A METHOD FOR DETERMINING THE EFFECT OF CERTAIN DRUGS ON THE MOTOR REACTION OF ANIMALS

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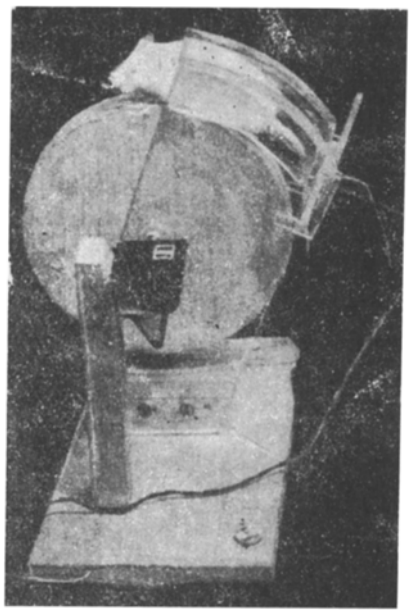
There are many experimental methods of determining the analgesic properties of drugs. In some cases the pain stimulus is caused by an electric current applied to the skin; in others, thermal stimulation is used – by burning the skin on the dorsum or the paws; in yet others a mechanical stimulus is used (for example, compressing the tail). Whatever method of stimulation is used, the response reactions are mainly motor in character. The strength of the stimulus and the duration of its action are taken into account. However, the investigator is interested in establishing not only the threshold of stimulation, but also the strength of the motor reaction, which may be expressed quantitatively.



Apparatus for quantitative registration of the motor reaction of mice.

Our suggested method can be used to make quantitative recordings of the motor reaction of animals in response to an electric current.

The apparatus for mice (see figure) consists of a wooden wheel, 10 cm in diameter and 2.5 cm thick, the rim of which is covered with gauze to prevent the mice from slipping. (In the apparatus for rats the wheel is 30 cm in diameter and 4 cm thick.)

The wheel can revolve around its axle, which is connected to a revolution counter. The supports holding the axle are approximately 3 cm higher than the wheel; to them is fixed the cage, inclined at an angle of approximately 35° to the horizontal, in which the mouse is placed. Behind the animal is a movable door, with a small vertical slit in the center. The electrodes consist of two small rustproof hooks, connected to an induction coil by thin leads. The electrodes are first disinfected with alcohol, and then inserted into the dorsal region of the animal on either side. After the animal has been placed in the cage, the leads are passed through the slit in the door and fixed to it at a distance of 2-3 cm from the electrodes. When the animal is stimulated by the electric current, it tries to run away, but because it is held by the electrodes it cannot move from its place, but can only turn the wheel, the revolutions of which are counted. The electric current is supplied by a battery or transformer. The current may be switched on manually or, better, by the automatic closure of contacts giving impulses at definite intervals of 1, 3, or 5 sec.

Stimulation is applied every 2-5 sec for 1 min or more. After several records have been made of the reaction with 5-min intervals (or longer), the drug to be tested is given by injection or by mouth. Stimulation is then continued at definite intervals of time of 5, 15, or 20 min, and the animal's motor reaction is recorded.

The suggested method can be used to determine the threshold of stimulation with a minimal reaction (movement of the wheel), or with a more marked reaction (squeak plus movement of the wheel), the strength of the reaction (the number of revolutions), fatigue, or the conditioned motor reaction (if the apparatus is connected to a device for giving conditioned stimuli). On the day before the experiment the level of the animal's reactivity is determined; this should also be checked on the day after the experiment. One person can look after several apparatuses of this type and can conduct several experiments simultaneously. Examples of a few investigations are given in the table.

Examples of Investigation of the Motor Reaction by the Suggested Method

Stimulation	No. of revolutions before administration of the drug	Drug and dose	Number of revolutions at different times (min) after administration of the drug				
			15	30	60	90	120
Every 2 sec For 5 min	112	Physiological saline	115	110	114	98	105
	130	Analgin - 0.15 g/kg	100	80	50	40	35
	125	Amidopyrine - 0.10 g/kg	130	95	40	40	45
	140	Chlorpromazine - 100 mg/kg	40	29	26	30	25

The suggested method is convenient for the quantitative determination of the motor reaction of animals, especially mice, in response to a pain stimulus and to the administration of certain drugs. The results may be treated statistically.

SUMMARY

A method is described for quantitative determination of the motor reaction of experimental animals to pain stimulation with the aid of a simple apparatus. The latter consists of a wooden wheel, on the axis of which a tachometer is located. A cage with a mouse is mounted over the wheel. The electrode hooks were connected by means of a fine conductor with an induction coil. When electric stimulation is applied, the animal tries to escape and so it turns the wheel of the tachometer. Stimulation with an automatic electrode is conducted according to the chosen scheme, every 2 or 5 sec for one or more minutes. From the number of revolutions for a definite period of time, prior to and after the use of the substance investigated, a conclusion may be drawn on the effect produced.