

Obesity and Metabolic Diseases

Obesity now presents as a world wide pandemic with the United States showing the highest prevalence with 30% of the population over the age of 15 years having a BMI greater than 30. The United Kingdom follows closely with 24% of the population complying with the same definition, whilst in Japan the level is less than 2.5%. The morbidly obese incidence with a BMI of greater than 40 in the USA has been estimated to account for 3 million of the population. Of even greater concern is the changing pattern of obesity in children. In the UK there has been a 5-fold increase in overweight children over the last 3 decades with the prevalence now approaching 26% and similar statistics are found in the USA.

Obesity, per se, is not the issue but its relationship to health risks. 80% of type 2 diabetes, 70% of cardio-vascular disease, 42% of

breast and colon cancer are directly associated to obesity. Further 25% of obese individuals are hypertensive and it accounts for 30% of gall bladder surgery. While over the last 3 decades we have seen life expectancy increasing significantly in both genders, it is questionable if we will not now see a marked downturn in this statistic.

What facilities can the clinical laboratory offer to monitor any testing that may be of value in obesity? The biochemical complications of metabolic syndrome are vast with lipids, cytokines and hormones involved in complex mechanisms. While glucose, insulin and hemoglobin A1c are well established, there is also a complex role played by a number of other analytes, including growth hormone, thyroid hormones, leptin, resistin, ghrelin, adiponectin, cholecystokinin, c-peptide, insulin, PAI-1, Lp-PLA2, and proinsulin.

Currently, ACM Global Central Laboratory offers a menu of cytokines and hormones that can be utilized to better understand the physiological processes that regulate the balance between energy metabolism and appetite regulation.

Adiponectin: (Acrp30, apM1) is a protein hormone that modulates a number of metabolic processes, including glucose regulation and fatty acid catabolism. Secreted from adipose tissue in relative abundance. Levels of the hormone are inversely correlated with body mass index and plays a role in the suppression of the metabolic processes that may result in type 2 diabetes, obesity, atherosclerosis and non-alcoholic fatty liver disease.

Leptin: An important protein hormone that plays a role in regulating energy generation and utilization, affecting appetite and metabolism.

Resistin: A hormone synthesized and released from adipose tissue thought to be related to type II diabetes and insulin resistance, energy balance and obesity.

Ghrelin: A hormone produced by cells lining the stomach that stimulates appetite. This hormone level increases prior to eating and decreases after a meal. It is the counterpoint to leptin which impacts satiation.

Proinsulin: This protein hormone synthesized in the pancreas, is the precursor hormone that cleaves into insulin and C-peptide. Elevations can be seen in renal failure, cirrhosis and hyperthyroidism. It's most important function is the role it plays in glucose metabolism.

C-Peptide: This protein results from the cleavage of the proinsulin hormone. This molecule is released into the blood in a 1:1 ratio with insulin. It often is used to determine the difference between Type I and Type II diabetes due to the factors that impact insulin levels, such as liver extraction and nutritional state.

Insulin: A hormone synthesized in the pancreas is responsible for the regulation of glucose in the blood. It is used in the evaluation of subjects with hypoglycemia, and insulin resistance.

Lp-PLA2: (Also requested as LpPLA, PLA2, and PLAC) An immunoassay to quantitate LP-PLA2 (lipoprotein-associated phospholipase A2) in human plasma and serum to assess risk for coronary heart disease and ischemic stroke related to atherosclerosis to be used in conjunction with subject clinical assessment, and other lipid and diagnostic tests.

PAI-1: PAI-1 is secreted from various types of tissue. One source is adipose tissue and hence can be found in elevated levels in obese subjects and those diagnosed with metabolic syndrome. It is thought to be the link to increased occurrences of thrombosis in these populations.

* Note assay summaries taken from product inserts.

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