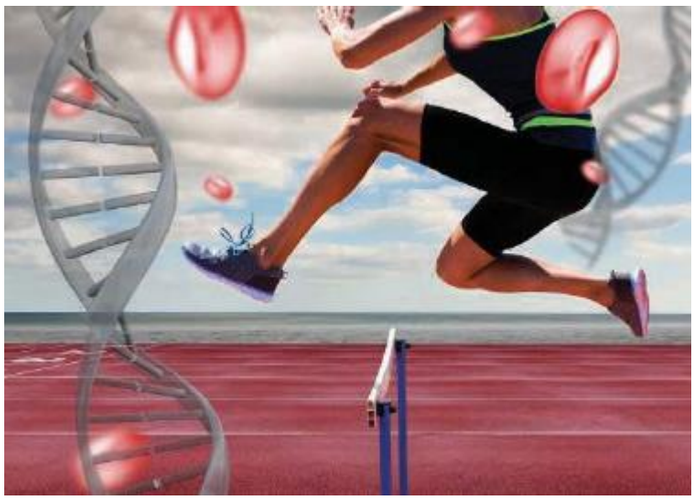

Each day, a dynamic interaction is taking place between your genes and the world around them. Through a process called epigenetics or epigenetic tagging, your genes are responding to changes in their environment. These changes involve diet, exercise, stress, and even your social behaviour and that of others. Epigenetic tags regulate genes, telling them when to turn on or off. From the early stages of embryo development to the final days of your life, this process enables your body to grow and respond to a changing environment, all without a single change to the nucleotide sequence of your genes.

Your life experiences are imprinted on your DNA. This single idea has led to research findings that have changed the way scientists are looking at two major fields of biology: health and inheritance. Much of the research around health and epigenetics concerns its link to increased frequency of certain diseases. While direct human research is challenging in this field, studies with other mammals have given scientists insight into how epigenetic tagging may affect our health. For instance, in all mammals, hormone-triggered diabetes can occur during pregnancy. This results in a high-glucose environment that research has shown to cause epigenetic tagging in a rat's offspring. This can increase the chance of female offspring developing diabetes during their own pregnancies.

Research shows that epigenetic tags can also be inherited. This means that when environmental factors or life experiences change gene regulation, these changes can be passed to a person's children and even later generations. This idea of epigenetic inheritance goes against the long-held view that inheritance involves only the transfer of the nucleotide sequence of DNA from parent to offspring. However, the research evidence is hard to dispute. In 2002, Swedish scientists studied records of food prices and availability starting in the 1890s. They found that the chance of dying from cardiovascular disease and diabetes in a given male population was influenced by the amount of food available to the subjects' fathers and paternal grandfathers just before they entered puberty.

Cancer genetics and epigenetics are inextricably linked in generating the malignant phenotype; epigenetic changes can cause mutations in genes, and, conversely, mutations are frequently observed in genes that modify the epigenome.

1.) How are genes regulated by epigenetic tagging?

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2.) What causes some types of cancer?

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3.) Based on what you have learned about epigenetics in this feature, do you believe that people have an obligation to live a lifestyle that reduces the chance of passing harmful epigenetic tags to their children? Justify your response.

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4.) Use google to find another example of how an environmental influence can regulate gene expression in humans, animals, and even plants

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