

All You Need to Know About Protein Kinases

A fascinating field of biological study is that of genetics. Almost every ailment that a human can suffer from has some basis within their genes. As understanding grows within this ever-growing field of study, scientists are continuing to unlock the human genome and the valuable knowledge that can be gained from an understanding of it. With the aid of improving technology and further research, medical professionals are already able to develop improved diagnostics, better therapeutic strategies, more effective decision-making tools for care providers and patients, and create approaches for demonstrating clinical efficacy based on solid evidence. As knowledge and understanding continues to deepen, the role of genetics in the field of healthcare is beginning to evolve as we step into an era of genomic medicine. Evidently, genetics play a crucial role in a person's health and as study into this topic progresses, it is sure to shed further light on the cellular part within health and disease.

One extremely interesting discovery of genetic study is that of protein kinases. We will delve into this subject a little more to give evidence to the amazing role that genome-based research is playing in the development of medicine in this modern day of age.

What are Protein Kinases?

There are an amazing 500 different [protein kinase](#) encoding genes within the human genome. These amazing enzymes are part of the kinase family, enzymes that work to modify things like lipids or carbohydrates. Protein kinases specifically target proteins by adding phosphates to them. It causes functional changes within the protein in regard to its cellular location, its enzyme activity or its association with another protein. Protein kinases are a frequent find, found in humans, bacteria, and plants. As many as 30 per cent of all human proteins can be changed with kinase activity. They are known to be able to regulate cellular pathways, particularly the ones required for signal transduction (the transmission of chemical or physical signals through a cell). In this article we will [learn more](#) about these fascinating marvels of genetics, the classifications of such and the functions they can carry out.

The Two Main Groups of Protein Kinases

Although many smaller groups also exist, there are two main categories of protein kinases.

The larger majority are known as [serine/threonine kinases](#) – these add phosphates to the amino acid residues of serine or threonine. Of the more than 500 protein kinases that exist, 350 of them are of this category. These kinases play an important role when it comes to regulating the proliferation of cells, cell differentiation, cell death and embryonic development. The activation that the phosphorylation that serine/threonine kinases cause is essential for the functionality of proteins in the cell.

Another major group of protein kinases are called *tyrosine-specific protein kinases* and, as the name suggests, phosphorylate the residues of tyrosine amino acids. Similar to serine/threonine kinases, these kinases are also used in signal transduction. They have a pivotal role as they serve as growth factor receptors, and in downstream signalling from these factors, within the body.

Further Classifications of Protein Kinases

As previously mentioned, there are great number of different kinds of protein kinases with unique attributes and functions. To name a few more, there are *dual-specificity protein kinases* that can act on serine, threonine, and tyrosine. Additionally, there can be found *histidine-specific protein kinases* that are most commonly found in prokaryotes, as well as in eukaryotes, plants, and fungi. In this kinase, a phosphate is added to a histidine residue in the kinase before later being transferred to an aspartate residue on a different protein.

Evidently, there is a lot to know about the fascinating world of kinases! Despite massive investigation and discovery, there is also still a lot to learn.

The Uses and Functions of Kinases

While working undetected, kinases perform important tasks within a genome that are essential for life. Kinases are a massively important family of enzymes, crucial to the whole biological system. Within the realm of biochemical study of cellular processes, they are extremely useful and, besides this, have a variety of other functions too. Let's consider a few uses of protein kinases that prove just how invaluable they are.

Studies of protein kinases can assist in drug discovery. If there is any abnormal kinase activity, it often leads to illness such as diabetes, autoimmune disorders, or even leukaemia. As such, protein kinases are the subject of a great deal of study when it comes to drug discovery and disease pathophysiology. As knowledge and understanding grows, it will help researchers to develop drugs that can target cancer cells and immune cells, with the goal of treating cancer and inflammatory conditions. Studies of protein kinases and how they act has brought amazing success within clinical research and the discovery and development of drugs to treat cancer. Since deregulated kinase activity causes disease, drugs that inhibit them are being developed and some are even already in clinic use.

Studies of protein kinases can assist in cellular and molecular toxicology. When it comes to pathophysiological processes, the important role of regulating protein kinases is played by toxicological agents. The concentration of toxicant greatly affects the activity of kinases. By adapting the concentration of a toxicant, it is possible to regulate the activity of the protein kinase. While high concentration levels slow down the activity of the protein kinase, low levels of toxicant concentrating spread up the activity. With this important evidence, it is possible to apply protein kinases in the files of cellular and molecular toxicology.

The Future of Protein Kinase Study

With so much to learn from the tiny elements within our genes, the full scope of protein kinase use is not yet fully understood. As technology improves and research develops, the door is opening, the padlock unlocking, the true potential becoming evident. We will be sure to see the value of this research in years to come as scientists work hard to find ways to fight the blights that plague humankind today.