LETTERS TO THE EDITOR

CIRCADIAN RHYTHMS OF CORTISOL AND CORTICOSTERONE METABOLITES IN HEALTHY MAN

It is well known that 17-hydroxycorticosteroids in blood and urine show circadian rhythms^{1,2)}, but there have been very few literatures about those of their individual urinary metabolites. Gordon *et al.*³⁾ described the circadian rhythms for tetrahydrocortisol (THF) and tetrahydrocorticosterone (THB) determined by specific double isotope technique in 1968. Circadian rhythms of urinary metabolites of cortisol and corticosterone were examined by temperature programmed gas chromatography in this paper.

Three healthy males (A: 27 years, 168 cm, 68 kg; B: 32 years, 162 cm, 67 kg; C: 27 years, 168 cm, 51 kg) worked as usual in our institute except sleeping there overnight and not drinking alcohols. Their urines were collected every six hour beginning noon for twenty four hours. The metabolites of cortisol, that is, tetrahydrocortisone (THE), THF, cortolone, β -cortolone and β -cortol, and the metabolite of corticosterone, that is, *allo*-tetrahydrocorticosterone (*a*-THB), as well as pregnanetriol were measured simultaneously by the modification of the method of Horning *et al.*⁴⁾ with the temperature programmed gas chromatography. In addition, 17-ketogenic steroids (17-KGS)⁵⁾ and creatinine⁶⁾ were determined. For each subject each 6-hr value of a metabolite was calculated as a percentage of the 24-hr mean for the metabolite. The mean values of the three subjects or two subjects in relation to *a*-THB and β -cortol were shown in Fig. 1.

It has been presented that the amount of creatinine excreted in urine lowered a little in the sleeping time at night⁷⁾, and the tendency is seen in our experiment. Circadian rhythm is not observed definitely in pregnanetriol which is not a metabolite of corticoids. The rhythms for THE and THF accord well with that for THF reported by Gordon *et al.*³⁾, and also the rhythm for *a*-THB is fairly consisted with that for THB by them. The amplitudes of the circadian rhythms in cortolone and β -cortolone are a little smaller than in THE and THF, and the amplitude in β -cortol becomes further small. The excreted amount of β -cortol was small in comparison with those of THE, THF, cortolone and β -cortolone, and could not be determined exactly in subject A. Since the excreted amount of *a*-THB is also small and additionally the amount of THB was larger than that of *a*-THB in subject A, it could not be exactly measured on the chromatogram. The pattern for *a*-THB closely resembled that for THF. Since the amplitude of 17-KGS was smaller than that of THE or THF, the gas chromatographic method seemed to be more preferred than the method of 17-KGS for the survey of the variation of rhythms.

Fig. 1. Urinary excretion of creatinine, 17-KGS, pregnanetriol and cortisol and corticosterone metabolites.

Since the specific double isotope technique is too intricate to examining the variation of circadian rhythms of shift workers, the examination of the variation of THE or THF by simple method using gas chromatography seems to be useful for that purpose.

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*National Institute of Industrial Health
Kizuki-Sumiyoshi
Kawasaki and
Department of Chemistry
Science University of Tokyo
Kagurazaka, Shinjuku-ku
Tokyo*

Kazuko MORI
Kanji ABE

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