Regulating Gene Expression â€“ how does it work?

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The name â€œepigeneticsâ€ refers to any process that regulates gene expression. This concept can be critically applied to certain therapies, especially therapies on genetic diseases, wherein researchers are examining whether the epigenetic interactions between genes (the instructions for the expression of various genes) can influence which genes are turned on or off. An example of an enzyme that has this potential: tau protein, which is made in part by breaking down the phosphate groups on the â€œcarpodiceâ€ of tau protein, meaning it is also a good candidate to perform an epigenetic process.

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B. Methods and side effects

There are two different methods of assessing gene expression: DNA methylation (reducing the expression of specific genes) and protein kinase phosphorylation (reducing the expression of particular protein). This article describes epigenetic processes and understanding them.

You can read more about the two different methods used here and here.

Q. What is DNA methylation?

DNA methylation refers to DNA methylation at sites on DNA where DNA is damaged by the exposure of high levels of light, such as DNA damage is due to ultraviolet rays. DNA methylation is involved in the processing of genetic information, making up significant proportions of a cellâ€™s internal signaling.

Q. What is protein kinase phosphorylation?

Phosphorylation refers to this type of DNA methylation that occurs when phosphate groups stick to messenger RNA (the molecule in a cell that carries the instructions for DNA replication, translation and cellular functions). The procedure is accomplished by modifying messenger RNA at the protein level (deactivating transcription) and closing a channel at the protein level (producing synthesis).

Q. What is important about gene transcription?

We need gene transcription to produce our genes in order to function properly. Protein kinase phosphorylation does not affect gene transcription, but DNA methylation has a significant impact.

Q. What type of DNA damage is involved in gene modification?

DNA damage is caused by short-lived and distributed events of DNA damage between chromosomes, called nuclear DNA replication, nuclear stretch damage, and chromosome perturbation and that occurs over time.

Q. What are the common type of â€œepigeneticâ€ changes?

Typical changes are associated with gene expression (changing the expression of the genes), as in the case of tau protein and its role in tau disease, or osteoporosis with its impact on DNA methylation. Epigenetic processes have also been found in making certain drugs which alter their activity, and can be part of treating some rare genetic diseases.

Q. What effect is gene methylation having on gene expression?

Methylation is known to have several effects on gene expression, that are frequently effects and therefore change gene expression.

Hence, we find that methylation can modify DNA transcription and importantly, identify of many non-genetic causes of diseases. While different forms of gene methylation have been identified, protein kinase phosphorylation has been seen to change gene expression in neurodegenerative diseases, such as Alzheimerâ€™s, Parkinsonâ€™s and Huntingtonâ€™s diseases.

A Fire Hydrant In The Middle Of A Forest