ANNALES
UNIVERSITATIS MARIAE CURIE-SKŁODOWSKA
LUBLIN — POLONIA
VOL. LI, 19 SECTIO D 1996

Katedra i Klinika Neurologii Akademi Medycznej w Lublinie.
Kierownik: prof. dr hab. Wiesław Kawiak

MARIA PILARCZYK

The Effect of Intravenous Loading with Glucose on Inorganic and Lipid Phosphorus in the Blood of Patients with Cerebral Infarction

Wpływ dożylnego obciążenia glukozą na losy fosforu nieorganicznego i lipidowego we krwi chorych z zawałem mózgu

The nervous tissue is extremely rich in phosphoric compounds represented mainly by phospholipids, cerebrosides, gangliosides, and phosphates. Well-known are elaborations concerning the occurrence of disturbances in carbohydrate metabolism in patients with different forms of cerebral stroke (1, 2).

Phosphorus of various origins is actively involved in glucose metabolism. Therefore it is essential to determine the interdependence between what happens to this element in the patients with acute vascular brain injury, and transient hyperglycaemia in the course of illness.

The authoress' own investigations aimed at determining the effect of glucose introduced to the organisms of patients with ischaemic cerebral stroke, which is quite often performed for therapeutic reasons, on inorganic and lipid phosphorus concentrations in the blood of these patients.

MATERIALS AND METHODS

The control group consisted of 25 healthy subjects, while the studied group of patients with cerebral infarction comprised 30 subjects.

Determination of inorganic and lipid phosphorus concentrations was performed

on an empty stomach as well as in 4th, 34th, 64th and 124th min after loading with glucose had been accomplished. Glucose was applied intravenously in the amount of 60 ml of 40% solution over the period of 4 min. The glucose loading test as well as all other examinations were carried out only once in the control group, whereas patients with cerebral infarction had examinations performed on days I, III, VII, and XIV of illness.

Determination of inorganic phosphorus was performed by means of the Fiske--Subbarov method in the Śliwińska's modification, whereas determination of lipid phosphorus was based on the Hochmayer and Fried's method. The results of investigations were subject to the statistical analysis.

RESULTS

Before the loading with glucose was performed inorganic phosphorus concentration in the blood of control subjects was 3.5 mg%. In 4th, 34th, 64th and 124th min of the loading test the level of the studied element in the blood lowered by 0.1mg% and was random ($p > 0.05$).

The average content of lipid phosphorus in the blood before the loading with glucose in the control group was within the scope of values given in the literature as normal. In 4th, 34th, 64th and 124th min of loading with glucose the average concentration of lipid phosphorus lowered successively by: 0.2mg%, 0.4mg%, 0.3m% and 0.5mg% when compared with average initial concentration. The differences were statistically insignificant. ($p > 0.05$)

In the group of patients with cerebral infarction average concentration of inorganic phosphorus on the first day of illness, on an empty stomach and in the fourth minute after the loading test was accomplished, proved to be different from corresponding control concentrations by 0.6mg% and 0.8mg% which was statistically insignificant ($p > 0.05$). In the remaining testing times average inorganic phosphorus concentrations in the patients were lower than in corresponding control concentrations by 0.2mg% and the differences were statistically insignificant ($p > 0.05$).

By comparing concentrations of inorganic phosphorus average values in the blood of patients with cerebral infarction on days III, VII and XIV of illness the author was able to reveal a significant decrease

in average phosphorus concentration on an empty stomach as well as in the fourth minute of the loading test on day XIV of illness in comparison with the first day of illness ($p<0.05$).

Before the loading with glucose was performed on day I of illness, lipid phosphorus concentrations in the blood of all the patients with cerebral infarction were within the limits of control concentrations, but average content was higher by 1mg% in relation to the mean control value and this difference proved to be statistically significant ($p>0.05$).

After the loading with glucose was accomplished in the given times of testing, the differences between average lipid phosphorus concentrations in the blood of patients with cerebral infarction and corresponding with them control concentrations were successively: 1.1 mg%, 1.2 mg%, 1.0 mg%, 1.4 mg% and proved to be statistically significant ($p>0.05$).

By comparing average lipid phosphorus concentrations in the blood of patients with cerebral infarction on days III, VII and XIV of illness the author was able to proved that differences between lipid phosphorus concentrations in the blood of patients in given testing times and results obtained on day I of illness were not statistically significant ($p<0.05$).

DISCUSSION

The results of the authoress' own investigations justify the statement that in patients with cerebral infarction, on an empty stomach and after the loading with glucose test at the very beginning of illness, a statistically significant increase in the inorganic phosphorus level in the serum is present. In some patients it is also observed in the later course of illness.

Patients with cerebral infarction reveal a statistically significant increase in the lipid phosphorus level in the blood on an empty stomach and after the loading with glucose in all times of investigation taken into account.

The explanation of reasons of the revealed disturbances in the phosphorus balance has proved to be very difficult. Usually a very severe general condition of patients sometimes accompanied by disturbances

in consciousness as well as frequent presence of pathological changes in the cardiovascular system in the patients may account for multidirectional systematic disturbances.

The results of my own inrestigations on phospholipid balanse reveal its disturbance in patients with cerebral infarction, especially in the initial phase of illness. This may suggest that the increase of lipid phosphorus concentration is dependent of the presence of brain tissue destruction products and the rate of their elimination from the infarction focus.

In patients with cerebral infarction no constantly present and significant effect of glucose on inorganic and lipid phosphorus content in the blood was detected. However, under these circumstances, contents of these elements, though sometimes decreasing, were still higher than in healthy subjects.

REFERENCES

1. Michel R. H.: Phospholipids in the Nervous System. Vol. I.: Metabolism, red. Horrocks L. et al.: Raven Press, New York, 1982
2. Wender et al.: Zaburzenia metaboliczne w udarach mózgu. Neur. Neurochir. Psychiatr. Pol., 2, 169, 1961

Otrz. 1996.06.21

STRESZCZENIE

Wykonano ocenę wpływu glukozy wprowadzonej dożylnie do ustroju chorych z zawałem mózgu na stężenie fosforu nieorganicznego i lipidowego we krwi tych chorych. W grupie chorych z zawałem mózgu nie stwierdzono stale występującego i istotnego wpływu glukozy na zawartość fosforu nieorganicznego i lipidowego we krwi, jednakże w tych warunkach zawartość pierwiastków, chociaż uległa także zmniejszeniu, jednak była wyższa niż u osób zdrowych.