

of 2×10^{-7} dyne cm. If we suppose that the sense cells are stimulated by the pulling of a hair, then it is reasonable (assuming that elongation of a hair of about 1.4×10^{-10} cm. is detectable and Brownian motion limits the natural sensitivity of sense cells) to accept the threshold for the perceptible force as about 0.1 dyne (according to Hl. de Vries). Therefore I conclude that, if the cockchafer has permanent magnetic material at all, it cannot exert a mechanical force in the Earth's magnetic field greater than 2×10^{-5} dyne, which is much too small to be perceived by the sense organs of the cockchafer.

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PHYSIOLOGY

Hypoglycaemic Response to Leucine in a Leucine-sensitive Man

It has been reported previously^{1,2} that certain individuals show a profound lowering of the blood glucose-level following ingestion of leucine or isovaleric acid and that this is a familial trait.

We have studied the mechanism of this hypoglycaemic response in a fasting leucine-sensitive male aged 29 years (case 3¹) using methods previously described to follow peripheral glucose metabolism in the forearm^{3,4} and plasma insulin activity⁵. Following successive infusions into the brachial artery at rates of 7 mgm./min. for 20 min. of L-leucine and commercial isovaleric acid neutralized in saline, 10.5 gm. L-leucine was taken by mouth.

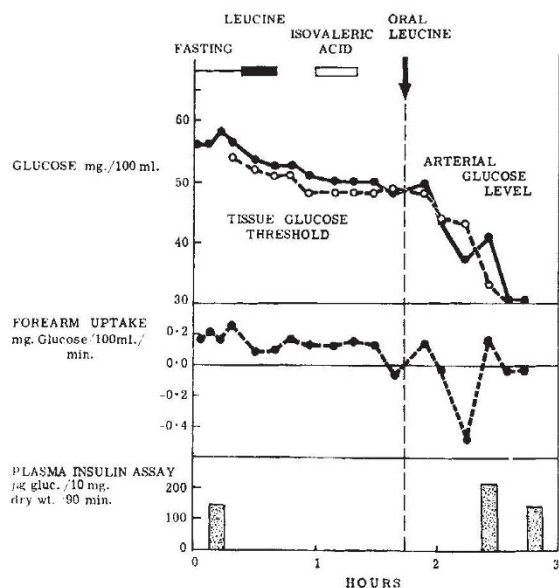


Fig. 1. Above, arterial blood glucose concentration ●---● and glucose threshold ○—○; middle, glucose uptake by the tissues of the fore-arm (mgm. glucose removed from the arterial blood per 100 ml. tissue per min.); below, arterial plasma insulin activity (µgm. glucose taken up per 10 mgm. dry weight of rat hemi-diaphragm)

Fig. 1 shows the arterial blood glucose-level and plasma insulin activity, the glucose uptake and calculated glucose threshold of the fore-arm tissues. Neither leucine nor isovaleric acid, when continuously infused, affected the glucose uptake or glucose threshold of the fore-arm tissues. The oral dose of leucine, however, lowered the blood glucose-level and the tissue glucose threshold. The arterial plasma insulin activity increased significantly ($P < 0.05$) from 139 ± 20 to 212 ± 19 µgm. glucose/10 mgm. dry weight rat hemi-diaphragm/90 min. incubation, but this increase was only transient, results in accord with those published recently by Yalow and Berson⁶.

The subsequent fall in the glucose threshold of the fore-arm tissues resembled that observed in normal individuals after injections of insulin⁴. It may be noted that the systemic fall of blood sugar was not accompanied by an increase of glucose uptake by the fore-arm tissues; this has also been observed in other subjects after intravenous insulin.

We conclude that: (1) it is unlikely that the peripheral tissues take up more glucose as a direct response to circulating leucine or isovaleric acid; (2) the hypoglycaemic effect of leucine in sensitive subjects is due to a transient rise in the plasma insulin activity.

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Effect of Strophanthin G on Oxidative Metabolism in Cardiac Muscle

PREVIOUS results published from this laboratory indicate that the increased mechanical efficiency (ratio of work output to energy input) apparent after the administration of non-toxic doses of cardiac glycosides to isolated spontaneously beating hearts is invariably associated with raised levels of oxidative metabolism^{1,2}. Hajdu and Leonard³ recently directed attention to the possibility that such an increased rate of oxygen consumption could be due to the increased mechanical work output associated with the positive inotropic response rather than to the fundamental metabolic action of the glycosides themselves.

An attempt has been made to investigate this possibility by comparing the effect of strophanthin G ('Onabain' (Arnaud): Laboratoire Nativelle product) on the rate of oxygen uptake in actively beating hearts with that on hearts in systolic and diastolic arrest.

Experiments were carried out at 25.0° C. on hearts isolated from unselected summer toads (*Bufo*