

---

**Supplementary material**
**Supplementary Table 1 Erythrocyte fatty acid composition of diabetic individuals with impaired glucose tolerance<sup>1</sup>**

Fatty acid		Controls ( <i>n</i> = 42)		Individuals with IGT ( <i>n</i> = 28)	
		%	-C=C-	%	-C=C-
PC	16:0	35.1	0	37.5	0
	18:0	11.3	0	11.7	0
	<b>Total SFAs</b>	<b>46.4</b>		<b>49.2</b>	
	18:1	17.8	17.8	19.1	19.1
	<b>Total MUFAs</b>	<b>17.8</b>		<b>19.1</b>	
	18:2 n-6	18.6	37.2	15.7	31.4
	20:4 n-6	5.3	21.2	4.7	18.8
	18:3 n-3	0.2	0.6	0.2	0.6
	20:5 n-3	1.0	5.0	0.6	3.0
	22:6 n-3	1.7	10.2	1.1	6.6
	<b>Total PUFAs</b>	<b>26.8</b>		<b>22.3</b>	
	Total	91.0		90.6	
	UI		92.0		79.5
PE	16:0	27.9	-	29.7	0
	18:0	10.3	-	10.8	0
	<b>Total SFAs</b>	<b>38.4</b>		<b>40.5</b>	
	18:1	27.5	27.5	30.1	30.1

<b>Total MUFAs</b>	<b>27.5</b>		<b>30.1</b>	
18:2 n-6	6.4	12.8	5.6	11.2
20:4 n-6	19.8	79.2	17.5	70.0
18:3 n-3	0.1	0.3	0.2	0.6
20:5 n-3	2.2	11.0	1.4	7.0
22:6 n-3	6.1	36.6	4.7	28.2
<b>Total PUFAs</b>	<b>34.6</b>		<b>29.4</b>	
Total	100.3		100.0	
<b>UI</b>		<b>167.4</b>		<b>147.1</b>

<sup>1</sup>Ex-post calculations performed by the author are based on the original data listed by Min *et al*<sup>[32]</sup>. IGT: Impaired glucose tolerance; PC: Phosphatidylcholine; PE: Phosphatidylethanolamine; SFA: Saturated fatty acid; MUFA: Mono-unsaturated fatty acid; PUFA: Poly-unsaturated fatty acid; UI: Unsaturation index.

**Supplementary Table 2 Erythrocyte fatty acid composition of controls and individuals with gestational diabetes mellitus<sup>1</sup>**

Fatty acids	Phosphatidylcholine				Phosphatidylethanolamine			
	Control, <i>n</i> = 61		GDM, <i>n</i> = 53		Control, <i>n</i> = 61		GDM, <i>n</i> = 53	
	%	-C=C-	%	-C=C-	%	-C=C-	%	-C=C-
16:0	23.49	0	30.64	0	17.45	0	19.33	0
18:0	19.05	0	17.63	0	7.16	0	7.82	0
<b>Total SFAs</b>	<b>42.54</b>		<b>48.27</b>		<b>24.61</b>		<b>27.15</b>	
16:1	0.48	0.48	0.54	0.54	0.47	0.47	0.49	0.49
18:1	12.63	12.63	15.29	15.29	18.14	18.14	19.60	19.60
<b>Total MUFAs</b>	<b>13.11</b>		<b>15.83</b>		<b>18.61</b>		<b>20.09</b>	
20:3 n-9	0.20	0.60	0.11	0.33	0.11	0.33	0.18	0.54
18:2 n-6	13.32	26.64	13.80	27.60	5.05	10.10	5.05	10.10
20:3 n-6	2.22	6.66	1.72	5.16	1.11	3.33	0.84	2.52
20:4 n-6	10.74	42.96	8.35	33.40	14.97	59.88	13.69	54.76
22:4 n-6	1.33	5.32	0.83	3.32	4.20	16.80	3.70	14.80
22:5 n-6	0.63	3.15	0.60	3.00	0.97	4.85	0.95	4.75
18:3 n-3	0.18	0.54	0.15	0.45	0.21	0.63	0.24	0.72
20:5 n-3	0.61	3.05	0.36	1.80	0.92	4.60	0.79	3.95
22:5 n-3	1.64	8.20	0.89	4.45	2.98	14.90	2.41	12.05
22:6 n-3	6.31	37.86	3.25	19.50	7.27	43.62	5.86	35.16
<b>Total PUFAs</b>	<b>37.18</b>		<b>30.06</b>		<b>37.79</b>		<b>33.71</b>	

---

Total	92.83	94.16	81.01	80.95
<b>UI</b>	<b>148.09</b>	<b>114.84</b>	<b>177.65</b>	<b>159.44</b>

---

<sup>1</sup>Ex-post calculations performed by the author are based on the original data listed by Min *et al*<sup>[33]</sup>. SFA: Saturated fatty acid; MUFA: Mono-unsaturated fatty acid; PUFA: Poly-unsaturated fatty acid; UI: Unsaturation index.

**Supplementary Table 3 Fatty acid composition (% of total fatty acids) of membrane phospholipids in fathead minnow muscle under different temperature conditions<sup>1</sup>**

Fatty acid	15 °C		25 °C		30 °C	
	(%)	-C=C- ( <i>n</i> )	(%)	-C=C- ( <i>n</i> )	(%)	-C=C- ( <i>n</i> )
14:0	0.04	0	0.02	0	0.1	0
16:0	12.8	0	14.2	0	30.0	0
17:0	0.1	0	0.2	0	0.1	0
18:0	4.8	0	5.3	0	6.9	0
24:0	0.1	0	0.2	0	1.3	0
<b>Total SFAs</b>	<b>17.8</b>		<b>19.92</b>		<b>38.4</b>	
15:1	1.8	1.8	1.0	1.0	0.1	0.1
16:1 n-7	0.4	0.4	0.3	0.3	0.3	0.3
17:1 n-9	1.0	1.0	0.7	0.7	2.4	2.4
18:1 n-7	2.6	2.6	2.2	2.2	6.1	6.1
18:1 n-9	9.6	9.6	10.9	10.9	14.3	14.3
20:1 n-9	0.5	0.5	0.4	0.4	2.4	2.4
24:1 n-9	0.2	0.2	0.6	0.6	1.0	1.0
<b>Total MUFAs</b>	<b>16.1</b>		<b>16.1</b>		<b>26.6</b>	
18:2 n-6	5.8	11.6	7.3	14.6	5.7	11.4
20:2 n-6	0.9	1.8	0.7	1.4	0.1	0.2
18:3 n-6	0.0	0.0	0.1	0.3	1.5	4.5
18:3 n-3	0.1	0.3	0.1	0.3	0.1	0.3
20:3 n-6	1.8	5.4	0.9	2.7	0.0	0.0

18:4 n-3	0.0	0.0	0.0	0.0	0.1	0.4
20:4 n-6	6.1	24.4	5.8	23.2	4.5	18.0
20:4 n-3	1.1	4.4	0.3	1.2	0.2	0.8
22:4 n-6	1.7	6.8	0.7	2.8	1.7	6.8
20:5 n-3	8.7	43.5	7.9	39.5	5.1	25.5
22:5 n-3	3.2	16.0	2.4	12.0	0.0	0.0
22:6 n-3	36.6	219.6	35.3	211.8	15.9	95.4
<b>Total PUFAs</b>	<b>66.0</b>		<b>61.5</b>		<b>34.9</b>	
Total	99.9		97.5		99.9	
<b>UI</b>		<b>349.9</b>		<b>325.9</b>		<b>189.9</b>

<sup>1</sup>Ex-post calculations performed by the author are based on the original data listed by Fadhlououi *et al*<sup>[60]</sup>. SFA: Saturated fatty acid; MUFA: Mono-unsaturated fatty acid; PUFA: Poly-unsaturated fatty acid; UI: Unsaturation index.

**Supplementary Table 4 Unsaturation index of non-esterified fatty acids released from human white fat cells, and human serum lipids of healthy subjects<sup>1</sup>**

Fatty acid	Released from white fatt cells <sup>2</sup>		Serum lipids <sup>3</sup>	
	mol% of total fatty acids	Total number of double bonds	mol% of total fatty acids	Total number of double bonds
C12:0	0.61	0		
C14:0	3.51	0		
C15:0	0.40	0		
C16:0	24.97	0		
C18:0	6.14	0		
C20:0	0.08	0		
C22:0	0.02	0		
<b>Total SFAs</b>	<b>35.73</b>		<b>27.05</b>	
C14:1	0.26	0.26		
C16:1	4.40	4.40		
C17:1	0.36	0.36		
C18:1	40.70	40.70		
C20:1 n-9	0.58	0.58		
C22:1 n-9	0.03	0.03		
<b>Total MUFAs</b>	<b>46.33</b>	<b>46.33</b>	<b>23.60</b>	<b>23.60</b>
C18:2 n-6	15.74	31.48	27.47	54.94
C20:2 n-9	0.02	0.03		
C20:2 n-6	0.23	0.46		
C18:3 n-3	0.73	2.20	2.48	7.44
C18:3 n-6	0.05	0.15		
C20:3 n-6	0.21	0.64		
C20:3 n-3	0.03	0.08		
C20:4 n-6	0.51	2.04	4.48	17.92

---

C20:4 n-3	0.04	0.14		
C22:4 n-6	0.08	0.33		
C20:5 n-3	0.09	0.45	1.56	7.80
C22:5 n-6	0.01	0.04		
C22:5 n-3	0.09	0.45		
C22:6 n-3	0.12	0.70	13.36	80.16
<b>Total PUFAs</b>	<b>17.95</b>	<b>39.20</b>	<b>49.55</b>	<b>168.26</b>
Total	100.01		100.00	
<b>UI</b>		<b>85.53</b>		<b>191.86</b>

---

<sup>1</sup>Ex-post calculations performed by the author. For the conversion to mol%, the values of the data published by Raclot *et al*<sup>[69]</sup> were multiplied by 0.272<sup>2</sup>, and those by Wang *et al*<sup>[70]</sup> by 0.142<sup>3</sup>. The unsaturation index was calculated as the mean number of cis double bonds per fatty-acid residue multiplied by 100. SFA: Saturated fatty acid; MUFA: Monounsaturated fatty acid; PUFA: Polyunsaturated fatty acid.

**Supplementary Table 5 Erythrocyte fatty acid composition of controls and diabetic patients without diabetic retinopathy<sup>1</sup>**

Fatty acid	Controls, <i>n</i> = 18		Diabetic individuals without DR, <i>n</i> = 14	
	(%)	-C=C- ( <i>n</i> )	%	-C=C- ( <i>n</i> )
14:0	0.43	0	0.48	0
15:0	0.17	0	0.22	0
16:0	22.41	0	23.75	0
17:0	0.38	0	0.44	0
18:0	17.22	0	17.72	0
18:1 (trans)	0.22	-	0.20	-
20:0	0.15	0	0.18	0
22:0	0.33	0	0.42	0
24:0	0.74	0	0.78	0
<b>Total SFAs</b>	<b>42.05</b>		<b>44.19</b>	
16:1	0.73	0.73	1.03	1.03
18:1	17.16	17.16	19.15	19.15
20:1 n-9	0.21	0.21	0.26	0.26
22:1 n-9	0.06	0.06	0.09	0.09
24:1 n-9	0.69	0.69	1.15	1.15
<b>Total MUFAs</b>	<b>18.85</b>		<b>21.68</b>	
20:3 n-9	0.19	0.57	0.2	0.6
18:2 n-6	12.87	25.74	10.58	21.16
18:3 n-6	0.09	0.27	0.12	0.36
20:2 n-6	0.20	0.40	0.23	0.46
20:3 n-6	1.30	3.90	1.50	4.50
20:4 n-6	13.04	52.16	11.33	45.32
22:4 n-6	2.00	8.00	2.01	8.04
22:5 n-6	0.35	1.75	0.30	1.50
18:3 n-3	0.22	0.66	0.21	0.63
20:5 n-3	0.97	4.85	1.03	5.15

22:5 n-3	2.23	11.15	1.56	7.80
22:6 n-3	4.51	27.06	2.85	17.10
<b>Total PUFAs</b>	<b>37.97</b>		<b>31.92</b>	
Total	98.87		97.79	
<b>UI</b>		<b>155.36</b>		<b>134.30</b>

<sup>1</sup>Ex-post calculations performed by the author are based on the original data listed by Koehrer *et al*<sup>[83]</sup>. Lipid extraction from erythrocytes and fatty acid analysis by gas chromatography were performed as described by Koehrer *et al*<sup>[83]</sup>. To obtain the UI, starts with the multiplication of the percentage of each fatty acid percentage (row 2) by its number of carbon-carbon double bonds. Summarizing the obtained multiplication values (row 3) yields the UI. DR: Diabetic retinopathy; SFA: Saturated fatty acid; MUFA: Mono-unsaturated fatty acid; PUFA: Poly-unsaturated fatty acid; UI: Unsaturation index.

**Supplementary Table 6 Erythrocyte fatty acid composition of diabetic individuals with diabetic retinopathy<sup>1</sup>**

Fatty acid	Diabetic individuals with mild DR, <i>n</i> = 12		Diabetic individuals with moderate DR, <i>n</i> = 12		Diabetic individuals with severe DR, <i>n</i> = 22	
	%	-C=C-	%	-C=C-	%	-C=C-
14:0	0.73	0	0.64	0	0.85	0
15:0	0.19	0	0.22	0	0.22	0
16:0	25.28	0	25.80	0	25.08	0
17:0	0.35	0	0.45	0	0.48	0
18:0	16.43	0	18.81	0	17.17	0
18:1 (trans)	0.23	-	0.31	-	0.39	-
20:0	0.21	0	0.26	0	0.32	0
22:0	0.46	0	0.76	0	0.78	0
24:0	0.94	0	1.75	0	1.66	0
<b>Total SFA</b>	<b>44.82</b>		<b>49.00</b>		<b>46.95</b>	
16:1	0.98	0.98	0.80	0.80	0.74	0.74
18:1	19.24	19.24	18.14	18.14	17.41	17.41
20:1 n-9	0.23	0.23	0.26	0.26	0.24	0.24
22:1 n-9	0.09	0.09	0.08	0.08	0.11	0.11
24:1 n-9	1.31	1.31	2.16	2.16	2.00	2.00
<b>Total MUFAs</b>	<b>21.85</b>		<b>21.44</b>		<b>20.50</b>	
20:3 n-9	0.18	0.54	0.20	0.60	0.15	0.45
18:2 n-6	11.30	22.60	0.15	20.30	10.61	21.22
18:3 n-6	0.12	0.36	0.09	0.27	0.10	0.30
20:2 n-6	0.25	0.50	0.20	0.40	0.28	0.56
20:3 n-6	1.31	3.93	1.26	3.78	1.27	3.81
20:4 n-6	9.33	37.32	9.93	39.72	9.90	39.60
22:4 n-6	1.82	7.28	1.69	6.76	1.79	7.16
22:5 n-6	0.34	1.70	0.36	1.80	0.35	1.75
18:3 n-3	0.27	0.81	0.23	0.69	0.22	0.66

20:5 n-3	0.93	4.65	0.70	3.50	0.94	4.70
22:5 n-3	1.67	8.35	1.15	5.75	1.49	7.45
22:6 n-3	2.67	16.02	2.41	14.46	2.75	16.50
<b>Total PUFAs</b>	<b>30.19</b>		<b>28.37</b>		<b>29.85</b>	
Total	96.86		98.81		97.30	
<b>UI</b>		<b>125.91</b>		<b>119.47</b>		<b>124.66</b>

<sup>1</sup>Ex-post calculations performed by the author are based on the original data listed by Koehrer *et al*<sup>[83]</sup>. DR: Diabetic retinopathy; SFA: Saturated fatty acid; MUFA: Mono-unsaturated fatty acid; PUFA: Poly-unsaturated fatty acid; UI: Unsaturation index.