

# Nightingale Blood Biomarker Analysis Service

Boost your research  
with comprehensive blood  
metabolite insights.

Nightingale

## Powerful platform enabled by NMR

### Unique combination of biomarkers

Biomarkers include clinically validated routine markers, emerging biomarkers with strong medical relevance and promising, new biomarkers.

### Robust and highly reproducible results

Our fully automated analysis process is constantly monitored under a certified quality management system. And the NMR technology allows high reproducibility which ensures consistent and reliable results across all sample sets.

### Fast, cost-efficient and scalable technology

We use a high-throughput NMR technology which ensures efficient analysis for sample sets of all sizes without batch effects.

### Accurate and fully quantified metabolic data

Not only our analysis, but even our quantification process of the NMR spectral data is fully automated, which provides precise and accurate metabolite results in absolute concentration units.

### Comprehensive overview of an individual's health

Biomarkers in our panel provide a physiologically meaningful picture of the overall health making it possible to explore novel connections between metabolites and an individual's health status.

### Certified quality management system

Nightingale's quality management system has been certified according to EN ISO 13485 standard.

#### TECH SPECIFICATIONS

<b>Technology</b>	<sup>1</sup> H NMR Spectroscopy, Nightingale Health's proprietary analysis
<b>Specimen type</b>	Serum and Plasma
<b>Sample volume</b>	100 µL and 350 µL
<b>Number of biomarkers</b>	250
<b>Result units</b>	Absolute biomarker quantification (mmol/l or g/l)
<b>Sample storage</b>	Long-term storage -70° C or below

#### CLINICALLY AND ANALYTICALLY VALIDATED BIOMARKERS (37)

<b>Cholesterol</b>					
Total cholesterol	mmol/l	Ratio of polyunsaturated fatty acids to total fatty acids	%	<b>Branched-chain amino acids</b>	
VLDL cholesterol	mmol/l	Ratio of monounsaturated fatty acids to total fatty acids	%	Total concentration of branched-chain amino acids (leucine + isoleucine + valine)	mmol/l
Clinical LDL cholesterol	mmol/l	Ratio of saturated fatty acids to total fatty acids	%	Isoleucine	mmol/l
HDL cholesterol	mmol/l	Ratio of docosahexaenoic acid to total fatty acids	%	Leucine	mmol/l
		Ratio of polyunsaturated fatty acids to monounsaturated fatty acids	%	Valine	mmol/l
<b>Triglycerides</b>		Ratio of omega-6 fatty acids to omega-3 fatty acids	%	<b>Aromatic amino acids</b>	
Total triglycerides	mmol/l			Phenylalanine	mmol/l
				Tyrosine	mmol/l
<b>Fatty acids</b>		<b>Apolipoproteins</b>		<b>Glycolysis related metabolites</b>	
Total fatty acids	mmol/l	Apolipoprotein B	g/l	Glucose	mmol/l
Omega-3 fatty acids	mmol/l	Apolipoprotein A1	g/l	Lactate	mmol/l
Omega-6 fatty acids	mmol/l	Ratio of apolipoprotein B to apolipoprotein A1	ratio	<b>Fluid balance</b>	
Polyunsaturated fatty acids	mmol/l			Creatinine	mmol/l
Monounsaturated fatty acids	mmol/l			Albumin	g/l
Saturated fatty acids	mmol/l	<b>Amino acids</b>		<b>Inflammation</b>	
Docosahexaenoic acid	mmol/l	Alanine	mmol/l	Glycoprotein acetyls	mmol/l
		Glycine	mmol/l		
<b>Fatty acid ratios</b>		Histidine	mmol/l		
Ratio of omega-3 fatty acids to total fatty acids	%				
Ratio of omega-6 fatty acids to total fatty acids	%				

# List of all biomarkers

<b>Cholesterol</b>		<b>Other lipids</b>		<b>Glycolysis related metabolites</b>		<b>Medium VLDL (average diameter 44.5 nm)</b>	
Total cholesterol	mmol/l	Phosphoglycerides	mmol/l	Glucose	mmol/l	Concentration of medium VLDL particles	mmol/l
Total cholesterol minus HDL-C	mmol/l	Ratio of triglycerides to phosphoglycerides	ratio	Lactate	mmol/l	Total lipids in medium VLDL	mmol/l
Remnant cholesterol		Total cholines	mmol/l	Pyruvate	mmol/l	Phospholipids in medium VLDL	mmol/l
(non-HDL, non-LDL -cholesterol)	mmol/l	Phosphatidylcholines	mmol/l	Citrate **	mmol/l	Cholesterol in medium VLDL	mmol/l
VLDL cholesterol	mmol/l	Sphingomyelins	mmol/l	Glycerol *	mmol/l	Cholesteryl esters in medium VLDL	mmol/l
Clinical LDL cholesterol	mmol/l					Free cholesterol in medium VLDL	mmol/l
LDL cholesterol	mmol/l	<b>Apolipoproteins</b>		<b>Ketone bodies</b>		Triglycerides in medium VLDL	mmol/l
HDL cholesterol	mmol/l	Apolipoprotein B	g/l	3-Hydroxybutyrate	mmol/l		
		Apolipoprotein A1	g/l	Acetate	mmol/l	<b>Small VLDL (average diameter 36.8 nm)</b>	
		Ratio of apolipoprotein B to apolipoprotein A1	ratio	Acetoacetate	mmol/l	Concentration of small VLDL particles	mmol/l
				Acetone	mmol/l	Total lipids in small VLDL	mmol/l
<b>Triglycerides</b>		<b>Fatty acids</b>				Phospholipids in small VLDL	mmol/l
Total triglycerides	mmol/l	Total fatty acids	mmol/l	<b>Fluid balance</b>		Cholesterol in small VLDL	mmol/l
Triglycerides in VLDL	mmol/l	Degree of unsaturation	degree	Creatinine	mmol/l	Cholesteryl esters in small VLDL	mmol/l
Triglycerides in LDL	mmol/l	Omega-3 fatty acids	mmol/l	Albumin	g/l	Free cholesterol in small VLDL	mmol/l
Triglycerides in HDL	mmol/l	Omega-6 fatty acids	mmol/l			Triglycerides in small VLDL	mmol/l
		Polyunsaturated fatty acids	mmol/l	<b>Inflammation</b>			
<b>Phospholipids</b>		Monounsaturated fatty acids	mmol/l	Glycoprotein acetyls	mmol/l	<b>Very small VLDL (average diameter 31.3 nm)</b>	
Total phospholipids in lipoprotein particles	mmol/l	Saturated fatty acids	mmol/l			Concentration of very small VLDL particles	mmol/l
Phospholipids in VLDL	mmol/l	Linoleic acid	mmol/l	<b>Lipoprotein subclasses</b>		Total lipids in very small VLDL	mmol/l
Phospholipids in LDL	mmol/l	Docosahexaenoic acid	mmol/l	<b>Chylomicrons and extremely large VLDL (particle diameters from 75 nm upwards)</b>		Phospholipids in very small VLDL	mmol/l
Phospholipids in HDL	mmol/l			Concentration of chylomicrons and extremely large VLDL particles	mmol/l	Cholesterol in very small VLDL	mmol/l
		<b>Fatty acid ratios</b>		Total lipids in chylomicrons and extremely large VLDL	mmol/l	Cholesteryl esters in very small VLDL	mmol/l
<b>Cholesteryl esters</b>		Ratio of omega-3 fatty acids to total fatty acids	%	Phospholipids in chylomicrons and extremely large VLDL	mmol/l	Free cholesterol in very small VLDL	mmol/l
Total esterified cholesterol	mmol/l	Ratio of omega-6 fatty acids to total fatty acids	%	Cholesterol in chylomicrons and extremely large VLDL	mmol/l	Triglycerides in very small VLDL	mmol/l
Cholesterol esters in VLDL	mmol/l	Ratio of polyunsaturated fatty acids to total fatty acids	%	Cholesteryl esters in chylomicrons and extremely large VLDL	mmol/l		
Cholesterol esters in LDL	mmol/l	Ratio of saturated fatty acids to total fatty acids	%	Free cholesterol in chylomicrons and extremely large VLDL	mmol/l	<b>IDL (average diameter 28.6 nm)</b>	
Cholesterol esters in HDL	mmol/l	Ratio of linoleic acid to total fatty acids	%	Triglycerides in chylomicrons and extremely large VLDL	mmol/l	Concentration of IDL particles	mmol/l
		Ratio of docosahexaenoic acid to total fatty acids	%			Total lipids in IDL	mmol/l
<b>Free cholesterol</b>		Ratio of polyunsaturated fatty acids to monounsaturated fatty acids	ratio	<b>Very large VLDL (average diameter 64 nm)</b>		Phospholipids in IDL	mmol/l
Total free cholesterol	mmol/l	Ratio of omega-6 fatty acids to omega-3 fatty acids	ratio	Concentration of very large VLDL particles	mmol/l	Cholesterol in IDL	mmol/l
Free cholesterol in VLDL	mmol/l			Total lipids in very large VLDL	mmol/l	Cholesteryl esters in IDL	mmol/l
Free cholesterol in LDL	mmol/l	<b>Amino acids</b>		Phospholipids in very large VLDL	mmol/l	Free cholesterol in IDL	mmol/l
Free cholesterol in HDL	mmol/l	Alanine	mmol/l	Cholesterol in very large VLDL	mmol/l	Triglycerides in IDL	mmol/l
		Glutamine	mmol/l	Cholesteryl esters in very large VLDL	mmol/l		
<b>Total lipids</b>		Glycine	mmol/l	Free cholesterol in very large VLDL	mmol/l	<b>Large LDL (average diameter 25.5 nm)</b>	
Total lipids in lipoprotein particles	mmol/l	Histidine	mmol/l	Triglycerides in very large VLDL	mmol/l	Concentration of large LDL particles	mmol/l
Total lipids in VLDL	mmol/l					Total lipids in large LDL	mmol/l
Total lipids in LDL	mmol/l	<b>Branched-chain amino acids</b>		<b>Large VLDL (average diameter 53.6 nm)</b>		Phospholipids in large LDL	mmol/l
Total lipids in HDL	mmol/l	Total concentration of branched -chain amino acids (leucine + isoleucine + valine)	mmol/l	Concentration of large VLDL particles	mmol/l	Cholesterol in large LDL	mmol/l
		Isoleucine	mmol/l	Total lipids in very large VLDL	mmol/l	Cholesteryl esters in large LDL	mmol/l
<b>Lipoprotein particle concentrations</b>		Leucine	mmol/l	Phospholipids in very large VLDL	mmol/l	Free cholesterol in large LDL	mmol/l
Total concentration of lipoprotein particles	mmol/l	Valine	mmol/l	Cholesterol in very large VLDL	mmol/l	Triglycerides in large LDL	mmol/l
Concentration of VLDL particles	mmol/l			Cholesteryl esters in very large VLDL	mmol/l		
Concentration of LDL particles	mmol/l	<b>Aromatic amino acids</b>		Free cholesterol in very large VLDL	mmol/l	<b>Medium LDL (average diameter 23 nm)</b>	
Concentration of HDL particles	mmol/l	Phenylalanine	mmol/l	Triglycerides in very large VLDL	mmol/l	Concentration of medium LDL particles	mmol/l
		Tyrosine	mmol/l			Total lipids in medium LDL	mmol/l
<b>Lipoprotein particle sizes</b>				<b>Very large VLDL (average diameter 64 nm)</b>		Phospholipids in medium LDL	mmol/l
Average diameter for VLDL particles	nm			Concentration of very large VLDL particles	mmol/l	Cholesterol in medium LDL	mmol/l
Average diameter for LDL particles	nm			Total lipids in large VLDL	mmol/l	Cholesteryl esters in medium LDL	mmol/l
Average diameter for HDL particles	nm			Phospholipids in large VLDL	mmol/l	Free cholesterol in medium LDL	mmol/l
				Cholesterol in large VLDL	mmol/l	Triglycerides in medium LDL	mmol/l
				Cholesteryl esters in large VLDL	mmol/l		
				Free cholesterol in large VLDL	mmol/l		
				Triglycerides in large VLDL	mmol/l		

All listed biomarkers are available for Serum and Heparin plasma samples.

Biomarkers marked with \* are not available for EDTA plasma samples.

Biomarkers marked with \*\* are not available for Citrate plasma samples.

## List of all biomarkers

### Small LDL (average diameter 18.7 nm)

Concentration of small LDL particles	mmol/l
Total lipids in small LDL	mmol/l
Phospholipids in small LDL	mmol/l
Cholesterol in small LDL	mmol/l
Cholesteryl esters in small LDL	mmol/l
Free cholesterol in small LDL	mmol/l
Triglycerides in small LDL	mmol/l

### Very large HDL (average diameter 14.3 nm)

Concentration of very large HDL particles	mmol/l
Total lipids in very large HDL	mmol/l
Phospholipids in very large HDL	mmol/l
Cholesterol in very large HDL	mmol/l
Cholesteryl esters in very large HDL	mmol/l
Free cholesterol in very large HDL	mmol/l
Triglycerides in very large HDL	mmol/l

### Large HDL (average diameter 12.1 nm)

Concentration of large HDL particles	mmol/l
Total lipids in large HDL	mmol/l
Phospholipids in large HDL	mmol/l
Cholesterol in large HDL	mmol/l
Cholesteryl esters in large HDL	mmol/l
Free cholesterol in large HDL	mmol/l
Triglycerides in large HDL	mmol/l

### Medium HDL (average diameter 10.9 nm)

Concentration of medium HDL particles	mmol/l
Total lipids in medium HDL	mmol/l
Phospholipids in medium HDL	mmol/l
Cholesterol in medium HDL	mmol/l
Cholesteryl esters in medium HDL	mmol/l
Free cholesterol in medium HDL	mmol/l
Triglycerides in medium HDL	mmol/l

### Small HDL (average diameter 8.7 nm)

Concentration of small HDL particles	mmol/l
Total lipids in small HDL	mmol/l
Phospholipids in small HDL	mmol/l
Cholesterol in small HDL	mmol/l
Cholesteryl esters in small HDL	mmol/l
Free cholesterol in small HDL	mmol/l
Triglycerides in small HDL	mmol/l

### Relative lipoprotein lipid concentrations

#### Chylomicrons and extremely large VLDL ratios

Phospholipids to total lipids ratio in chylomicrons and extremely large VLDL	%
Cholesterol to total lipids ratio in chylomicrons and extremely large VLDL	%
Cholesteryl esters to total lipids ratio in chylomicrons and extremely large VLDL	%
Free cholesterol to total lipids ratio in chylomicrons and extremely large VLDL	%

Triglycerides to total lipids ratio in chylomicrons and extremely large VLDL	%
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#### Very large VLDL ratios

Phospholipids to total lipids ratio in very large VLDL	%
Cholesterol to total lipids ratio in very large VLDL	%
Cholesteryl esters to total lipids ratio in very large VLDL	%
Free cholesterol to total lipids ratio in very large VLDL	%
Triglycerides to total lipids ratio in very large VLDL	%

#### Large VLDL ratios

Phospholipids to total lipids ratio in large VLDL	%
Cholesterol to total lipids ratio in large VLDL	%
Cholesteryl esters to total lipids ratio in large VLDL	%
Free cholesterol to total lipids ratio in large VLDL	%
Triglycerides to total lipids ratio in large VLDL	%

#### Medium VLDL ratios

Phospholipids to total lipids ratio in medium VLDL	%
Cholesterol to total lipids ratio in medium VLDL	%
Cholesteryl esters to total lipids ratio in medium VLDL	%
Free cholesterol to total lipids ratio in medium VLDL	%
Triglycerides to total lipids ratio in medium VLDL	%

#### Small VLDL ratios

Phospholipids to total lipids ratio in small VLDL	%
Cholesterol to total lipids ratio in small VLDL	%
Cholesteryl esters to total lipids ratio in small VLDL	%
Free cholesterol to total lipids ratio in small VLDL	%
Triglycerides to total lipids ratio in small VLDL	%

#### Very small VLDL ratios

Phospholipids to total lipids ratio in very small VLDL	%
Cholesterol to total lipids ratio in very small VLDL	%
Cholesteryl esters to total lipids ratio in very small VLDL	%
Free cholesterol to total lipids ratio in very small VLDL	%
Triglycerides to total lipids ratio in very small VLDL	%

#### IDL ratios

Phospholipids to total lipids ratio in IDL	%
Cholesterol to total lipids ratio in IDL	%
Cholesteryl esters to total lipids ratio in IDL	%
Free cholesterol to total lipids ratio in IDL	%
Triglycerides to total lipids ratio in IDL	%

#### Large LDL ratios

Phospholipids to total lipids ratio in large LDL	%
Cholesterol to total lipids ratio in large LDL	%
Cholesteryl esters to total lipids ratio in large LDL	%
Free cholesterol to total lipids ratio in large LDL	%
Triglycerides to total lipids ratio in large LDL	%

#### Medium LDL ratios

Phospholipids to total lipids ratio in medium LDL	%
Cholesterol to total lipids ratio in medium LDL	%

Cholesteryl esters to total lipids ratio in medium LDL	%
Free cholesterol to total lipids ratio in medium LDL	%
Triglycerides to total lipids ratio in medium LDL	%

#### Small LDL ratios

Phospholipids to total lipids ratio in small LDL	%
Cholesterol to total lipids ratio in small LDL	%
Cholesteryl esters to total lipids ratio in small LDL	%
Free cholesterol to total lipids ratio in small LDL	%
Triglycerides to total lipids ratio in small LDL	%

#### Very large HDL ratios

Phospholipids to total lipids ratio in very large HDL	%
Cholesterol to total lipids ratio in very large HDL	%
Cholesteryl esters to total lipids ratio in very large HDL	%
Free cholesterol to total lipids ratio in very large HDL	%
Triglycerides to total lipids ratio in very large HDL	%

#### Large HDL ratios

Phospholipids to total lipids ratio in large HDL	%
Cholesterol to total lipids ratio in large HDL	%
Cholesteryl esters to total lipids ratio in large HDL	%
Free cholesterol to total lipids ratio in large HDL	%
Triglycerides to total lipids ratio in large HDL	%

#### Medium HDL ratios

Phospholipids to total lipids ratio in medium HDL	%
Cholesterol to total lipids ratio in medium HDL	%
Cholesteryl esters to total lipids ratio in medium HDL	%
Free cholesterol to total lipids ratio in medium HDL	%
Triglycerides to total lipids ratio in medium HDL	%

#### Small HDL ratios

Phospholipids to total lipids ratio in small HDL	%
Cholesterol to total lipids ratio in small HDL	%
Cholesteryl esters to total lipids ratio in small HDL	%
Free cholesterol to total lipids ratio in small HDL	%
Triglycerides to total lipids ratio in small HDL	%

## ABOUT US

Nightingale Health Plc provides a NMR (Nuclear Magnetic Resonance) based metabolomics technology, supplying biomarker analysis services for human blood, urine, CSF and umbilical cord blood samples. By measuring biomarkers from multiple pathways in a single experiment, Nightingale equips public health researchers with comprehensive insights into the effects of lifestyle factors and future disease risk, accelerating future breakthroughs in precision medicine. In the long term, the company plans to fully integrate its services into clinical practice, helping to empower patients to follow-up on their own well-being and take proactive steps to stay healthy.