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ENLIGHTNING EPIGENETICS THROUGH AYURVEDA AND IT'S ROLE IN FUTURE

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ABSTRACT

Epigenetics: it is the recent science which deals with the study of cellular and physiological traits that are heritable by daughter cells and not caused by changes in the DNA sequence. Specific epigenetic processes include paramutation, bookmarking, imprinting, gene silencing, X chromosome inactivation, position effect, reprogramming, transvection, maternal effects. Nowadays it is found that many diseases are caused by epigenetics. Exercise Diet, Nicotine, Alcohol, Chemicals in the living space or workplace, Medications and many more unknown factors are linked to epigenetical changes.

Need of study: Ayurveda is science of life. Many of factors causing diseases stated by ayurveda are now found out be related with epigenetics. Also ayurveda can prevent these epigenetical changes. Following ayurvedic lifestyle can also reduce chances of epigenetical changes. This study will try to co relate epigenetics and ayurveda. Also will try to explain how ayurveda can help to overcome diseases caused by epigenetics.

Keywords : Ayurveda, Congenital anomalies, Epigenetics, Garbha.

INTRODUCTION: Brian Dias and Kerry Ressler[1] trained mice, using foot shocks, to fear an odor that resembles cherry blossoms. Later, they tested the extent to which the animals' offspring startled when exposed to the same smell. The younger generation had not even been conceived when their fathers underwent the training, and had never smelt the odor before the experiment. The offspring of trained mice were "able to detect and respond to far less amounts of odor, suggesting they are more sensitive" to it. They did not react the same way to other odors, and compared to the offspring of non-trained mice, their reaction to the cherry blossom whiff was about 200 percent stronger. The scientists then looked at a gene, M71 that governs the functioning of an odor receptor in the nose that responds specifically to the cherry blossom smell. The gene, inherited through the sperm of trained mice, had undergone no change to its DNA encoding, the team found. But the gene did carry epigenetic marks that could alter its behavior and cause it to be "expressed more" in descendants, said Dias. This in turn caused a physical change in the brains of the trained mice, their sons and grandsons, who all had a larger glomerulus a section in the olfactory (smell) unit of the brain.Unlike simple genetics based on changes to the DNA sequence (the genotype), the changes in gene expression or cellular phenotype of epigenetics have other causes, thus use of the term *epi-* (over, outside of, around) – *genetics*. Epigenetic changes can modify the activation of certain genes, but not the sequence of DNA. Additionally, the chromatin proteins associated with DNA may be activated or silenced. DNA

damage can also cause epigenetic changes.DNA damages are very frequent, occurring on average about 10,000 times a day per cell of the human body. These damages are largely repaired, but at the site of a DNA repair, epigenetic changes can remain.

Many things can cause epigenetic and developmental epigenetic changes -

- Exercise
- Diet
- Nicotine
- Alcohol
- Chemicals in the living space or workplace:
- Medications

These environmental factors are only a few examples of things that can cause epigenetic changes. Many other environmental factors, known and unknown can cause epigenetic changes.

In 2008, the National Institutes of Health announced that $190 million had been earmarked for epigenetics research over the next five years. In announcing the funding, government officials noted that epigenetics has the potential to explain mechanisms of aging, human development, and the origins of cancer, heart disease, mental illness, as well as several other conditions. Some investigators, like Randy Jirtle, PhD, of Duke University Medical Center[2] think epigenetics may ultimately turn out to have a greater role in disease than genetics.

According to ayurveda fertilization of shukra (sperm) and shonita (ovum) into garbhashay (uterus) along with aatma (soul) is called as garbha (embryo). Factors like ritu, kshetra, ambu and beeja are responsible for formation of garbha. Abnormality in these factors can land up in congenital anomalies. Factors like diet, exercise, alcohol, stress, exertion etc can affect mother and fetus. Garbha is also said to be formed by six factors like matruja, pitruja, rasaja, satvaja, saatmyaja and aatmaj. These are combination of genetic, psychological and nutritional factors. Many of these factors can cause congenital anomalies.

Vitiated beeja i.e. shukra and shonita causes fetal defects. Some of diseases like prameha, kushta are said to be caused by beeja dushti which later seen in adult life. Also ayurveda has mentioned garbha upghaatkar bhaav meaning factors causing abnormalities to fetus. Such factors include intercourse, exertion, trauma, journey, keeping awake at nights, suppression of urges, fasting, abnormal postures, hearing unpleasant sounds etc.

DISCUSSION: Genetics is science of genes. Genes are parts of chromosomes situated in nucleus. Abnormality in genes and chromosome causes many diseases and birth defects. But epigenetics is branch which deals with cellular and physiological traits that are heritable by daughter cells and not caused by changes in the DNA sequence. There are some factors found out causing epigenetical changes. For example In the Överkalix study, Marcus Pembrey and colleagues observed that the paternal grandsons of Swedish men who were exposed during preadolescence to famine in the 19th century were less likely to die of cardiovascular disease. If food was plentiful, then diabetes mortality in the grandchildren increased, suggesting that this was a transgenerational epigenetic inheritance.

A more recent study, where 114 monozygotic twins and 80 dizygotic twins were analyzed for the DNA methylation status of around 6000 unique genomic regions, concluded that epigenetic

similarity at the time of blastocyst splitting may also contribute to phenotypic similarities in monozygotic co-twins. This supports the notion that microenvironment at early stages of embryonic development can be quite important for the establishment of epigenetic marks.

Some human disorders are associated with genomic imprinting, a phenomenon in mammals where the father and mother contribute different epigenetic patterns for specific genomic loci in their germ cells. The best-known case of imprinting in human disorders is that of Angelman syndrome and Prader-Willi syndrome—both can be produced by the same genetic mutation, chromosome 15q partial deletion, and the particular syndrome that will develop depends on whether the mutation is inherited from the child's mother or from their father. This is due to the presence of genomic imprinting in the region.

Mothers aren't the only ones who pass epigenetic changes to offspring. Experiments with rats have shown the crop fungicide vinclozolin can cause susceptibility to cancer and kidney defects, both of which can be transferred to offspring through methylation changes. In a similar medical experiment, researchers discovered that cocaine-using mice passed memory problems on to three generations of descendants.

Hence now it is observed that factors like Exercise, Diet, Nicotine, Alcohol, Chemicals in the living space or workplace &Medications can induce epigenetical changes which may land up into diseases which may be transgenerational. Many of factors are still unknown. Ayurveda has mentioned above factors as hetu i.e. etiological factors. Also ayurveda mentions that exposure to these factors during pregnancy will cause congenital anomalies.

CONCLUSION: Epigenetics is recent and developing science. Many factors are causing epigenetical changes without change in DNA sequence. Epigenetics has many and varied potential medical applications as it tends to be multidimensional in nature. These epigenetical changes cause diseases which may be transgenerational. Ayurveda has stated many factors causing diseases and congenital birth defects. Ayurvedic medicines and panchkarma treatment does beeja shuddhi. Also following garbhini paricharya also helps in maintaining mother and child health. Many of the etiological factors mentioned in ayurveda now can be explained by epigenetics. Also with ayurveda we may avoid such epigenetical changes.

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