Glossary

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Acetyl CoA Carboxylase (ACC)

Acetyl CoA carboxylase (ACC) is a key enzyme involved in both synthesis and metabolism of fatty acids. ACC produces malonyl CoA, which is both a substrate for fatty acid biosyntheis, and is a potent inhibitor of mitochondrial fatty acid uptake. In lipogenic tissues like the liver, ACC is the rate-limiting enzyme for fatty acid biosynthesis. In muscle, ACC is a key regulator of fatty acid oxidation, secondary to the production of malonyl CoA.

Allosteric regulation of enzymes

Allosteric regulation of an enzyme involves the change in the shape and activity of an enzyme that results from molecular binding with a regulatory substance at a site other than the enzymatically active one. An example of this is binding of 5-adenosine monophosphate (AMP) to a regulatory site on AMP-activated protein kinase that results in an activation of the enzyme.

AMP-activated protein kinase (AMPK)

AMPK is a key kinase that controls many cellular processes, particularly pathways involved in cellular energy status. AMPK is activated during metabolic stress, where it then can either activate energy producing metabolic pathways or inhibit energy consuming pathways. For these reasons it has been termed a ''fuel gauge'' of the cell.

Arg302Gln amino acid substitution in the gamma-2 regulatory subunit (PRKAG2) of AMPK

PRKAG2 is the gene that encodes the gamma2 subunit of AMP-activated protein kinase (AMPK). Mutations in PRKAG2 have recently been shown to cause cardiac hypertrophy, cardiac glycogen accumulation, Wolff-Parkinson White syndrome and conduction system disease causing pre-excitation. One of these mutations involves the substitution of arginine for glutamine at the 302 amino acid position of the gamma2 subunit of AMPK. It is thought that this mutation decreases the activity of AMPK in the heart.

Eicosapentanoic acid and docosahexanoic acid

Eicosapentanoic acid (EPA) and docosahexanoic acid (DHA) are polyunsaturated fatty acids that are found in abundance in fish oils. EPA and DHA are thought to be effective in treating a number of disorders, many involving inflammation. EPA and DHA can also reduce the level of blood triglycerides in humans, which may reduce the risk of heart disease. Dietary consumption of EPA and DHA have been demonstrated to reduced total mortality, cardiovascular mortality, and morbidity.

Fatty acid synthase (FAS)

FAS is an important enzyme in the synthesis of fatty acids, primarily in liver cells. In eukaryotes, synthesis of fatty acids takes place on a large, multifunctional FAS enzyme complex formed from a single polypeptide chain. Malonyl CoA serves as a substrate for the synthesis of fatty acids.

GAMT knock out mice

Creatine is an important molecule involved in energy storage and in transmission of phosphate-bound energy substrates. One of the creatine synthetic enzymes is S-adenosyl-L-methionine:N-guanidinoacetate methyltransferase (GAMT). GAMT knockout mice lack GAMT, and therefore have a defect in creatine synthesis. They are therefore useful in looking at the role of creatine deficiency in energy homeostasis.

GLUT1

GLUT 1 is a protein that transports glucose across cell membranes. GLUT 1 primarily reside in the plasma membrane, and unlike GLUT 4 it is not responsive to insulin.

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Lipoprotein lipase

Lipoprotein lipase is an enzyme that cleaves fatty acids from triacylglycerol contained with lipoproteins

Liver X receptors (LXRs)

Liver X receptors (LXRs) alpha and beta are responsible for the transcriptional regulation of a number of genes involved in cholesterol efflux from cells. LXRs limit cholesterol accumulation by regulating expression of genes involved in cholesterol efflux and storage. As a result, pharmacological activation of LXRs may be a molecular target for the treatment of cardiovascular disease.

Oxysterols

Oxyterols are oxygenated derivatives of cholesterol. They have diverse biological activities, including binding to SREBP-1c and LXRs.

Peroxisome proliferator-activated receptor a (PPARa)

Peroxisomal proliferators-activated receptors are nuclear receptors involved in the transcriptional regulation of proteins. One of these nuclear receptors is peroxisomal proliferatore-activate receptor a (PPARα). PPARα has many functions, including regulating enzymes involved in the control of fatty acid oxidation in muscle.

Prostaglandins, thromboxanes and leukotrienes

Prostaglandins, thromboxanes and leukotrienes are derivatives of arachidonic acid, and belong to a class of biologically active lipids called eicosanoids. They have diverse effects in the body, including vasodilation, vasconstriction, clot formation and mediation of inflammation.

SREBP-1c

Sterol regulatory element-binding protein (SREBP)-1c is a key regulator of fatty acid metabolism and plays a pivotal role in the transcriptional regulation of different lipogenic genes mediating lipid synthesis. Emerging evidence suggests that insulin resistance and its associated metabolic dyslipidemia result from perturbations in the expression of SREBP-1c, inducing lipogensis and production of VLDL particles.

Stearoyl-CoA desaturase-1 (SCD1)

Stearoyl-CoA desaturase (SCD)1 catalyzes the rate-limiting reaction of monounsaturated fatty acid synthesis and plays an important role in the development of obesity. SCD1 is suppressed by leptin but induced by insulin. SCD-1 expression is also under the control of SREBP-1c. Studies have shown that inhibition of SCD1 can prevent the development of high-fat diet-induced obesity and hepatic steatosis.