

**Table 1.** Primer sequence for RT-PCR. ACTB – beta-actin, HMGCR - HMG-CoA reductase, CPT1a - carnitine palmitoyltransferase I, CHKA - choline kinase alpha, CHKB - choline kinase beta, PCYT1A- choline-phosphate cytidylyltransferase A, CHPT1 - cholinephosphotransferase 1, PISD - phosphatidylserine decarboxylase, SMS1 - sphingomyelin synthase 1, SMS2- sphingomyelin synthase 2.

<b>Gene name</b>	<b>Forward sequence (from 5` to 3`)</b>	<b>Reverse sequence (from 5` to 3`)</b>
ACTB	AGCACAGAGCCTCGCCTT	CATCATCCATGGTGAGCTGG
CPT1a	ATCAATCGGACTCTGGAAACGG	TCAGGGAGTAGCGCATGGT
HMGCR	TACCATGTCAGGGGTAC	CAAGCCTAGAGACATAAT
CHKA	CGGAAGTATCCCACCAAGAA	TCCCCAGAGGAAATGAGATG
CHKB	TGGTGCTAGAAAGCGTGATG	GCCGACTTGGGATGTACT
PCYT1A	GCAACCAGCTCCTTTTCTG	GCAAACCTCCACAATGAGGT
CHPT1	TCTGCTCTTTTATTGGGATGTTTG	CAACACAAAGACAATCACTAAAGC
PISD	ATCACTACCGCAACCTCAGCGA	TACCTGCTCCACCTCACAGTC
SMS 1	GCACTTTCCTGTTTCGTTCTC	TACAGCGTGCCAACTATGC
SMS 2	GCATTTCCAGTGTGCTCCAAAGC	GTAACCGTGTGACCGCTGAAGA

**Table 2.** Analysis of correlations between the <sup>1</sup>H-NMR signal intensities of selected groups of lipids and the levels of fatty acids, and patients BMI, serum triacylglycerols and total cholesterol.

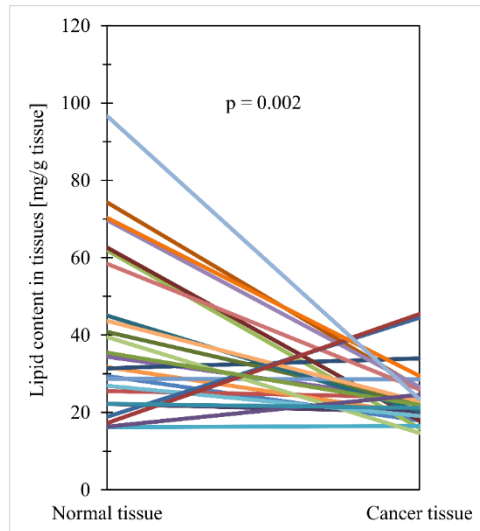
Lipid/lipid group	Correlation with BMI		Correlation with serum triacylglycerols		Correlation with serum total cholesterol	
	R	p	R	p	R	p
Free cholesterol	-0.101	0.662	-0.116	0.588	0.099	0.644
Phosphatidylethanolamines	0.096	0.679	-0.165	0.441	-0.215	0.312
Sphingomyelin	-0.066	0.776	-0.259	0.222	-0.024	0.910
Phosphatidylcholines	-0.043	0.852	-0.260	0.221	-0.013	0.951
Phospholipids	-0.071	0.758	-0.302	0.152	-0.139	0.517
Triacylglycerols	-0.425	0.053	-0.181	0.397	-0.120	0.575
16:0	0.063	0.786	-0.218	0.306	0.269	0.204
18:0	0.024	0.918	0.069	0.750	-0.087	0.685
Total SFA	-0.034	0.884	-0.114	0.597	0.023	0.916
16:1	0.118	0.609	0.121	0.574	0.140	0.516
18:1	0.044	0.850	0.048	0.824	-0.056	0.795
Total MUFA	0.024	0.918	0.060	0.780	-0.044	0.838
18:2 (LA)	0.054	0.815	-0.155	0.470	0.194	0.363
20:4 (ARA)	-0.030	0.899	0.046	0.831	-0.012	0.955
Total n-6 PUFA	-0.028	0.903	-0.005	0.982	0.053	0.806
18:3 (ALA)	-0.127	0.583	-0.124	0.563	-0.350	0.093
20:5 (EPA)	0.208	0.364	-0.246	0.247	0.012	0.956
22:6 (DHA)	-0.021	0.928	-0.050	0.815	0.096	0.655
Total n-3 PUFA	0.079	0.733	-0.109	0.612	0.054	0.803

R - Pearson's correlation coefficient, p - significance.

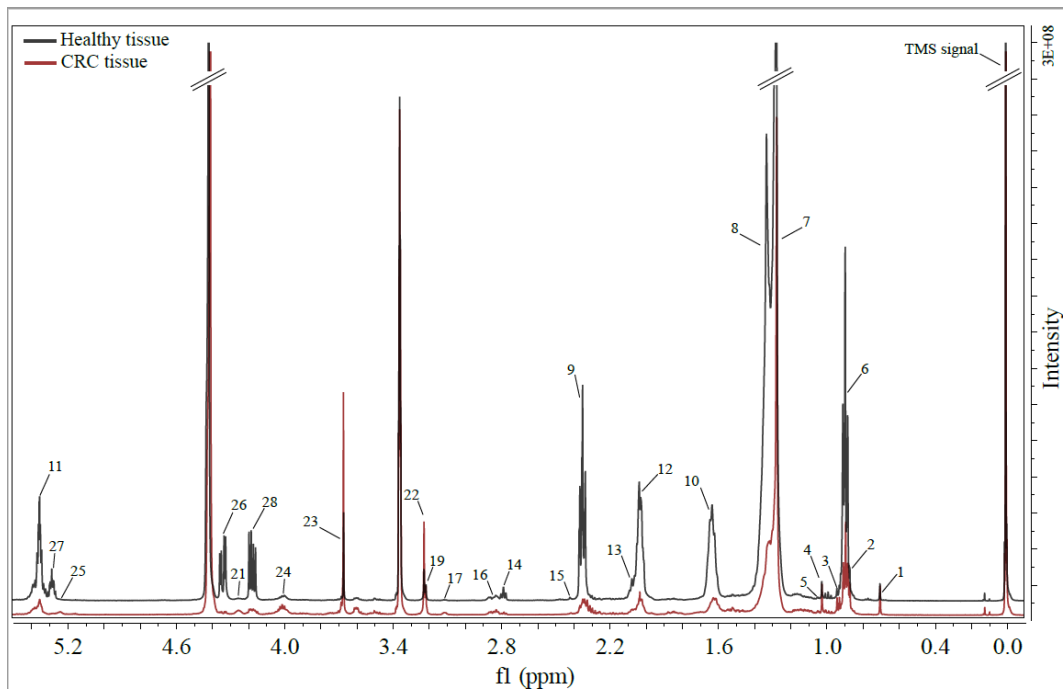
**Table 3.** Differences in <sup>1</sup>H-NMR signal intensity of selected lipid groups and fatty acid levels in tumor tissue in various groups of CRC patients.

Lipid/lipid group	CRC patients with T stage 1 and 2 Mean ± SEM	CRC patients with T stage 3 and 4 Mean ± SEM	p	Male CRC patients Mean ± SEM	Female CRC patients Mean ± SEM	p
Free cholesterol <sup>a</sup>	163 ± 19.1	140 ± 20.4	0.437	130 ± 16.4	186 ± 22.4	0.053
Phosphatidylethanolamines <sup>a</sup>	31.9 ± 6.20	23.6 ± 5.07	0.309	23.9 ± 19.1	33.3 ± 6.81	0.259
Sphingomyelin <sup>a</sup>	181 ± 15.5	146 ± 19.8	0.201	150 ± 16.9	181 ± 20.9	0.271
Phosphatidylcholines <sup>a</sup>	563 ± 47.9	443 ± 60.3	0.149	461 ± 50.0	557 ± 69.6	0.272
Phospholipids <sup>a</sup>	81.1 ± 10.5	63.2 ± 10.2	0.240	64.6 ± 9.21	82.7 ± 12.3	0.251
Triacylglycerols <sup>a</sup>	45.3 ± 9.72	38.6 ± 8.01	0.603	40.6 ± 6.56	43.4 ± 12.8	0.837
16:0 <sup>b</sup>	21.0 ± 0.485	20.5 ± 0.429	0.466	20.5 ± 0.462	21.0 ± 0.340	0.486
18:0 <sup>b</sup>	12.3 ± 0.825	12.7 ± 0.777	0.728	12.5 ± 0.656	12.7 ± 1.07	0.867
Total SFA <sup>b</sup>	36.7 ± 0.778	36.9 ± 0.722	0.857	36.8 ± 0.593	36.9 ± 1.04	0.907
16:1 <sup>b</sup>	3.38 ± 0.330	3.31 ± 0.259	0.863	3.41 ± 0.266	3.23 ± 0.313	0.679
18:1 <sup>b</sup>	35.4 ± 1.57	35.9 ± 1.50	0.828	35.8 ± 1.24	35.5 ± 2.08	0.896
Total MUFA <sup>b</sup>	40.0 ± 1.81	40.7 ± 1.69	0.778	40.5 ± 1.46	40.0 ± 2.26	0.851
18:2 (LA) <sup>b</sup>	12.0 ± 0.651	10.6 ± 0.453	0.087	11.0 ± 0.547	11.6 ± 0.553	0.519
20:4 (ARA) <sup>b</sup>	6.58 ± 0.579	6.85 ± 0.787	0.793	6.77 ± 0.640	6.66 ± 0.847	0.922
Total n-6 PUFA <sup>b</sup>	21.0 ± 1.05	20.1 ± 1.00	0.542	20.4 ± 0.930	20.8 ± 1.18	0.765
18:3 (ALA) <sup>b</sup>	0.061 ± 0.011	0.050 ± 0.008	0.424	0.060 ± 0.009	0.046 ± 0.008	0.304
20:5 (EPA) <sup>b</sup>	0.466 ± 0.077	0.455 ± 0.045	0.804	0.499 ± 0.052	0.376 ± 0.062	0.156
22:6 (DHA) <sup>b</sup>	1.00 ± 0.091	1.03 ± 0.080	0.845	1.00 ± 0.067	1.05 ± 0.117	0.678
Total n-3 PUFA <sup>b</sup>	2.11 ± 0.190	2.10 ± 0.125	0.957	2.12 ± 0.126	2.08 ± 0.204	0.840
Number of samples	11	14		16	9	

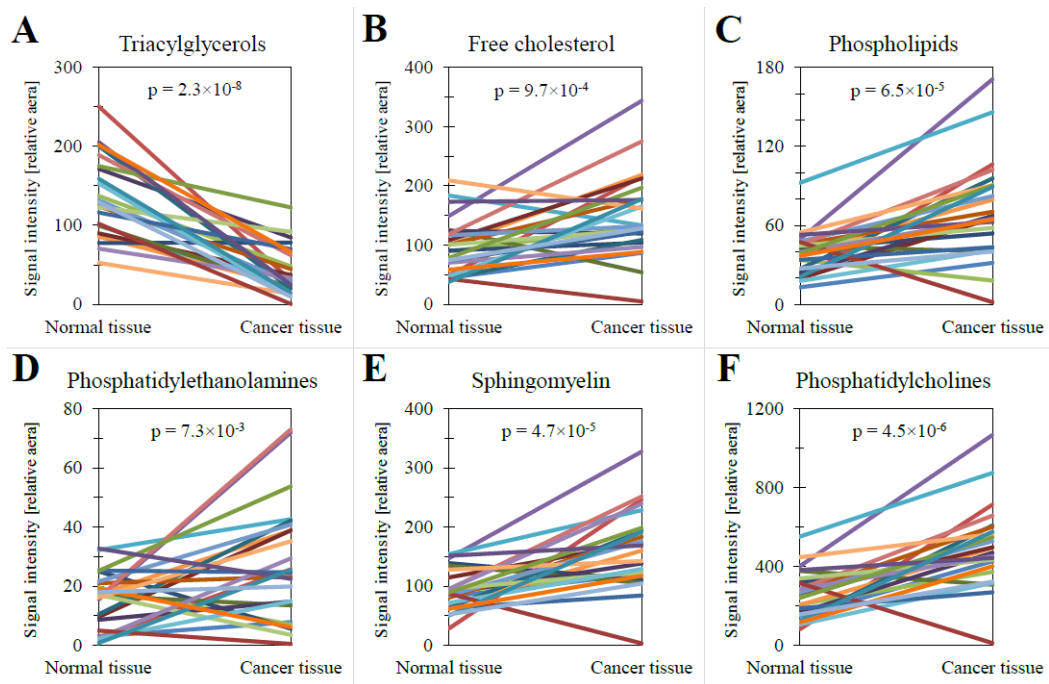
<sup>a</sup>Signal intensity from <sup>1</sup>H-NMR (relative area), <sup>b</sup>% of total fatty acid content, p -significance from two-tailed t-test.



**Figure 1.** Total lipid content in normal and colorectal cancer tissue. Each line represents individual patient;  $n = 25$ .



**Figure 2.** Example of a  $^1\text{H}$ -NMR spectrum for lipids isolated from healthy tissue and CRC tissue. 1 -  $\text{C}_{18}\text{H}_3$  in total cholesterol; 2 -  $\text{C}_{26}\text{H}_3/\text{C}_{27}\text{H}_3$  in total cholesterol; 3 -  $\text{C}_{21}\text{H}_3$  in free cholesterol; 4 -  $\text{C}_{19}\text{H}_3$  in free cholesterol; 5 -  $\text{C}_{19}\text{H}_3$  in esterified cholesterol; 6 -  $-\text{CH}_3$  in fatty acyl chain; 7 -  $-(\text{CH}_2)_n$  in fatty acyl chain; 8 -  $\text{CHCH}_2\text{CH}_2(\text{CH}_2)-$  in fatty acyl chain; 9 -  $-\text{CO}-\text{CH}_2-$  in fatty acyl chain; 10 -  $-\text{CO}-\text{CH}_2\text{CH}_2-$  in fatty acyl chain; 11 -  $-\text{HC}=\text{CH}-$  in fatty acyl chain; 12 -  $-\text{CH}_2\text{HC}=\text{C}$  in fatty acyl chain: 18:1; 13 -  $-\text{CH}_2\text{HC}=\text{C}$  in fatty acyl chain: 18:2n-6/20:4n-6; 14  $\text{CHCH}_2\text{CH}=\text{C}$  in fatty acyl chain: 18:2n-6; 15 -  $\text{CO}-\text{CH}_2-$  in fatty acyl chain: 22:6n-3; 16  $\text{CHCH}_2\text{CH}=\text{C}$  in fatty acyl chain: 20:4n-6/22:6n-3; 17 -  $\text{CH}_2-\text{CH}_2-\text{NH}_2$  of PE; 18  $\text{C}_2\text{H}$  in glycerol backbone of PE; 19 -  $\text{N}+(\text{CH}_3)_3$  in SM head group; 20 -  $\text{CH}_2\text{N}+(\text{CH}_3)_3$  in SM head group; 21 -  $\text{CH}_2\text{CH}_2\text{N}+(\text{CH}_3)_3$  in SM head group; 22 -  $\text{CH}_2\text{N}+(\text{CH}_3)_3$  in PC head group; 23 -  $\text{N}+(\text{CH}_3)_3$  in PC head group; 24  $>\text{C}_3\text{H}_2$  in glycerol backbone of PL; 25 -  $\text{C}_2\text{H}$  in glycerol backbone of PL; 26  $>\text{C}_1\text{H}_2/\text{C}_3\text{H}_2$  in glycerol backbone of TG; 27 -  $\text{C}_2\text{H}$  in glycerol backbone of TG; 28  $>\text{C}_1\text{H}_2/\text{C}_3\text{H}_2$  in glycerol backbone of TG and PL.



**Figure 3.** Intensities of  $^1\text{H}$ -NMR signal for selected groups of lipids: (A) triacylglycerols; (B) free cholesterol; (C) phospholipids; (D) phosphatidylethanolamines; (E) sphingomyelin; (F) phosphatidylcholines. Each line represents individual patient;  $n=25$ .