Change the Way you Think

Change your Gene Expression!

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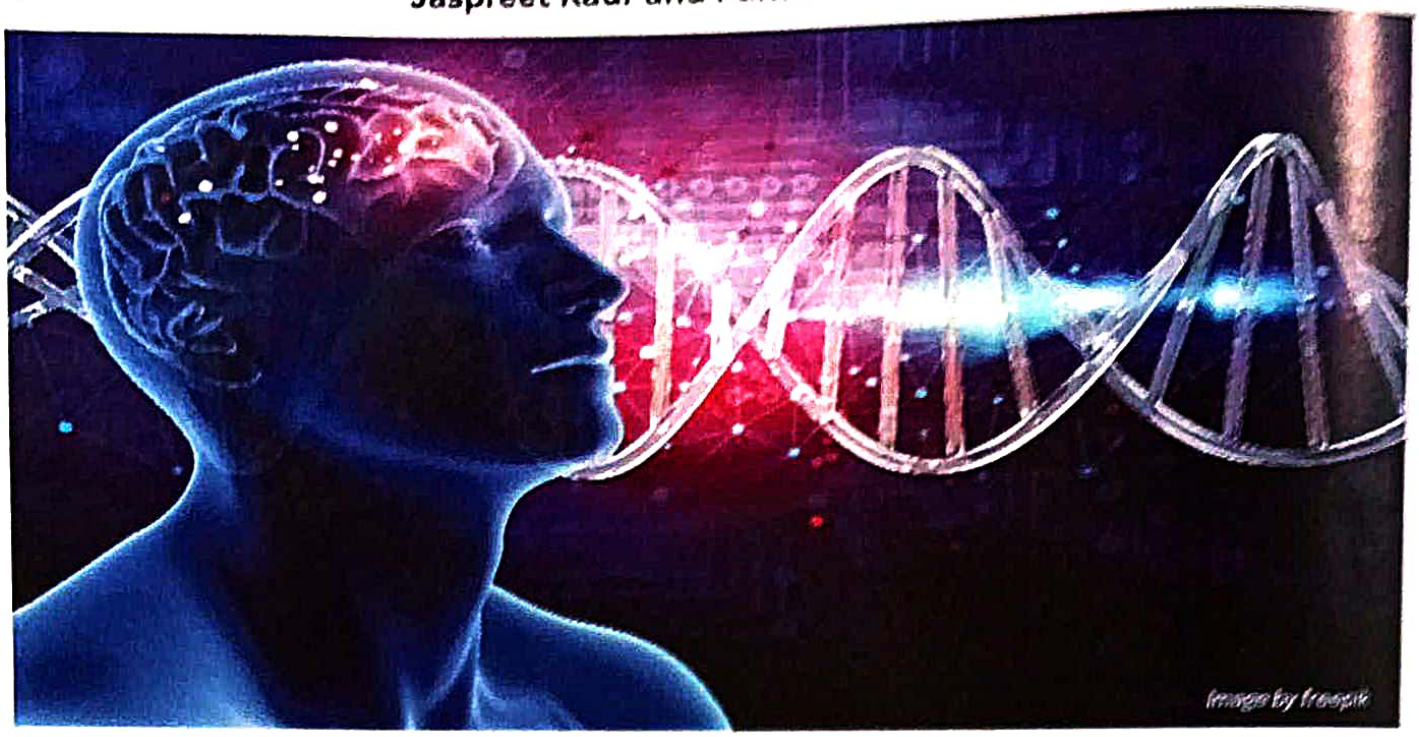

OUR everyday lives are surrounded by different lifestyle choices, which impact our physical and mental health. The impact of unhealthy eating habits, sedentary lifestyle, work-related problems, conflicts in relationships or some traumatic events, including Post-Traumatic Stress Disorder (PTSD), can alleviate an ever-increasing psychological stress. Stress causes emotional and hormonal imbalances and also leads to structural changes in our DNA and genes. The problem is aggravated by toxic thinking and a chain of negative thoughts.

The relationship between genetics and stress can be understood by studying epigenetics, which means 'attached to the DNA'. So, the chemical groups like methyl ($-CH_3$) or acetyl groups ($-CH_3CO$) are attached to specific nucleotides of DNA. Other chemical modifications include phosphorylation of the cytosine-guanosine dinucleotide units (CpG islands) and histone modifications. Epigenetics is the study of such modifications. The association of stress with the altering of genes for mental health issues like depression and anxiety has been understood from studies done with mice and rat brains and post-mortem human brain tissues.

Early life stress, including prenatal stress, adolescence stress with some adverse childhood experiences like loss of parents and emotional or physical abuse, can lead to epigenetic modifications in genes involved in the neurotransmitter systems, such as the dopaminergic system, serotonergic system, Gamma-aminobutyric Acid (GABA)-ergic system, and glutamatergic system. For example, the CpG methylation of two specific genes can be studied — serotonin transporter-SLC6A4 and FK506 binding protein 5-FKBP5 as potential biomarkers for depression. Thus, epigenetic patterns like DNA methylation and histone modification may act as important molecular biomarkers for the diagnostics and treatment options of many pathological or neurological disorders.

So, it's clear that epigenetic modifications play a significant role in our genetic architecture. To understand these modifications in simpler terms, let us understand that DNA acts as an information messenger molecule in which the information is stored in discrete units called 'genes'. The interplay of DNA with the environment gives a unique identity to each individual. The human genome project decoded the function of different genes involved in various physiological or biological processes. The entire DNA sequence of the human genome, which is wrapped in 23 pairs of chromosomes, is like a complete book written with just four letters or characters: A (Adenine), T (Thymine), G (Guanine) and C (Cytosine).

Some of these characters or nucleotides undergo chemical modifications like adding methyl, acetyl or phosphoryl groups at 'specific' or desired positions only. These modifications play an important role in regulating gene expression in different organisms. In simpler terms, they help switch the