

Lipoprotein Particle Profile™ (LPP®)

Cellular Precision, Personalized Solutions

Patient: **Doe, Jon**

Accession ID: 0000000000

Provider: Sample Test

Order Status: **Complete**

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PATIENT

NAME Doe, Jane	AGE 59
DOB 2/25/1960	GENDER Female
PATIENT ID 00-000-00000	

SPECIMEN

ACCESSION ID 0000000000	DATE COLLECTED 04/17/2019
ORDER ID 0000-00000000000-000000	DATE RECEIVED 04/18/2019
	DATE REPORTED 04/24/2019

PROVIDER









ACCOUNT ID 000000	CLIENT NAME Sample Provider, MD
ADDRESS 123 S. Any Street ANYWHERE, TX 77000	

Normal






Borderline

Out of Range







Lipoprotein Particle Numbers

Tests		In Range	Out of Range	Reference Range	Units
VLDL Particles			123	<85	nmol/L
Total LDL Particles			905	<900	nmol/L
Non-HDL Particles			1028	<1000	nmol/L
Remnant Lipoprotein			236	<150	nmol/L
Dense LDL III			390	<300	nmol/L
Dense LDL IV		55		<100	nmol/L
Total HDL Particles			5925	>7000	nmol/L
Buoyant HDL 2b		1769		>1500	nmol/L

Lipid Panel

Tests		In Range	Out of Range	Reference Range	Units
Total Cholesterol		198		<200	mg/dL
Triglycerides			344	30-150	mg/dL
HDL			34	>40	mg/dL
LDL			108	40-130	mg/dL
Non-HDL Cholesterol			164	<160	mg/dL

Vascular Inflammation

Tests		In Range	Out of Range	Reference Range	Units
Insulin		16.1		<21.0	μIU/mL
hs-CRP			2.69	<3.00	mg/L
Lipoprotein(a)		4.6		<30.0	mg/dL
Apolipoprotein B			99	40-100	mg/dL
Apolipoprotein A1		124		>115	mg/dL
Homocysteine			12.3	<11.0	μmol/L

PATIENT: Doe, Jane

PROVIDER: Sample Provider, MD

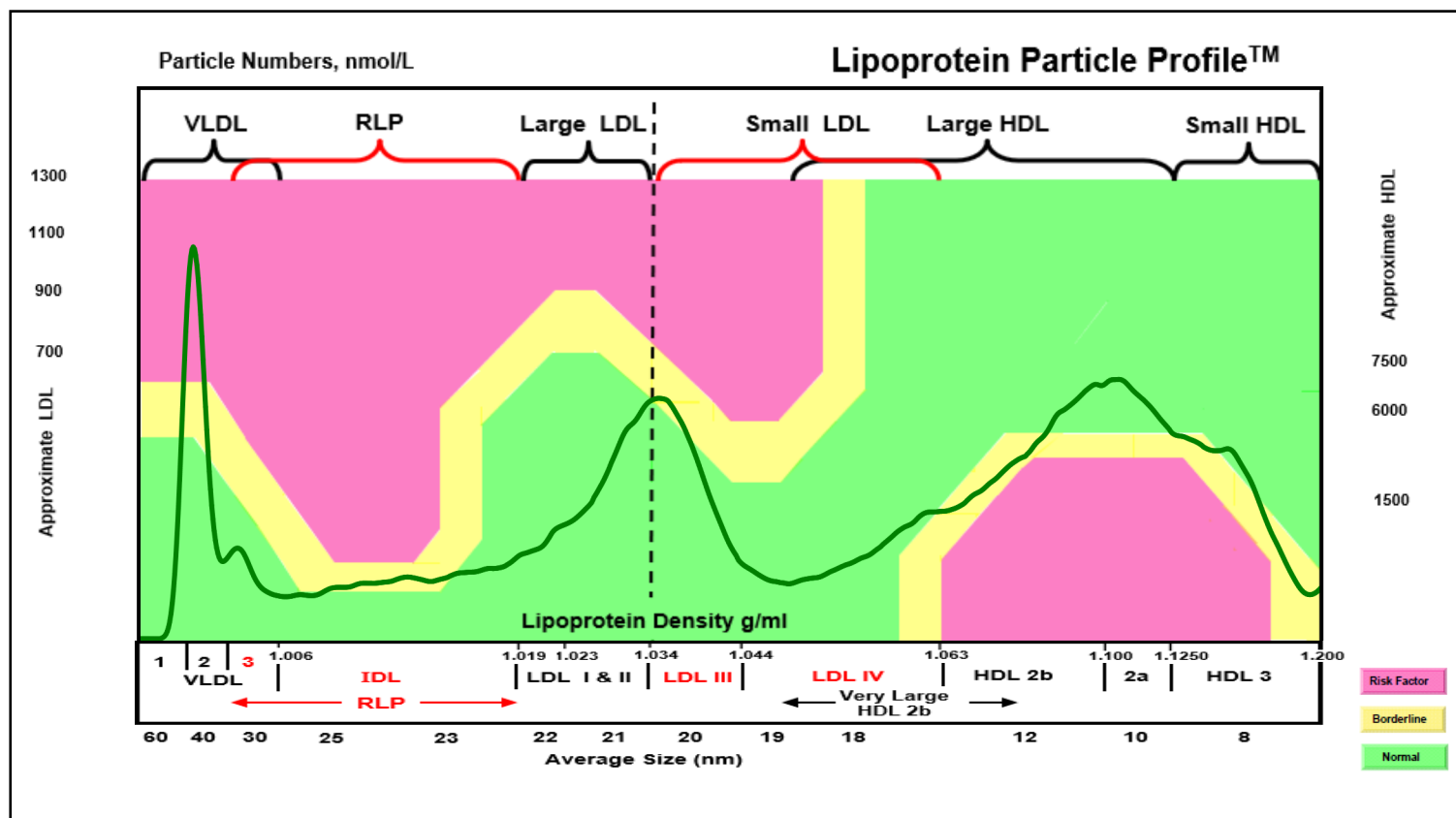
DATE REPORTED: 04/24/2019

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Metabolic Syndrome Traits

Tests		In Range	Out of Range	Reference Range	Units
Metabolic Syndrome Traits			1	Zero	

A diagnosis of metabolic syndrome is confirmed if any three of the following traits exist in a patient: (1) high triglycerides [$>150\text{mg/dL}$]*; (2) low HDL [$<40\text{mg/dL}$ in men, $<50\text{mg/dL}$ in women]*; (3) elevated small dense LDL III and LDL IV [$>400\text{nmol/L}$]*; (4) high fasting glucose [$>100\text{mg/dL}$]; (5) high blood pressure [$>130/85$]; (6) high waist circumference [>40 inches in men, >35 inches in women]. *Included in this section of report. Clinician must determine traits (4), (5), (6).



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Lipoprotein Particle Profile (Component Summaries)

This information is provided for educational purposes.

Lipoprotein Particle Numbers – Lipoproteins are ball-shaped proteins in the blood that transport fats (lipids) throughout the body. The fact that lipoproteins – not the cholesterol that is carried within them – causes cardiovascular disease by penetrating the endothelial lining of the arteries, becoming oxidized and contributing to arterial plaque, has been well established. Further, the most effective treatment will depend on which lipoproteins are elevated, so measuring lipoprotein particle numbers enables a clinician to (1) determine accurately the level of cardiometabolic risk and (2) how best to treat it.

Remnant Lipoprotein (RLP) – This highly atherogenic lipoprotein causes platelet aggregation and impairs vascular relaxation. Unlike other LDL particles which have to be oxidized before they are taken into the arterial intima by macrophage cells, RLP can contribute to plaque buildup even when not oxidized. Foam cells (the sticky contributors to arterial plaque) contains high levels of RLP. Treatment with omega 3 fatty acids can be efficacious.

Dense LDL III and LDL IV – These lipoproteins are small and can thus more easily penetrate and damage the lining of the arteries due to their size, causing plaque and atherosclerosis. They are highly correlated to cardiovascular disease.

HDL2b – This is a protective lipoprotein that indicates how well cholesterol is being cleared by the liver (reverse cholesterol transport system). HDL is made in the liver as HDL3 and as it travels through the body accumulating cholesterol it becomes the larger and lipid-enriched HDL2b. It positively correlates with heart health.

Lipid Panel – The lipid panel measures cholesterol, not lipoproteins (which carry cholesterol). Although directly measuring the actual number of lipoproteins (versus the amount of cholesterol inside them) is widely recognized as a superior tool in assessing cardiometabolic health, clinicians and patients tend to be familiar with a standard lipid panel and its historical use. It is important to note that half of all people who have a heart attack will have cholesterol values that fall in the normal range. Thus, the lipid panel is most useful when viewed in the context of other biomarkers, particularly lipoprotein particle numbers. Elevated triglycerides and low HDL-cholesterol are highly correlated to metabolic syndrome and increase the risk of heart disease significantly.

Vascular Inflammation – Cardiovascular disease is generally considered an inflammatory process and the analytes included here are important determinants of cardiometabolic risk, particularly with respect to vascular inflammation.

Insulin – Insulin is a hormone made by beta cells (β -cells) in the pancreas and secreted in response to elevated blood sugar. Its main function is to regulate plasma glucose levels within a narrow range and is correlated to the efficiency with which a person can metabolize carbohydrates. If one becomes de-sensitized to the action of insulin (insulin resistant), more is needed to achieve adequate glucose-lowering effects, thus altering metabolism to favor fat storage over efficient energy production. High fasting insulin indicates insulin resistance and possible pre-diabetes. Stimulatory hormones (i.e. adrenaline, cortisol) can also reduce insulin levels.

hs-CRP – High Sensitivity C-reactive Protein (hs-CRP) is an acute phase protein that reflects the presence of inflammation in the body. High CRP, regardless of cause, is strongly correlated to the risk of sudden cardiac death and low-grade chronic systemic inflammation raises the risk of metabolic syndrome, heart disease, diabetes and other degenerative diseases.

Lipoprotein(a) – This unique lipoprotein is particularly dangerous because it inhibits the formation of plasmin which is an enzyme that dissolves blood clots. High levels of Lp(a) are strongly linked to thrombosis significantly raising the risk of blood clots and associated cardiac events. It can also penetrate the arterial lining, become oxidized and build plaque, thus contributing to atherosclerosis independent of its thrombotic potential.

Apolipoprotein B – ApoB100 is a protein produced in the liver that attached to the surface of all low-density lipoproteins (LDL), regardless of type. Every molecule of VLDL, RLP, Lp(a) and LDL has exactly one, and only one apoB100 molecule attached to it and thus, apoB reflects the level of atherogenic lipoproteins in the blood.

Apolipoprotein A1 – ApoA1 is a protein that is attached to the surface of all high-density lipoproteins (HDL) and is thus reflective of the amount of protective lipoproteins in the blood. It facilitates the removal of fats (cholesterol) from arterial walls by enabling its transport back to the liver for eventual excretion. Like HDL, low levels raise risk of heart disease.

Homocysteine – A metabolic intermediate, this protein is dangerous at high levels because it indicates poor methylation (detoxification) ability. Homocysteine will also act as an arterial abrasive, physically damaging the endothelial lining of blood vessels. High levels are strongly linked to kidney and heart disease, stroke and dementia.