Inorganic Phosphorus Content in Human Aqueous Humor in Relation to Hours Postmortem

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FURUNO, J. and KOMURA, S. Inorganic Phosphorus Content in Human Aqueous Humor in Relation to Hours Postmortem. Tohoku J. exp. Med., 1976, 119 (3), 293-295 — It appears possible to utilize the inorganic phosphorus content in the aqueous humor for estimation of postmortem interval, especially if the factors relating to the body temperature are known in detail.

postmortem interval; inorganic phosphorus; human aqueous humor

Estimation of postmortem interval is of particular importance in forensic medicine, and there are many papers on studies of this theme (Fattech 1973). There are, however, only a few papers on basic studies of estimation of postmortem intervals in terms of behavior of inorganic phosphorus content in the aqueous humor, and there remain not a few points yet to be unravelled (Furuno et al. 1959; Schleyer 1962).

MATERIALS AND METHODS

This study was made in 110 cases, ranging in age from one to 82 years, where the aqueous humor was collectable in judicial autopsies performed in our department.

The aqueous humor was collected with the syringe for tuberculin injection, and the left and right aqueous humors were combined to use as test humor.

The method of Fiske and Subbarow (1925) was followed for the determination of inorganic phosphorus of the aqueous humor in appropriate dilutions.

For the purpose of collecting reference data for estimation of postmortem intervals, the intrarectal temperature was measured with the thermometer inserted into the rectum at the time when the aqueous humor was collected to calculate the hourly loss in body temperature. The atmospheric temperature measured at the Simonoseki Meteorological Observatory in Yamaguchi Prefecture was used as the average temperature at the start of each autopsy.

RESULTS AND DISCUSSION

Relations among the average atmospheric temperature, postmortem interval and inorganic phosphorus content in the aqueous humor were studied in the first place, as shown in Figs. 1, 2, 3 and 4. It was revealed that the inorganic phosphorus content increased on an average and the estimated postmortem interval varied less widely with the prolongation of postmortem interval and the elevation

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Fig. 1. Inorganic phosphorus content of human aqueous humor after death at average temperature between 3°C and 11°C.
There is a positive correlation between the inorganic phosphorus content and the postmortem interval, $r=0.54$.

Fig. 2. Inorganic phosphorus content of human aqueous humor after death at average temperature between 11°C and 16°C.
There is a strong positive correlation between the inorganic phosphorus content and the postmortem interval, $r=0.85$.

of average atmospheric temperature. It was also disclosed that particular care was needed in cases where there was a difference between the temperature at the place where the cadaver had been preserved and the average atmospheric temperature; for example, the cases which had been hospitalized and died in winter or the cadavers preserved with dry ice in summer. In cases of cerebral diseases such as hemorrhage in the cerebral parenchyma, the body temperature was occasionally elevated. In cases of blood loss, the relationship between the postmortem interval and the inorganic phosphorus content in the aqueous humor appeared to differ from that in cases of other causes of death. In the next place, the relations among the hourly loss in body temperature, postmortem interval and inorganic phosphorus content in the aqueous humor were studied. The inorganic phosphorus content in the aqueous humor increased with the prolongation of postmortem interval, and it appeared that the lower the degree of hourly loss in body temperature, the higher was the correlation between the postmortem interval and the inorganic phosphorus content in the aqueous humor.

From the above findings, the inorganic phosphorus content in the aqueous humor seems to be useful for estimation of the postmortem interval, especially when the factors relating to the temperature at the site where the cadaver was preserved and the body temperature of the cadaver are known in detail.
Fig. 3. Inorganic phosphorus content of human aqueous humor after death at average temperature between 16°C and 21°C. There is a strong positive correlation between the postmortem interval, $r=0.89$.

Fig. 4. Inorganic phosphorus content of human aqueous humor after death at average temperature between 21°C and 29°C. There is a strong positive correlation between the inorganic phosphorus content and the postmortem interval, $r=0.87$.

References