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Lipid Metabolism of Tumors. II. Influence of Food Lipids upon the Nature of Tumor Phospholipid.

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That the nature of the lipids in the animal body is influenced by the food lipids has been reported by previous workers. The question has been raised in connection with the lipid metabolism of tumors whether or not the same can be said about the tumor lipids or to what extent they are influenced by the lipids of the food.

The tumors used in this experiment are the Jensen rat sarcoma, mouse carcinoma of Buffalo Strain 3 and the Crocker sarcoma of the mouse. The animals after the inoculation of the tumor were fed food composed of casein (30.6%), cane sugar (40.8), lipid (21.7), and salt mixture (4.9), with yeast and Oscodal as the sources of the vitamines. As the lipids of the food cod liver oil,

TABLE I.
Phospholipid Iodine Number of Liver and Tumor of Rats Fed With Different lipids.

Main lipid in the diet	Tissues	Dry substance %	Phospholipid		Weight	
			gm. per 100 gm. dry tissue	Iodine number	Body gm.	Tumor gm.
Cod liver oil	Tumor 1	17.62	7.57	104	175	20
	" 2	17.05	8.16	93	242	31
	" 3	17.45	7.34	97	174	36
	Liver 1	29.00	11.18	130		
	" 2	27.65	10.80	127		
	" 3	27.50	9.40	133		
Butter	Tumor 1	21.30	6.62	88	164	50
	" 2	17.82	6.30	75	247	59
	" 3	16.55	7.14	80	201	78
	Liver 1	33.80	6.67	97		
	" 2	25.30	8.95	85		
	" 3	22.60	10.30	84		
Linseed oil	Tumor 1	17.55	6.70	97	194	35
	" 2	22.10	5.30	100	281	84
	" 3	17.35	5.20	96	164	50
	Liver 1	27.70	10.08	108		
	" 2	33.20	7.50	114		
	" 3	25.80	10.93	111		
Cocoanut oil	Tumor 1	17.85	8.50	85	205	26
	" 2	17.80	8.94	75	320	26
	" 3	16.95	8.99	85	217	41
	Liver 1	26.10	11.09	94		
	" 2	27.30	11.23	102		
	" 3	26.85	8.40	100		

butter, linseed oil and cocoanut oil, that is, the high and low iodine number animal and vegetable lipids, were used. After a considerably long time of feeding with these special diets, 5 to 7 weeks in case of the rat tumor and about 2 months in the other cases, the animals were killed and the iodine number of the tissue lipids was determined by the micromethod in which pyridine sulphate dibromide of Rosenmund and Kuhnhenn was used as a halogenizing agent and the lipids by the oxidative method of Bloor. The accuracy of this method for iodine number compared with macromethod was discussed, and the conclusion that this micromethod is available for the iodine number determination was emphasized. The phospholipid iodine number of the tissue lipids of the tumor animals was first studied. The results are shown in the following tables, and in summary it may be said that the iodine number of the phospholipid of tumors is dependent upon the food lipids like that of other tissues of the body. The iodine number of tumor phospholipid is lower than that of liver. The brain phospholipid of the mouse does not seem to change its iodine number by 2 months' feeding with different lipids.

TABLE II.

Phospholipid Iodine Number of Tumors and Other Tissues of Mice Fed With Different Lipids.

Tumors: Adenocarcinoma, Buffalo Strain 3; Sarcoma, Crocker.

Tissues of 6-10 mice were combined, from which adequate amounts of various tissues were taken for the extraction of the lipids.

Main lipid in the diet	Tissues	Dry substance %	Phospholipid	
			gm. per 100 gm. moist tissue	Iodine number
Cod liver oil	Carcinoma	18.55	1.000	100
	Liver	29.20	3.235	122
	Kidney	21.03	1.985	116
	Spleen	22.10	1.585	102
	Heart		2.280	142
	Brain		6.425	81
Butter	Carcinoma	20.00	1.735	97
	Liver	28.10	3.005	112
	Kidney	23.00	2.300	115
	Spleen	23.05	1.320	104
	Heart		2.100	138
Cocoanut oil	Sarcoma	19.20	0.905	63
	Liver	27.40	2.430	90
	Kidney		2.490	98
	Spleen		1.665	88
	Heart		2.520	107
	Brain		5.825	87