Membrandepolarisation nach Erhöhung der K^+-Konzentration auf den 3fachen (16,2 mMol/l) und 4fachen (21,6 mMol/l) physiologischen Wert. Es sind Mittelwerte mit ihren mittleren Streuungen angeführt

	Depolarisation nach 5 sec (mV)		Depolarisation nach 2 min (mV)		Gesamtzeit der Depolarisation (sec)	
Faser	$3 \times K^+$	$4 \times K^+$	$3 \times K^+$	$4 \times K^+$	$3 \times K^+$	$4 \times K^+$
oberflächliche	$9{,}57 \pm 2{,}75$	$9{,}08 \pm 4{,}1$	$17{,}7 \pm 3{,}5$	$21{,}2 \pm 3{,}47$	$17{,}8 \pm 6{,}0$	$19{,}3 \pm 8{,}04$
tiefe	$1{,}0 \pm 2{,}08$	$2{,}25 \pm 2{,}81$	$11{,}7 \pm 4{,}07$	$12{,}2 \pm 3{,}59$	$46{,}1 \pm 30{,}0$	$51{,}5 \pm 17{,}6$

Diffusion von Kalium in die Tiefe zustande. Dieser Faktor wird von ATWOOD nicht berücksichtigt. Die Einwirkungszeit von wenigen Sekunden in ATWOODS Experimenten ist, wie es aus unseren Daten hervorgeht, für die tiefen Fasern erheblich zu kurz und für die oberflächlichen Fasern nicht ausreichend.

Unsere Versuche zeigen, dass der Befund von ATWOOD mit hoher Kaliumdepolarisation und kleinen EPSP nur für eine Fasergruppe, nämlich die Gruppe 1 unserer Einteilung, zutrifft. In der kurzen Einwirkungszeit der kaliumreichen Lösung können die tiefen Fasern, die hauptsächlich die Kontraktion auf Nervenreiz unterhalten, keine optimale Depolarisation aufweisen. In den Experimenten dieses Autors hat deshalb der Vergleich der Kaliumdepolarisation mit den EPSP einiger Muskelfasern, die keineswegs als repräsentativ betrachtet werden können, zu einer nicht statthaften Schlussfolgerung geführt[8].

Summary. Three groups of fibres with different EPSP were differentiated in the claw-opening muscle of crayfish. Small and late depolarization of the deep fibres was observed on application of 3–4 times the normal concentration of KCl.

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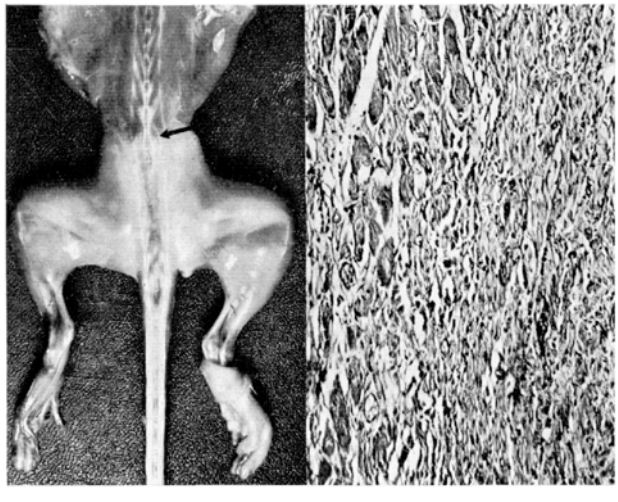
A Muscular Dystrophy Induced by Cold Following Restriction of the Arterial Blood Supply[1]

Muscular dystrophies are known to occur in experimental animals under the influence of hereditary factors, drugs and diets. Yet, the value of these as experimental models of disease is somewhat limited by the complexity of the underlying pathogenic mechanisms, individual variations in susceptibility and the variable distribution of the lesions. Recently, we have succeeded in developing a simple technique for the consistent induction of a severe and predictably localized myolysis by exposing certain skeletal muscle groups to cold following restriction of their arterial blood supply.

In preliminary experiments we tested a variety of procedures for cooling and for the restriction of the blood supply; only the most efficacious combination of techniques was then used in the principal experiment to be described here.

In twenty female Sprague-Dawley rats of the Holtzman Farms with a mean body weight of 105 g (range 96–110 g), the aorta was exposed through a midline incision under ether anesthesia and completely occluded by a nylon ligature just caudad from the origin of the renal arteries. Immediately after the operation, most of the animals showed a slight impairment in the use of their hind limbs, but this soon disappeared, and after two or three days they were able to walk in an essentially normal manner, presumably as the result of adequate collateral circulation. Five of these rats, killed on the fourth day, showed no macroscopically detectable lesion in the musculature of the hind limbs. On the fifth day, the remaining 15



Left: Light discoloration of the musculature from waist (arrow) down. *Right:* The muscle fibers undergo lysis while the sarcolemma sheaths proliferate (PAS, × 120).

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animals were shaved with electric clippers from the waist down and immobilized on a board according to a previously described technique[2]. Then they were placed vertically (hind feet down) for 30 min in a tank filled with an ice-water mixture which reached just to the waist.

Immediately after freezing the rats their hind legs were stiff (as if in a rigor mortis) and pale, while during the next few hours they became flaccid and somewhat cyanotic. On the following day, the cyanosis of the skin disappeared but the hind legs remained completely or almost completely paralyzed in all animals. This paralysis persisted, and during the next week an acute involution of the musculature ensued so that the contours of the long bones became easily visible through the skin. Upon autopsy on the 12th day, the involuted muscles exhibited a light 'fish flesh' type of discoloration which, upon histologic examination, proved to be the result of an intense generalized lysis of striated muscle fibers associated with proliferation of the sarcolemma cells and of the surrounding connective tissue (Figure). The vessels, nerves and skin showed no evident change. Similar cold exposure or aorta ligature alone produced no comparable muscle lesions.

Apparently, ligature of the aorta produces only a latent vascular deficiency which becomes manifest, however, upon exposure to cold. The procedure is thus suitable for the consistent production of selective striated muscle lesions in a predetermined territory. It should lend itself especially to biochemical studies on myolysis for which it is important that a large muscle mass of predetermined size be affected simultaneously.

Zusammenfassung. Nach vollkommener Ligatur der Aorta knapp unterhalb der Nierenarterien gelingt es bei der Ratte, durch Abkühlung der Hinterbeine regelmässig eine streng auf die kaudale Körperhälfte beschränkte Dystrophie der Skelettmuskulatur hervorzurufen.

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The Effect of Limb Ischaemia on the Serum Glycerol Concentration of the Rat

An increase in the concentration of non-esterified fatty acids (NEFA) in the blood usually indicates a greater rate of mobilization from the fat stores. Changes in the NEFA concentration of plasma during and after 4 h bilateral hind limb ischaemia in rats have been investigated by STONER[1]. The general response was the same whether the samples were obtained by decapitation or under nembutal anaesthesia but the actual concentrations depended on the sampling procedure. The plasma NEFA concentration rose whilst the tourniquets were in place and remained high after release. There was little difference between control and experimental values 3 h after release, owing to a rise in the NEFA concentration of control animals during the afternoon. STONER[1] also showed that the increase was dependent on the presence of an intact sympathetic nervous system.

In the case of rats after tourniquet release, an increase in the plasma NEFA concentration might reflect not only a greater rate of release from the depots, but also impaired utilization of NEFA. Changes in the rate of fat mobilization might be followed more easily by measuring the concentration of circulating glycerol[2,3].

Male albino rats of the Porton strain (body weight 223 g ± 22 S.D.) fed on M.R.C. diet 41B were used. Bilateral hind limb ischaemia was produced by rubber tourniquets applied under ether anaesthesia[4]. Each experimental animal was paired with a control which was killed at the same time. Control animals were also anaesthetized to compensate for any effects of ether. Only one such pair was studied at any particular time on any day. Glycerol was estimated enzymatically[5] on filtrates of serum deproteinized with barium hydroxide and zinc sulphate[6].

The serum glycerol concentrations varied widely under all conditions (Table). The process of deproteinizing contributes to this variation, as the unavoidable dilution involved can bring the concentrations of the weaker samples close to the limit of reliability of the method (about 5 μM).

A chi-square test showed that the concentrations in the whole group of injured rats were significantly greater ($P < 0.01$) than in the controls from noon onwards, but comparison of the means ('t'-test) at specific times showed a significant difference between the control and injured rats only at 3 p.m.

The effect of hind-limb ischaemia on the concentration of glycerol in serum. Bilateral hind-limb tourniquets were applied during a 3 min period of ether anaesthesia at 10 a.m. Control animals were similarly anaesthetized with the exception of the 10 a.m. group. Blood samples were obtained by decapitation at the times indicated. Tourniquets were removed at 2.0 p.m. in the experimental groups killed at 3 and 5 p.m. Glycerol concentrations μM/l serum ± S.E.M. Number of rats shown in parenthesis

Time	Control	Experimental
10.00 a.m.	162 ± 17 (8)	–
10.10 a.m.	124 ± 17 (7)	–
12.00 a.m.	154 ± 31 (6)	188 ± 17 (6)
2.00 p.m.	113 ± 8 (6)	138 ± 16 (6)
3.00 p.m.	112 ± 10 (6)	182 ± 11 (6)[a]
5.00 p.m.	137 ± 7 (7)	169 ± 18 (7)

[a] $P < 0.001$.

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