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# **Supplemental methods**

**Exclusion criteria**

Participants of all groups were excluded if they had a history of any of the following diagnoses: organic brain syndrome, schizophrenia, psychosis not otherwise specified, bipolar disorder, bulimia nervosa, or binge-eating disorder. Further exclusion criteria for all participants were an IQ below 85; current substance abuse; inflammatory, neurologic or metabolic illness; chronic medical or neurological illness that could affect appetite, eating behavior or body weight; clinically relevant anemia; pregnancy or breast feeding. Psychoactive medication within four weeks before the study (except for selective serotonin reuptake inhibitors) was an additional exclusion criterion for all groups.

Reasons for drop out from AcAN\_TP1 to AcAN\_TP2 included insufficient weight gain (BMI increase of at least 12% was an inclusion criterion), premature discharge and failed venipuncture.

**Description of the intensive inpatient refeeding**

Short-term weight restoration was achieved with completely orally intensive inpatient refeeding as described by Bargiacchi et al.[1]. This included a starting daily caloric intake between 1500 and 2400 kcal with 0.5 to 2 kg per week expected body weight gain. For this purpose, a structured meal plan consisting of 3 meals, 3 snacks and a fluid intake of 2 liters per day was developed in collaboration with a nutritionist. The meal plan was adjusted for each participant based on the severity of undernutrition and on the food intake before admission to inpatient treatment. Based on the achieved weight gain, caloric intake was typically increased every 2 to 3 days in the first weeks of inpatient treatment. Hydration status was carefully monitored by regularly examining patients regarding skin turgor, edema, blood pressure and pulse. Furthermore, urine specific gravity was determined daily and electrolytes were determined every other day in the first weeks of inpatient treatment. While most patients quickly assimilated to the inpatient setting and started eating all served meals on the first or second day of inpatient treatment, a few patients refused to eat individual meals or food items. In this case, patients were encouraged to drink a corresponding quantity of a high-calorie nutrition product (Fresubin Energy Fibre Drink). All meals and snacks were supervised by the nursing staff until shortly before achieving target weight. Subsequently, the supervision was progressively reduced to encourage patients to take responsibility for adherence to the meal plan.

**Clinical measures**

To ascertain the absence or presence of a current eating disorder, we administered the expert form of the SIAB-EX in all participants.[2] Interviews were adapted to DSM-5 criteria (no amenorrhea criterion) [3] and carried out by clinically experienced and trained research assistants under the supervision of the attending child and adolescent psychiatrist. Additionally, we assessed eating disorder-specific psychopathology with the Eating Disorder Inventory-2 (EDI-2)[4], depressive symptoms with the Beck Depression Inventory Version 2 (BDI-II)[5] and general levels of psychopathology with the revised Symptom Checklist 90 (SCL-90-R).[6] BMI standard deviation scores (BMI-SDS)[7] were computed to provide an age- and gender-corrected index. Study data were managed using Research Electronic Data Capture.[8]

**Sample preparation and NMR metabolomics analysis**

Venous blood samples were collected between 7 and 9 a.m. after an overnight fast (for the AcAN\_TP1 group within 96 hours of admission to treatment). Aprotinin was added during blood sampling (270 KIU/ml final concentration) to prevent protein degradation. Plasma samples were immediately centrifuged (2500x*g*, 15 min, 5°C), aliquoted and stored at −80°C until analysis. 1H NMR spectroscopy measurements were performed in a Bruker 600‐MHz Avance III Neo NMR‐spectrometer equipped with a BBI Probe and a Bruker SampleJet robot with a cooling system for sample storage at 4 °C as previously described.[9] Before the measurement the samples were mixed with phosphate buffer to a volume of 200ul. The samples were then pipetted in 3mm sample tubes and were measured immediately. The Bruker in vitro diagnostics (IVDr) methods were used for the measurements. Data processing and analysis was performed in Bruker TopSpin 4.1.1 and ICON-NMR. Automatic metabolite and lipoprotein reports were obtained using Bruker IVDr B.I. Methods Plasma/Serum Analysis (B.I.Quant‐PS, v.2.0.0) for metabolites and with Bruker Lipoprotein Subclass Analysis (B.I.LISA, v.1.0.0) for lipoproteins and their subfractions. The experimenters were blinded to group assignment during the performance of the measurements.

**Statistical analysis**

Statistical analysis was performed with SPSS v19.0 (SPSS, Inc., Chicago, IL) for Windows, with GraphPad prism 7 (GraphPad Software Inc., La Jolla, CA), and with MetaboanalystR.[10] NMR data were submitted to MetaboanalystR for orthogonal partial-least squares discriminant analysis (OPLS-DA) to compare, a) HC vs AcAN, b) HC vs AcAN\_TP2, c) AcAN\_TP1 vs AcAN\_TP2. In the longitudinal analysis, only samples of AcAN\_TP1 patients with an available TP2 measurement were included. For the analyses, missing values were replaced by 1/5 of min positive values of their corresponding variables and for normalization all data were mean-centered and divided by the standard deviation of each variable. Since the majority of parameters were not normally distributed, volcano plots were created based on a Mann-Whitney-U-Test for patients with AcAN vs HC as well as AcAN\_TP2 vs HC and Wilcoxon signed-rank test for AcAN\_TP1 vs AcAN\_TP2 with false discovery (FDR) <0.05 in both cases. The fold change ratios and the FDR-adjusted p-value of the significant parameters are presented in supplemental tables 1-3. For the significant parameters based on fold changes and for parameters strongly related to the significant ones (i.e. components of the same density lipoprotein particles), we additionally compared the absolute concentrations between groups with the same tests as described above. This allows to assess whether the concentrations in the investigated groups are within or outside the normal range, as well as to focus not only on individual parameters but also on biochemically relevant patterns that may differ between groups. The results are presented in tables 1-4 as mean ± SEM. The sample size of the study was calculated in order to provide more than 80% power to detect differences between two groups (either unpaired, i.e. HC vs AcAN, or paired, i.e. AcAN\_TP1 vs AcAN\_TP2) of an effect size d> 0.5 (unadjusted for multiple comparisons), or > 0.8 (adjusted for multiple comparison, i.e. 153 parameters) at two-tailed a=0.05. G\*Power software was used to calculate statistical power.

**References for supplemental methods**

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## 

## **Supplemental tables**

**Flow diagram of patients with AcAN who were assessed both at admission and after short-term weight restoration through oral refeeding (AcAN\_TP1 and AcAN\_TP2)**

**Met Inclusion Criterion (≥ 12% BMI increase) for Follow-Up Timepoint 2 (n=52)**

**Excluded (n=4)**

* Duplicate (n=1)
* Insufficient Plasma (n=3)

**Participants at Timepoint 1 with Successful Venipuncture (n=76)**

**Final count at Timepoint 1 (n=72)**

**Excluded (n=6)**

* Insufficient Plasma (n=6)

**Final count at Follow-Up Timepoint 2 (n=46)**

**Supplemental table 1: Metabolites and lipoprotein subfraction parameters that were significantly different in patients with AcAN compared to HC after adjustment for FDR**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameters** | **FC** | **log2(FC)** | **P - adjusted** | **-log10(p)** |
| Leucine | 0.68 | -0.55 | <0.001 | 4.99 |
| fC\_HDL-1 | 1.30 | 0.38 | <0.001 | 4.41 |
| C\_VLDL-2 | 1.40 | 0.48 | 0.003 | 2.48 |
| ApoA2\_HDL-1 | 1.30 | 0.38 | 0.003 | 2.47 |
| TG\_VLDL-5 | 0.83 | -0.28 | 0.003 | 2.47 |
| fC\_HDL | 1.15 | 0.20 | 0.003 | 2.47 |
| Glucose | 0.91 | -0.14 | 0.003 | 2.47 |
| PL\_LDL-6 | 1.18 | 0.24 | 0.011 | 1.98 |
| C\_VLDL-4 | 1.30 | 0.38 | 0.012 | 1.94 |
| C | 1.11 | 0.15 | 0.012 | 1.93 |
| fC\_LDL | 1.14 | 0.19 | 0.014 | 1.85 |
| PL\_VLDL-5 | 0.73 | -0.45 | 0.015 | 1.84 |
| ApoA1\_HDL-1 | 1.24 | 0.31 | 0.015 | 1.84 |
| C\_VLDL-3 | 1.34 | 0.42 | 0.016 | 1.81 |
| C\_LDL-6 | 1.20 | 0.27 | 0.016 | 1.81 |
| fC\_HDL-2 | 1.10 | 0.14 | 0.016 | 1.81 |
| TG\_LDL-5 | 1.35 | 0.43 | 0.016 | 1.79 |
| TG\_LDL-6 | 1.20 | 0.26 | 0.016 | 1.79 |
| Isoleucine | 0.76 | -0.39 | 0.018 | 1.75 |
| fC\_LDL-6 | 1.20 | 0.26 | 0.019 | 1.72 |
| Valine | 0.83 | -0.27 | 0.019 | 1.71 |
| C\_VLDL-5 | 0.68 | -0.55 | 0.023 | 1.64 |
| C\_HDL-1 | 1.25 | 0.32 | 0.023 | 1.64 |
| LDL-6-Particles | 1.18 | 0.24 | 0.023 | 1.64 |
| ApoB\_LDL-6 | 1.18 | 0.24 | 0.023 | 1.64 |
| Apo-A1 | 1.06 | 0.09 | 0.029 | 1.54 |
| PL\_HDL-1 | 1.22 | 0.28 | 0.029 | 1.53 |
| Glutamine | 1.21 | 0.28 | 0.029 | 1.53 |
| HDL-C | 1.07 | 0.10 | 0.031 | 1.51 |
| TG\_VLDL-3 | 1.22 | 0.29 | 0.032 | 1.50 |
| C\_IDL | 1.22 | 0.29 | 0.041 | 1.38 |
| PL\_IDL | 1.27 | 0.34 | 0.043 | 1.37 |

FC: Fold change of AcAN/HC. P-adjusted for multiple comparisons with FDR <0.05

C, Cholesterol; fC, free cholesterol; PL, phospholipids; TG, triglycerides, FDR: False Discovery Rate

**Supplemental table 2: Metabolites and lipoprotein subfraction parameters that were significantly different in patients with recovered AN after refeeding (AcAN-TP2) compared to HC after adjustment for FDR**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameters** | **FC** | **log2(FC)** | **P - adjusted** | **-log10(p)** |
| C | 1.21 | 0.27 | <0.001 | 5.60 |
| C\_LDL-3 | 1.32 | 0.40 | <0.001 | 4.74 |
| PL\_LDL-3 | 1.27 | 0.35 | <0.001 | 4.66 |
| fC\_LDL-2 | 1.31 | 0.39 | <0.001 | 4.50 |
| LDL-C | 1.25 | 0.32 | <0.001 | 4.50 |
| PL\_LDL | 1.20 | 0.27 | <0.001 | 4.46 |
| C\_LDL-2 | 1.35 | 0.43 | <0.001 | 4.24 |
| ApoB\_LDL-3 | 1.26 | 0.33 | <0.001 | 4.12 |
| LDL-3-Particles | 1.26 | 0.33 | <0.001 | 4.12 |
| PL\_LDL-2 | 1.31 | 0.39 | <0.001 | 4.10 |
| fC\_LDL-3 | 1.22 | 0.29 | <0.001 | 4.10 |
| fC\_LDL-1 | 1.33 | 0.41 | <0.001 | 3.96 |
| C\_LDL-1 | 1.37 | 0.45 | <0.001 | 3.82 |
| LDL-2-Particles | 1.28 | 0.36 | <0.001 | 3.62 |
| ApoB\_LDL-2 | 1.28 | 0.36 | <0.001 | 3.62 |
| ApoB\_LDL-1 | 1.26 | 0.33 | <0.001 | 3.55 |
| LDL-1-Particles | 1.26 | 0.33 | <0.001 | 3.55 |
| fC\_LDL | 1.19 | 0.25 | <0.001 | 3.35 |
| fC\_HDL | 1.14 | 0.19 | <0.001 | 3.27 |
| fC\_HDL-1 | 1.21 | 0.27 | <0.001 | 3.25 |
| PL\_LDL-1 | 1.29 | 0.37 | <0.001 | 3.09 |
| ApoB\_LDL | 1.19 | 0.25 | <0.001 | 3.02 |
| LDL-Particles | 1.19 | 0.25 | <0.001 | 3.02 |
| HDL-C | 1.11 | 0.15 | <0.001 | 3.02 |
| PL\_IDL | 1.41 | 0.49 | 0.001 | 2.92 |
| fC\_HDL-3 | 1.19 | 0.25 | 0.002 | 2.71 |
| C\_HDL-1 | 1.26 | 0.33 | 0.002 | 2.62 |
| fC\_LDL-6 | 1.19 | 0.25 | 0.003 | 2.54 |
| Apo-B100 | 1.16 | 0.21 | 0.003 | 2.54 |
| Total\_Particles\_ApoB | 1.16 | 0.21 | 0.003 | 2.54 |
| TG\_LDL-3 | 1.15 | 0.20 | 0.003 | 2.54 |
| Apo-A1 | 1.08 | 0.11 | 0.005 | 2.28 |
| C\_LDL-6 | 1.20 | 0.26 | 0.006 | 2.23 |
| Apo-A2 | 1.08 | 0.11 | 0.006 | 2.22 |
| TG\_IDL | 1.52 | 0.61 | 0.006 | 2.21 |
| ApoA2\_HDL-1 | 1.20 | 0.26 | 0.008 | 2.10 |
| TG\_VLDL-2 | 1.29 | 0.37 | 0.008 | 2.10 |
| C\_HDL-2 | 1.10 | 0.13 | 0.012 | 1.92 |
| PL\_HDL-1 | 1.19 | 0.25 | 0.012 | 1.92 |
| PL\_HDL | 1.07 | 0.10 | 0.013 | 1.89 |
| PL\_LDL-6 | 1.14 | 0.19 | 0.014 | 1.86 |
| ApoA2\_HDL | 1.07 | 0.10 | 0.016 | 1.81 |
| ApoA1\_HDL | 1.07 | 0.10 | 0.019 | 1.73 |
| ApoA1\_HDL-2 | 1.08 | 0.11 | 0.020 | 1.70 |
| fC\_HDL-2 | 1.09 | 0.12 | 0.027 | 1.58 |
| LDL-6-Particles | 1.15 | 0.20 | 0.031 | 1.50 |
| ApoB\_LDL-6 | 1.15 | 0.20 | 0.031 | 1.50 |
| LDL-C\_HDL-C | 1.11 | 0.15 | 0.031 | 1.50 |
| Lactate | 0.72 | -0.47 | 0.033 | 1.48 |
| C\_HDL-3 | 1.07 | 0.10 | 0.034 | 1.47 |
| ApoA2\_HDL-2 | 1.12 | 0.16 | 0.035 | 1.46 |
| PL\_VLDL-2 | 1.24 | 0.31 | 0.038 | 1.43 |
| ApoA1\_HDL-1 | 1.15 | 0.20 | 0.042 | 1.38 |
| TG\_LDL-2 | 1.13 | 0.18 | 0.043 | 1.36 |
| ApoA2\_HDL-3 | 1.09 | 0.12 | 0.047 | 1.33 |

FC: Fold change of AcAN\_TP2 vs HC. P-adjusted for multiple comparisons with FDR <0.05, C, Cholesterol; fC, free cholesterol; PL, phospholipids; TG, triglycerides; FDR, False discovery rate

**Supplemental Table 3: Metabolites and lipoprotein subfraction parameters that were significantly different in patients with AN before (AcAN-TP1) and after weight restoration with refeeding (AcAN-TP2) after FDR-adjustment**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameters** | **FC** | **log2(FC)** | **P - adjusted** | **- log10(p)** |
| C\_HDL-3 | 1.12 | 0.17 | 0.003 | 2.48 |
| ApoA1\_HDL-3 | 1.12 | 0.16 | 0.003 | 2.48 |
| C\_HDL-2 | 1.20 | 0.27 | 0.006 | 2.21 |
| PL\_HDL-2 | 1.21 | 0.28 | 0.009 | 2.03 |
| PL\_HDL-3 | 1.11 | 0.15 | 0.010 | 1.98 |
| TG\_LDL-5 | 0.73 | -0.46 | 0.019 | 1.73 |
| C\_VLDL-3 | 0.74 | -0.44 | 0.026 | 1.59 |

FC: Fold change of AcAN\_TP2/AcAN\_TP1. P-adjusted for multiple comparisons with FDR <0.05, C, Cholesterol; fC, free cholesterol; PL, phospholipids; TG, triglycerides; FDR, False Discovery Rate

**Supplemental Table 4: Concentrations of aminoacids, ketoacids and their derivatives**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | HC (N=74) | AcAN (N=72) | AcAN\_TP1 (N=46) | AcAN\_TP2 (N=46) | HC vs AcAN | HC vs AcAN\_TP2 | AcAN\_TP1 vs AcAN\_TP2 |
|  |  |  |  |  | ***P*** | | |
| Creatinine | 63±2 | 67±3 | 67±3 | 63±3 | 0.124 | 0.941 | 0.392 |
| Glycine | 220±013 | 246±13 | 224±14 | 259±16 | 0.152 | 0.060 | 0.042 |
| Histidine | 64±5 | 59±5 | 67±7 | 78±6 | 0.641 | 0.047 | 0.252 |
| Phenylalanine | 155±10 | 173±14 | 156±18 | 165±13 | 0.577 | 0.782 | 0.475 |
| Acetate | 58±5 | 59±5 | 56±8 | 56±5 | 0.777 | 0.915 | 0.879 |
| Citrate | 117±9 | 112±10 | 109±13 | 105±11 | 0.637 | 0.275 | 0.929 |
| Formate | 19±2 | 18±2 | 20±2 | 20±3 | 0.593 | 0.932 | 0.977 |
| Lactate | 1070±87 | 932±56 | 940±68 | 768±40 | 0.632 | 0.012 | 0.066 |
| 3-OH-butyrate | 95±48 | 61±19 | 35±9 | 23±5 | 0.215 | 0.048 | 0.550 |
| Acetone | 26±8 | 27±7 | 17±3 | 11±7 | 0.482 | 0.073 | 0.071 |
| Pyruvate | 69±4 | 63±4 | 65±5 | 55±3 | 0.985 | 0.046 | 0.043 |

*P* shows the unadjusted p-values depending on distribution from unpaired t-test, Mann-Whitney test (cross-sectional analysis: HC vs AcAN and HC vs AcAN\_TP2) or paired t-test and Wilcoxon-signed rank test (longitudinal analysis: AcAN\_TP1 vs AcAN\_TP2

### **Supplemental Appendix**

VLDL: Very Low Density Lipoprotein, IDL: Intermediate Density Lipoprotein, LDL: Low Density Lipoprotein, HDL: High Density Lipoprotein

**Densities (in kg/L) of Lipoprotein Main Fractions:**

VLDL: 0.950 – 1.006, IDL: 1.006 – 1.019, LDL: 1.019 – 1.063, HDL: 1.063 – 1.210

**Density of LDL subfractions:**

LDL-1: 1.019 – 1.031, LDL-2: 1.031 – 1.034, LDL-3: 1.034 - 1.037, LDL-4: 1.037 – 1.40, LDL-5: 1.040 – 1.044, LDL-6: 1.044 – 1.063

**Density of HDL subfractions:**

HDL-1: 1.063 – 1.100, HDL-2: 1.100 – 1.112, HDL-3: 1.112 – 1.125, HDL-4: 1.125 – 1.210

Total of 153 parameters were measured. 21 parameters were excluded from the analysis due to very low values (0 values) in more than 50% of the samples.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Measured parameters** |  |  |  |  |  |
| **Included in the analysis** | | | | **Excluded from the analysis** | |
| TG | TG\_VLDL-1 | PL\_LDL-1 | Alanine | Ethanol |  |
| C | TG\_VLDL-2 | PL\_LDL-2 | Creatinine | Trimethylamine N-oxide | |
| LDL-C | TG\_VLDL-3 | PL\_LDL-3 | Glutamine | 2-Aminobutyrate | |
| HDL-C | TG\_VLDL-4 | PL\_LDL-4 | Glycine | Asparagine |  |
| Apo-A1 | TG\_VLDL-5 | PL\_LDL-5 | Histidine | Creatine |  |
| Apo-A2 | C\_VLDL-1 | PL\_LDL-6 | Isoleucine | Glutamate |  |
| Apo-B100 | C\_VLDL-2 | ApoB\_LDL-1 | Leucine | Lysine |  |
| LDL-C\_HDL-C | C\_VLDL-3 | ApoB\_LDL-2 | Methionine | N,N-Dimethylglycine | |
| Apo-B100\_Apo-A1 | C\_VLDL-4 | ApoB\_LDL-3 | Phenylalanine | Ornithine |  |
| Total\_Particles\_ApoB | C\_VLDL-5 | ApoB\_LDL-4 | Valine | Proline |  |
| VLDL-Particles | fC\_VLDL-1 | ApoB\_LDL-5 | Acetate | Sarcosine |  |
| IDL-Particles | fC\_VLDL-2 | ApoB\_LDL-6 | Citrate | Threonine |  |
| LDL-Particles | fC\_VLDL-3 | TG\_HDL-1 | Formate | 2-Hydroxybutyrate | |
| LDL-1-Particles | fC\_VLDL-4 | TG\_HDL-2 | Lactate | Succinate |  |
| LDL-2-Particles | fC\_VLDL-5 | TG\_HDL-3 | 3-Hydrodxybutyrate | Choline |  |
| LDL-3-Particles | PL\_VLDL-1 | TG\_HDL-4 | Acetone | 2-Oxoglutarate | |
| LDL-4-Particles | PL\_VLDL-2 | C\_HDL-1 | Pyruvate | Acetoacetate |  |
| LDL-5-Particles | PL\_VLDL-3 | C\_HDL-2 | Glucose | Galactose |  |
| LDL-6-Particles | PL\_VLDL-4 | C\_HDL-3 | Ca\_EDTA | Glycerol |  |
| TG\_VLDL | PL\_VLDL-5 | C\_HDL-4 | K\_EDTA | Dimethylsufone | |
| TG\_IDL | TG\_LDL-1 | fC\_HDL-1 |  | Tyrosine |  |
| TG\_LDL | TG\_LDL-2 | fC\_HDL-2 |  |  |  |
| TG\_HDL | TG\_LDL-3 | fC\_HDL-3 |  |  |  |
| C\_VLDL | TG\_LDL-4 | fC\_HDL-4 |  |  |  |
| C\_IDL | TG\_LDL-5 | PL\_HDL-1 |  |  |  |
| fC\_VLDL | TG\_LDL-6 | PL\_HDL-2 |  |  |  |
| fC\_IDL | C\_LDL-1 | PL\_HDL-3 |  |  |  |
| fC\_LDL | C\_LDL-2 | PL\_HDL-4 |  |  |  |
| fC\_HDL | C\_LDL-3 | ApoA1\_HDL-1 |  |  |  |
| PL\_VLDL | C\_LDL-4 | ApoA1\_HDL-2 |  |  |  |
| PL\_IDL | C\_LDL-5 | ApoA1\_HDL-3 |  |  |  |
| PL\_LDL | C\_LDL-6 | ApoA1\_HDL-4 |  |  |  |
| PL\_HDL | fC\_LDL-1 | ApoA2\_HDL-1 |  |  |  |
| ApoA1\_HDL | fC\_LDL-2 | ApoA2\_HDL-2 |  |  |  |
| ApoA2\_HDL | fC\_LDL-3 | ApoA2\_HDL-3 |  |  |  |
| ApoB\_VLDL | fC\_LDL-4 | ApoA2\_HDL-4 |  |  |  |
| ApoB\_IDL | fC\_LDL-5 |  |  |  |  |
| ApoB\_LDL | fC\_LDL-6 |  |  |  |  |

**Quality control assessment of the investigated parameters:** Mean, Standard Deviation (SD) and Coefficient of Variability (CV) of a quality control sample measured in 5 consecutive days

|  |  |  |  |
| --- | --- | --- | --- |
| pars | SD | Mean | CV |
| TG\_mg\_dl | 3.921 | 122.236 | 3.21 |
| C\_mg\_dl | 4.972 | 174.810 | 2.84 |
| LDL-C\_mg\_dl | 3.760 | 95.528 | 3.94 |
| HDL-C\_mg\_dl | 2.044 | 46.124 | 4.43 |
| Apo-A1\_mg\_dl | 4.070 | 132.382 | 3.07 |
| Apo-A2\_mg\_dl | 1.053 | 26.852 | 3.92 |
| Apo-B100\_mg\_dl | 2.339 | 80.784 | 2.90 |
| LDL-C\_HDL-C | 0.048 | 2.070 | 2.34 |
| Apo-B100\_Apo-A1 | 0.010 | 0.610 | 1.64 |
| Total\_Particles\_ApoB\_nmol\_l | 42.495 | 1468.846 | 2.89 |
| VLDL-Particles\_nmol\_l | 2.065 | 155.988 | 1.32 |
| IDL-Particles\_nmol\_l | 6.510 | 67.662 | 9.62 |
| LDL-Particles\_nmol\_l | 24.083 | 1189.372 | 2.02 |
| LDL-1-Particles\_nmol\_l | 8.289 | 173.886 | 4.77 |
| LDL-2-Particles\_nmol\_l | 16.205 | 96.612 | 16.77 |
| LDL-3-Particles\_nmol\_l | 13.891 | 152.016 | 9.14 |
| LDL-4-Particles\_nmol\_l | 11.979 | 236.254 | 5.07 |
| LDL-5-Particles\_nmol\_l | 11.210 | 236.784 | 4.73 |
| LDL-6-Particles\_nmol\_l | 20.600 | 268.766 | 7.66 |
| TG\_VLDL\_mg\_d\_l | 2.283 | 76.142 | 3.00 |
| TG\_IDL\_mg\_d\_l | 0.400 | 10.918 | 3.67 |
| TG\_LDL\_mg\_d\_l | 0.958 | 18.832 | 5.09 |
| TG\_HDL\_mg\_d\_l | 0.625 | 12.766 | 4.90 |
| C\_VLDL\_mg\_d\_l | 0.678 | 19.686 | 3.44 |
| C\_IDL\_mg\_d\_l | 1.305 | 8.282 | 15.75 |
| fC\_VLDL\_mg\_d\_l | 0.365 | 10.096 | 3.61 |
| fC\_IDL\_mg\_d\_l | 0.305 | 2.140 | 14.27 |
| fC\_LDL\_mg\_d\_l | 1.934 | 29.182 | 6.63 |
| fC\_HDL\_mg\_d\_l | 1.318 | 13.204 | 9.98 |
| PL\_VLDL\_mg\_d\_l | 0.393 | 22.162 | 1.77 |
| PL\_IDL\_mg\_d\_l | 0.435 | 4.116 | 10.56 |
| PL\_LDL\_mg\_d\_l | 1.560 | 56.298 | 2.77 |
| PL\_HDL\_mg\_d\_l | 1.537 | 67.684 | 2.27 |
| ApoA1\_HDL\_mg\_d\_l | 5.400 | 130.682 | 4.13 |
| ApoA2\_HDL\_mg\_d\_l | 0.950 | 27.960 | 3.40 |
| ApoB\_VLDL\_mg\_d\_l | 0.113 | 8.578 | 1.31 |
| ApoB\_IDL\_mg\_d\_l | 0.360 | 3.720 | 9.68 |
| ApoB\_LDL\_mg\_d\_l | 1.325 | 65.412 | 2.03 |
| TG\_VLDL-1\_mg\_d\_l | 0.809 | 39.032 | 2.07 |
| TG\_VLDL-2\_mg\_d\_l | 0.970 | 11.378 | 8.53 |
| TG\_VLDL-3\_mg\_d\_l | 0.970 | 9.694 | 10.01 |
| TG\_VLDL-4\_mg\_d\_l | 0.453 | 8.880 | 5.10 |
| TG\_VLDL-5\_mg\_d\_l | 0.143 | 4.138 | 3.47 |
| C\_VLDL-1\_mg\_d\_l | 0.390 | 7.474 | 5.22 |
| C\_VLDL-2\_mg\_d\_l | 0.185 | 2.636 | 7.03 |
| C\_VLDL-3\_mg\_d\_l | 0.289 | 2.344 | 12.32 |
| C\_VLDL-4\_mg\_d\_l | 0.338 | 4.160 | 8.12 |
| C\_VLDL-5\_mg\_d\_l | 0.202 | 2.110 | 9.58 |
| fC\_VLDL-1\_mg\_d\_l | 0.089 | 1.974 | 4.53 |
| fC\_VLDL-2\_mg\_d\_l | 0.061 | 1.212 | 5.07 |
| fc\_VLDL-3\_mg\_d\_l | 0.100 | 1.064 | 9.41 |
| fC\_VLDL-4\_mg\_d\_l | 0.136 | 1.672 | 8.12 |
| fC\_VLDL-5\_mg\_d\_l | 0.135 | 1.130 | 11.97 |
| PL\_VLDL-1\_mg\_d\_l | 0.240 | 5.618 | 4.26 |
| PL\_VLDL-2\_mg\_d\_l | 0.171 | 2.704 | 6.33 |
| PL\_VLDL-3\_mg\_d\_l | 0.257 | 2.790 | 9.22 |
| PL\_VLDL-4\_mg\_d\_l | 0.154 | 4.516 | 3.42 |
| PL\_VLDL-5\_mg\_d\_l | 0.120 | 2.692 | 4.45 |
| TG\_LDL-1\_mg\_d\_l | 0.274 | 5.018 | 5.46 |
| TG\_LDL-2\_mg\_d\_l | 0.134 | 2.026 | 6.61 |
| TG\_LDL-3\_mg\_d\_l | 0.029 | 2.942 | 1.00 |
| TG\_LDL-4\_mg\_d\_l | 0.154 | 3.302 | 4.68 |
| TG\_LDL-5\_mg\_d\_l | 0.087 | 3.116 | 2.79 |
| TG\_LDL-6\_mg\_d\_l | 0.212 | 3.002 | 7.07 |
| C\_LDL-1\_mg\_d\_l | 0.809 | 17.360 | 4.66 |
| C\_LDL-2\_mg\_d\_l | 1.656 | 8.282 | 19.99 |
| C\_LDL-3\_mg\_d\_l | 1.246 | 13.516 | 9.22 |
| C\_LDL-4\_mg\_d\_l | 1.069 | 20.608 | 5.19 |
| C\_LDL-5\_mg\_d\_l | 0.815 | 19.116 | 4.26 |
| C\_LDL-6\_mg\_d\_l | 1.469 | 17.580 | 8.36 |
| fC\_LDL-1\_mg\_d\_l | 0.343 | 4.678 | 7.33 |
| fC\_LDL-2\_mg\_d\_l | 0.792 | 2.456 | C |
| fC\_LDL-3\_mg\_d\_l | 0.492 | 4.854 | 10.13 |
| fC\_LDL-4\_mg\_d\_l | 0.419 | 5.656 | 7.41 |
| fC\_LDL-5\_mg\_d\_l | 0.388 | 5.202 | 7.46 |
| fC\_LDL-6\_mg\_d\_l | 0.406 | 3.782 | 10.75 |
| PL\_LDL-1\_mg\_d\_l | 0.391 | 10.526 | 3.72 |
| PL\_LDL-2\_mg\_d\_l | 0.795 | 5.314 | 14.96 |
| PL\_LDL-3\_mg\_d\_l | 0.650 | 7.980 | 8.14 |
| PL\_LDL-4\_mg\_d\_l | 0.536 | 11.646 | 4.60 |
| PL\_LDL-5\_mg\_d\_l | 0.448 | 10.590 | 4.23 |
| PL\_LDL-6\_mg\_d\_l | 0.696 | 9.864 | 7.05 |
| ApoB\_LDL-1\_mg\_d\_l | 0.457 | 9.562 | 4.78 |
| ApoB\_LDL-2\_mg\_d\_l | 0.889 | 5.314 | 16.74 |
| ApoB\_LDL-3\_mg\_d\_l | 0.761 | 8.360 | 9.11 |
| ApoB\_LDL-4\_mg\_d\_l | 0.656 | 12.994 | 5.05 |
| ApoB\_LDL-5\_mg\_d\_l | 0.617 | 13.024 | 4.73 |
| ApoB\_LDL-6\_mg\_d\_l | 1.134 | 14.780 | 7.67 |
| TG\_HDL-1\_mg\_d\_l | 0.280 | 3.660 | 7.65 |
| TG\_HDL-2\_mg\_d\_l | 0.169 | 2.120 | 7.98 |
| TG\_HDL-3\_mg\_d\_l | 0.156 | 2.486 | 6.27 |
| TG\_HDL-4\_mg\_d\_l | 0.151 | 4.194 | 3.61 |
| C\_HDL-1\_mg\_d\_l | 0.813 | 11.030 | 7.37 |
| C\_HDL-2\_mg\_d\_l | 0.379 | 7.654 | 4.95 |
| C\_HDL-3\_mg\_d\_l | 0.267 | 9.160 | 2.91 |
| C\_HDL-4\_mg\_d\_l | 0.743 | 16.690 | 4.45 |
| fC\_HDL-1\_mg\_d\_l | 0.542 | 3.032 | 17.87 |
| fC\_HDL-2\_mg\_d\_l | 0.214 | 1.464 | 14.61 |
| fC\_HDL-3\_mg\_d\_l | 0.286 | 1.878 | 15.25 |
| fC\_HDL-4\_mg\_d\_l | 0.396 | 3.498 | 11.33 |
| PL\_HDL-1\_mg\_d\_l | 0.942 | 14.842 | 6.34 |
| PL\_HDL-2\_mg\_d\_l | 0.478 | 12.668 | 3.77 |
| PL\_HDL-3\_mg\_d\_l | 0.385 | 14.646 | 2.63 |
| PL\_HDL-4\_mg\_d\_l | 0.658 | 24.268 | 2.71 |
| ApoA1\_HDL-1\_mg\_d\_l | 2.128 | 18.362 | 11.59 |
| ApoA1\_HDL-2\_mg\_d\_l | 0.444 | 17.446 | 2.55 |
| ApoA1\_HDL-3\_mg\_d\_l | 0.490 | 26.732 | 1.83 |
| ApoA1\_HDL-4\_mg\_d\_l | 2.387 | 69.106 | 3.45 |
| ApoA2\_HDL-1\_mg\_d\_l | 0.135 | 1.914 | 7.07 |
| ApoA2\_HDL-2\_mg\_d\_l | 0.163 | 2.830 | 5.77 |
| ApoA2\_HDL-3\_mg\_d\_l | 0.303 | 5.796 | 5.23 |
| ApoA2\_HDL-4\_mg\_d\_l | 0.686 | 16.346 | 4.19 |
| Alanine\_mmol/l | 0.013 | 0.454 | 2.85 |
| creatine\_mmol/l | 0.003 | 0.017 | 18.13 |
| creatinine\_mmol/l | 0.008 | 0.057 | 14.63 |
| histidine\_mmol/l | 0.012 | 0.069 | 17.24 |
| isoleucine\_mmol/l | 0.005 | 0.037 | 12.31 |
| leucine\_mmol/l | 0.008 | 0.072 | 10.61 |
| lysine\_mmol/l | 0.014 | 0.123 | 11.19 |
| phenylalanine\_mmol/l | 0.007 | 0.048 | 14.21 |
| tyrosine\_mmol/l | 0.005 | 0.059 | 9.28 |
| valine\_mmol/l | 0.024 | 0.206 | 11.44 |
| acetate\_mmol/l | 0.006 | 0.016 | 34.80 |
| citrate\_mmol/l | 0.308 | 22.409 | 1.38 |
| formate\_mmol/l | 0.010 | 0.054 | 18.09 |
| lactate\_mmol/l | 0.462 | 6.090 | 7.59 |
| pyruvate\_mmol/l | 0.038 | 0.448 | 8.43 |
| glucose\_mmol/l | 0.721 | 24.577 | 2.93 |