Lab Dept:	**Chemistry**
Test Name:	**FATTY ACID PROFILE, COMPREHENSIVE**

General Information

Lab Order Codes:	FAPC
Synonyms:	Fatty Acid Profile, Comprehensive (C8-C26), Serum
CPT Codes:	82725 - Fatty Acids, nonesterified
Test Includes:	See Reference Range

Logistics

Test Indications:	Useful for monitoring patients undergoing diet therapy for mitochondrial or peroxisomal disorders (possibly inducing essential fatty acid deficiency (EFAD) in response to restricted fat intake). Monitoring treatment of EFAD. Monitoring the response to provocative tests (fasting tests, loading tests). This test is not the recommended initial screening test for evaluating patients with possible peroxisomal disorders, single-enzyme defects of peroxisomal metabolism such as X-linked adrenoleukodystrophy, or peroxisomal biogenesis disorders (Zellweger syndrome spectrum). For these purposes, the preferred tests are either Fatty Acid Profile, Peroxisomal (C22-C26), Plasma or Fatty Acid Profile, Peroxisomal (C22-C26), Serum.
Lab Testing Sections:	Chemistry - Sendouts
Referred to:	Mayo Medical Laboratories (MML Test: FAPCP)
Phone Numbers:	MIN Lab: 612-813-6280 STP Lab: 651-220-6550
Test Availability:	Daily, 24 hours
Turnaround Time:	3-5 days, test performed Monday - Friday
Special Instructions:	See Patient Preparation

Specimen

Specimen Type:	Blood

Container:	SST (Marble, gold or red top tube)
Draw Volume:	1.5 mL (Minimum: 0.5 mL) blood
Processed Volume:	0.5 mL (Minimum: 0.15 mL) serum
Collection:	Routine blood collection
Special Processing:	Lab Staff: Centrifuge specimen and aliquot serum into a plastic screw-capped round bottom vial. Store and ship at frozen temperatures. Forward promptly. Serum specimen stable frozen (preferred) for 92 days, refrigerated for 72 hours.
Patient Preparation:	Overnight (12-14 hour) fast recommended, see Cautions for further guidance on infants or persons suspected of having a fatty acid oxidation disorder. Patient must not consume any alcohol for 24 hours before the specimen is drawn.
Sample Rejection:	Specimens other than serum; specimens held at incorrect temperature; gross lipemia.

Interpretive

Reference Range:

Fatty Acid nmol/mL	<1 year	1 - 17 years	≥18 years
Octanoic Acid, C8:0	7 - 63	9 - 41	8 - 47
Decenoic Acid, C10:1	0.8 - 4.8	1.6 - 6.6	1.8 - 5.0
Decanoic Acid, C10:0	2 - 62	3 - 25	2 - 18
Lauroleic Acid, C12:1	0.6 - 4.8	1.3 - 5.8	1.4 - 6.6
Lauric Acid, C12:0	6 - 190	5 - 80	6 - 90
Tetradecadienoic Acid, C14:2	0.3 - 6.5	0.2 - 5.8	0.8 - 5.0
Myristoleic Acid, C14:1	1 - 46	1 – 31	3 - 64

Myristic Acid, C14:0	30 - 320		40 - 290	30 - 450
Hexadecadienoic Acid, C16:2	4 - 27		3 - 29	10 - 48
Hexadecenoic Acid, C16:1w9	21 - 69		24 - 82	25 - 105
Palmitoleic Acid, C16:1w7	20 - 1020		100 - 670	110 - 1130
Palmitic Acid, C16:0	720 - 3120		960 - 3460	1480 - 3730
γ-Linolenic Acid, C18:3w6	6 - 110		9 - 130	16 - 150
α-Linolenic Acid, C18:3w3	10 - 190		20 - 120	50 - 130
Linoleic Acid, C18:2w6	1-31 days	32 days – 11 months	1 - 17 years	≥18 years
	350 - 2660	1000 - 3300	1600 - 3500	2270 - 3850
Oleic Acid, C18:1w9	250 - 3500		350 - 3500	650 - 3500
Vaccenic Acid, C18:1w7	140 - 720		320 - 900	280 - 740
Stearic Acid, C18:0	270 - 1140		280 - 1170	590 - 1170
EPA, C20:5w3	2 - 60		8 - 90	14 - 100
Arachidonic Acid, C20:4w6	110 - 1110		350 - 1030	520 - 1490
Mead Acid, C20:0:3w9	1 - 31 days	32 days – 11 months	≥1year	
	8 - 60	3 - 24	7 - 30	
h-γ-Linolenic Acid, C20:3w6	30 - 170		60 - 220	50 - 250

Arachidic Acid, C20:0	30 - 120	30 - 90	50 - 90
DHA, C22:6w3	10 - 220	30 - 160	30 - 250
DPA, C22:5w6	3 - 70	10 - 50	10 - 70
DPA, C22:5w3	6 - 110	30 - 270	20 - 210
DTA, C22:4w6	2 - 50	10 - 40	10 - 80
Docosenoic Acid, C22:1	<1 year	≥1year	
	2 - 20	4 - 13	
Docosanoic Acid, C22:0	All ages		
	0.0 - 96.3		
Nervonic Acid, C24:1	30 - 150	50 - 130	60 - 100
Tetracosanoic Acid, C24:0	All ages		
	0.0 - 91.4		
Hexacosenoic Acid, C26:1	0.2 - 2.1	≥1year	
		0.3 - 0.7	
Hexacosanoic Axid, C26:0	All ages		
	0.00 - 1.30		
Pristanic Acid, C15:0(CH3)4	1 day – 4 months: 0.00 – 0.60nmol/mL 5-8 months: 0.00 – 0.84 nmol/mL 9-12 months: 0.00 – 0.77 nmol/mL 13-23 months: 0.00 – 1.47 nmol/mL > or =2 years: 0.00 – 2.98 nmol/mL		
Phytanic Acid, C16:0(CH3)4	1 day – 4 months: 0.00 – 5.28 nmol/mL 5-8 months: 0.00 – 5.70 nmol/mL 9-12 months: 0.00 – 4.40 nmol/mL 13-23 months: 0.00 – 8.62 nmol/mL > or =2 years: 0.00 – 9.88 nmol/mL		
Triene Tetraene Ratio	1 – 31 days	32 days – 17 years	≥18 years

	0.017 - 0.083	0.013 - 0.050	0.010 - 0.038	
Values Expressed as mmol/L				
Total Saturated Acid	1.2 - 4.6		1.4 - 4.9	2.5 - 5.5
Total Monounsaturated Acid	0.3 - 4.6		0.5 - 4.4	1.3 - 5.8
Total Polyunsaturated Acid	1.1 - 4.9		1.7 - 5.3	3.2 - 5.8
Total w3	0.0 - 0.4		0.1 - 0.5	0.2 - 0.5
Total w6	0.9 - 4.4		1.6 - 4.7	3.0 - 5.4
Total Fatty Acids	3.3 - 14.0		4.4 - 14.3	7.3 - 16.8

Interpretation: An increased triene/tetraene ration is consistent with essential fatty acid deficiency.

Fatty acid oxidation disorders are recognized on the basis of disease-specific patterns that are correlated to the results of other inestigations in plasma (carnitine, acylcarnitines) and urine (organic acids, acylglycines).

Increased concentrations of serum very long-chain fatty acids (VLCFA) C24:0 and C26:0 are seen in peroxisomal disorders, X-linked adrenoleukodystrophy, adenomyeloneuropathy, and Zellweger syndrome (cerebrohepatorenal syndrome).

Increased concentrations of serum phytanic acid (along with normal pristanic acid concentrations) are seen in Refsum disease (phyanase deficiency). Serum phytanic acid concentration also may be increased in other peroxisomal disorders and, when combined with the VLCFA, pristanoic acid and pipecolic acid allow differential diagnosis of peroxisomal disorders.

Critical Values: N/A

Limitations:	For nutritional assessment, a 12-14 hour fast is required; however, infants or persons suspected of having fatty acid oxidation disorder should not fast before testing owing to the possibility of acute metabolic decompensation. Instead, collect the specimen after the longest fast possible, just before feeding. In the case of a patient on total parenteral nutrition (TPN), specimen can be drawn as normal.
Methodology:	Gas chromatography/Mass spectrometry (GC-MS), Stable isotope dilution analysis
References:	Mayo Clinic Laboratories August 2023
Updates:	12/15/2005: Reference range updates. 12/23/2010: Units update 1/26/2016: CPT update 8/3/2016: Tube update 8/23/2023: Updated CPT code, added specimen stability, corrected specimen rejection criteria