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Short communication

SLEEP DEPRIVATION DECREASES THE BEARD-HAIR GROWTH IN MAN

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Abstract. Ten young men underwent a sleep deprivation of 48 h which resulted in a 19% decrease of beard-hair growth. This effect, reflecting the lowering of protein synthesis during sleep deprivation, was presumably related to hormonal disturbance, namely depression of growth hormone release, decrease of dihydroxytestosterone availability or increase of sympathetic tone and/or corticoids.

One of the long postulated functions of sleep concerns protein synthesis (6), its role being to induce optimal conditions for tissue restoration and memory storage and to prepare for behavioral activities of waking. Moreover, we know (10) that the release of the growth hormone in man, crucial for such a synthesis, depends on the level of slow wave sleep, particularly the stages III and IV. In this study we utilized the beard-hair growth, a peripheral index of protein synthesis easily quantified in man. Beard-hair consists of a complex scleroprotein partially made up of cystine resulting from the combination of two cystein molecules (3).

Ten adult men 22-25 years old were deprived of sleep during 48 h. During the deprivation, as well as the previous control period (48 h) the subjects ate standard meals at the student cafeteria near the laboratory. The were asked to spend the nights of the control period at home and to avoid large variations of ambient temperature. They ha

to go to bed between 10 and 12 PM and to refrain from sexual intercourse. During the deprivation period, the subjects were never left alone. During the night, they remained in the library of the laboratory listening to music, talking and playing cards etc. They were asked to be calm (to avoid any physical fatigue) and to be dressed comfortably and warmly (close to the ambient temperature of control nights). The library was illuminated with a dim light to diminish photic stimulations as far as possible. The subjects were shaved in a definite order three times: (i) 48 h before deprivation for control baseline; (ii) just before deprivation; (iii) just after deprivation. The shaving was done at 9 a.m. The areas selected for study, in the middle of the cheek (2 cm under the lower level of the ear) was delimited with indelible ink. Skin and beard were softened, massaged to project from scales, carefully dried and shaved by the experimenter with a one slide razor. The length of beard-hair was measured under the microscope with a 25/100 mm scale graduation and the samples were studied in a blind design, each composed ong 20 hairs.

Table I shows that in the sleep-deprived subjects the beard-hair lenght was decreased by 19%. The difference was significant at the level $P < < 0.001$ (student t-test). This result is consistent with data (10) showing

TABLE I

Influence of 48 h total sleep deprivation on beard-hair growth

Hair length (mm) in non/deprived subjects			Hair length (mm) in deprived subjects	
Subjects n°	Mean ($n = 20$)	±SD	Mean ($n = 20$)	±SD
1	1.17	0.25	1.17	0.18
2	1.07	0.20	1.02	0.14
3	1.18	0.18	1.12	0.25
4	1.01	0.26	0.98	0.27
5	1.10	0.28	0.87	0.10
6	1.00	0.11	0.97	0.15
7	1.26	0.28	1.00	0.31
8	1.70	0.34	1.07	0.35
9	2.05	0.45	1.20	0.31
10	1.59	0.45	1.28	0.39
Mean	1.313	±0.35	1.068	±0.12
		$P < 0.001$		

that the growth hormone release, crucial for protein synthesis, is prevented by deprivation of deep slow sleep. However, the growth hormone does not intervene alone in the growing of beard-hair. Testosterone, which is responsible for beard growth in puberty (3) may be also concerned. Whereas in adolescence the plasmatic level of the testosterone

increases during sleep, together with the luteinising hormone -LH- (2), in the adults the circadian acrophase of testosterone is said to take place during waking hours (8), while the daily peak of the LH still occurs during sleep. The coordination of hormones in the growth of beard is not yet definitely established; however, should dihydroxytestosterone (DHT), the biologically active form, bind the intracellular-receptors of the hair follicle, it could modify the functioning of the target structure, faciliting the fixation of the growth hormone. Thus, sleep deprivation could also affect the growth of the beard-hair in two ways: (i) the disturbance in the circadian rhythm diminished the efficiency of LH (Reinberg, personal communication), resulting in a decrease in the rate of testosterone synthesis; (ii) diminishing the peripheral enzymatic transformation of testosterone into DHT, independently of the quantity of testosterone available. In either case, the cellular receptors of the hair-follicle accessible to the growth-hormone would become insufficient. In connection with the role of testosterone, it was shown (1), that anticipation of sexual behavior induces an increase in beard growth. In our study a possible anticipation of sexual behavior for the post-experimental period did not prevent the depression of beard-hair synthesis induced by sleep deprivation. Thus, the decrease we observed might suggest that the limiting factor in beard-hair growth after sleep deprivation, is more related to the activity level of the growth hormone at the periphery.

Although our results are consistent with the protein synthesis processes assigned to sleep, deprivation of sleep is a stress generating situation by itself (7) and other factors such as sympathetic tone (4) and corticosteroids (9) might also indirectly affect beard-hair growth owing to their catabolic properties (7). Finally, a lowered level of protein synthesis could promote the way of functional metabolism at the expense of the structural body growth.

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