HyTest

Metabolic Syndrome

Antibodies and antigens




Introduction

Metabolic syndrome is a cluster of conditions that increases the likelihood of cardiovascular heart diseases and diabetes. These metabolic risk factors include abdominal obesity, elevated blood pressure, insulin resistance, high blood sugar levels and abnormal blood cholesterol levels. Both genetic factors and the lifestyle of the individual, including limited physical activity and excess weight, are considered to be underlying causes of metabolic syndrome.

Estimates by the American Heart Association suggest that 20-25% of US adults have metabolic syndrome. It should be noted that there is currently no unified definition of metabolic syndrome. Instead, several organizations including the World Health Organization (WHO), the International Diabetes Federation (IDF) and the European Group for the study of Insulin Resistance (EGIR), have presented their own individual criteria for metabolic syndrome. These criterions have common features but also differing parameters and this inevitably complicates the comparisons of different studies. Nevertheless, as obesity rates grow it is expected to also result in an increase in the incidence of metabolic syndrome.

At HyTest, we provide immunological reagents — antibodies and antigens — that enable the development of quantitative immunoassays for the detection of various biomarkers, such as adiponectin, insulin and glycated hemoglobin.

Please note that in this brochure the monoclonal antibodies (MAbs) are only listed according to the analyte that they recognize. In most cases there are several different MAbs available under one catalogue number. More detailed information regarding the performance of our products, a full list of individual MAbs and recommendations for capture-detection antibody pairs (when available) can be found on our website — www.hytest.fi. You are also most welcome to contact our Tech Support Team directly by writing to support@hytest.fi.

Adiponectin

CLINICAL UTILITY

- **Type 2 diabetes**

Adiponectin has been extensively studied as a prognostic and diagnostic marker of diabetes and cardiovascular diseases. It has been shown that the amount of adiponectin in blood reduces in cases of patients who suffer from Type 2 diabetes mellitus or coronary artery diseases, or who are insulin-resistant or obese (Arita et al., 1999, Kogan et al., 2013; Ouchi et al., 1999 and 2000, Weyer et al., 2001).

Adiponectin is an abundant hormone that is secreted by adipocytes. Adiponectin is an insulin-sensitizing hormone with anti-diabetic, anti-inflammatory and anti-atherogenic properties. Its main function is considered most likely to be the regulation of glucose metabolism. In blood, adiponectin is found in different oligomeric forms (Figure 1) as well as in complexes with several proteins.

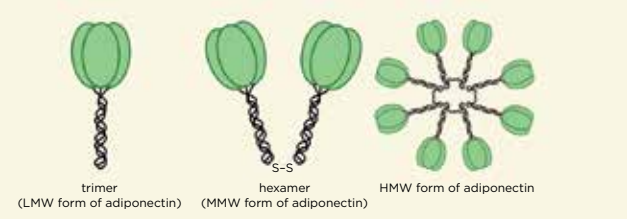


Figure 1. Schematic representation of the oligomeric forms of adiponectin.

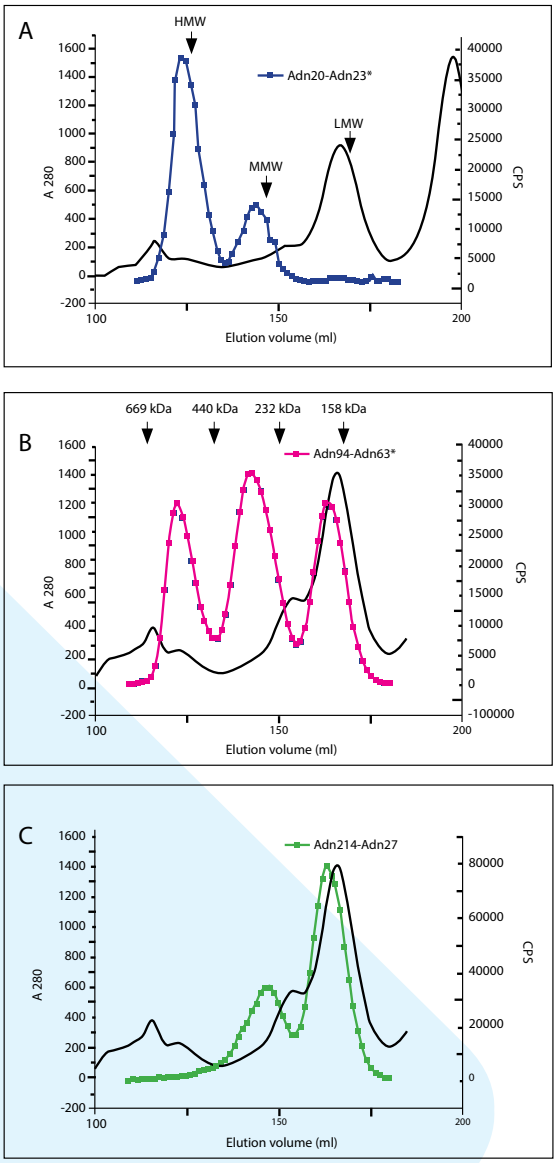
Detecting total, HMW or LMW forms of human adiponectin

It has been suggested that the concentration of the HMW form of adiponectin or HMW/total adiponectin ratio correlates with insulin resistance and metabolic syndrome better than just the concentration of total adiponectin (Hara et al., 2006, Lara-Castro et al., 2006).

We have developed several monoclonal antibodies that enable the development of immunoassays with different specificities to the various oligomeric forms of adiponectin (Figure 2).

Native purified adiponectin contains all three oligomeric forms

We offer native adiponectin purified from pooled human plasma. The preparation contains all oligomeric forms of adiponectin (Figure 3) and can be used as a calibrator in all types of adiponectin immunoassays.



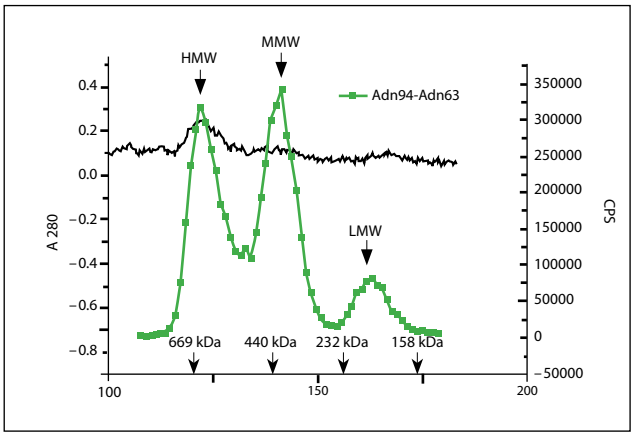


Figure 3. Native purified adiponectin contains all oligomeric forms. 3 µg of adiponectin was applied onto a gel-filtration column and immunoreactivity in fractions was measured by the sandwich ELISA using Adn94 and Adn63 as capture and detection antibodies respectively. Molecular weight markers are depicted by arrows on the x-axis. The black curve represents the optical density measured at 280 nm.

Figure 2. Sandwich ELISA in protein fractions after size-exclusion chromatography, measured by three different capture-detection antibody combinations. (A) Adn20-Adn23, (B) Adn94-Adn63 and (C) Adn214-Adn27. 1 ml of normal human serum was applied onto the column. Positions of oligomeric forms of adiponectin and molecular weight markers are depicted in the picture. The black line presents the optical density detected at 280 nm.

MONOCLONAL ANTIBODIES

Cat.#	Product	Tested applications
2AN6*	Monoclonal mouse anti-human adiponectin	Enzyme immunoassays Western blotting

* Please note: Several MAbs are available under one catalogue number. Please see www.hytest.fi for more information.

ANTIGEN

Cat.#	Product	Source	Purity
8AN7	Adiponectin, human, native	Pooled human plasma	>95%

Glycated hemoglobin HbA1c

CLINICAL UTILITY

- **Chronic hyperglycemia**
- **Type 2 diabetes**

Many proteins, including hemoglobin, become glycated during their life cycle. Glycation, in contrast to glycosylation, is a non-enzymatic process that takes place in the bloodstream. The concentration of glycated hemoglobin (HbA1c) provides information regarding the average concentration of blood glucose during the previous 2-3 months. The higher the amount of HbA1c, the higher the blood glucose concentration has been over a longer period of time. HbA1c concentration is the most widely used index of chronic hyperglycemia (Weykamp et al., 2008) and routine measurements are important in the management of Type 2 diabetes. HbA1c measurement is also recommended to be used to diagnose diabetes.

Sandwich immunoassay for detecting HbA1c

We provide monoclonal antibodies that detect both HbA1c and HbA10, which is the non-glycated hemoglobin, as well as one antibody that only detects HbA1c. A calibration curve of native HbA1c for the MAb combination Hb6-75C9 is provided in Figure 4.

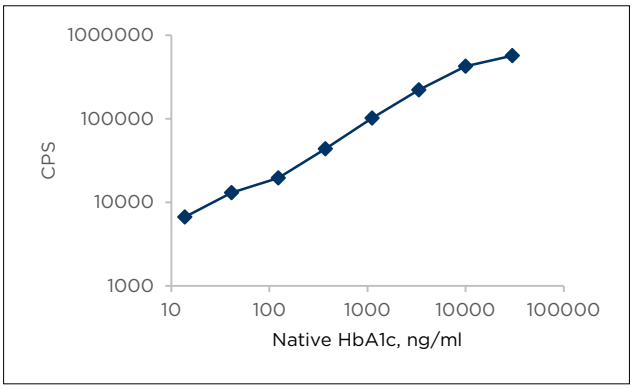


Figure 4. Calibration curve for the Hb6-75C9 fluoroimmunoassay. MAb Hb6 was used as a coating antibody (1 µg/well), while MAb 75C9 was labeled with stable Eu3+ chelate and served as a detection antibody (0.4 µg/well). Native HbA1c was utilized as an antigen.

MONOCLONAL ANTIBODIES

Cat.#	Product	Tested applications
4HH0*	Monoclonal mouse anti-hemoglobin, human, $HbA1_0$	Enzyme immunoassays
4HA1	Monoclonal mouse anti-glycated hemoglobin, human, $HbA1_c$	Enzyme immunoassays

* Please note: A few MAbs are available under one catalogue number. Please see www.hytest.fi for more information.

Proinsulin, insulin and C-peptide

CLINICAL UTILITY

- **Diabetes mellitus**
- **Hypoglycemia**

Assays for proinsulin, insulin and C-peptide are widely used in the monitoring of hypoglycemia, pathogenesis and the treatment of diabetes mellitus. Insulin is synthesized in the pancreas from its precursor proinsulin and during this process proinsulin is proteolytically cleaved into three peptides: A- and B-chains and C-peptide. A- and B-chains are covalently linked by disulfide bonds to form mature insulin (Figure 5).

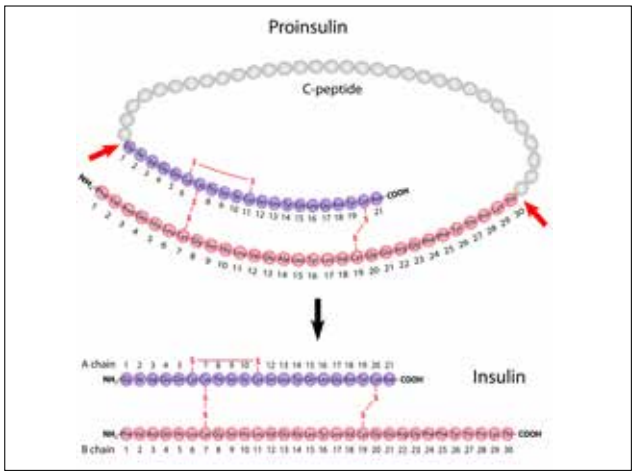


Figure 5. Proinsulin is enzymatically cleaved into C-peptide and mature insulin.

The analysis of proinsulin synthesis and processing, as well as insulin and C-peptide clearance, is very important for the improved understanding of carbohydrate metabolism abnormalities. Assays for insulin, proinsulin and C-peptide are widely used in the monitoring of hypoglycemia, pathogenesis and the treatment of diabetes mellitus.

Monoclonal antibodies specific to human and rat proteins

We provide over 30 monoclonal antibodies that enable the development of immunoassays for the detection of human and rat proinsulin, insulin and C-peptide molecules. By choosing the right antibody combinations it is possible to detect C-peptide with no cross-reaction to proinsulin.

MONOCLONAL ANTIBODIES

Cat.#	Product	Tested applications
2P9*	Monoclonal mouse anti-human proinsulin	Enzyme immunoassays Immunohistochemistry
4PR8	Monoclonal mouse anti-rat proinsulin	Enzyme immunoassays
2I1*	Monoclonal mouse anti-human insulin	Enzyme immunoassays Immunohistochemistry
2IP10*	Monoclonal mouse anti-rat-mouse insulin/proinsulin	Enzyme immunoassays Immunohistochemistry
2I2*	Monoclonal mouse anti-human C-peptide	Enzyme immunoassays
2I3*	Monoclonal mouse anti-rat C-peptide	Enzyme immunoassays

* Please note: Several MAbs are available under one catalogue number. Please see www.hytest.fi for more information.

Retinol-binding protein 4 (RBP4)

CLINICAL UTILITY

- **Type 2 diabetes**

It has recently been suggested that retinol-binding protein 4 (RBP4) levels in blood correlate with insulin-resistance and obesity. A growing body of evidence shows that RBP4 could be used as an indicator of Type 2 diabetes and metabolic syndrome, although some of the data appear to be conflicting and further investigation is required (reviewed in Kotnik et al., 2011). In addition, it appears that RBP4 in urine might serve as a biomarker for the loss of function of the human proximal renal tubule (Norden et al., 2014).

In blood, RBP4 is a carrier of retinol (vitamin A) (Blaner, 1989). A major proportion of RBP4 in the bloodstream is found to be in complex with transthyretin (prealbumin) (Jaconi et al., 1995).

Sandwich immunoassay for detecting RBP4

We provide several monoclonal antibodies that recognize both free RBP4 and RBP4 in complex with transthyretin. Figure 6 provides an example of a calibration curve of the RBP4 sandwich immunoassay that utilizes purified endogenous RBP4 as the antigen.

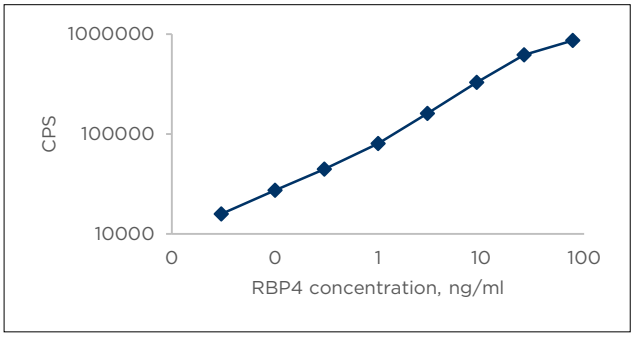


Figure 6. Calibration curve of the RBP4 sandwich immunoassay. MAbs RB48 and RB51 were used as capture and detection antibodies respectively and purified endogenous RBP4 as the antigen.

Native purified RBP4

We provide RBP4 in two different forms: free and in complex with transthyretin. Both are stable and still retain their activity after 5-6 freeze-thaw cycles (Figure 7).

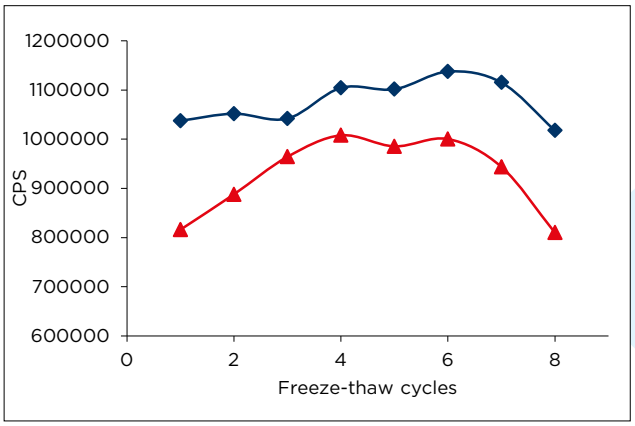


Figure 7. Purified RPB4 retains its immunoreactivity after repeated freeze-thaw cycles. The immunoreactivity of purified native RBP4 and RPB4 in complex with transthyretin was measured after repeated freeze-thaw cycles using MAbs RB48 and RB42 as capture and detection antibodies respectively.

MONOCLONAL ANTIBODIES

Cat.#	Product	Tested applications
4RB2*	Monoclonal mouse anti-retinol-binding protein 4	Enzyme immunoassays Western blotting

* Please note: Several MAbs are available under one catalogue number. Please see www.hytest.fi for more information.

ANTIGENS

Cat.#	Product	Source	Purity
8RF9	Retinol-binding protein 4 from human plasma, free form	Pooled human plasma	>95%
8RP7	Retinol-binding protein 4 from human plasma, complexed with prealbumin	Pooled human plasma	>70%

Additional products

Leptin

Leptin is a hormone that is secreted by adipocytes. It crosses the blood-brain barrier and binds to receptors in the brain. When the level of leptin increases, it tells the brain that the energy reservoirs are full and that there is no need for food intake. This signaling route is often impaired in obese people as a result of leptin resistance.

We provide monoclonal antibodies that are specific to leptin for research purposes. They have been tested in sandwich immunoassays and Western blotting.

MONOCLONAL ANTIBODIES

Cat.#	Product	Tested applications
2LE1*	Monoclonal mouse anti-human leptin	Enzyme immunoassays Western blotting

* Please note: A few MAbs are available under one catalogue number. Please see www.hytest.fi for more information.

Ghrelin

Ghrelin is a hormone that is secreted by cells in the gastrointestinal track. Both leptin and ghrelin regulate the appetite but in an opposite manner to leptin, ghrelin increases the sensation of hunger. It crosses the blood-brain barrier and binds to receptors on hypothalamus.

We provide monoclonal antibodies that are specific to ghrelin for research purposes. They have been tested in ELISA.

MONOCLONAL ANTIBODIES

Cat.#	Product	Tested applications
2GH1*	Monoclonal mouse anti-ghrelin	Enzyme immunoassays

* Please note: A few MAbs are available under one catalogue number. Please see www.hytest.fi for more information.

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Together. Today and Tomorrow.

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