**HDAC Inhibitors Important for Cancer Treatment**

“P53 is a protein that is part of the cell cycle and acts as a checkpoint for DNA to ensure there is not damage. Currently, it is known that there are P53 mutants in over 50% of cancers,” said Dr. Montgomery. She explained that an enzyme called HDAC, histone deacetylase, acts to silence genes and decrease transcription, which is the coding for new DNA copies. An HDAC inhibitor acts to overexpress genes resulting in a decreased amount of DNA available and cell cycle arrest. HDAC inhibitors have been introduced into therapeutic drugs and could potentially have anti-inflammatory properties.

Dr. Montgomery stated, “I began working with HDAC inhibitors because of my interesting in their relationship with P53, which I have worked with since my post-doctorate training.” From nutritional data, it has been discovered that iron nutrition of P53 mutant cancer cells can have startling results from starvation or overload. The professor incorporated HDAC inhibitors into treatment of cancer cells to determine enzyme activity and cell growth. She explained that damage to DNA could be reduced by treatments with HDAC inhibitors including iron because cancer cells are iron greedy, which would allow for a more effective treatment.

She mentioned, when she attended a research conference earlier this semester, that there were world-renown researchers interested in her work using a combination of HDAC inhibitors and iron for immune regulation. She expressed the importance of cancer treatment research because there are over 100 types of cancer, and it has become one of the leading causes of death across the world. Due to the fact that cancer involves DNA damage and the cell cycle, there is no discrimination of what regions of the world or individuals are more susceptible to cancer. There are multiple characteristics of cancer that make the disease complex, which makes creating treatments for the disease a difficult task. However, there is data to support the theory that manipulating DNA for replication in cancer cells may induce cell death, which leads to the popularity of exploring HDAC inhibitors.

In her paper, HDAC Inhibitors as Epigenetic Regulators of the Immune System: Impacts on Cancer Therapy and Inflammatory Diseases, she and her co-authors discuss that HDAC inhibitors could help monitor the immune system, which in turn could increase the effectiveness of therapeutic drugs against cancer (Hull, E., Montgomery, M., and Leyva, K., 2016). Cancer type and severity varying within each individual, which causing the curability of HDAC inhibitor treatments to be complex. Dr. Montgomery looked into the potential of using HDAC inhibitors to regulate immune response, such as inflammation, using trial treatments on different cell lines. “Treating cancer is a balancing act because it is difficult to use strong drugs without evoking an immune response,” she explained. The professor expressed that HDAC inhibitors could be gene regulators that help suppress chronic inflammatory diseases.

In the professor’s research, she asked the question, “How can HDAC inhibitors effect the immune supervision within cancer cells?” Dr. Montgomery and her team used animal models with an example cancer type, melanoma, which showed that HDAC inhibitors can upregulate genes causing a decrease in their immune surveillance (Hull, E. et al., 2016). This could make an antibody treatment more successful because the P53 mutant proteins will not be anticipating the attack.

Dr. Montgomery rationalized that the function of HDAC inhibitors gives endless possibilities, which could improve chemotherapy drugs and assist in eradicating complex diseases.

**References**

Hull, E., Montgomery, M., and Leyva, K., (2016). HDAC Inhibitors as Epigenetic Regulators of the Immune System: Impacts on Cancer Therapy and Inflammatory Diseases. *BioMed Research International*, 2016, 8797206. doi:10.1155/2016/8797206