Potassium Levels in the Aqueous and Vitreous Humor after Death

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KOMURA, S. and OSHIRO, S. Potassium Levels in the Aqueous and Vitreous Humor after Death. Tohoku J. exp. Med., 1977, 122 (1), 65-68 — It appears possible to utilize the potassium in the aqueous humor as well as the potassium in the vitreous humor for the estimation of the postmortem interval, especially if the factors relating to the body temperature are taken into consideration. ——— postmortem interval; potassium; aqueous humor; vitreous humor

Estimation of postmortem interval is of great importance in practice of forensic medicine. However, it is difficult to estimate it more precisely.

A study to estimate the postmortem interval has been conducted for several years in our laboratory by examining the variation of the inorganic phosphorus in the human aqueous humor. We demonstrated that the amount of the inorganic phosphorus remarkably varied with the factors relating to the temperature at the site where the cadaver was preserved (Furuno and Komura 1976).

It is reported that the potassium content in the vitreous humor increased without being influenced by the environmental temperature after death (Haffe 1962; Lie 1967). As we had doubts about this through our study of the aqueous inorganic phosphorus, we investigated the potassium levels in the vitreous humor and, in addition, the potassium content in the aqueous humor.

MATERIALS AND METHODS

Ninety materials collected from administrative and judicial autopsies were examined, and also thirty male rabbits were investigated as to the aqueous and vitreous humor, at Scientific Crime Detection Laboratory, Okinawa Prefectural Police Headquarters.

The aqueous and vitreous humors were collected with the syringe for tuberculin injection.

A flame photometer manufactured by Instrumentation Laboratory, Inc. was used for the qualitative analysis of potassium. The atmospheric temperature at the start of autopsy, measured at the Meteorological Observatory, was utilized as the average temperature for each autopsy.

Rabbits killed by air embolism were kept in a place of low temperature between 2°C and 6°C and high temperature between 23°C and 27°C. Changes in the potassium content of the aqueous and vitreous humors were examined periodically.

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RESULTS AND DISCUSSION

Relations among the average atmospheric temperature, postmortem interval and potassium levels in the aqueous and vitreous humors of the human cadavers

Fig. 1. Potassium content of human vitreous humor after death at average temperature between 14°C and 17°C. There is a high positive correlation between the potassium content and the postmortem interval, $r=0.78$.

Fig. 2. Potassium content of human vitreous humor after death at average temperature between 26°C and 29°C. There is a high positive correlation between the potassium content and the postmortem interval, $r=0.92$.

Fig. 3. Potassium content of human aqueous humor after death at average temperature between 14°C and 17°C. There is a high positive correlation between the potassium content and the postmortem interval, $r=0.84$. 
Fig. 4. Potassium content of human aqueous humor after death at average temperature between 26°C and 29°C. There is a high positive correlation between the potassium content and the postmortem interval, $r=0.96$.

Fig. 5. Potassium content of the aqueous humor after death in rabbits at low temperature (open circle) between 2°C and 6°C and high temperature (solid circle) between 23°C and 27°C.

were studied in the first place, as shown in Figs. 1 to 4. The vitreous potassium level was found to increase with the postmortem interval, showing some variation due to the difference in the average temperature. The result of the aqueous potassium content was similar to that of the vitreous potassium. However, the levels were higher than those reported so far (Jaffe 1962; Lie 1967) and the difference became larger with lengthening of the postmortem interval. This might be due to the difference in the method employed.

Second, the relations among the environmental temperature, postmortem interval and potassium levels in the aqueous and vitreous humors in rabbits were studied. The result of the aqueous humor is shown in Fig. 5. The vitreous humor gave almost the same result. It was revealed that the potassium levels in the aqueous and vitreous humors were not so much influenced by the difference in the temperature as the quantity of the inorganic phosphorus (Furuno and Komura 1976).

From the above findings, the aqueous potassium as well as the vitreous potassium seems to be useful for estimation of the postmortem interval, although the influence of the environmental temperature should be considered.
References

