The Torch
Vol. 3 (16)

Cigarette smoking and epigenetic changes

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It is well known that smoking causes various types of cancer. It also causes epigenetic changes in the lung epithelium, which not only enhances the probability of the occurrence of cancer but also increases the vulnerability of an individual to viral or bacterial infections. Epigenetics literally translates to “above the genome”. Technically, it refers to external DNA modifications that do not change the sequence of DNA but affect the way the cells read the genes. Therefore, the epigenetic factors of cells are affected by various environmental factors like smoking. Methylation is one of the external modifications of DNA in which a methyl (-CH3) group is added to the DNA. Smoking causes methylation changes in around 0.2% of the genes. This number may seem small, but it corresponds to 204 unique genes of lung epithelium. The lung epithelial cells generally synthesise proteins and enzymes to suppress cancer and other types of infections. However, as a consequence of methylation, these products are not available and the genes involved in metabolism, transcription, transport and signal transduction are rendered inactive. While the expression of some genes is suppressed, the other genes are overexpressed. Both of these conditions are harmful, as the optimum expression of genes is needed for the regular functioning of the body. Additionally, epigenetic factors are heritable and these methylation changes can be passed onto future generations. Therefore, smoking is a habit that needs to be curbed in order to protect ourselves and our future generations.

Keywords: Smoking, Epigenetics, Small airway epithelium, Methylation

Citation:
Simran Jain. Cigarette smoking and epigenetic changes. The Torch. 2022. 3(16). Available from: https://www.styvalley.com/pub/magazines/torch/read/cigarette-smoking-and-epigenetic-changes.