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Seasonal Variation in Urinary Excretion of 5-S-Cysteinyldopa in Healthy Japanese

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The urinary excretion of 5-S-cysteinyldopa was examined in 10 healthy Japanese subjects once a month during a period of one year. The mean values were highest in August (296 μg/day) and lowest in February (141 μg/day). Individual variations were so great that only a weak difference was observed ($p<0.05$). *Key words: Dopa; Sunlight.* (Received September 16, 1986.)

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Urinary excretion of 5-S-cysteinyldopa (5-S-CD) has been widely used as a biochemical marker of melanoma metastasis (1, 2). The catecholic amino acid arises from the oxidation of dopa and the subsequent coupling of dopaquinone with cysteine (3). Thus, 5-S-CD formed in melanoma tissues (4) by the action of tyrosinase is excreted in large amounts in the urine of melanoma patients (2, 4). 5-S-CD is also excreted in smaller amounts in the urine of healthy subjects, regardless of skin and hair colour (5).

Seasonal variation in the excretion of 5-S-CD was reported in healthy Swedes (6). The results showed a 3-fold increase in the mean excretion value in the summer as compared with that in the winter. We thought it necessary to study the seasonal variation in the urinary excretion of 5-S-CD in healthy Japanese, because of the difference of climate, life style and genetic background. The urinary excretion of dopa and dopamine were also examined.

MATERIALS AND METHODS

This study included 10 healthy subjects; 7 were students of the University, aged 18–21 years (2 males and 5 females), and the other 3 were 35 (male), 38 (female) and 40 (male) years old. All the subjects lived without excessive exposure to sunlight.

Urine was collected for 24 h in bottles containing 50 ml of acetic acid and 1 g of sodium metabisulphite. 5-S-CD, dopa and dopamine were determined by HPLC with electrochemical detection as previously described (7).

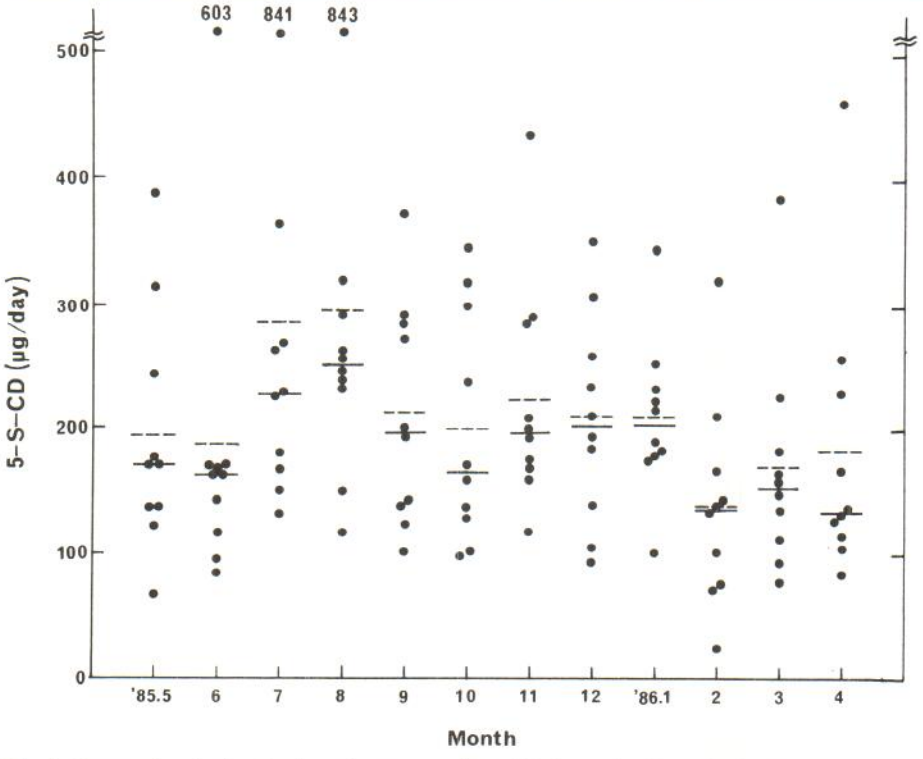

Fig. 1. Seasonal variation in the urinary excretion of 5-S-cysteinyldopa in healthy Japanese. The median is indicated by —, and the mean by – – –.

Urine sampling was performed every month on days 15–25, in May, 1985, through April, 1986. The weather conditions during the study (Table I) was recorded in Nagoya local meteorological observatory at a distance of 12 km from the University.

RESULTS

Fig. 1 shows the urinary excretion of 5-S-CD in healthy subjects measured every month during a period of one year. The higher excretion was observed in July and August and the lower in February-April. The highest mean value was 296 μg/day in August and the lowest 141 μg/day in February. The mean 5-S-CD excretion for 12 months was 209 μg/day.

Abnormally high excretions were noted in 3 samples from 2 subjects; one showed a high excretion in June and the other in July and August. Both had the fairest skin of all the subjects investigated.

The urinary excretions of dopa and dopamine showed no significant change in any particular season. The mean excretions of dopa and dopamine for 12 months were 56 and 346 μg/day, respectively.

DISCUSSION

We have found that the 5-S-CD excretion in the summer was approximately twice that in the winter. However, individual variations were so great that only a weak difference was observed between the highest and the lowest months ($p<0.05$). This is in contrast to the

Table I. *Average temperature, hours of sunshine and total solar radiation in Nagoya, May 1985 to April 1986*

Month	Temperature (°C)	Sunshine (h)	Solar radiation (MJ/m^2)
1985			
5	+19.4	184	16.8
6	+21.6	117	13.6
7	+26.7	177	16.3
8	+27.7	218	17.5
9	+23.9	124	11.2
10	+17.6	141	10.8
11	+11.3	129	8.4
12	+ 5.5	145	8.0
1986			
1	+ 2.7	182	8.7
2	+ 2.6	192	11.8
3	+ 7.8	203	13.7
4	+13.9	195	15.6

results among the Swedes; there was a 3-fold increase in summer, which appeared to be statistically significant ($p<0.001$) (6). The fact that seasonal variation in the 5-S-CD excretion was much smaller in the Japanese than in the Swedes should be ascribed to the differences in climate and life style as well as genetic background. In Sweden there is a drastic decrease of sunshine in the winter (6), while in Japan, sunshine is as good in the winter as in the summer (Table I). Furthermore, in Sweden, people spend longer summer vacations with intensive exposure to sunlight, while in Japan, people spend shorter summer vacations.

In the study on the Swedes (6), the normal ranges were not so great except in summer, and the 5-S-CD excretion below 150 μg/day was regarded as normal, between 150 and 400 μg/day as borderline, and above 400 μg/day as pathological (2). However, in this study, some subjects showed 5-S-CD excretion above 300 μg/day even in the winter-time. Therefore, a caution should be required in setting a "normal" range for the Japanese.

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