General Metabolomic Profiler

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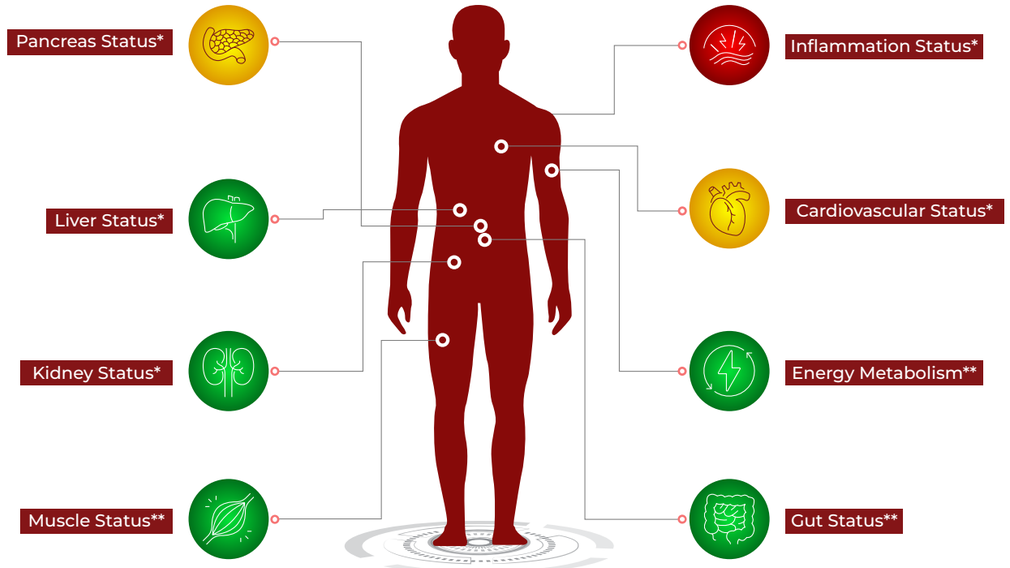
Report on Measurement Results

Sample ID:	5005782004	Date of Birth:	1970-04-07
Material:	Serum	Date of Report:	2025-01-14
Gender :	Female	Analysis-Software:	lifespin Profiler V1.4 lifespin lipoPRO 1.2.3c

1. Summary of the Personal Status

The following overview provides a summary of the personal metabolomic status. The individual metabolomic areas are explained in more detail in Section 2. A comprehensive list of all measured parameters, including personalized reference ranges, can be found in Sections 3 and 4.



*to be launched in Q1/25; ** to be launched during 2025

lifespin uses traffic light logic to display the status of metabolomic areas.

- No indication of deviation from normal/average metabolomic status.
- Indication of deviation from normal/average metabolimic status. Reanalysis in 2 months recommended, further examination by physician should be considered.
- Critical indication of deviation from normal/average metabolomic status. Further examination by physician urgently recommended.

Disclaimer: The test contains no medical diagnosis and does not replace the medical diagnosis of a physician.

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2. Personal Metabolomic Status

2.1. Pancreas Status

Indication of deviation from normal/average metabolomic status. Reanalysis in 2 months recommended, further examination by physician should be considered.

The pancreas is essential for producing insulin and other hormones that regulate blood sugar levels, making it a key factor in preventing and managing diabetes, as well as ensuring proper digestion through enzyme production.

Metabolite	Value	Ref. range [2.5–97.5 perc.]
Glucose [mmol/L]	3.429	4 5 6
Mannose [mmol/L]	0.088	0.050 0.075 0.100
Lactic acid [mmol/L]	1.585	0.8 1.2 1.6 2.0
Valine [mmol/L]	0.196	0.16 0.20 0.24 0.28 0.32
Pyruvic acid [mmol/L]	0.027	0.02 0.04 0.06 0.08
VLDL–4 particle size [nm]	37.030	36.9 37.0 37.1 37.2
Total VLDL–particle size [nm]	38.150	36 37 38 39
Glycerol [mmol/L]	0.127	0.10 0.15 0.20
Leucine [mmol/L]	0.121	0.125 0.150 0.175 0.200
Total HDL–particle size [nm]	8.908	8.6 8.8 9.0
VLDL–3 particle number [nmol/L]	13	5 10 15 20

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2.2. Kidney Status

No indication of deviation from normal/average state of metabolomic status.

Kidney or renal diseases are inflammatory or non-inflammatory diseases that effect the kidneys. Uncontrolled renal diseases can lead to serious clinical pictures, such as acute or chronic renal insufficiency.

Metabolite	Value	Ref. range [2.5–97.5 perc.]
Creatinine [mmol/L]	0.097	0.04 0.06 0.08 0.10
myo-Inositol [mmol/L]	0.029	0.02 0.03 0.04 0.05 0.06
Phenylalanine [mmol/L]	0.020	0.01 0.02 0.03 0.04 0.05
Urea [mmol/L]	1.810	1 2 3
Cholesterol in HDL [mg/dL]	85.0	60 80 100

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2.3. Liver Status

No indication of deviation from normal/average state of metabolomic status.

Liver diseases or pathological disorders of the liver structure and / or function are known as hepatopathies and can be caused by various factors such as infections, autoimmun diseases or metabolic disorders. Liver disease is often recognized late, as it only causes clear symptoms at an advanced stage. At earlier stages, often only mild and unspecific symptoms occur.

Metabolite	Value	Ref. range [2.5–97.5 perc.]
Lysine [mmol/L]	0.037	0 04 0 05 0 06 0 07 0 08
Methionine [mmol/L]	0.018	0.010 0.015 0.020 0.025 0.030
Phenylalanine [mmol/L]	0.020	0.01 0.02 0.03 0.04 0.05
Tyrosine [mmol/L]	0.024	0.03 0.04 0.05 0.06
BRT-ratio*	15.174	9 12 15 18
Cholesterol in HDL [mg/dL]	85.0	60 80 100

Notes:
*BRT-ratio is calculated as (Valine + Leucine + Isoleucine) / (Tyrosine)

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2.4. Cardiovascular Status

Indication of deviation from normal/average metabolomic status. Reanalysis in 2 months recommended, further examination by physician should be considered.

Cardiovascular risk describes the likelihood of developing cardiovascular disease and is influenced by factors such as age, high blood pressure and lifestyle. In addition to cholesterol levels, the number, size and distribution of lipoprotein particles (e.g. LDL and HDL) also play a decisive role, as smaller and denser LDL particles represent a higher risk of vascular damage. A detailed analysis of these particles offers a more precise assessment of the risk and enables targeted prevention.

Metabolite	Value	Ref. range [2.5–97.5 perc.]
non–HDL Cholesterol* [mg/dL]	165.412	80 120 160 200
Free non–HDL Chol. / Esterified HDL–Chol**.	0.285	0.2 0.3 0.4 0.5
Total Cholesterol [mg/dL]	250.4	150 200 250
Triglycerides [mg/dL]	142.1	40 80 120 160
Esterified Cholesterol in HDL [mg/dL]	120.5	80 100 120 140
Total HDL–particle size [nm]	8.908	8.6 8.8 9.0
Total LDL–particle size [nm]	21.913	21.8 21.9 22.0 22.1 22.2

Notes:
*non-HDL Cholesterol is calculated as Total Cholesterol - Cholesterol in HDL
**Free non - HDL Chol./ Esterified HDL-Chol. is calculated as (total free Cholesterol - Free Cholesterol inHDL) / Esterified Cholesterol in HDL.

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2.5. Inflammation

Critical indication of deviation from normal/average state of metabolomic status. Further examination by physician urgently recommended.

Inflammation serves as an indicator of metabolic stress, with altered metabolite concentrations in this section linked to low-grade inflammatory processes.

Metabolite	Value	Ref. range [2.5–97.5 perc.]
Glycoprotein A [mmol/L]	0.349	0.24 0.28 0.32 0.36
Glycoprotein B [mmol/L]	0.145	0.08 0.10 0.12 0.14
Histidine [mmol/L]	0.066	0.06 0.07 0.08 0.09 0.10

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3. Small Metabolites

Metabolite concentrations and the associated personalized reference ranges are shown in the following chapter.

Proteins

Metabolite	Concentration mmol/L	Reference Range mmol/L	Plot
Albumin	0.802	0.736-1.008	
Glycoprotein A	0.349	0.219-0.381	
Glycoprotein B	0.145	0.071-0.157	
Total Protein	0.598	0.553-0.728	

Sugar

Metabolite	Concentration mmol/L	Reference Range mmol/L	Plot
Glucose	3.429	3.929-6.947	
Mannitol	n.d.	n.d.	
Mannose	0.088	0.033-0.123	
myo-Inositol	0.029	<0.067	

Ketone Bodies

Metabolite	Concentration mmol/L	Reference Range mmol/L	Plot
Acetone	0.038	0.013-0.080	
3-Hydroxybutyric acid	0.085	0.008-0.249	
Acetoacetic acid	0.038	0.008-0.079	

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Amides & Amines and Derivatives

Metabolite	Concentration mmol/L	Reference Range mmol/L	Plot
Creatinine	0.097	0.030-0.103	
Pantothenic acid	n.d.	n.d.	
Uracil	n.d.	n.d.	
Urea	1.810	1.141-3.846	
Choline	0.018	0.002-0.022	
Creatine	0.051	0.011-0.067	
Dimethylamine	0.001	<0.008	
Dopamine	n.d.	n.d.	
Ethanolamine	n.d.	<0.020	
Methylamine	n.d.	<0.002	
Serotonin	n.d.	n.d.	
Spermidine	n.d.	<0.048	
Trimethylamine	0.001	<0.002	
Tryptamine	n.d.	<0.053	

Other Lipids

Metabolite	Concentration mmol/L	Reference Range mmol/L	Plot
Phosphatidylcholine	2.620	1.581-3.008	
Sphingomyelin	0.658	0.184-1.385	

Amino Acids and Derivatives

Metabolite	Concentration mmol/L	Reference Range mmol/L	Plot
1-Methylhistidine	0.010	<0.011	
2-Aminoadipic acid	0.040	<0.100	
3-Methylhistidine	n.d.	<0.016	
4-Aminobenzoic acid	n.d.	n.d.	
Hydroxyproline	n.d.	n.d.	

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Metabolite	Concentration mmol/L	Reference Range mmol/L	Plot
alpha-Aminobutyric acid	0.025	<0.078	
beta-Aminobutyric acid	n.d.	<0.023	
Alanine	0.277	0.256-0.673	
beta-Alanine	n.d.	<0.006	
Arginine	0.019	<0.034	
Asparagine	0.040	<0.057	
Aspartic acid	n.d.	<0.036	
Betaine	n.d.	n.d.	
Carnitine	0.024	0.006-0.048	
Cystine	n.d.	<0.068	
Dimethylglycine	0.007	<0.015	
Glutamic acid	0.041	0.029-0.094	
Glutamine	0.406	0.506-0.916	
Glycine	0.216	0.249-0.563	
Histidine	0.066	0.055-0.100	
Isoleucine	0.043	0.031-0.089	
Leucine	0.121	0.114-0.236	
Lysine	0.037	0.034-0.087	
Levodopa	n.d.	n.d.	
Methionine	0.018	0.008-0.033	
Ornithine	0.017	0.018-0.067	
Phenylalanine	0.020	<0.050	
Phosphoserine	n.d.	n.d.	
Proline	0.117	0.065-0.244	
Sarcosine	0.012	<0.027	
Serine	0.139	0.077-0.184	
Taurine	0.084	<0.098	
Threonine	0.127	0.044-0.161	
Tyrosine	0.024	0.024-0.062	
Valine	0.196	0.173-0.343	

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Alcohols

Metabolite	Concentration mmol/L	Reference Range mmol/L	Plot
1,2-Propanediol	n.d.	<0.012	
2-Methyl-1,3-propanediol	0.005	<0.010	
2,3-Butanediol	n.d.	<0.014	
Ethanol	n.d.	0.012-0.311	
Glycerol	0.127	<0.214	
Isopropanol	0.355	<0.027	
Methanol	0.023	0.026-0.094	
n-Propanol	n.d.	<0.014	
tert-Butanol	0.003	0.001-0.005	

Organic Acids

Metabolite	Concentration mmol/L	Reference Range mmol/L	Plot
2-Hydroxyisobutyric acid	n.d.	<0.003	
Acetic acid	0.022	0.020-0.122	
Ascorbic acid	0.048	<0.071	
Citric acid	0.053	0.035-0.464	
Dimethylmalonic acid	0.002	<0.005	
Formic acid	0.009	<0.024	
Fumaric acid	n.d.	<0.006	
Glucuronic acid	n.d.	<0.048	
Itaconate	n.d.	<0.005	
Lactic acid	1.585	0.826-2.214	
Maleic acid	n.d.	<0.004	
Methylmalonic acid	n.d.	<0.014	
Propionic acid	n.d.	<0.007	
Pyruvic acid	0.027	0.022-0.077	
Succinic acid	0.006	0.003-0.013	

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Organic Bases

Metabolite	Concentration mmol/L	Reference Range mmol/L	Plot
Adenine	n.d.	n.d.	
Hypoxanthine	0.016	<0.013	
Inosine	n.d.	n.d.	

Sulfones

Metabolite	Concentration mmol/L	Reference Range mmol/L	Plot
Dimethylsulfone	0.009	0.005-0.026	

Free Drugs

Metabolite	Concentration mmol/L	Reference Range mmol/L	Plot
Free Ceftazidime	n.d.	n.d.	
Free Fluconazole	n.d.	n.d.	
Free Flucytosine	n.d.	n.d.	
Free Fosfomycin	n.d.	n.d.	
Free Piperacillin	n.d.	n.d.	

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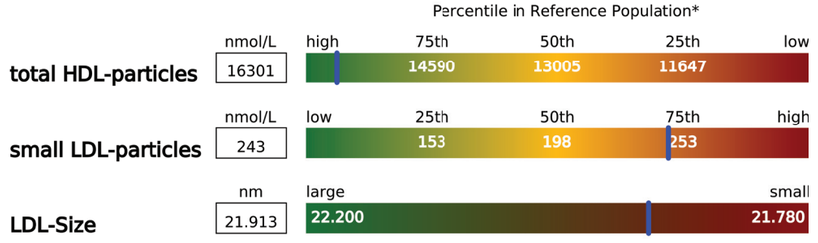
4. Lipoproteins

Lipoprotein concentrations from Main- and Subclasses and the associated personalized reference ranges are shown in the following chapter. lifespin uses traffic light logic to display known risk factors such as lipoprototein particles and sizes for cardiovascular status.

Particle Concentrations and Sizes



*lifespin reference population, for detailed information see section 5. The blue vertical lines represent the measured concentration.

Standard Lipid Parameters

Parameter	Concentration [mg/dL]	Reference Ranges* [mg/dL]	Plot**
Total Cholesterol	250.4	145.787 - 288.949	
LDL-Cholesterol	113.6	51.184 - 158.533	
HDL-Cholesterol	85.0	45.678 - 107.927	
Triglycerides	142.1	42.097 - 225.265	

*The used lifespin reference ranges are sexspecific from 3242 healthy donors. Details see section 5.

** gray horizontal boxes represent 95% range of model, blue vertical lines represent sample value.

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Apolipoproteins

Parameter	Concentration [mg/dL]	Reference Range [mg/dL]	Plot*
Apo-A1	206.1	115.9-230.6	
Apo-A2	49.1	29.3-53.4	
Apo-B100	118.3	52.2-170.2	

*gray horizontal boxes represent 95% range of model, blue vertical lines represent sample value

Parameter Ratios

Parameter	Value [-/-]	Range [-/-]	Plot*
LDL-Chol/HDL-Chol	1.337	0.626-3.915	
Apo-B100/Apo-A1	0.574	0.290-1.259	
Free LDL-Chol/LDL-Chol	0.209	0.208-0.209	
Free HDL-Chol/HDL-Chol	0.157	0.152-0.174	

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4.1. Detailed Lipoprotein Profile

Particle Sizes

Parameter	Diameter [nm]	Reference Range [nm]	Plot*
Total HDL-particle size	8.908	8.446-9.132	
HDL-1 particle size	11.504	11.475-11.638	
HDL-2 particle size	10.223	10.214-10.225	
HDL-3 particle size	9.636	9.607-9.643	
HDL-4 particle size	8.233	8.106-8.321	
Total LDL-particle size	21.913	21.780-22.200	
LDL-1 particle size	24.312	24.289-24.371	
LDL-2 particle size	22.928	22.924-22.934	
LDL-3 particle size	22.350	22.350-22.350	
LDL-4 particle size	21.830	21.826-21.834	
LDL-5 particle size	21.145	21.143-21.148	
LDL-6 particle size	19.464	19.415-19.512	
Total VLDL-particle size	38.150	36.330-39.490	
VLDL-1 particle size	62.588	57.960-63.655	
VLDL-2 particle size	50.430	49.782-50.447	
VLDL-3 particle size	42.948	42.782-43.011	
VLDL-4 particle size	37.030	36.917-37.237	
VLDL-5 particle size	31.497	31.387-31.609	
Total Chylomicrons-particle size	82.090	80.370-87.271	

*Particle size is calculated as the mean diameter for each subfraction.
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Particle Concentrations in Lipoprotein Main Classes and Subclasses*

Parameter	Concentration [nmol/L]	Reference Range [nmol/L]	Plot**
Lipoprotein Main Classes			
non-HDL particle number	950	415-1390	
HDL-particle number	16301	9339-18089	
LDL-particle number	770	325-1123	
VLDL-particle number	67	15-144	
IDL-particle number	114	64-143	
Chylomicrons-particle number	0	<1	
Lipoprotein Subclasses			
HDL-1 particle number	1908	366-2598	
HDL-2 particle number	1227	329-1603	
HDL-3 particle number	1646	690-2052	
HDL-4 particle number	11521	7433-12204	
LDL-1 particle number	210	104-287	
LDL-2 particle number	119	53-167	
LDL-3 particle number	53	22-77	
LDL-4 particle number	83	33-130	
LDL-5 particle number	61	23-98	
LDL-6 particle number	243	89-372	
VLDL-1 particle number	2	<6	
VLDL-2 particle number	5	1-13	
VLDL-3 particle number	13	3-35	
VLDL-4 particle number	23	6-48	
VLDL-5 particle number	23	5-45	

*Particle numbers are calculated using a particle model. From measurements of the total cholesterol and triglyceride levels in serum and the molar mass of these quantities, the model can estimate the particle concentration.

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Concentrations in Lipoprotein Main Classes

Parameter	Concentration [mg/dL]	Reference Range [mg/dL]	Plot*
Cholesterol in			
HDL	85.0	36.2-102.8	
LDL	113.6	50.2-163.9	
IDL	39.4	21.9-49.3	
VLDL	12.4	2.7-26.6	
Chylomicrons	0.1	<1.1	
Free Cholesterol in			
HDL	13.3	6.3-15.8	
LDL	23.7	10.5-34.2	
IDL	7.5	4.2-9.3	
VLDL	3.2	0.7-6.8	
Chylomicrons	0.0	<0.1	
Esterified Cholesterol in			
HDL	120.5	50.3-146.7	
LDL	151.1	66.9-218.0	
IDL	53.7	29.9-67.2	
VLDL	15.4	3.4-33.6	
Chylomicrons	0.1	<1.6	
Triglycerides in			
HDL	13.8	5.8-16.8	
LDL	10.0	4.4-14.6	
IDL	6.4	3.5-8.1	
VLDL	109.9	22.2-263.2	
Chylomicrons	1.9	<22.9	

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Parameter	Concentration [mg/dL]	Reference Range [mg/dL]	Plot*
Phospholipids in			
HDL	139.1	63.8-166.6	
LDL	39.2	17.1-56.9	
IDL	19.3	10.6-24.3	
VLDL	7.6	1.7-16.4	
Chylomicrons	0.0	<0.5	
Apo-A1 in			
HDL	206.1	115.9-230.6	
Apo-A2 in			
HDL	49.1	29.3-53.4	
Apo-B100 in			
LDL	84.0	35.0-123.9	
IDL	24.0	13.2-30.3	
VLDL	10.3	2.4-21.5	
Chylomicrons	0.0	<0.1	

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Concentrations in LDL-Subclasses

Parameter	Concentration [mg/dL]	Reference Range [mg/dL]	Plot*
Cholesterol in			
LDL-1	43.9	21.8-59.9	
LDL-2	20.1	8.9-28.1	
LDL-3	8.1	3.3-11.9	
LDL-4	11.7	4.6-18.2	
LDL-5	7.6	2.9-12.2	
LDL-6	22.2	8.1-33.9	
Free Cholesterol in			
LDL-1	9.0	4.5-12.3	
LDL-2	4.2	1.9-5.9	
LDL-3	1.7	0.7-2.5	
LDL-4	2.5	1.0-3.9	
LDL-5	1.6	0.6-2.6	
LDL-6	4.7	1.7-7.2	
Esterified Cholesterol in			
LDL-1	58.8	29.2-80.1	
LDL-2	26.7	11.9-37.3	
LDL-3	10.7	4.4-15.7	
LDL-4	15.5	6.1-24.1	
LDL-5	10.1	3.8-16.2	
LDL-6	29.4	10.8-45.0	
Triglycerides in			
LDL-1	3.7	1.9-5.1	
LDL-2	1.1	0.5-1.6	
LDL-3	0.5	0.2-0.7	
LDL-4	0.8	0.3-1.3	
LDL-5	0.8	0.3-1.3	
LDL-6	3.1	1.1-4.7	

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Parameter	Concentration [mg/dL]	Reference Range [mg/dL]	Plot*
Phospholipids in			
LDL-1	14.7	7.4-20.1	
LDL-2	4.2	1.9-5.8	
LDL-3	1.8	0.7-2.6	
LDL-4	3.2	1.3-5.0	
LDL-5	3.1	1.2-5.0	
LDL-6	12.2	4.5-18.7	

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Concentrations in HDL-Subclasses

Parameter	Concentration [mg/dL]	Reference Range [mg/dL]	Plot*
Cholesterol in			
HDL-1	29.7	6.0-40.1	
HDL-2	10.8	2.9-14.1	
HDL-3	10.8	4.5-13.5	
HDL-4	33.7	20.6-36.4	
Free Cholesterol in			
HDL-1	3.5	0.7-4.8	
HDL-2	1.6	0.4-2.0	
HDL-3	1.7	0.7-2.1	
HDL-4	6.5	4.1-7.0	
Esterified Cholesterol in			
HDL-1	44.0	8.9-59.4	
HDL-2	15.5	4.1-20.2	
HDL-3	15.3	6.3-19.1	
HDL-4	45.7	27.8-49.4	
Triglycerides in			
HDL-1	4.8	1.0-6.4	
HDL-2	1.8	0.5-2.3	
HDL-3	2.0	0.8-2.4	
HDL-4	5.3	3.2-5.8	
Phospholipids in			
HDL-1	37.3	7.4-50.6	
HDL-2	17.8	4.8-23.2	
HDL-3	21.0	8.8-26.2	
HDL-4	62.9	38.3-68.1	

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Concentrations VLDL-Subclasses

Parameter	Concentration [mg/dL]	Reference Range [mg/dL]	Plot*
Cholesterol in			
VLDL-1	0.83	<2.49	
VLDL-2	1.20	0.17-2.96	
VLDL-3	1.78	0.38-4.73	
VLDL-4	4.64	1.24-9.67	
VLDL-5	3.92	0.86-7.36	
Free Cholesterol in			
VLDL-1	0.14	<0.42	
VLDL-2	0.25	0.04-0.61	
VLDL-3	0.42	0.09-1.12	
VLDL-4	1.23	0.33-2.56	
VLDL-5	1.14	0.25-2.15	
Esterified Cholesterol in			
VLDL-1	1.16	<3.48	
VLDL-2	1.60	0.23-3.95	
VLDL-3	2.29	0.49-6.08	
VLDL-4	5.73	1.53-11.95	
VLDL-5	4.67	1.03-8.76	
Triglycerides in			
VLDL-1	14.29	<43.56	
VLDL-2	18.41	2.66-45.47	
VLDL-3	28.13	5.97-74.74	
VLDL-4	30.51	8.05-65.76	
VLDL-5	18.59	4.03-35.37	
Phospholipids in			
VLDL-1	0.49	<1.45	
VLDL-2	0.77	0.11-1.90	
VLDL-3	1.16	0.25-3.09	
VLDL-4	2.67	0.71-5.56	
VLDL-5	2.55	0.56-4.80	

*gray horizontal boxes represent 95% range of model, blue vertical lines represent sample value

lifespin
General Metabolomic Profiler

Sample ID: 5005782004 | Analysis software: lifespin Profiler V1.4 / lipoPro 1.2.3c | Date of Report: 2025-01-14

5. Notes

In the following an explanantion of the technical terms and abbrevations used in this report is given in the following table

Technical terms & Abbreviations	Description
Concentration	Concentration of non-protein bound metabolites and lipoproteins in blood measured by NMR technology.
g/dL mmol/L nmol/L nm	The units mg/dL (miligram/deciliter), mmol/L (millimol/liter), nmol/L (nanomol/liter) and nm (nanometer) are different specifications of concentration and sizes of metabolites and lipoproteins in the blood.
Reference Range	**Small metabolites:** The reference ranges are derived from the 95% concentration range of 3329 healthy donors (1635 female and 1694 male donors) whereby the sample handling took place under very controlled conditions. In case the sex of the patient was provided, the reference ranges are stratified by sex. Some metabolites are either not present or can only be found in very small amounts in blood samples of healthy donors and thus the concentration is usually below the limit of detection. In this case the report shows n.d. instead of a reference range. **Lipoproteins:** The reference ranges are derived from the 95% concentrations range of 3242 measured samples from healthy donors (1591 female and 1651 male donors) whereby the sample handling took place under very controlled conditions. Some parameters are either not present or can only be found in very small amounts in blood samples of healthy donors and thus the concentration is usually below the limit of detection. In this case the report shows n.d. instead of a reference range.
Plots	Grey horizontal boxes represent the 95% range of model, blue vertical lines represent sample value.
“n.d.”	Not detectable - this parameter was not detected in the blood sample. It is not present or below the limit of detection.
“no result”	Due to a technical error no result is generated for this specific small metabolite.
CHOL	Cholesterol
HDL	High Density Lipoprotein
LDL	Low Density Lipoprotein
IDL	Intermediate Density Lipoprotein
VLDL	Very Low Density Lipoprotein
Apo-A1	Apoplipoprotein-A1
Apo-A2	Apolipropotein-A2
Apo-B100	Apolipoprotein-B100

*****End of Report*****

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