PRM muscle cells (BOGUSCH[11]) indicate that ACh may be the excitatory transmitter in the PRM. On the other hand, our investigations have shown that the relaxing effect of 5-Ht could be potentiated by the administration of Lilly 110 140 (5×10^{-4} *M*) a selective inhibitor of 5-Ht uptake (WONG[12]). According to BENNETT[13], one mechanism involved in inactivating biogenic amines appears to be the re-uptake into the nerve ending which has released them. High affinity uptake of biogenic amines have also been reported to exist in glial cells.

5-Ht and ACh are also implicated in the regulation of phasic and tonic contractions in the molluscan smooth muscle preparation of the anterior byssus retractor muscle (ABRM) of *Mytilus edulis* (TWAROG[14], YORK[15]). MARCHAND-DUMONT et al.[16] conclude from their experiments on the ABRM that the muscular membrane is necessary for the relaxing effects of 5-Ht and that these effects are mediated through cyclic AMP. The relaxing mechanism of the PRM seems also to be mediated by this cyclic nucleotide, functioning as intracellular messenger. Figure 1c shows the response of the curarized (10^{-3} *M*) PRM preparation to caffeine (10^{-2}) which is known to release calcium from intracellular storage sites to activate the contractile apparatus (WABNITZ[17]). The caffeine contraction could be relaxed by 5-HT (Figure 1c) and also by dibutyryl cyclic AMP (WABNITZ et al. in preparation) indicating that 1. 5-Ht may play a part in the intracellular calcium regulation and /or 2. 5-Ht is able to release calcium from the contractile proteins (MARCHAND-DUMONT et al.[16]).

Figures 2a, b and the Table show the results of a representative analysis of the presence of 5-Ht and free amino acids in the PRM obtained by the sensitive dansylation method (NEUHOFF[8]). From the autoradiogram the occurrence of 29 substances which have reacted with ^{14}C-dansylchloride in the extract of the homogenate of a resting PRM can be seen. 5-Ht, which occurs as dansyl-*N*-serotonin (Figure 2, No. 4) and as dansyl-*bis*-serotonin (Figure 2, No. 23) could definitely be proved. By measuring the radioactivity of these two substances, the content of free 5-Ht within the PRM could be determined. The amount of measured 5-Ht in electrically and pharmacologically untreated muscles was 3.3 $\pm$ 0.3 µg/g wet tissue. Electrical stimulation (square pulses, 0.4 msec, 3V, 0.1 Hz, 30 min) applied to the isolated PRM preparation perfused with ringer solution containing the 5-Ht re-uptake inhibitor Lilly 110 140 produced a decay of the 5-Ht content. The amount of measured 5-Ht after electrical and pharmacological treatment was 2.1 $\pm$ 0.2 µg/g wet tissue. From our pharmacological and biochemical data and the histochemical observations by BOGUSCH[7], we can be relatively certain that 5-Ht plays a role in the regulation of the mechanical activity of the PRM in vivo.

The following amino acids, whose role in other tissues as transmitter substances will be discussed (for review see GERSCHENFELD[2]), are also found in the PRM: aspartate, γ-aminobutyrate, glutamate, glycine and taurine. Whether any of these compounds serve as neurotransmitter or are involved in intracellular mechanisms of 'catch' muscles is not yet known, but their role is clearly worthy of investigation (VON WACHTENDONK et al., in preparation).

Furthermore, the appearance of 3 new unidentified substances seems to us to be of some interest because these substances were found to be in the PRM of *Helix pomatia*, as well as in the ABRM of *Mytilus* (KÄPPLER et al.[18]) and their presence is possibly limited to 'catch' muscles.

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Intestinal Absorption of Glucose Immediately after Vincristin Administration in Rats

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Summary. Vincristin leads to a time-dependent decrease of glucose absorption. Thus it is not possible to combine experiments which seek simultaneous information on intestinal absorption and epithelial replacement.

GLICKMAN[2] could show that colchicine, a substance which influences the microtubular system, diminished fat absorption as early as 2 h after administration by influencing solely the extrusion of the chylomicrons. The present study was performed to investigate whether or not measurement of in vivo absorption of water-soluble substrates (glucose, Na^+ and K^+) can be combined with measurement of cell production according to CLARKE[3].

Methods. 17 male outbred rats of a Wistar strain (SV 49 Thomae, Biberach) with an average body weight of 200 g were kept under SPF conditions in a Trexler plastic isolator in wire bottom cages. On the day prior to investigation, solid food (Altromin 14/15 fortified, Altrogge, Lage Lippe) was withheld at the beginning of the dark period (19.00 to 07.00 h) with free access to water. After i.p. pentobarbital anesthesia, the rats received an i.v. injection at 09.00 h of vincristin (1 mg/kg body weight; $n = 8$) or an equal amount of Ringer solution (3 ml/kg body weight; $n = 9$). After this a 15 cm jejunal segment just distal to the ligamentum of Treitz was cannulated

[1] Acknowledgements. I am greatful to Prof. R. M. CLARKE (Newcastle, NSW, Australia) and to Prof. T. NEVALAINEN (Kuopio, Finland) for their helpful discussions and to Ms. JOHANNA BREITSAMETER for technical assistance. This work was supported by the 'Deutsche Forschungsgemeinschaft, Bonn' (SFB 112 project No. E 4).
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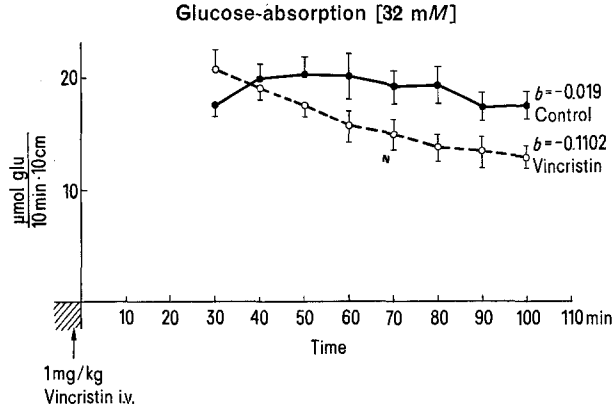

Fig. 1. Net absorption of glucose from a 32 mmol/l solution. Values are expressed as arithmetic mean with standard deviation. There were 8 vincristin-treated rats and 9 control rats. The coefficient of regression in control rats of $b = -0.019$ is not significantly different from zero but the coefficient of regression of $b = -0.1102$ in the 'vincristin-rats' is significantly different from zero ($p < 0.005$). Both coefficients of regression are significantly different ($p < 0.01$). Statistical analysis was performed by analysis of variance.

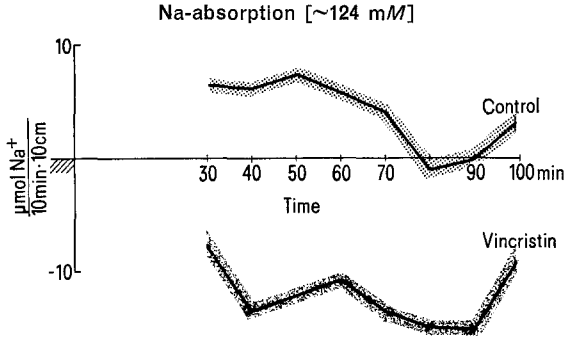

Fig. 2. Net absorption of Na^+. Na^+ concentration in the perfusion fluid between 120–131 mmol/l. The very large standard deviation is omitted.

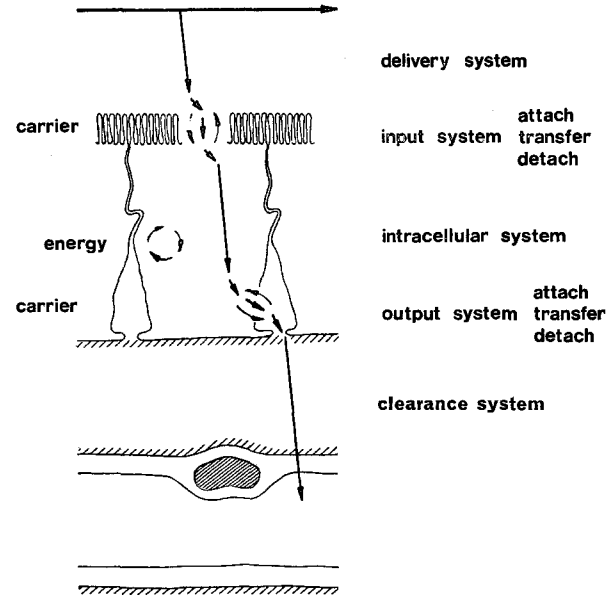

Fig. 3. Path of a glucose molecule from the gut lumen to the blood vessel.

and, after an initial washout, perfused in a single pass perfusion at a rate of 12 ml/h. The perfusate was collected in 10 min fractions starting about 20 min after vincristin injection. The perfusion solution was a Ringer-solution with 32 mmol glucose (Fluka), 32 mmol mannitol (Merck), 20 mg phenolred (Fluka), about 124 mmol Na^+ and about 3,5 mmol K^+ per liter. The final osmolarity was about 305 mosmol/l, the pH value was 6.1. At the end of the perfusion, the perfused gut segment was fixed with ethanol-acetic acid (3:1 volumes) at a hydrostatic pressure of 35 cm fluid. Absorption was referred to the length of the gut segment fixed under these conditions.

Results. All rats which got vincristin had an accumulation of metaphases; anaphases or telophases were never seen in these rats. Under the influence of vincristin, there was a reduced disappearence of glucose from the gut lumen, and this effect increased with time (Figure 1). There was always a net secretion of K^+ which is independent of time and application of vincristin.

Control rats showed a net absorption of Na^+ which tends to decrease with time. Under the influence of vincristin, there was a net secretion of Na^+ even 20 min after administration, and this net secretion seemed to be independent of time (Figure 2). The variations in Na^+ concentration in the perfusion fluid and the variation of net Na^+-transfer within a single animal made an analysis of net Na^+-transport difficult. 2 vincristin-treated rats which were perfused with a solution with a Na^+ concentration of 133 and 134 mmol/l showed a net absorption of Na^+, but a similar decrease of glucose absorption as the other treated rats.

Discussion. Vincristin acts primarily on the microtubular system[4]. The steps in glucose transport which are probably influenced by vincristin can be discussed by following the path of a molecule from the gut lumen to the blood vessel (Figure 3 according to[5]).

Delivery and clearance system are only hypothetically influenced by vincristin.

Input- and outputsystem. It is known that, even soon after administration, colchicine influences the brush border membrane[6–8]. There are recent reports on inhibition of glucose and amino acid transport into adipose cell ghosts[9] and Ehrlich ascites tumor cells[10] by substances which act on the microtubular system. From these investigations, it seems possible that vincristin decreased the 'activity' of the glucose-carrier in the brush border membrane[11] or the baso-lateral cell membrane[12].

Intracellular system. It could be demonstrated that vincristin[13] and colchicine[14] cause metabolic changes in mature cells and therefore a reduced energy supply may be one reason for the decrease in glucose absorption.

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Paracellular route. The small intestinal epithelium is not a 'tight' epithelium[15,16] and therefore a backdiffusion of already absorbed substances through the tight junctions occurs. This back diffusion could explain the behaviour of net secretion of Na^+ in case of perfusion solutions with a Na^+ concentration below the serum concentration.

Cell loss. Increased cell loss from the villus tops could be the reason for a reduced glucose absorption, but from the investigations of CLARKE[17], such mucosal cell loss seems unlikely.

There seems to be the following mechanisms by which vincristin may influence sugar transport: First, by reduced engergy production due to inhibition of metabolic pathways. Secondly it is known that microtubuli influence membrane characteristics[18]. Therefore membrane transport of glucose (input or output) may be decreased by vincristine. Another membrane located transport system may be influenced – the sodium transport system. Sugar transport shows a sodium dependency in vivo also[19,20], and there is a correlation between net transport of sodium and net sugar transport[21,22]. Two findings cast some doubts on the theory that the reversed net transport of sodium is the reason for the decrease in glucose transport: the impairment of net sodium transport is detectable even in the first sampling period and there seems to be a dependency of the direction of net sodium transport upon the luminal sodium concentration.

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Changes in the Distensibility of the Cat Aortic Arch Induced by Noradrenaline

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Summary. In the isolated preparation of the aortic arch of the cat, noradrenaline (NA) reduced at low pre-loads, and increased at high pre-loads, the arterial wall distensibility. For each dose of NA, the changes were directly related to the pressure level in the system.

Sympathetic fibres originating in the stellate ganglion of cats, rabbits and mice are known to be incorporated into the aortic nerve[1-3], and to terminate in the smooth muscle of the aortic wall. Electron microscopy of the wall of the aortic arch in cats revealed the presence of nerve endings which contained vesicles[4]. When observed in the vicinity of the smooth muscle fibres of the adventitia, they resembled very closely those described in other vascular areas, generally considered to have an effector function[5-9]. They persisted after degeneration of the aortic nerve induced by section at the neck level[4]. The functional significance of these fibres is still unknown, but since they appear to be effector in nature, it seems reasonable to suggest that an increase in this activity would modify the contractile state of the smooth muscle, thereby resulting in a change in the elastic properties of the aortic arch. The characteristics of these fibres make noradrenaline the most likely candidate for the neurotransmitter. Therefore, an in vitro study was undertaken to analyze the effects of NA on the aortic arch distensibility through changes induced on the pressure-volume diagram. Since the arterial distensibility is reduced as the mean blood pressure increases[10], one could not dissociate in an intact preparation the distensibility changes induced directly by NA on the arterial wall from those secondary to the hypertensive effect of the amine.

Material and methods. Segments of aortic arch, about 30 mm long, were removed from anesthetized cats and isolated from surrounding tissue. All branching arteries were ligated. Both ends of the segment were fitted to 2 metalic cannulae, one of which was closed and the other connected to the system of the volume injection. The whole assembly was rigidly attached to 2 upright blocks, able to slip on a horizontal bar when displaced by a force of 1 g or less. The assembly was mounted in a tissue bath maintained at 36–36.5 °C and filled with Hank's solution (pH 7.3–7.4) equilibrated with 5% CO_2 + 95% O_2. One of the 2 upright blocks was firmly attached to a bar, whereas the other was connected to a pulley system to which longitudinal loads of 7.5, 27.5 and 52.5 g were applied. Each load was used in a group of 7 preparations. A period of at least 30 min elapsed from the pre-loading until the start of the experiment.

The segments were inflated with Hank's solution by means of an infusion delivered by a pump at the constant rate of 5 ml/min. Total volume inside the segment could be calculated at any time by adding to the initial volume of the segment the volume computed from the time scale of an oscilloscope. The initial volume was calculated from the formula $V = h\pi r^2$. h and r were measured at the end of each experiment after performing a longitudinal excision of the wall and extending the segment on a flat surface. It was previously observed that pre-loading the segment did not modify the V value, because the increase in length compensated for the reduction of the

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