Effect of kazunoko lipid on the concentrations of plasma glucose and lipids and liver lipids in mice

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INTRODUCTION

Kazunoko, which is Japanese traditional food, is a salted herring roe food product. Kazunoko lipid contains lots of n-3 polyunsaturated fatty acids, such as eicosapentaenoic (EPA) and docosahexaenoic acids (DHA). EPA and DHA have suppressing-effects on the morbidity of coronary artery disease, hypertension, and hyperlipidemia. However, Kazunoko lipid enriched cholesterol. It has been thought that dietary cholesterol increases a risk of coronary heart disease. Aim to this study is to clarify the effect of kazunoko lipid on total cholesterol, triacylglycerol and phospholipid levels in plasma and liver and plasma glucose level of male Crj:CD-1 mice.

Fig. 1 Kazunoko (salted herring roe food product)

Table 1 Proximate compositions of Kazunoko (g/100g)

Moisture	80.3
Protein	16.1
Lipid	2.7
Ash	0.4
Carbohydrate	0.5

Table 2 Lipid classes of Kazunoko lipid (g/100g)

Total lipid	2.99
Cholesterol	0.26
Triacylglycerol	0.53
Phospholipid	2.14

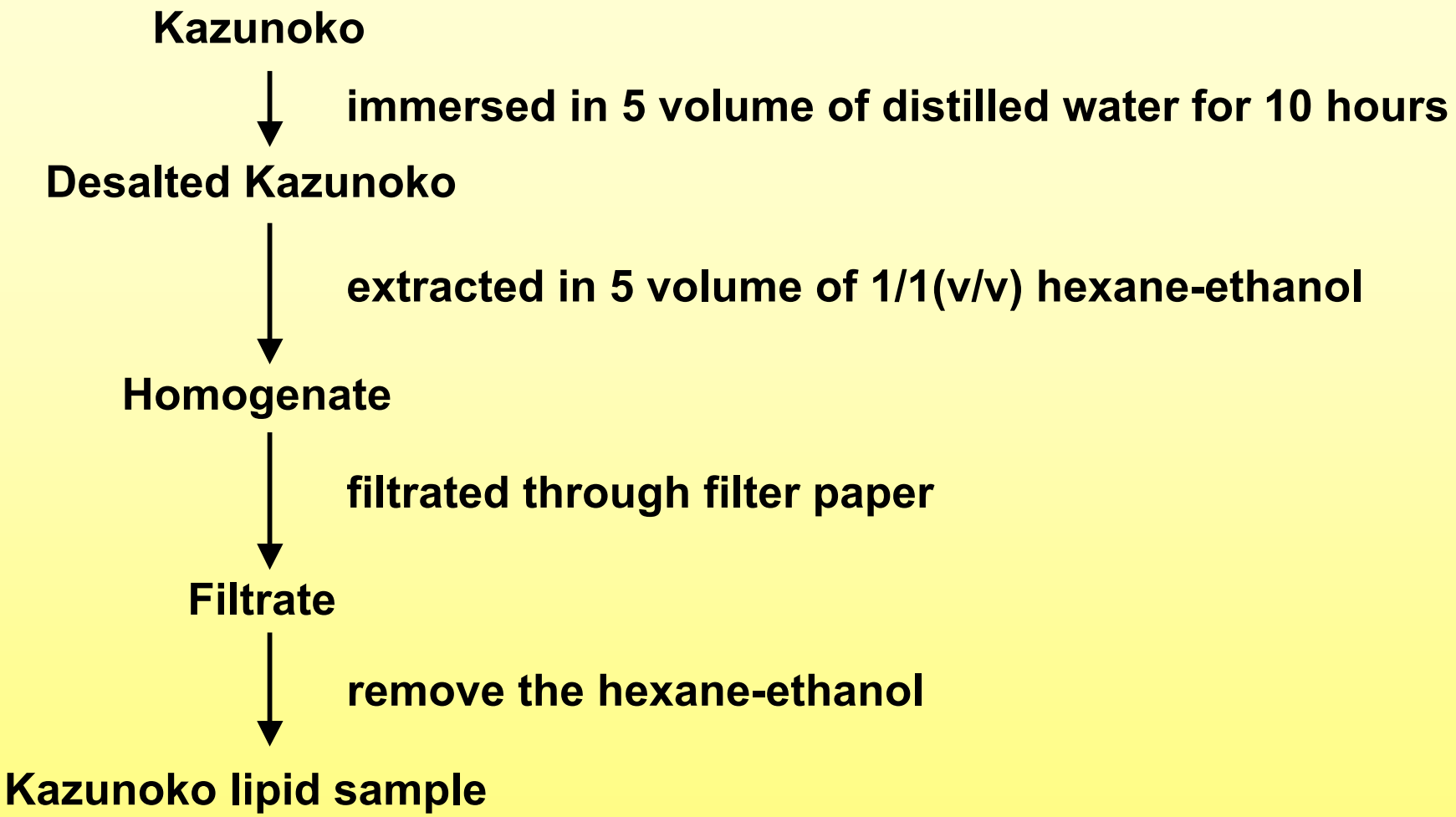

Fig. 2 Extraction of Kazunoko lipid

Animal: male Crj:CD-1(ICR) mice

Age: 5 months old

Trial term: 12 weeks

Table 4 Composition of experimental diets

	Dietary group			
	Lard	1% Kazunoko	3% Kazunoko	6% Kazunoko
Corn starch	47.8	47.8	47.8	47.8
Casein	20	20	20	20
Granulated sugar	15	15	15	15
Cellulose powder	5	5	5	5
Mineral mixture	4	4	4	4
Vitamin mixture	2	2	2	2
L-Methionine	0.2	0.2	0.2	0.2
Lard	6	5	3	—
Kazunoko lipid	—	1	3	6

Table 5 Main fatty acids composition of experimental diet (%)

	Dietary group			
	Lard	1% Kazunoko	3% Kazunoko	6% Kazunoko
14:0	2.1	2.1	2.3	2.8
16:0	26.1	25.7	26.6	29.1
18:0	13.4	12.2	9.5	2.5
16:1n-7	3.0	3.2	3.9	5.6
18:1n-9	41.8	38.8	31.6	13.9
18:1n-7	2.9	3.2	3.8	5.0
18:2n-6	8.6	7.8	5.8	1.0
20:4n-6	—	0.2	0.5	1.1
20:5n-3	—	1.7	5.5	14.7
22:6n-3	—	2.8	8.4	21.6

Table 6 Cholesterol level of experimental diets (mg/100g diet)

	Dietary group			
	Lard	1% Kazunoko	3% Kazunoko	6% Kazunoko
Cholesterol	9	71	219	432

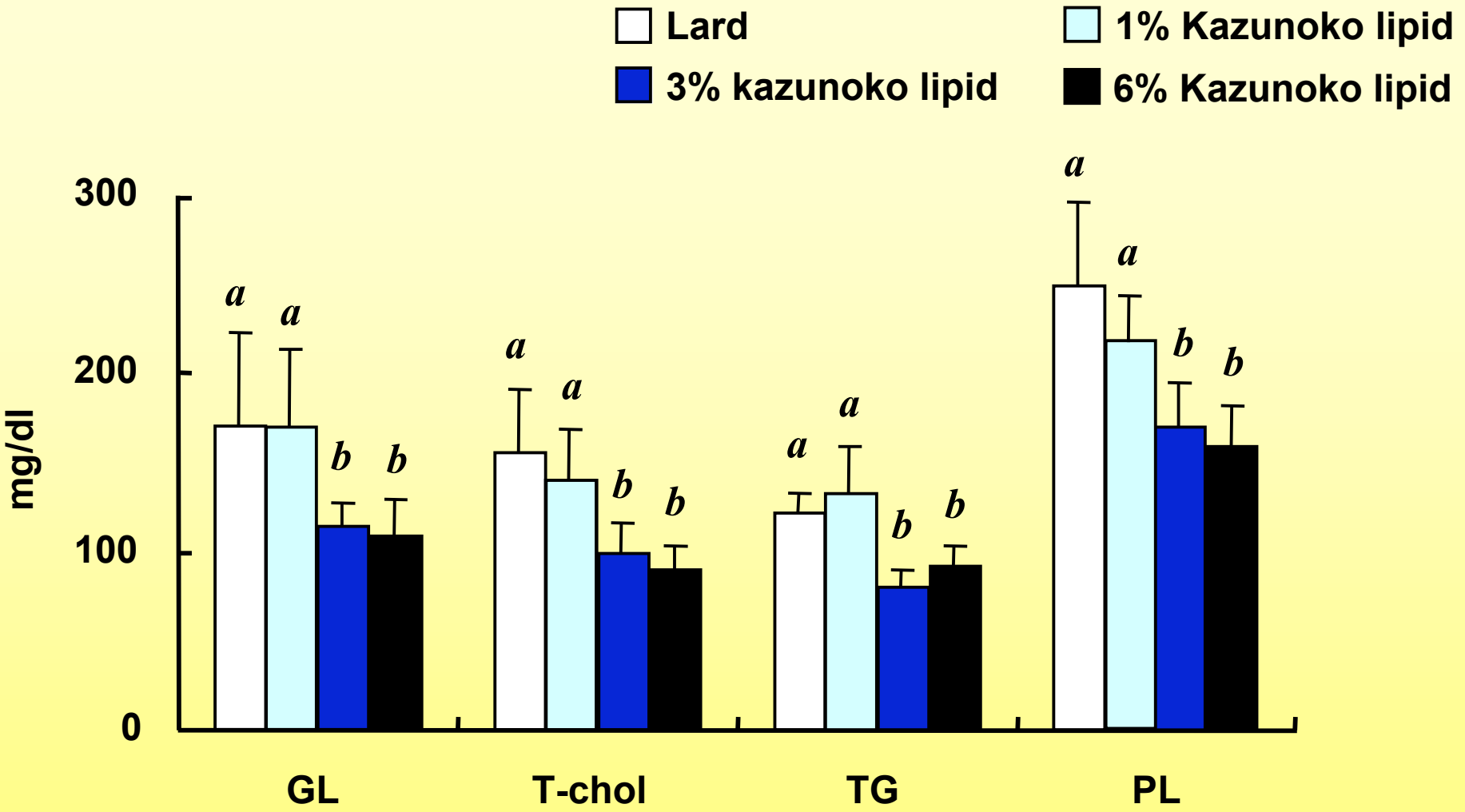

Fig. 3 Concentrations of plasma glucose, total cholesterol, triacylglycerol and phospholipid in mice. Values are means ± SEM, *n* =10-11. Means without a common letter differ, *P* < 0.05. GL, glucose; T-chol, total cholesterol; TG, triacylglycerol; PL, phospholipid.

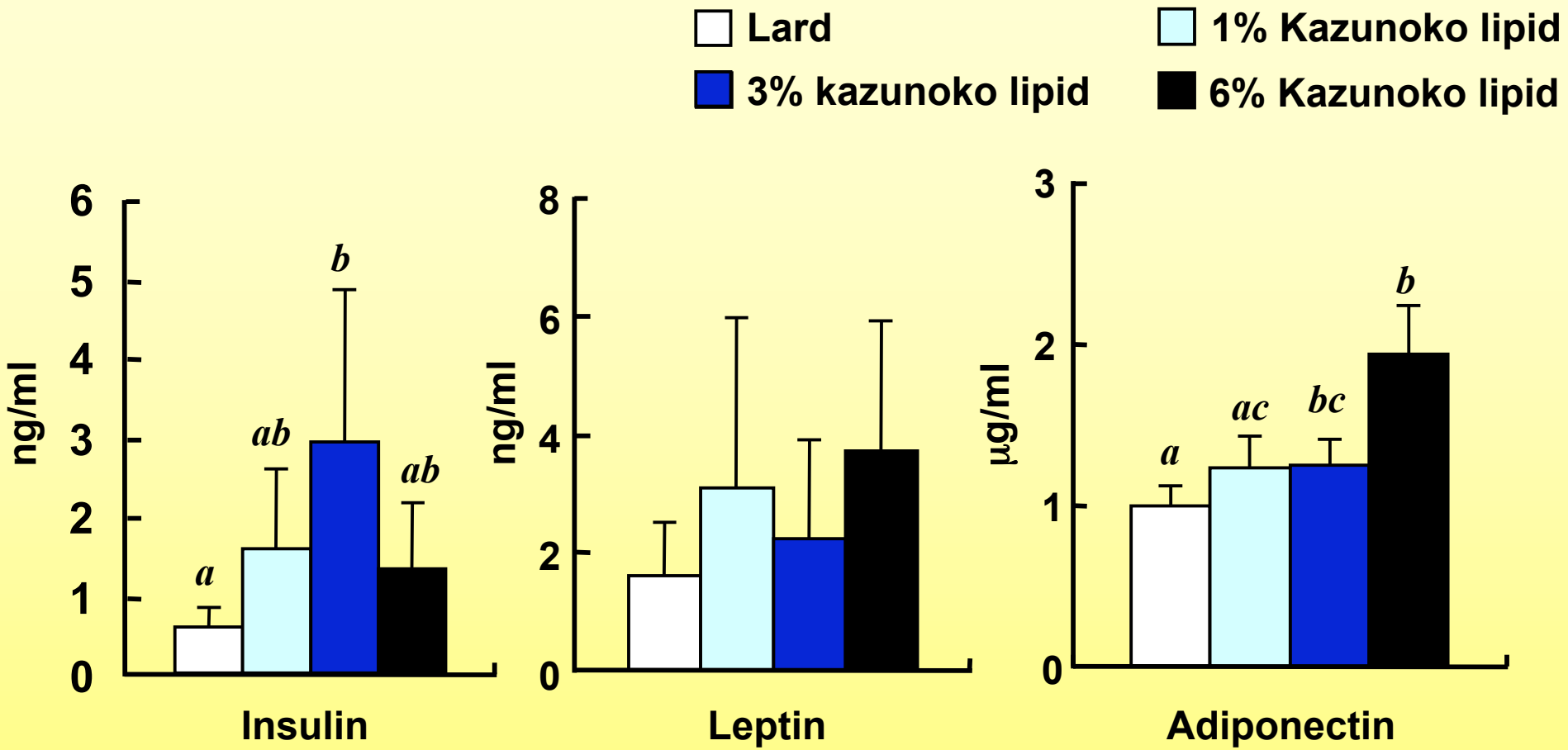

Fig. 4 Levels of plasma insulin, leptin and adiponectin in mice. Values are means ± SEM, *n* =10-11. Means without a common letter differ, *P* < 0.05.

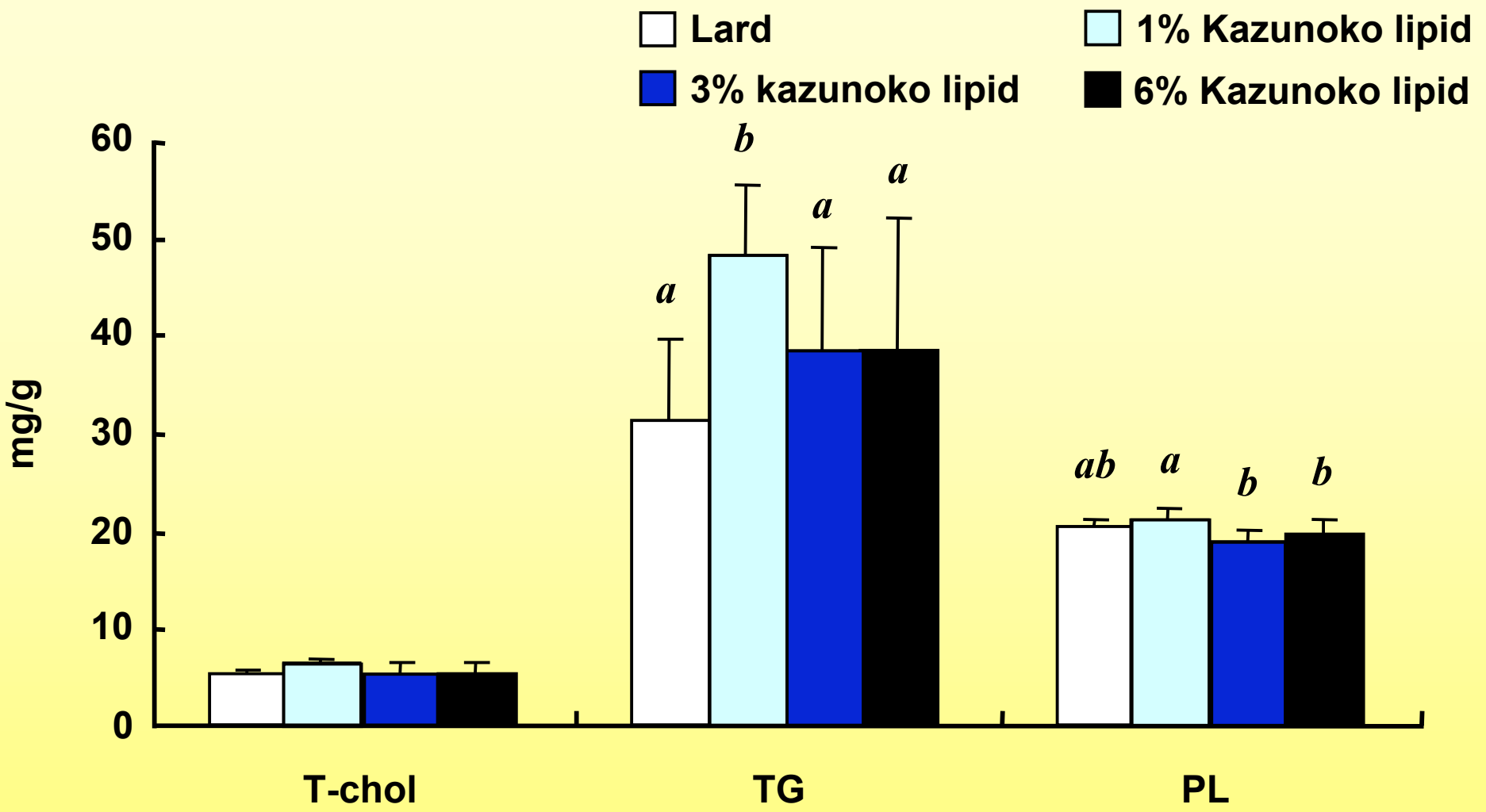

Fig. 5 Levels of liver glucose, total cholesterol, triacylglycerol and phospho-lipid in mice. Values are means ± SEM, *n* =10-11. Means without a common letter differ, *P* < 0.05. T-chol, total cholesterol; TG, triacylglycerol; PL, phospholipid

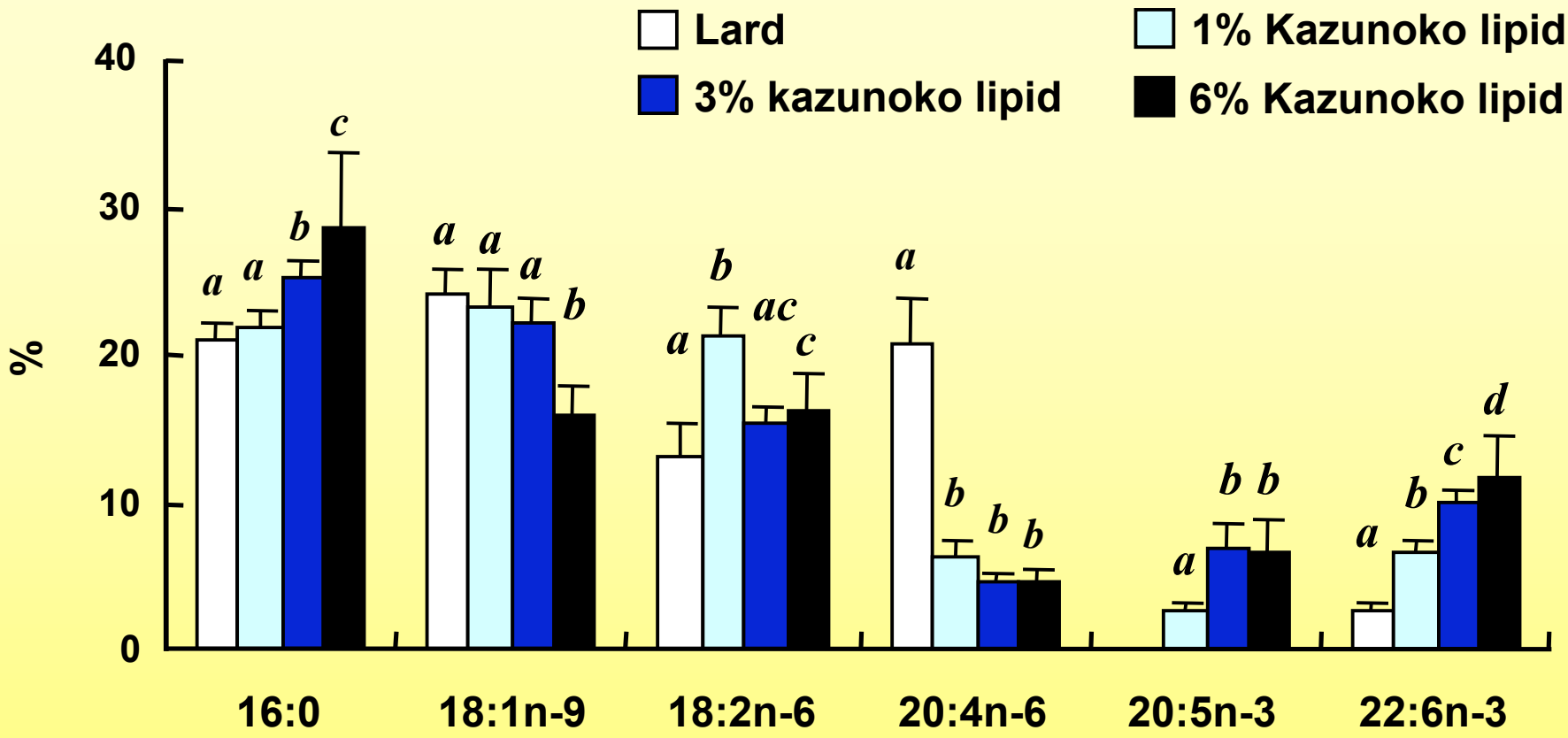

Fig. 6 Percentages of main fatty acids in plasma of mice. Values are means ± SEM, *n* =10-11. Means without a common letter differ, *P* < 0.05.

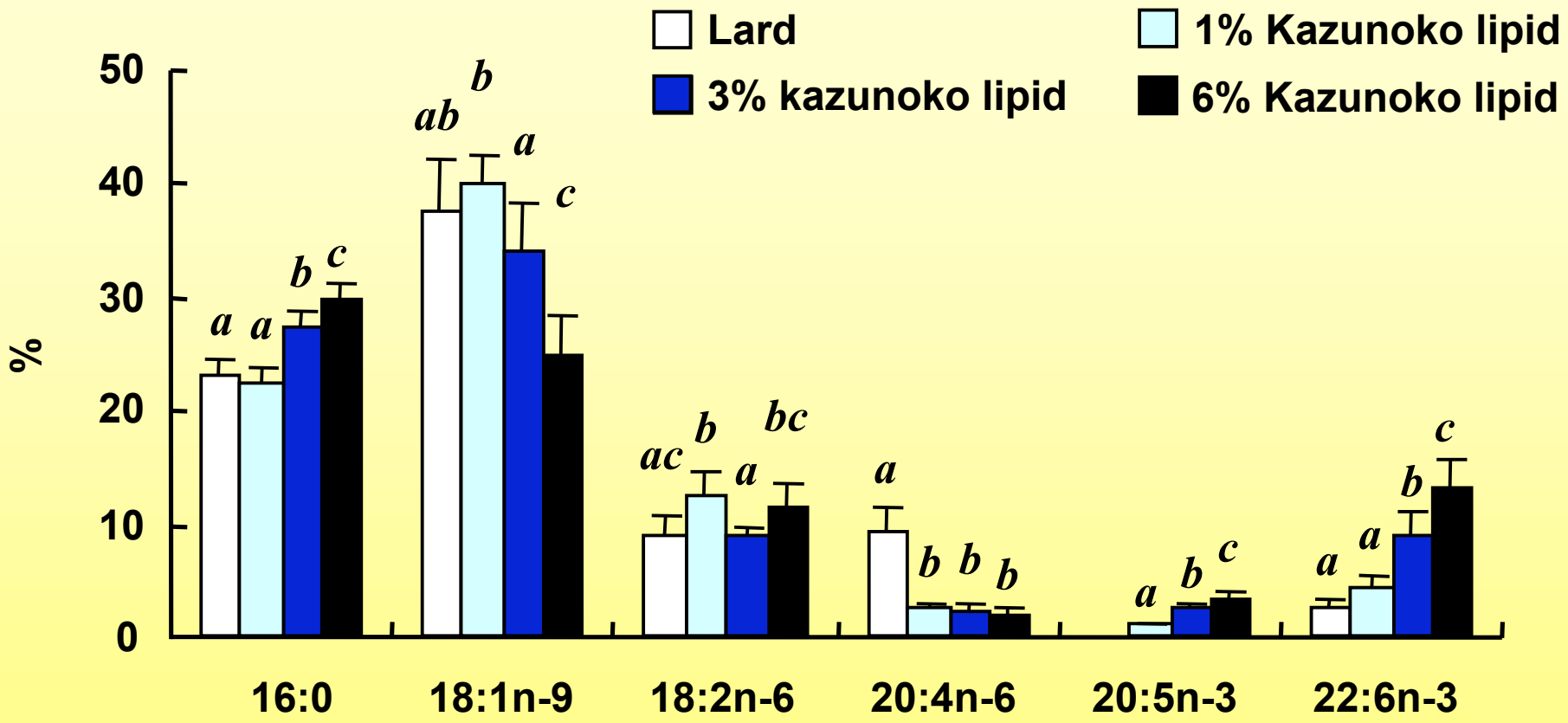

Fig. 7 Percentages of main fatty acids in liver of mice. Values are means ± SEM, *n* =10-11. Means without a common letter differ, *P* < 0.05.

Conclusion

Plasma cholesterol levels of 3% and 6% Kazunoko lipid diet groups were significantly lower than those of lard and 1% Kazunoko lipid diet groups though Kazunoko lipid contained lots of cholesterol. This result indicates that influence of EPA and DHA overcome the effect of dietary cholesterol on plasma cholesterol level.

Plasma glucose level was significantly lower in 3% and 6% Kazunoko lipid diet groups than in lard diet group. Plasma insulin, leptin and adiponectin levels of Kazunoko lipid diet groups tended to be higher than those of lard diet group. Plasma adiponectin level was significantly higher in 6% Kazunoko lipid diet group than in lard and 1% Kazunoko lipid diet groups.

These results suggest that Kazunoko lipid intake induces the reduction of plasma lipid and glucose levels.