The renin activity of renal venous plasma rose to 12.8 ± 10.0 which was now significantly ($P<0.001$) greater than that of arterial plasma. The renin activity of renal lymph also increased significantly to 28.6 ± 9.7.

These results illustrate that with this preparation all parameters used to calculate renin release remain stable over a 1 h period. In the basal state there is nett release of renin into lymph but not into blood. It is possible to augment substantially renin release into lymph and into blood.

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Modification of transport processes across rat intestine

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Several techniques have been developed whereby the electrical properties of the colon and the small intestine can be continually monitored. These have allowed the measurement of the effects of naturally occurring substances on electrolyte transport processes and those mechanisms dependent on the movement of ions, e.g. hexose. Changes in both absorptive and secretory events may be detected *in vivo* in response to substances introduced either into the blood stream or administered intraluminally. *In vitro* methods are used to eliminate the possibilities that the effects of administered substances are dependent on events occurring at sites away from the intestine and that the responses observed are brought about by vascular or motility changes.

An advantage of these methods is that the absorption or secretion of very small amounts of electrolytes and non-electrolytes can readily be detected, amounts which by chemical or radiochemical means are very difficult to measure, e.g. perfusion of rat ileum with 10 mM glucose at 3 ml/min for 1 min produces a marked change in potential difference (p.d.) (4.5 ± 0.4 mV–9 expts.) accompanied by a small hexose absorption (1.5 ± 0.2 µmoles, 9 expts.).

Data obtained from single experiments, following the administration of naturally occurring substances, can be employed to construct dose-response curves. Furthermore, these techniques are valuable in that they provide a tool with which the mode of action of blocking agents can be studied. Thus acetylcholine has been found to increase the p.d. across the rat proximal colon, both *in vivo* and *in vitro*, a sigmoid relationship being recorded between the change in p.d. and the log acetylcholine dose. The inability of hexamethonium and pentolinium to alter the response of acetylcholine suggested a direct effect of the transmitter substance on the colon, and the inhibitory effects of atropine suggested the acetylcholine effect is mediated by a muscarinic type of receptor. Subsequent measurements of unidirectional ion fluxes established that acetylcholine virtually abolished net Na^+ movement and induced net Cl^1 secretion. These alterations in ion movement could account for the observed electrical changes.

In a number of diarrhoeal states biologically active substances are thought to be released in excessive amounts and act by modifying absorption and/or secretory processes. For example, it has been suggested that in the carcinoid syndrome both bradykinin and 5-hydroxytryptamine may be involved in producing a net secretory state. Certainly both these substances and prostaglandins E_1 and E_2 alter the electrical properties of the intestine. The techniques demonstrated will be useful in determining the mode of action of these and other substances and how they can be inhibited.