be reversible: bathing the heart in a solution containing 4 mM of potassium restored its activity.

Potassium nitrate and thallium nitrate had the same effect on contractions of the rectus abdominis muscle. The concentration-effect curves ran parallel courses. Based on the average values obtained in 11 experiments, the mean active concentrations of the 2 ions (the 50 mm isotonic contraction recorded by the kymograph at 1:25 transmission) may be regarded as identical (K^+ 11.1 mM/l, S.D., 2.36; Tl^+ 10.3 mM/l, S.D., 1.66).

The foregoing findings raise the question why potassium restarts the arrested frog heart; that is, which of its qualities is the one that accounts for its biological actions. ZWAARDEMAKER[3] still believed that it might be the radiation of the ^{40}K isotope. Although the frog heart arrested with potassium-free solution can be restarted with external irradiation[4], it seems certain that the very weak radiation of the active isotope can have no role to play in the effect of potassium. As the Table shows, in our experiments the inactive solution containing $^{39}K^+$ restarted the arrested frog heart in the same manner as did the Ringer in general use which contains $^{40}K^+$. Thallium also is devoid of radiation effect.

Work is now in progress in these laboratories to find out whether the potassium-like actions of thallium are due to the close proximity of the ionic radii alone[1] or in combination with other atomic properties (field strength), and how these actions are brought about by radiation energy; further, to lay clear the causes underlying the antimitotic[5] and radiomimetic[6] activities of thallium.

Effects of potassium and thallium ions on the isolated frog heart

K^+ concentration mM/l	Tl^+	Anion	Tested	No. of hearts: Restarted after arrested with K^+-free solution	No. of hearts: Arrested while working with Ringer containing K^+	Washings to achieve effect
4[a]	–	Cl	15	15		1–2
–	2	Cl	9	7		1–2
–	2	NO_3	14	11		1–2
4	2	Cl	5		5	1–2
–	4	NO_3	12		9	1–2
4	4	NO_3	10		9	1
8	–	NO_3	9		0	4
12	–	NO_3	12		10	1

[a] $^{39}K^+$ employed.

Zusammenfassung. Thallium ist am isolierten Froschherz und M. rectus abdominis von kaliumähnlicher Wirkung. Es setzt das mit kaliumfreier Lösung in Stillstand gebrachte Froschherz in Bewegung, bei erhöhter Konzentration führt es zum Herzstillstand. Am rectus-Muskel verursacht Thallium eine Kontraktur. Seine Aktivität am Froschherz übertrifft jene von Kalium, während am isolierten rectus-Muskel ihre Aktivität gleichwertig ist.

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Further Contribution to the Effect of Diazoxide on the Thyroid Gland in Rats

In 2 previous papers[1,2] we reported the effects of the i.v. injection of 5 mg of diazoxide on the thyroid gland in rats. We found a significant decrease in the 4 h uptake of radioiodine after diazoxide injected just prior to the ^{131}I. However, the blood flow through the thyroid gland at time intervals up to 3 min after the application of diazoxide was elevated. In this paper, we present further results elucidating the relation between the blood flow and radioiodine uptake in the thyroid gland after diazoxide.

Methods. Male Wistar rats weighing 175–210 g fed standard laboratory diet (Larsen) and water ad libitum were used. Methods were the same as described in previous papers[1,2]. The uptake of radioiodine was measured 4 h after an i.p. application of 0.2 μCi ^{131}I. The organ blood flow was indicated by the tissue uptake of radioactive rubidium ^{86}Rb, measured 40 sec after i.v. injection of 10 μCi ^{86}Rb (according to SAPIRSTEIN[3]) and expressed in % of the dose in 1 g of the tissue. 5 mg of diazoxide (Hyperstat Schering) in 0.33 ml of original solution was injected in the tail vein just prior to the application of radioiodine and at different time intervals before the radioactive rubidium (we are grateful to Schering Comp., Bloomfield, New Jersey for kindly supplying the diazoxide).

Results and discussion. The results of the tissue uptake of ^{86}Rb in the thyroid gland at 90 sec, 15 min, 30 min, 1 h, 2 h and 4 h intervals are presented in the Figure. At 90 sec interval after diazoxide, a temporary increase in ^{86}Rb uptake was noted (in agreement with our previous findings[2]). However, at further time intervals the values decrease rapidly, reaching the minimum 62% of the mean control value at 30 min and returning to the initial level at 4 h intervals. The 95% confidence intervals indicate the significance. Radioiodine uptake in the thyroid gland was decreased after diazoxide also in this series of experiments,

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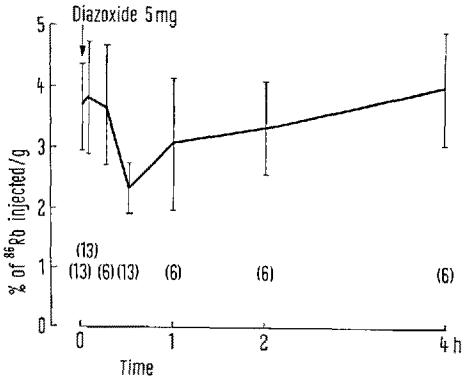
normal mean value in 6 rats being 0.471 ± 0.042%/mg, after diazoxide in 6 rats 0.379 ± 0.033%/mg.

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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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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