The hormone’s amino acid

Insulin, an endocrine hormone, is one of the most well-studied proteins synthesized by the human body. Its relatively simple structure and short amino acid sequence have made it a useful model for many protein studies. It is synthesized in beta cells of the pancreas through posttranslational cleavage of proinsulin, and released upon stimulation by elevated levels of glucose in the blood. Insulin plays an important role in regulating several anabolic processes, and is most well-known for lowering the level of blood sugar by promoting the uptake and storage of glucose by the liver.

Deficiency of, or resistance to insulin, results in either of the two forms ofdiabetesmellitus, a chronic metabolic disorder whose occurrence has increased among humans, especially in the United States; yet to this day, there is no definite cure for either form of the disease. Type II diabetes in particular must be treated with combinations of several different approaches, including dietary management, weight loss programs, and oral or antidiabetic drugs, or possibly surgical procedures such as gastric bypass.

This proposal discusses the potential of taurine (2-amino ethanesulfonic acid), which had previously been tested in studies on rats and mice, to raise levels of insulin sensitivity in human subjects with insulin resistance, and raises the possibility that taurine could be used in a supplemental form for the treatment of diabetes mellitus type II patients. Introduction The endocrine hormone insulin was the first protein whose amino acid sequence was completed. For his work on deciphering its structure, Fred Sanger won the 1958 Noble Prize.

Its discovery is considered a landmark, proving that proteins have a unique and defined sequence of amino acids, which has since been termed the

primary structure. Since then, insulin has been used as a model for many subsequent studies regarding the structure and properties of various proteins. It is the human body’s major anabolic hormone, promoting reactions that lead to the uptake of glucose and its conversion into storage forms such as glycogen and triglycerides, while simultaneously inhibiting their breakdown for use as fuel. It also promotes the uptake of amino acids and the synthesis of proteins, promoting growth.

Insulin was also the first protein to be synthesized using recombinant DNA in bacteria, and this technique has made possible the large scale production of supplemental insulin for use in one of the most serious metabolic diseases prevalent among humans, diabetes mellitus. The rising incidence of this disease, particularly in the United States, has drawn further interest into researching the intricacies of insulin and its role in regulating numerous anabolic body functions, as well as the various ways in which insulin’s functions can be regulated.

Type II diabetes, the most common form of the disease, has no cure, and research is proceeding to look into several ways to increase sensitivity to insulin in insulin-resistant individuals suffering from this form of diabetes. In particular, taurine, a derivative of the amino acid cysteine, has shown a promising ability to potentially lowerobesityand insulin resistance in rats and mice, although so far there have been few test studies on humans. Compared to other, more complex proteins, insulin is relatively small.

It has a compact and monomeric structure (although it is capable of forming dimers or hexamers under certain conditions), with a molecular weight of roughly 6 kDa. The structure of active insulin is made up of two linked

chains, labeled A and B, connected by two disulfide bonds, with a third disulfide bond linking the A chain back onto itself. This is a structure typical of the insulinfamilyor group of proteins, which includes other peptide hormones such as relaxin, mammalian Leydig cell-specific insulin-like peptide, early placenta insulin-like peptide, and insulin-like growth factors I and II in humans.

Evolutionarily related hormones belonging to this family have also been found in some insects and molluscs, and the nematode Caenorhabditis elegans. The hormone’s amino acid sequence (specifically, the sequence of the A and B chains) is conserved to such a degree that in most mammals, insulin extracted from another species remains biologically active. For instance, insulin from pigs and even bacteria, has been used to treat human patients suffering from diabetes mellitus.