FATTY ACID COMPOSITON OF NEUTRAL LIPIDS OF SOME VARIETIES OF Carthamus tinctorius

S. M. Aslanov and A. A. Radzhabov

UDC 664.35+664.3+661.732.9

The results have been given previously of a study of the fatty acid composition of the neutral lipids of a number of varieties of safflower Carthamus tinctorius, family Asteraceae. Continuing these investigations, we have established the fatty acid composition of the neutral lipids (NLs) obtained from the seeds and petals of two previously unstudied varieties of safflower – Milyutinskii-114 and Tashkentskii-51 (according to the VIR [N. I. Vavilov All-Union Scientific-Research Institute of Plant Growing] catalog, K-262 and 261, respectively) – grown under the conditions of Azerbaidzhan.

The neutral lipids were isolated by the circulation extraction of the comminuted seeds and petals with petroleum ether (bp 40-60°C) in a Soxhlet apparatus until the raw material was exhausted [2]. The yield of total neutral lipids from the varieties Milyutinskii-114 and Tashkentskii-51 amounted to 26.0 and 23.6%, respectively, from the seeds, and 7.3 and 5.2% from the petals.

The fatty acids of the neutral lipids were chromatographed in the form of the methyl esters [3], and the individual components were identified by the procedure described in [4]. From the study of the fatty acid composition (for lipids from the seeds and petals of the two varieties of safflower we obtained the following results, GLC, %):

Fatty acid	Milyutinskii-114		Tashkentskii-51	
	seeds	petals	seeds	petals
12:0	Tr.	Tr.	Tr.	Tr.
14:0	0,6	0,8	0,2	0,3
16:0	7,7	44,6	6,8	42,4
16:1	1,1	1,4	0,8	1,8
18:0	3,4	2,6	5,9	4,8
18:1	13,7	16,0	16,7	18,8
18:2	73,5	34,3	69,6	30,4
18:3	Tr.	0,4	Tr.	0,8
20:0	Tr.	0,5	Tr.	0,7
Total acids				
saturated	11,7	47,9	12,9	48,2
unsaturated	88,3	52,1	87,1	51,8

As can be seen, the qualitative compositions of the fatty acids of the NLs of the seeds and leaves were identical and included nine components. Only the amounts of the individual fatty acids differed appreciably. Among the fatty acids detected, palmitic (16:0), oleic (18:0), and linoleic (18:2) predominated, and lauric (12:0), myristic (14:0), palmitoleic (16:1), stearic (18:0), linolenic (18:3), and arachitic (20:0) acids were present in small amount. Among the saturated acids the main component was palmitic, and among the unsaturated acids linoleic acid. A relatively high proportion of palmitic acid was observed in the NLs of the petals, and a comparatively high proportion of linoleic acid characterized the NLs of the seeds. Similar results were obtained for the varieties of safflower studied previously [1]. Depending on variety features, differences were also established in the amounts of certain fatty acids. Thus, the NLs of the seeds and leaves of the variety Milyutinskii-114 were characterized in comparison with the variety Tashkentskii-51 by a larger amount of the 14:0, 16:0, and 18:2 acids. The NLs of the seeds and petals of the variety Tashkentskii-51 contained more of the 18:0, 18:3, and 20:0 (in the petals) acids than the NLs of the seeds and petals of the variety Milyutinskii-114.

Thus, the neutral lipids obtained from the seeds and petals of the safflower varieties studied have identical qualitative fatty acid compositions but differ from one another by the proportions of individual acids.

V. L. Komorov Institute of Botany, Academy of Sciences of the Azerbaidzhan SSR, Baku.
Translated from Khimiya Prirodynkh Soedinenii, No. 6, pp. 870-872, November-December, 1988. Original article submitted March 25, 1988; revision submitted July 18, 1988.

 0009-3130/88/2406-0744$12.50

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MODIFICATION BY ENDOGENOUS PHOSPHOLIPIDS OF PORCINE KIDNEY Na, K-ATPase

I. I. Ismailov and Z. U. Bekmukhetova

UDC 577.352:577.3.01

The specific nature of the transport of ions in individual segments of a nephron is interconnected with the heterogeneity of the properties of transport ATPases, which depends to a considerable degree on the phospholipid compositon of the membrane-bound ATPase complex [1]. The replacement of certain phospholipids (PLs) strongly bound to the enzyme molecule is accompanied by a substantial change in its activity [2-4]. However, literature information on the role of various PLs in the reactivation of delipidated Na, K-ATPase is contradictory and does not take the functional features of the objects investigated into account.

We have studied the protein-lipid ratios and phospholipic compositions of membrane-bound Na, K-ATPases from the cortical, medullary, and capillary zones of the porcine kidney, and also the influence of endogenous PLs on the activity of the enzyme. A decrease in the protein:lipid ratio in preparations of membrane-bound Na, K-ATPase was found along the cortical-papillary gradient: in the cortical zone it was 1:0.5; in the medullary zone, 1:0.9; and in the papillary zone, 1:1.4. The amount of PLs in the total lipid of the extract estimated on the basis of inorganic phosphorus (P_i) also differed over the zones of the kidney: in the cortical zone 54; in the medullary zone 60; in the papillary zone 62 μg P_i/mg lipid, which corresponds, when calculated to protein, to a threefold increase in the amount of PLs along the cortical-capillary gradient. The main differences in the phospholipid composition of the membrane-bound enzyme complex from functionally different sections of the nephron were observed in the amounts of polar PLs – phosphatidylserine, phosphatidylinositol, and sphingomyelin (Table 1). The enrichment of the composition with polar phospholipids correlates with a change in the activity of the Na, K-ATPase (% on the total ATPase activity (Table 2).

The modification of delipidated Na, K-ATPase was carried out by reconstructing it in sonicated (22 kHz, 5 min) proteoliposomes formed from proteins and lipids from different

TABLE 1. Phospholipic Composition (% on the total lipid P_i, M ± m) of Membrane-Bound Na, K-ATPase according to the Zones of the Porcine Kidney

Phospholipid	Zone		
	cortical	medullary	papillary
Phosphatidylethanolamine	48,2±1,31	41,0±1,89	39,0±1,42
Phosphatidylcholine	40,5±2,43	36,3±1,80	32,0±1,61
Phosphatidylinositol	8,1±0,57	12,2±0,43	11,1±0,74
Sphingomyelin	—	5,5±0,32	9,2±0,43
Phosphatidylserine	—	—	6,5±0,51
% of the lipid P_i found	96,8±1,64	95,0±1,21	97,8±1,16

Institute of Physiology, Academy of Sciences of the Uzbek SSR, Tashkent. Translated from Khimiya Prirodynkh Soedinenii, No. 6, pp. 872-873, November-December, 1988. Original article submitted July 14, 1988.

0009-3130/88/2406-0745$12.50