

# Difference Between Lipoprotein Lipase and Hormone Sensitive Lipase



[www.differencebetween.com](http://www.differencebetween.com)

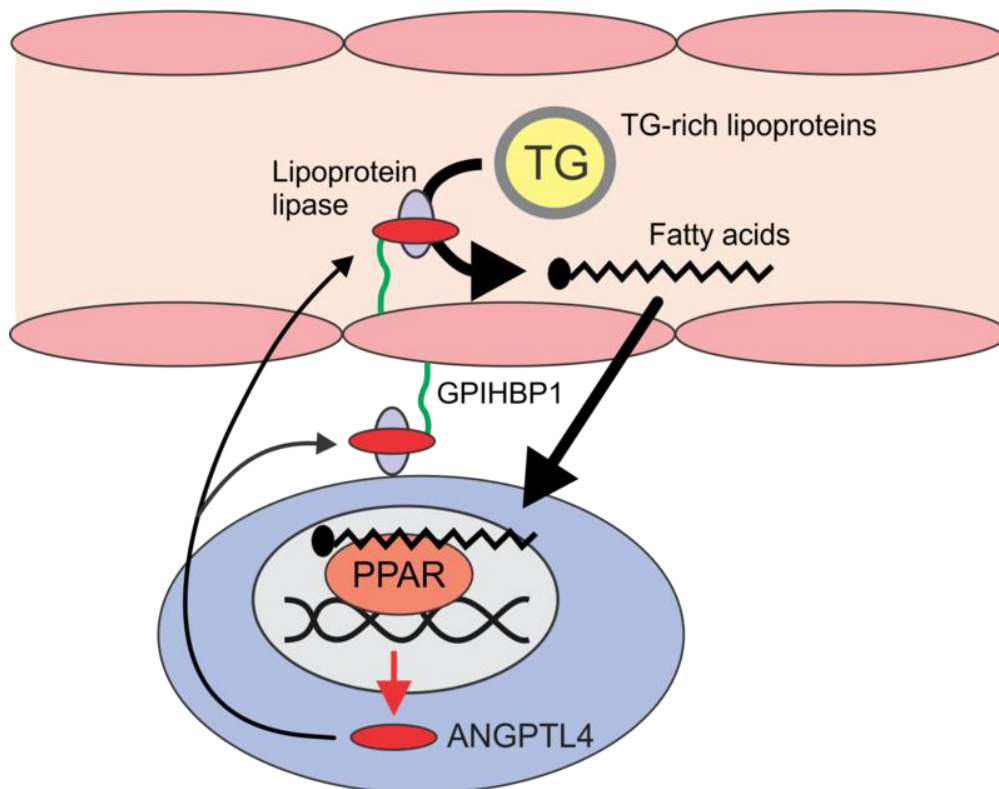
## Key Difference - Lipoprotein Lipase vs Hormone Sensitive Lipase

Lipases are enzymes that hydrolyze lipids. In order to be absorbed into the circulatory system, lipids should be hydrolyzed into fatty acids and glycerol. Lipoprotein lipase (LPL) is an enzyme which is a member of the lipase gene family and activates by insulin. Hormone-sensitive lipase (HSL) is an enzyme involved in the hydrolysis of esters especially cholesteryl esters and are activated by glucagon and stress hormones. The **key difference** is the activating factor of the two enzymes. **LPL is activated by insulin whereas HSL is activated by stress hormones (glucagon etc.)**.

## What is Lipoprotein Lipase?

Lipoprotein lipase (LPL) is considered as a member of the gene family of lipase. These lipases include hepatic lipase, endothelial lipase, and pancreatic lipase. LPL is made out of two specific regions namely, the larger N-terminus and the smaller C-terminus domain. The larger N-terminus domain consists of the lipolytic active site. A peptide linker aids these two domains to attach together. The N-terminus is a globular structure that has a central Beta sheet which is enclosed by helices. The C-terminus takes the shape of an elongated cylinder and is a Beta sandwich made out of two layers of Beta sheets.

Lipoprotein lipases are usually water-soluble enzymes which function to hydrolyze triglycerides in lipoproteins. They also take part in the promotion of the cellular uptake of cholesterol-rich lipoproteins, chylomicron remnants, and free fatty acids. LPL gets attached to the luminal surface of endothelial cells which are present in capillaries. This attachment of the enzyme is caused by heparin sulfated proteoglycans and the protein glycosylphosphatidylinositol HDL-binding protein 1 (GPIHBP1). LPL is broadly spread in heart, skeletal tissue, and adipose and as well as mammary glands subjected to lactation.



**Figure 01: Lipoprotein Lipase**

LPL is mainly regulated transcriptionally and post-transcriptionally. The functions of these LPL are to help in encoding lipoprotein lipases which are found on endothelial cells in muscles, heart and adipose tissue. It also acts as a homodimer. It can act as a catalyst to help convert VLDL to IDL and then to LDL. If there are serious mutations that have taken place, then it causes LPL deficiency which results in type I hyperlipoproteinemia. But, if there are mutations which are not serious then it may give rise to disorders of lipoprotein metabolism.

## What is Hormone Sensitive Lipase?

Hormone-sensitive lipase (HSL) is referred to as an enzyme which involves in the hydrolysis of esters. It is an intracellular neutral lipase which is also referred by the term cholesteryl ester hydrolase previously. HSL can be of two forms, long and short form. Both forms are presented in different types of tissues. HSL is expressed in steroidogenic tissues such as testis in long form. It functions in the conversion of cholesteryl esters into free cholesterol. This results in the production of steroid hormones. HSL is expressed in the adipose tissue in the long format which involves in the hydrolysis of triglycerides to fatty acids.

During high demand for energy at body level, HSL is activated to mobilize stored fats. Activation of HSL takes place in two steps with the involvement of two different mechanisms. Initially, HSL is moved into the surface of a lipid molecule by phosphorylated perilipin A which imitates the hydrolysis of the lipid molecule.

## LIPOLYSIS

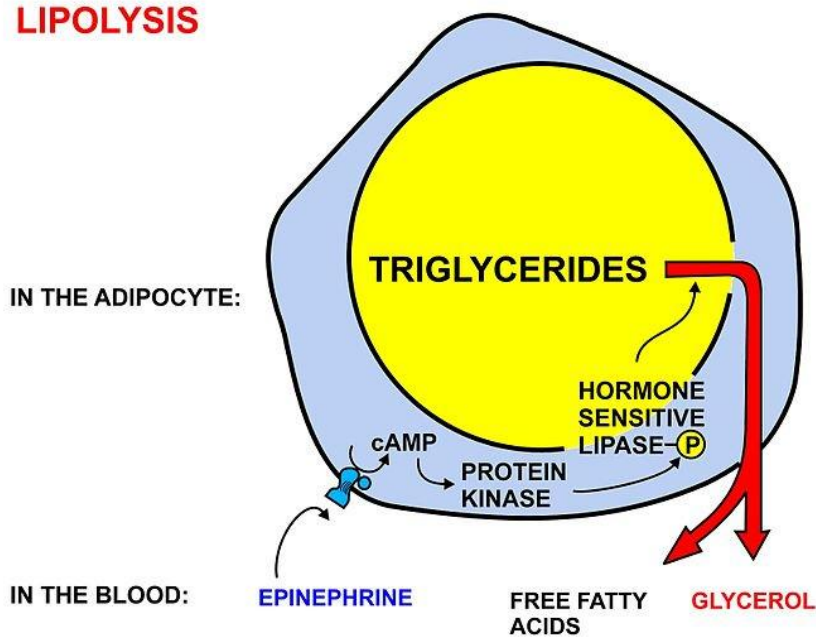


Figure 02: The process of lipolysis and HSL action

Secondarily, HSL is activated in a less significant mechanism comparable to that of the first. Here HSL gets activated by a signaling pathway through a specific molecule known as cAMP-dependent protein kinase A (PKA). This activation is important in the mobilization of lipids which occur in response to the cyclic AMP (cAMP). cAMP production is elevated with the activation of G-protein-coupled receptor. Secondary pathway of HSL activation occurs in the glucagon receptor and ACTH receptor by the stimulation of beta-adrenergic and ACTH respectively. HSL involves in the mobilization of stored fats. This is considered as the main function of HSL. This enzyme hydrolyzes triacylglycerol and diacylglycerol resulting in freeing a fatty acid at each instance with the production of diglyceride and monoglyceride respectively.

## What is the Similarity Between Lipoprotein Lipase and Hormone Sensitive Lipase?

- Both participate in hydrolysis reactions

## What is the Difference Between Lipoprotein Lipase and Hormone Sensitive Lipase?

### Lipoprotein Lipase vs Hormone Sensitive Lipase

Lipoprotein lipase (LPL) is considered as a member of the gene family of lipase. These lipases include hepatic lipase, endothelial lipase, and pancreatic lipase.

An Immunogen is a foreign molecule or a type of an antigen which can elicit an immune response by triggering the host immune system.

### Activation

LPL is activated by Insulin and Apolipoprotein C II.

HSL is activated by Catecholamines and glucagon.

## Summary - Lipoprotein Lipase vs Hormone Sensitive Lipase

LPL and HSL are important enzymes in order to regulate and maintain fat metabolism in the liver, adipose tissue, and intestines. They participate in hydrolytic reactions. LPL acts in the fed state when fats are present abundantly and directs fats to be hydrolyzed to be stored. HSL acts in the fasting state in order to break the fat stores to produce free fatty acids for energy production. Thus a deficiency of these enzymes may lead to imbalances in fat metabolism.

### Reference:

1. Bernlohr, David A., and Melanie A. Simpson. "Adipose tissue and lipid metabolism." *Biochemistry of Lipids, Lipoproteins and Membranes New Comprehensive Biochemistry*, 1996, pp. 257–281.
2. Bernlohr, David A., and Melanie A. Simpson. "Adipose tissue and lipid metabolism." *Biochemistry of Lipids, Lipoproteins and Membranes New Comprehensive Biochemistry*, 1996, pp. 257–281.
3. Kraemer, Fredrick, and Wen-Jun Shen. "Nutrition & Metabolism." *Nutrition & Metabolism*, vol. 3, no. 1, 2006, p. 12.

### Image Courtesy:

1. 'Overview ANGPTL4' By Sander kersten ([CC BY-SA 3.0](#)) via [Commons Wikimedia](#)
2. 'Metabolism1' By Cruithne9 ([CC BY-SA 4.0](#)) via [Commons Wikimedia](#)

### How to Cite this Article?

APA: Difference Between Lipoprotein Lipase and Hormone Sensitive Lipase. (2017, October 17). Retrieved (date), from <http://differencebetween.com/difference-between-lipoprotein-lipase-and-vs-hormone-sensitive-lipase/>

MLA: "Difference Between Lipoprotein Lipase and Hormone Sensitive Lipase" *Difference Between.Com*. 17 October 2017. Web.

Chicago: "Difference Between Lipoprotein Lipase and Hormone Sensitive Lipase." *Difference Between.Com*. <http://differencebetween.com/difference-between-lipoprotein-lipase-and-vs-hormone-sensitive-lipase/> accessed (accessed [date]).



Copyright © 2010-2017 Difference Between. All rights reserved