This active substance influences the normal RH too by increasing its magnitude. Figure 2 shows that the only active sample of the donor was taken while its RH was disappearing, i.e. when the substance required for normal RH was being released in the coronary venous blood. Here, RH disappeared in the donor 30 sec after stelletectomy. Samples II-VII, taken before RH began to decline, did not alter the normal RH responses of the test dog. Sample VIII, which was taken while RH was disappearing and while the active substance was being released, increased the RH of the test animal considerably. On the other hand, samples IX and X, taken after RH had disappeared in the donor, had again no effect on the test animal's RH, for the active material had been previously depleted.

Figure 3 shows the typical actions of the RH-influencing material on the isolated rat heart. Besides its strong action on RH, an increase from 37% to 162%, the administration of the active substance caused a constrictor effect too. (Flow dropped from 7.2 ml/min to 3.06 ml/min.) This constrictor response was regularly present in dog hearts also, although to a smaller degree (under 10%). As the Figure shows, control plasma induces coronary constriction on the isolated rat heart too; but instead of being increased, RH disappeared after its administration. The negative chronotropic and the positive inotropic action seen in this Figure are characteristic for this material only in larger doses; in more moderate doses no effect on the heart could be observed, whereas the coronary effects were still very pronounced.

On isolated rat hearts, RH and heart beats are restored after DNP or CN poisoning by the substance described. The active substance has a positive inotropic effect on the dibinamine-treated Straub's hearts. Boiling did not alter these effects. Vasopressin, angiotensin, ATP, ADP, IMP, adrenalin, noradrenalin, metanephrine, bradykinin, serotonin, $CaCl_2$, and $MgCl_2$, were found not to simulate the characteristic action of the active substance described. Therefore, a new name, hyperemin, is suggested for this new vasoactive substance.

Considering the fact that the release and depletion of hyperemin does not take place immediately after stelletectomy, it is understandable why some authors, neglecting these circumstances, were unable to find the disappearance of RH after stelletectomy[5]. On the other hand, the release of hyperemin may be continuous without any complete depletion which can maintain a good state of reactive hyperemia for a longer period after stelletectomy or C_6 administration.

Zusammenfassung. Unter bestimmten Bedingungen gelang im Koronarsinusblut der Nachweis einer Substanz, welche eine normale reaktive Hyperämie der Koronargefässe vergrössern und eine gewichene reaktive Hyperämie wiederherstellen kann. Diese Substanz hebt DNP- und CN-Effekte auf und scheint mit bisher bekannten gefässaktiven Substanzen nicht identisch.

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Denervation Atrophy: Enzyme Changes in the Control Muscle

It is generally accepted that nerves exert a trophic influence upon the muscles that they supply. Transection of the nerve is followed by muscle atrophy which differs, in many respects, from the muscle wasting resulting from lack of use. Many experimental studies have been concerned with the morphological and biochemical changes that take place in the denervated muscle. In these studies, it is a common practice to sever a nerve, in one extremity, and to use as control the contralateral, normally innervated limb, from the same animal. However, it is known that muscles undergo hypertrophy and morphological changes in response to increasing work demands[1]. Denervation of one limb must place a greater work load on the contralateral muscles. Thus, using these muscles as controls may not be entirely adequate. Our study of lactic dehydrogenase (LDH) in denervated and contralateral soleus, using intact animals as controls, shows that changes in the activity of this enzyme do occur in the contralateral muscle.

The enzyme LDH is known to exist in at least two principal forms, each being a tetrameric molecule containing four polypeptide subunits. These two forms have been found in different proportions in several tissues. They have received the names of muscle (M) and heart (H) LDH[2]. In general, M LDH predominates in muscles with high glycolytic and low oxidative activity, whereas H LDH is higher in muscles with the opposite metabolic pattern. We chose to study these two forms because of their characteristic changes in denervated muscle[2].

The present study involved twelve adult white male rabbits. Six of these underwent unilateral transection of the sciatic nerve, high in the thigh, with removal of one piece of the nerve about 1 cm long. The remaining six rabbits (normal controls) underwent no surgery. Both groups were similarly fed and housed. Two months after surgery, they were killed by a blow on the head followed by exsanguination. In the operated group, the soleus from both legs was removed and dropped in liquid nitrogen. In the control group, the soleus from one leg was similarly obtained. Each specimen was homogenized in the cold,

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2 D. M. Dawson, T. L. Goodfriend, and N. O. Kaplan, Science *143*, 929 (1964).

and its non-collagen protein content was determined[3] after extraction with alkali[4].

Assays for M and H LDH, for each specimen, were run in two reagents containing either 1.0 or 20.0 mM pyruvate. Both reagents contained 2.0 mM reduced nicotinamide adenine dinucleotide (NADH) in 0.1 M Tris buffer, pH 7.5. The oxidized dinucleotide (NAD^+) formed in the reaction was measured fluorometrically[5]. The activity of the M and H LDH was estimated from the ratio between the amounts of NAD^+ formed in the low and the high pyruvate containing reagents[2].

The results obtained appear in the Table. When compared with the contralateral muscle, the denervated one shows a significant fall in the activity of both the H ($P < 0.01$) and M ($P < 0.05$) forms. However, when compared with the normal controls, no such fall for the M form is seen. In fact the value appears to be higher for the denervated than for the control muscle, although this difference is not significant at the 5% level. On the other hand, there is a significant increase ($P < 0.01$) in the M LDH activity of the contralateral muscle, when compared with the normal controls.

H and M forms of LDH in soleus muscle from the denervated hind leg of rabbit, from the contralateral leg, and from normal controls. Enzyme activity expressed as moles of pyruvate reduced per kg of soleus non-collagen protein per h of incubation

Soleus	LDH activity ± SEM	
	H	M
Denervated	38 ± 2.2	29 ± 3.1
Contralateral	81 ± 8.7	39 ± 2.8
Normal control	86 ± 3.6	24 ± 2.2

From these results, it appears that rabbit soleus H LDH decreases as a result of denervation, whereas M LDH does not. On the other hand, M LDH increases in the contralateral muscle, possibly due to increased use of the intact extremity. A centrally mediated mechanism, through the trophic influence of the uninterrupted nerve, cannot be discarded. Our findings indicate the necessity of using unoperated animals as controls for denervation studies. If contralateral muscles from the operated animals are used instead, some of the changes detected may be falsely attributed to the effects of denervation[6].

Riassunto. Sono state studiate le due forme principali (M e H) della deidrogenasa lattica nel muscolo soleo della gamba enervata e di quella del lato opposto, nel coniglio. Animali non operati servirono come controlli. La forma H, che predomina nel soleo normale, sperimentò una notevole diminuzione dopo enervazione. La forma M non sperimentò modificazione nel soleo enervato, ma aumentò in quello del lato opposto.

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[6] This study was aided by a grant from the National Foundation for Neuromuscular Diseases, Inc.

Über einige vegetative Reaktionen nach Geruchsreizen beim Menschen[1]

Im Zusammenhang mit anderen Untersuchungen über vegetative Reaktionen nach olfaktorischen Reizen[2] prüften wir auch die Änderungen des elektrischen Hautwiderstandes beim Menschen gleichzeitig mit dem Carotispuls und der Atmung. Die bisherigen Ergebnisse auf diesem Gebiet zeigen, dass Reize verschiedener Modalität zu Reaktionen führen, doch ist, insbesondere nach olfaktorischen Reizen, der Zusammenhang zwischen Reiz und Reaktion in zeitlicher und quantitativer Hinsicht nicht hinreichend geklärt[3].

Wir registrierten den Hautwiderstand (Gerät der Fa. Stoelting, Chicago) einerseits in seiner absoluten Grösse, andererseits allein die Änderungen aus einer relativen Ruhehöhe, weiter den Carotispuls und die Atmung pneumatisch-elektrisch mit einem selbstentwickelten Aufnahmegerät, dessen Ströme verstärkt und mit einem Oscilloscript (Philips) aufgezeichnet wurden. Die Duftreize wurden aus einem Strömungsolfaktometer (NEUHAUS[4]) gegeben, was genaue Konzentrationsangaben ermöglichte. Die Versuchsperson (VP) ruhte entspannt mit verbundenen Augen auf einer Liege. Als Duftstoffe wurden Buttersäure, Skatol und Muskinon verwendet.

Für die absolute Höhe des Hautwiderstandes sei folgendes Beispiel angeführt: Nach einem Reiz von 8 sec Dauer in einer Stärke von $7{,}7 \cdot 10^{13}$ Molekülen Buttersäure/cm^3 Luft verändert er sich zunächst kaum und sinkt erst 6 sec nach Reizbeginn in 1 sec von etwa 20000 Ω um 5800 Ω; danach nimmt er langsam wieder zu. Erst nach etwa $3^1/_2$ min ist die Ausgangshöhe wieder erreicht. In manchen Fällen steigt der Widerstand danach weiter und

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