

INFLUENCE OF THERAPEUTIC SLEEP ON THE MITOTIC ACTIVITY OF NORMAL AND DEGENERATING WHITE RAT EPIDERMIS

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In our previous investigations [2, 4] we showed that denervation of tissues led to a change in mitotic activity. In this connection it was important to determine whether degenerating tissue was able to respond by a change in the rate of cell division to various influences affecting the organism; the answer to this question could throw light on certain aspects of the regulation of cell division in tissues.

As a factor influencing the organism we selected therapeutic sleep, because according to published reports [1, 5, 6] in animals in a condition of therapeutic sleep certain tissues show a characteristically high mitotic rate.

Although occasional investigations of this problem have been made not nearly enough work has been carried out on the influence of therapeutic sleep on cell division.

The present work is a study of the influence of various depths of therapeutic sleep on proliferative processes in normal and degenerating rat epidermis.

METHOD

The work was carried out on 17 sexually mature white male rats weighing 172 g. In 8 of them degeneration of the left hind limb was induced by removal of about 0.5 cm of the nerve. The femoral nerve was removed at the level of Poupart's ligament, the obturator nerve at the level of the pelvis, and the sciatic nerve directly at its exit from the pelvis. In the remaining animals (controls) we removed a portion of soft tissue without dividing the nerves.

On the 10th day after the operation both control and experimental groups received 0.3 ml of 2% sodium amytal per 100 g subcutaneously. Observations were then made on the duration and depth of sleep.

The nature of the sleep was determined from the corneal reflex and the body position.

As soon as the animals had fallen asleep a piece of skin was removed from the upper third of the lower leg and used for a mitotic count. At the same time the mitotic phases were determined.

The histological treatment of the material was made by the usual methods, as described in our previous publications [2-4].

RESULTS

In the experiments in which we studied the relationship between the mitotic activity of the epidermal cells and the duration of sleep, no definite association was established either in the control or in the experimental group. The results obtained agreed with what was found by L. V. Sokolova [5], who showed that the duration of sleep had no appreciable influence on the change in mitotic activity of several tissues (cornea, epidermis, intestine).

To study the changes in mitotic activity in relationship to the depth of sleep we divided the experimental and control rats into 2 groups. The first included animals with light sleep, and the second those in which deep sleep had been induced by means of drugs.

Mitotic Index (as percentage) in the Epidermal Cells of the Skin of Rats, and Its Relationship to the Depth

Control						Experimental					
Deep sleep			Light sleep			Deep sleep			Light sleep		
No. of animal	Right limb	Left limb	No. of animal	Right limb	Left limb	No. of animal	Intact limb	Denervated limb	No. of animal	Intact limb	Denervated limb
12	8.4	8.8	9	5.0	7.1	4	10.2	7.4	3	6.1	4.4
10	8.6	9.2	17	7.2	5.5	2	10.8	6.5	6	6.4	3.0
14	8.7	10.3	15	8.0	6.2	5	12.5	10.3	1	7.0	7.2
13	9.5	8.6				8	14.0	12.0	7	8.2	5.5
11	10.7	12.2									
16	12.2	10.8									
Mean	9.6	9.9	—	6.7	6.2	—	11.9	9.0	—	6.9	5.0

As can be seen from the results shown in the table, in both the control and experimental animals in deep sleep the number of mitotic divisions in the epidermis of both limbs was in all cases higher than in rats sleeping lightly. In the control animals, in the group sleeping deeply the mean mitotic coefficient for the left limb was 9.9‰, and for the right limb 9.6‰, but in the rats sleeping lightly the corresponding figures were 6.2 and 6.7‰. The difference in the mean mitotic coefficients for the left limbs was significant at a level of $P=0.004$, and for the right limbs the difference was nearly significant at $P=0.02$.

An analysis of corresponding indices in the experimental animals showed that the difference in the mean coefficients was significant for the intact limbs ($P=0.002$), and nearly significant for the denervated limbs ($P=0.03$). At the same time, in the epidermis of the denervated limbs the number of mitoses was smaller than it was in the epidermis of the intact limbs of the same rats.

The results obtained indicate that denervated tissue had not lost its ability to respond to the influence applied to the organism by change in the number of dividing cells.

LITERATURE CITED

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5. L. V. Sokolova, Byull. éksper. biol., No. 7 (1959), p. 95.
6. W. S. Bullough, Proc. roy. Soc. B., 135 (1948), p. 233.

All abbreviations of periodicals in the above bibliography are letter-by-letter transliterations of the abbreviations as given in the original Russian journal. *Some or all of this periodical literature may well be available in English translation.* A complete list of the cover-to-cover English translations appears at the back of this issue.
