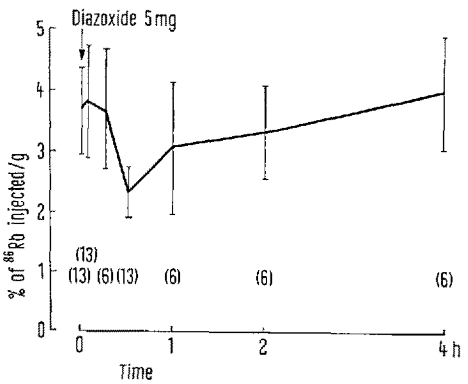
normal mean value in 6 rats being 0.471 $\pm$ 0.042%/mg, after diazoxide in 6 rats 0.379 $\pm$ 0.033%/mg.

The changes of the ^{86}Rb uptake thus show that the blood flow through the thyroid gland in rats after a temporary elevation decreases and is substantially inhibited especially during the first hour. The blood flow is one of the factors determining the clearance of radioiodide by the thyroid gland and its uptake by the gland as well. It is highly probable, therefore, that the inhibition of the radioiodine uptake in the thyroid gland after diazoxide is at least partially due to the decrease of the blood flow. In order to understand the true relation between both processes, the factor of time must be considered to a sufficient extent.



Blood flow through the thyroid gland of rats after i.v. injection of 5 mg of diazoxide. Mean values of the tissue uptake of ^{86}Rb expressed in % of injected dose/g of the tissue at corresponding time intervals. Verticals: 95% confidence intervals. No. of rats/group in brackets.

Zusammenfassung. Mit der ^{86}Rb-Methode wird nach i.v. Applikation von 5 mg Diazoxid die Schilddrüsendurchblutung bei der Ratte untersucht: Eine Verminderung der Durchblutung erreicht nach 30 min 65% der Ausgangswerte, wodurch die früher festgestellte diazoxidinduzierte Hemmung der Radiojodspeicherung erklärt werden kann.

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14 March 1968.

Sympathetic Regulation of Collecting Vein

Present knowledge of sympathetic control of the venous smooth muscle is based chiefly on regional blood volume studies[1–3]. Evidence is growing, however, which points to individualities in control and reactivity of various series-coupled vascular segments. Thus, it seems, it is hardly, if at all, possible to deduce even quantitative information on control of a particular venous segment referring to integrative data on an undefined sum of presumably heterogeneously acting vascular channels. Detailed information on the autonomic nervous control of the venous smooth muscle was considered of special interest in the particular case of medium-sized collecting veins to which, in contrast to the well-established innervation of small veins and venules (considered to contribute most to volume changes), adrenergic terminals are only dubiously attributed[4,5].

Since only active diameter changes – due presumably to smooth muscle activation – were pertinent in the present studies, to avoid passive diameter changes concurrent to intravascular pressure shifts, intravascular pressure has been held artificially constant. As venous cross-sectional area has been shown not to be circular (i.e. diameter values not to be identical in various directions) but above certain transmural pressure limits[6], to ensure the investigated diameter changes will be uniform in either direction, pressure was set well above this limit.

In 16 mongrel dogs, anaesthetized with thiopental (70 mg/kg b.w.) the femoral vein was hemodynamically isolated. A thin-walled rubber balloon, attached to the tip of a catheter, was inserted and inflated 3–5 cm proximal to the site of the diameter and pressure measurements: at the same distance, distally, the femoral vein was ligated. Intravascular pressure was held constant, connecting a cannula introduced in a side branch of the vein with a reservoir filled with temperatured saline.

The diameter (by means of an inductive transformer[7]) and pressure (by means of an electromanometer) were recorded. The contralateral sympathetic trunk having been transsected 30 min earlier, the ipsilateral lumbar sympathetic trunk was transsected on the LG_3–LG_4 level. Stimulation of the peripheral end of the sympathetic trunk was provided by bipolar platinum electrodes; square wave pulses of supramaximal intensity, 5 msec duration and graded frequencies were delivered.

Immediately after transsection of the ipsilateral sympathetic trunk in all experiments a considerable dilation of the femoral vein was registered (Figure 1). Peak values were reached within 30 sec, attaining up to 121.9% of the resting diameter. After having reached maximal values, the diameter tends to decline and stabilizes within 5–6 min at the value of 109.6% of resting diameter. Considering the evidence stated below it should be deduced that rather the stabilized value of the diameter than its maximal value (immediately after denervation) should be related to the missing nervous control. Thus, the short-

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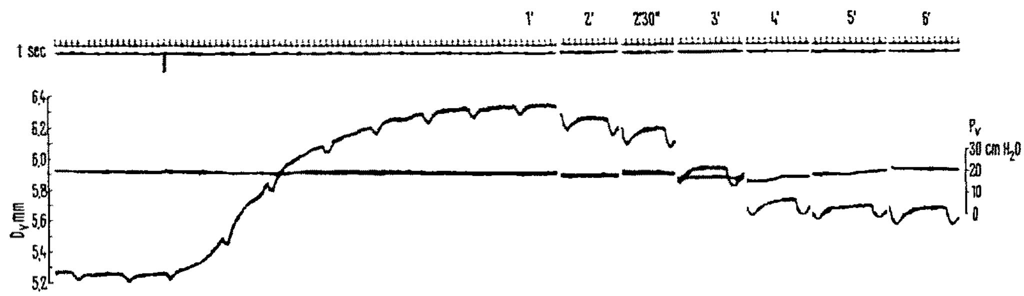

Fig. 1. Diameter of the femoral vein (Dv) immediately after section (see signal) of the ipsilateral sympathetic trunk. Venous pressure (Pv) relatively constant. Upper numerals, time after the trunk transsection in min.

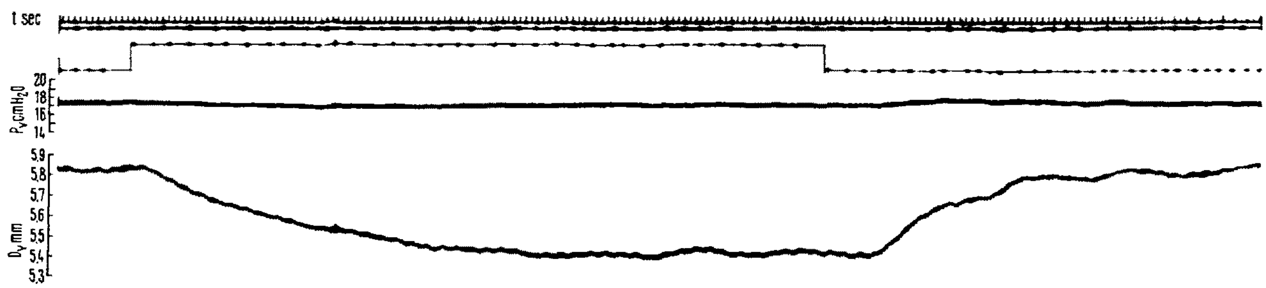

Fig. 2. Effect of stimulation – signal upward – (rectangular impulses, 5.8 V, 5 msec duration, 8 imp/sec) of the peripheral end of the lumbar sympathetic trunk on the diameter of the femoral vein (Dv). Venous pressure (Pv) constant.

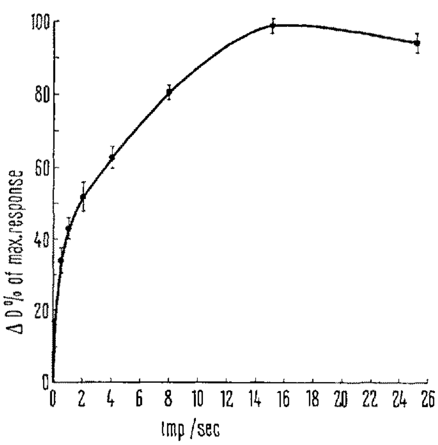

Fig. 3. Decrease in diameter (ΔD) of the femoral vein (in % of maximal contraction) in relation to stimulation frequency (imp/sec).

lasting overshut might be ascribed to an additional, gradually subsiding dilator mechanism presumably initiated by the trunk transsection.

The diameter of the femoral vein being stabilized, series of stimulations of the peripheral stump of the lumbar sympathetic trunk were performed.

As shown in Figure 2, not later than 3 sec after the onset of stimulation, the diameter of the femoral vein starts to decline. The contraction continues extremely slowly attaining stabilized values not earlier than 75 sec after stimulation has started. After stimulation has been ceased, the diameter tends to return to resting size reaching prestimulatory values within 60 sec.

Stimulation frequencies ranging from 0.5–25 imp/sec (the sequence of frequencies being randomized), the rate of stabilized contraction appeared to be frequency-dependent; stimulation at 15 imp/sec inducing generally maximal contraction (mean value 609.7 ± 65.1 μ i.e. $12.7 \pm 1.3\%$ of the resting diameter).

The responses to gradual impulse frequencies were quantified and expressed in each of the stimulations series (N = 22), as % of the maximum effect. It appears (Figure 3) that the frequency-response curve is hyperboloid in character: it increases steeply in the low frequency range (more than 50% of maximal response could be induced at the frequency as low as 2 imp/sec), whereas at 25 imp/sec a reduction in the response occurred.

Thus, it appears established that, in spite of controversial histochemical data, the adrenergic nervous system exerts direct control on the collecting vein in dogs. The individualities of this regulation, relatively to the concomittant conduit artery[8] and other vascular sections respectively, remain to be investigated.

Zusammenfassung. Die nach Durchtrennung des Truncus sympathicus (LG_3–LG_4) beim narkotisierten Hunde eintretende Dilatation der Vena femoralis erreicht in 30 sec ihr Maximum. Nach sukzessiver Abnahme beträgt der stabilisierte (in 10 min) Durchmesser 109,6% des Ruhediameters. Reizung des distalen Grenzstrang-Stumpfes bewirkt frequenzabhängige Diameterabnahme. Maximale Konstriktion (bis zu 12,7%) wird durch 15 imp/sec Reizung hervorgerufen.

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