The venoconstriction observed with adrenaline, noradrenaline and 5-hydroxytryptamine is consistent with previous studies. Histamine has previously been reported to be a constrictor of limb veins in man (Sharpey-Schafer & Ginsburg, 1962), but we have observed only dilator effects. The dilator effects of isoprenaline indicate the presence of β-adrenoceptors.

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REFERENCES

NACHEV, CH., COLLIER, J. G. & ROBINSON, B. F. (1970). A simplified method for measuring compliance of superficial veins. *Cardiovascular Res.*, in the Press.

SHARPEY-SCHAFER, E. P. & GINSBURG, JEAN (1962). Humoral agents and venous tone. *Lancet*, **2**, 1337–1340.

The responses of the isolated perfused spleen of man to sympathetic nerve stimulation, catecholamines and polypeptides

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Little information is available on the smooth muscle responses of the intact human spleen to various stimuli. It has been established in the dog that the spleen has both a resistance and a capacitative function (Davies, Gamble & Withrington, 1968) but indirect evidence suggests that the latter function is lacking in the human. We have successfully perfused, at constant flow, thirteen fresh human spleens with McEwen's (1956) solution equilibrated with 95% O_2 and 5% CO_2. The perfusion pressure was continuously monitored with a Statham transducer (P23Gb) whilst the venous pressure was maintained constant. Changes in perfusion pressure, therefore, reflected alterations in splenic vascular resistance. Volume changes of the spleen were recorded by enclosing it in a plethysmograph containing liquid paraffin at 37° C, but gradual leakages from the splenic capsule made quantitative observations difficult in some experiments. Whenever possible, postganglionic nerves were placed on platinum stimulating electrodes. All drugs were administered by injection into the arterial cannula.

In eight experiments splenic postganglionic nerves were stimulated at frequencies between 0·5 and 30 Hz; graded increases in splenic vascular resistance were observed in all experiments. The threshold frequency appeared to be 3 Hz and maximum increases in vascular tone occurred at 10 Hz. In five of these experiments spleen volume was continuously recorded and in three very small reductions (mean 3 ml) in spleen volume were observed to accompany the nerve stimulation.

Adrenaline and noradrenaline (0·25–25 μg) were administered in twelve experiments and graded increases in splenic vascular resistance were obtained; in five of these experiments spleen volume was continuously monitored and slight reductions (mean 5 ml) in spleen volume were detected. In four experiments the α-adrenoceptor blocking agent phenoxybenzamine (3–10 mg) was administered and the increase in splenic vascular resistance elicited by sympathetic nerve stimulation and the catecholamines was abolished. In two of the experiments the vasoconstrictor action of adrenaline was reversed after phenoxybenzamine to cause vasodilatation. The presence of β-adrenoceptors in the splenic vascular bed is also suggested by the

results of two experiments in which the administration of isoprenaline (0·5–10 μg) caused splenic vasodilatation.

The peptides angiotensin II, oxytocin and vasopressin were administered in seven experiments. Angiotensin II (0·05–25 μg) and vasopressin (0·5–2·0 i.u.) always caused profound increases in splenic vascular resistance. However, the administration of oxytocin (0·5–5·0 i.u.) caused vasodilatation in five of the seven experiments with no effect on the splenic vascular bed in the remaining two. No consistent changes in spleen volume were observed.

It appears that the vascular smooth muscle of the human spleen has a classical α- and β-adrenoceptor spectrum similar to that observed in many species. The very small changes we have observed in spleen volume (less than 5% total volume) provide direct evidence of the minor capacitative function of the human spleen.

REFERENCES

DAVIES, B. N., GAMBLE, J. & WITHRINGTON, P. G. (1968). The separation of the vascular and capsular smooth muscle responses to sympathetic nerve stimulation in the dog spleen. *J. Physiol., Lond.*, **196**, 42–43*P*.

MCEWEN, L. M. (1956). The effect on the isolated rabbit heart of vagal stimulation and its modification by cocaine, hexamethonium and ouabain. *J. Physiol., Lond.*, **131**, 678–689.

The human isolated cervix: a study of its spontaneous motility and responsiveness to drugs

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The human cervix has been said to consist mainly of fibrous tissue, and consequently doubt has arisen about whether nor not it possesses muscular contractility.

Hughesden (1952) showed muscular elements in the cervix, particularly in the outer layers, and he suggested that the cervix could show contractility. The work of Schild, Fitzpatrick & Nixon (1951) supports this as they showed that the cervix *in vivo* could exhibit contractions independent of the motility of the remainder of the uterus.

However, on the basis of histological studies and limited isolated tissue experiments, Danforth (1954) could show little spontaneous contractility or response to drugs. In order to investigate this further, strips of muscle from the outer layer of non-gravid cervices were suspended in Krebs solution at 37° C bubbled with 5% CO_2 in oxygen. Almost all of the strips studied exhibited spontaneous activity and response to drugs, under both isotonic and isometric conditions. Spontaneous activity was not, however, a prerequisite for drug response as those strips that did not exhibit motility could usually be stimulated to do so on application of a suitable drug. Addition of prostaglandin E_2 (0·025–0·5 μg/ml), prostaglandin $F_{2\alpha}$ (0·5–2·0 μg/ml) and oxytocin (1·0–10·0 mU/ml) to the bath caused changes in tone, amplitude and frequency of contraction, although in some cases not all of the three parameters altered.

Prostaglandin E_2 inhibited and oxytocin stimulated the activity of the strips. The response to prostaglandin $F_{2\alpha}$ was more variable but this did not depend upon the dose.

The observations that the cervical muscle can exhibit marked spontaneous contractility and respond to drugs suggests that it may possibly play a more active role in gestation and parturition than has previously been assumed.