Laboratory marker for metabolic syndrome		Cat. No.
NEFA FS (Non-esterified fatty acids)	Marker to determine the metabolic status – surrogate marker for insulin resistance	1 5781 ..
Triglycerides FS 5' **Triglycerides FS 10'**	Marker for heart disease and stroke, especially in individuals with low HDL and high LDL	1 5760 .. 1 5710 ..
Cholesterol FS 5' **Cholesterol FS 10'**	Marker for cardiovascular risk assessment	1 1350 .. 1 1300 ..
HDL-C Immuno FS **LDL-C Select FS**	Marker for atherosclerosis risk assessment	1 3521 .. 1 4121 ..
Apolipoprotein A1 FS **Apolipoprotein B FS**	Sensitive marker for early detection of coronary risk: Atherosclerosis risk assessment	1 7102 .. 1 7112 ..
Lp(a) 21 FS Lipoprotein (a)	Independent risk factor for coronary artery diseases	1 7139 ..
Phospholipids FS	Marker for determination of altered phospholipid concentration or composition	1 5741 ..
Lp-PLA$_2$ FS	Marker of vulnerable and unstable plaques	1 7181 ..
DCCT/NGSP HbA1c FS	Marker for diagnosis and monitoring of diabetes – "blood glucose memory" over the past six to eight weeks	1 3329 ..
Glucose Gluc-DH FS **Glucose GOD FS 5'** **Glucose GOD FS 10'** **Glucose Hexokinase FS**	Marker to monitor blood sugar regulation	1 2531 .. 1 2550 .. 1 2500 .. 1 2511 ..
Homocysteine FS	Sensitive marker for folate and cobalamin (vitamin B12) deficiency. Independent risk factor for cardiovascular disease (CVD)	1 3409 ..
β-Hydroxybutyrate FS	Sensitive marker for detection of ketoacidosis	1 3701 ..
Albumin in Urine/CSF FS (Microalbumin)	Early marker for diabetic nephropathy and hypertension	1 0242 ..
Cystatin C FS	Marker for reduced glomerular filtration rate (GFR); Superior to creatinine, especially for detection of moderate impaired kidney function	1 7158 ..

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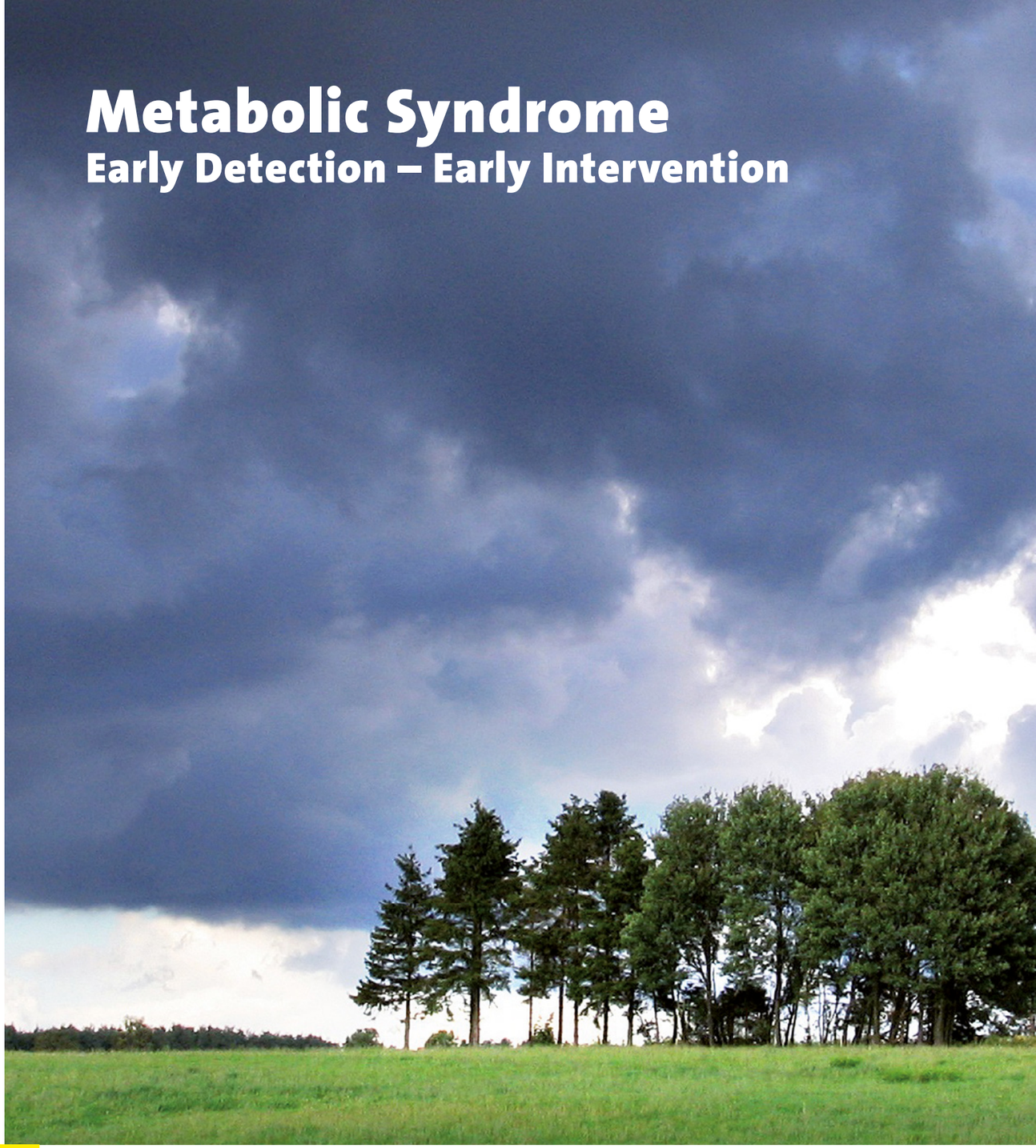
Metabolic Syndrome

Early Detection – Early Intervention



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Metabolic Syndrome

The metabolic syndrome (MetS) has received increased attention over the past years. It is widespread in countries of Western lifestyle. Estimates indicate that approximately 34% of the population (> 20 years) meet the criteria defining the metabolic syndrome. It comprises of a cluster of interrelated risk factors of metabolic origin appearing to promote the development of cardiovascular disease (CVD) as well as to increase the risk for developing type 2 diabetes.

The risk factors associated with the syndrome are well characterized: Central obesity, hypertension, dyslipidemia and elevated fasting blood glucose. Obesity, caused by chronic energy imbalance, evokes adipocyte hyperthrophy and hyperplasia. These processes lead to increased release of adipokines, free fatty acids and inflammatory mediators. Elevated concentrations of free fatty acids directly induce peripheral insulin resistance in all major insulin sensitive tissues, including muscle, liver, and endothelial cells. In addition to peripheral insulin resistance, excess of circulating free fatty acids may lead to diminished functions and apoptosis of pancreatic β-cells. Individuals showing characteristics of the metabolic syndrome commonly manifest a pro-thrombotic state as well. Underlying risk factors like physical inactivity, aging, and hormonal imbalance give rise to metabolic risk factors.

Diagnostic Criteria

Over the past two decades, many international organizations and expert groups, such as the International Diabetes Federation (IDF), the World Health Organization (WHO), the National Cholesterol Education Program Third Adult Treatment Panel (NCEP-ATPIII) and the European Group for the study of Insulin Resistance (EGIR) have developed criteria for the metabolic syndrome. Core components for defining the syndrome are similar but cut-off values, as well as relative importance of these core components differ among the definitions. Due to heterogeneity of available guidelines, a new definition has been proposed in 2009 by a working group of IDF and NCEP representatives.

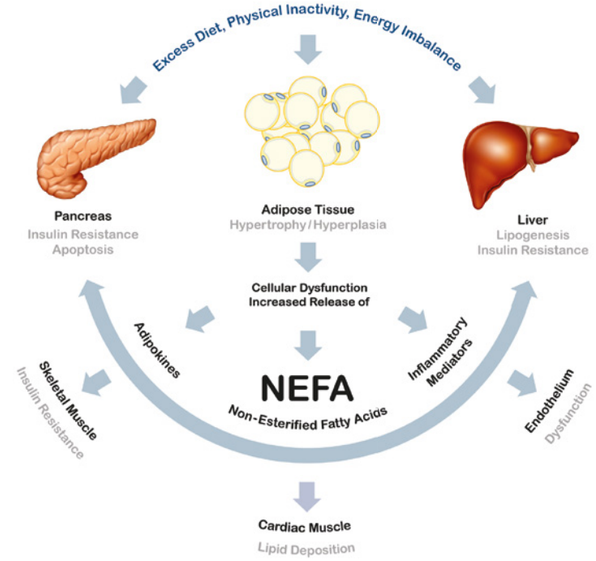
According to the new harmonized definition, the presence of any three out of five risk factors constitutes the diagnosis for metabolic syndrome.

Waist Circumference	**Population and country specific definition**
Elevated Triglycerides	**> 150 mg/dL (1.7 mmol/L)**
Reduced HDL-C	**Female < 50 mg/dL (1.3 mmol/L), Male < 40 mg/dL (1.0 mmol/L)**
Elevated Blood Pressure	**Systolic > 130 and/or Diastolic > 85 mm Hg**
Elevated Fasting Glucose	**> 100 mg/dL**

Harmonizing the metabolic syndrome: a joint interim statement of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the Study of Obesity.
Alberti KG et al., Circulation. 2009 Oct 20; 120(16): 1640-5. doi: 10.1161/CIRCULATIONAHA.109.192644

NEFA in Insulin Resistance

The most important factor linking obesity to the development of metabolic disturbance is the increased release of non-esterified fatty acids from abdominal adipocytes in patients with central obesity. Since NEFA effectively competes with glucose, elevated NEFA concentrations inhibit glucose oxidation effectively and induce insulin resistance by decreasing insulin secretion.



Clinical Management

The worldwide prevalence of the metabolic syndrome ranges from < 10% to as much as 84%, depending on the region (urban or rural), sex, age, ethnicity and race of a defined population and on the syndrome definition used. Patients with the metabolic syndrome are at 2- to 4-fold increased risk of stroke, 3- to 4-fold increased risk of myocardial infarction, and 2-fold the risk of dying from such an event compared with those without the syndrome regardless of a previous history of cardiovascular events.

Several organizations defined criteria for the diagnosis of the metabolic syndrome to introduce diagnosis and monitoring of the syndrome into clinical practice. Population screening for the metabolic syndrome with appropriate tests may identify high risk patients effectively, enable early diagnosis of the disease and help reducing the risk.

DiaSys Products for the Metabolic Syndrome

DiaSys, a leading specialist in development and manufacturing of diagnostic system solutions, offers a wide range of clinical chemistry and immunoturbidimetric tests with outstanding performance. The extensive portfolio of high quality products, optimized stability, comprises of reagents for the management of the metabolic syndrome and reagents for diagnosis and management of diabetes mellitus. The product portfolio is supplemented by NEFA FS, a reagent for the determination of non-esterified fatty acids. NEFA FS, a fluid stable 2-component reagent, is an excellent candidate to evaluate high risk patients in the laboratory, and allows diagnosis of the metabolic syndrome in an early stage of the disorder.