

Nr.	Untersucht	LSD 25		Mezkalin
1	Wirksame Dosis	0,03–0,3γ/Tier		ca. 100γ/Tier
2	Bilder bei höchsten erreichten tox. Dosen	ca. 50–100γ Fortlaufen		ca. 200γ Krämpfe-Tod
3	Hemmung des Netzbau- triebes in % der Versuchszahl	unter 0,05γ	über 0,05γ	
4	Durchschnittliche Ver- größerung der Netz- fläche um %	74,1	31,2	11,8
5	Zahl der gegenüber dem Vortag verlängerten Netze in %	+ 13,4	– 23,3	– 16,8
6	Vermehrung der über- großen Sektoren gegen den Vortag um	71,5	85,7	64,7
7	Durchschnittliche Zu- nahme der Winkelregel- mäßigkeit in Grad	– 4	+ 2	+ 8
8	Zahl der Netze, deren Winkel regelmäßiger waren als am Vortag in %	+ 0,84*	– 0,3*	– 0,81*
9	Klebfadenverlauf	100 regel- mäßig	28,6 regel- mäßig	17,6 unregel- mäßig

* Unterschiede mit dem *t*-Test «stark gesichert».

allen Netzen, die unter dem Einfluß niederer Dosen von LSD 25 gebaut worden sind [Tabelle (7), (8)], scheint auf einer Zunahme des Assoziationstempos bei der Anlage der Radialfäden zu beruhen. (Die Klebfadenregel- mäßigkeit wurde nicht quantitativ erfaßt.) Wahrschein- lich handelt es sich hierbei um eine bessere Verwertung des sensiblen Kontrollreizes. Dabei liegt eine qualitative Steigerung einer spontanen Leistung durch LSD 25 vor, im Gegensatz zu der erhöhten Unregelmäßigkeit durch Mezkalin [Tabelle (7), (8)]. Damit scheint uns der Spinnentest durch seine Aufgliederung der Wirkung beider Substanzen einen Hinweis dafür zu geben, daß der ähnlichen Wirkung am Menschen ein verschiedener Angriffspunkt zugrunde liegt.

P. N. WITT

Pharmakologisches Institut der Universität Bern, den 17. Januar 1951.

Summary

Investigating, with a special method, spiders' webs built under the influence of LSD 25 and Mezcaline, a difference between the two substances becomes apparent. The most striking is the improved exactitude of the angles with small doses of LSD 25, and the decreased accuracy under the influence of Mezcaline. Therefore it seems likely that the similar effect which the two drugs have on man is brought about by attacks from different points.

Subdivision of Cutaneous Afferents According to Skin Areas and Reflex Effects

It has been stated (LLOYD¹) that the response to a single shock to an ipsilateral cutaneous nerve is indirect facilitation of the flexor motoneurons and a likewise

indirect reciprocal inhibition of the extensor moto- neurones. With the more natural modes of stimulation to be used below, other reflex figures come to the fore (cf. HAGBARTH and NAESS¹).

In decerebrate or low spinal cats the hind limb to be used was deafferented and the excitability of antagoni- stic motoneurons tested by recording monosynaptic responses from a ventral root.

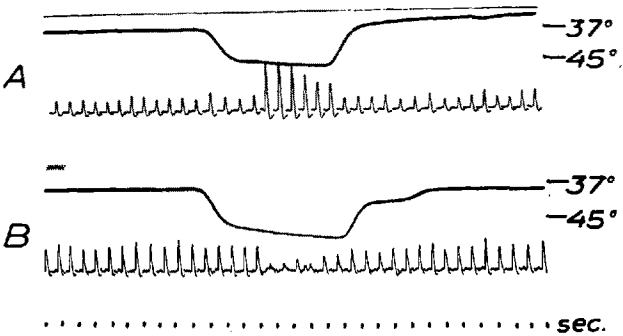


Fig. 1.—Decerebrate cat. Records from the ventral root L₇. Repeated monosynaptic test volleys obtained (A) from the gastrocnemius nerve and (B) from the deep peroneal nerve. Thermode on the intact sural nerve in the middle of the thigh. Local heating of the cutaneous nerve causes facilitation of the extensor motoneurons and inhibition of the flexor motoneurons. Upper line is temperature record, calibrated on the right in °C. Time 1000/sec.

In figure 1 the sural nerve is locally heated (thermode technique) to stimulate the small afferents selectively (C. v. EULER²). The reflex effects are shown in gastrocnemius and deep peroneal motoneurons respectively. The slowly iterated monosynaptic responses are increased on the extensor side and inhibited on the flexor side. When a similar stimulation is applied to the sural nerve in an otherwise intact animal it may cause extension of the ankle. Thus it is clear that the smallest afferent fibres of a cutaneous nerve sometimes set up ipsilateral reflex extension.

The extensor inhibition from a single shock to a cutaneous nerve may be followed by facilitation (BERNHARD³). This was repeatedly verified in the present investigation. Sometimes, however, in a series of obser- vations, exceptional results appeared. It turned out that the effect could be modified by applying the conditioning shock to different branches of the same cutaneous trunk. Figure 2 shows the excitability changes in the motone- rones of gastrocnemius following a conditioning shock to a small cutaneous branch passing over the heel. There is no inhibition to be seen, only a facilitation, the latency of which does not exceed 4 msec. Thus also the fastest fibres of a cutaneous nerve are sometimes capable of causing ipsilateral extensor facilitation.

The single shock technique, as well as the thermode technique described above, represent an unnatural mode of stimulation, and, by using such methods, it may be difficult to distinguish between functionally different groups of sensory units. By leaving the cutaneous nerves intact and stimulating the skin itself by adequate means, striking results were obtained which emphasize the importance of truly physiological conditioning.

¹ K-E. HAGBARTH and K. NAESS, Acta physiol. Scand. 21, 336 (1950).
² C. v. EULER, Acta physiol. Scand. 14, suppl. 45 (1947).
³ C. G. BERNHARD, Acta physiol. Scand. 6, suppl. 47 (1947).

¹ D. P. C. LLOYD, J. Neurophysiol. 9, 439 (1946).

In a decerebrate animal both hind limbs were denervated, leaving only the pure cutaneous nerves such as the sural and the saphenus, on the side of the leg to be used. The monosynaptic test volleys were continuously elicited from the central stump of the gastrocnemius nerve. By pinching the skin of the leg it proved possible to influence the amplitude of the test responses in a differential fashion by applying the stimulation to different areas of the skin. When pinching the skin over the heel, for example, a marked facilitation of the gastrocnemius motoneurons was obtained; but when a similar stimulation was applied to the surface over the ventral side of the ankle an equally prominent inhibition appeared.

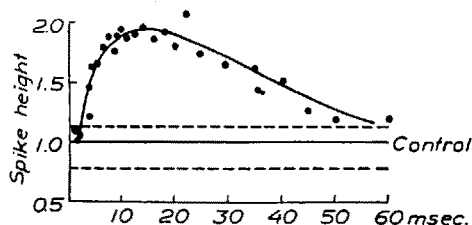


Fig. 2.—Decerebrate cat. Excitability changes of gastrocnemius motoneurons following a conditioning shock to a small cutaneous branch running over the heel.

In order to map out the facilitatory and inhibitory skin areas for the motoneurons of different muscles it was necessary to preserve all the skin afferents of the leg. Thus, in the experiment presented in figure 3, the innervation of the leg was left intact except for the gastrocnemius, the deep peroneal and the quadriceps nerve which were severed. From the central stumps of any of the latter nerves, monosynaptic test volleys could be evoked (the rectus component of the quadriceps had been removed). When pinching the skin great care was taken to ascertain that no movements of the leg or any other stimulation of deep afferents occurred.

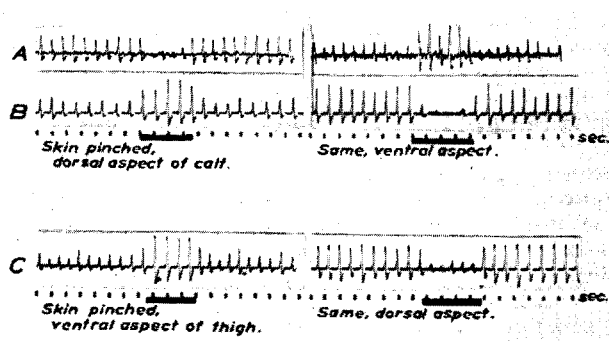


Fig. 3.—Decerebrate cat. Records (A and B) from the ventral root L_7 and (C) from the ventral root L_8 . Repeated monosynaptic test volleys obtained (A) from the deep peroneal nerve, (B) from the gastrocnemius nerve and (C) from the quadriceps nerve (the rectus component removed). By pinching the skin of the leg the excitability of the motoneurons is influenced and the effect is changed by varying the localisation of the skin stimulus. See text.

It was found that facilitation of the gastrocnemius motoneurons could be provoked from a skin area localized on the dorsal side of the leg and extending from about the middle of the thigh to just beneath the heel. From the surface of the rest of the leg, inhibition of the gastrocnemius motoneurons was obtained. The antagonistic flexor motoneurons (test shocks on the deep peroneal nerve) were influenced in the opposite way. They

were inhibited from the extensor facilitatory area just described, and facilitated from the rest of the leg. The results were quite constant and easy to repeat.

The extensor motoneurons of the quadriceps muscle were also influenced by pinching the skin. They were facilitated from the skin over the ventral side of the thigh and the knee and inhibited from other parts of the leg. The extensor facilitatory skin areas are mainly distributed over the extensor muscles concerned.

The skin stimuli employed have usually been mechanical and nocuous. But local heating to extreme temperatures (above 60–70°C) as well as moderate pressure on the skin were sometimes found to be adequate stimuli for the reflexes studied.

On the basis of the present investigation it is concluded that the reflex patterns which can be obtained from the exteroceptors of the limb are more complex than has generally been thought. The nature of the response is fundamentally determined by that particular skin area of the leg to which stimulation has been applied. For both flexor and extensor muscles, specific excitatory and inhibitory skin areas have been found. The end-organs responsible for these reactions are chiefly activated by nocuous stimuli (mechanical or thermal) but moderate pressure on the skin is also an adequate mode of stimulation. In the large cutaneous nerve trunks, leg afferents from different skin areas are intermingled, and, therefore, in the usual reflex work sensory units with very different reflex functions are indiscriminately activated by shocks to such nerves. The present results suggest that analytical penetration of the organization of skin reflexes has to be based on afferent selectivation. These results are part of a more extensive study which is in course of preparation.

K-E. HAGBARTH

Nobel Institute for Neurophysiology, Karolinska Institutet, Stockholm, January 31, 1951.

Zusammenfassung

Es wurden die ipsilateralen Reflexwirkungen von Hautafferenzen in der hinteren Extremität der Katze studiert. Es konnte gezeigt werden, daß in den großen Hautnervenstämmen sensorische Elemente mit verschiedenen Reflexfunktionen gemischt sind. Für Beuge- und Streckmuskeln wurden spezifische erregende und hemmende Hautareale gefunden.

PRO LABORATORIO

Méthode de dosage du ^{45}Ca et du ^{32}P au cours de l'emploi simultané des deux radioisotopes

Nombreux sont les importants travaux biochimiques utilisant le radiophosphore comme indicateur pour l'étude du métabolisme des tissus osseux. Pendant très longtemps, à cause de certaines difficultés d'ordre technique, on était limité à l'utilisation du radiophosphore pour l'étude de ces problèmes; mais à l'heure actuelle, il est possible de préparer du radiocalcium ayant des activités spécifiques suffisantes. Aussi différents auteurs ont déjà utilisé ce radioisotope au cours des recherches du métabolisme du calcium. Dans certains cas, il est important aussi de pouvoir faire le parallélisme entre le métabolisme du calcium et celui du phosphore. C'est dans le but de pouvoir faire cette compa-