

DIURNAL RHYTHM OF FLUCTUATIONS IN INDICES OF LIPID METABOLISM IN HEALTHY YOUNG PERSONS

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UDC 612.387"52"

The diurnal rhythm of fluctuations in indices of lipid metabolism was studied in 21 healthy persons aged from 16 to 25 years. The results showed no regular pattern of fluctuation in the levels of cholesterol, lecithin, total lipids, or nonesterified fatty acids in the blood of healthy persons during the 24-h period. A regular diurnal rhythm of fluctuations was found in the blood concentration of β -lipoproteins in healthy young subjects, with a minimum in the morning before breakfast and a maximum during the evening.

It is now known that the diurnal rhythm of physiological processes is one way in which the organism adapts itself to cyclic changes in external environmental conditions. The study of the diurnal rhythm of indices of lipid metabolism in healthy subjects has not yet been undertaken sufficiently broadly and deeply. Results obtained by different workers are highly contradictory. For instance, Kuznetsova [5] found a definite rhythm of diurnal fluctuations in the serum cholesterol level, which was significantly higher in the afternoon and lower at night and in the early morning in 16 healthy subjects aged 39-44 years. On the other hand, Baubinens and Stankevichens [1], who studied the diurnal rhythm of the blood lecithin and cholesterol concentrations in 12 healthy subjects, found no regular pattern of fluctuation in these indices of lipid metabolism under normal conditions in the 24-h period. Butnev [3] concluded that diurnal changes in the blood cholesterol level of healthy animals are not significant [3]. There are no reports in the literature of the study of the diurnal rhythm of other indices of lipid metabolism: the β -lipoproteins, total lipids, or nonesterified fatty acids (NEFA). The object of the investigation described below was to study the rhythm of diurnal fluctuations in certain indices of lipid metabolism in healthy young subjects.

EXPERIMENTAL METHOD AND RESULTS

The following estimations were carried out repeatedly at 7 A.M., 12 noon, 10 P.M., and 2 A.M. over a period of 24 h: the cholesterol concentration by Bloor's method [7], β -lipoproteins by Ledvin's modification [6] of the method of Burstein and Samaille, phospholipids as lipid phosphorus followed by calculation as lecithin by the method of Bell, Doisy, and Briggs [2], NEFA by Duncombe's method [8], total lipids by Lazaroff's method [10], and triglycerides (neutral lipids) as the difference between the concentration of total lipids and the combined concentrations of cholesterol and phospholipids, in the blood of 21 healthy subjects aged from 16 to 25 years.

The results revealed no regular pattern of fluctuations in the concentrations of cholesterol, phospholipids, triglycerides, and NEFA during the 24-h period in the blood of the healthy young subjects. A regular rhythm of diurnal fluctuation of total lipids and β -lipoproteins was, however, observed: their content fell to a minimum in the morning and increased significantly at night and during the evening (Table 1).

Department of Internal Medicine, Aktyubinsk Medical Institute. (Presented by Academician of the Academy of Medical Sciences of the USSR A. M. Chernukh.) Translated from *Byulleten' Éksperimental'noi Biologii i Meditsiny*, Vol. 74, No. 12, pp. 47-48, December, 1972. Original article submitted March 9, 1972.

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TABLE 1. Diurnal Rhythm of Fluctuations in Some Indices of Lipid Metabolism in Healthy Young Subjects ($M \pm m$; $n = 21$)

Indices studied	Time of day			
	7 A.M. (before breakfast)	12 noon	10 P.M.	2 A.M.
Cholesterol (in mg%)	122±6,6	108±8,4	109±7,1	106±6,6
Phospholipids (in mg%)	159±20,9	139±15,3	133±20,3	155±20,9
Total lipids (in mg%)	544±44,3	603±51,2	511±57,2	726±55,2*
Nonesterified fatty acids (μmoles/ml)	0,22±0,05	0,24±0,06	0,19±0,05	0,21±0,03
Triglycerides (in mg%)	168±74,5	216±55,6	170±41,9	506±132
β-Lipoproteins (in mg%)	465±35	561±36	607±36*	474±32

*Differences from results obtained on fasting subjects significant, $P < 0.05$.

The results thus demonstrate that the blood concentrations of cholesterol, phospholipids, triglycerides, and NEFA in healthy young subjects remain stable during the 24-h period. A diurnal rhythm of fluctuations with a regular and significant increase in the mean values during the evening and night was established for both β-lipoproteins and total lipids. These variations in the behavior of the individual indices of lipid metabolism during the 24-h period are presumably determined by the overall energy requirements, the state of metabolism in the liver, and the functioning of the "biological clock" located in the hypothalamo-diencephalic region and controlling the diurnal rhythm of physiological processes including lipid metabolism [9, 11, 12].

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