An Extension of Research Regarding the Up-Regulation of Fatty Acid Synthase in Cancer Cells and the Potential Use of Proton Pump Inhibitors as a Therapy for Pancreatic Ductal Adenocarcinoma
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Proton Pump Inhibitors (PPIs) have long been used in the treatment of gastrointestinal disorders, but in light of recent studies, researchers have begun to look at the possibility of repositioning PPIs for use in anticancer therapies. Studies have shown that PPIs selectively inhibit fatty acid synthase (FASN), which is the enzyme that regulates fatty acid production \textit{in vivo}. However, the mechanism of this inhibition was not understood before a study conducted by Fako et al., entitled “Repositioning Proton Pump Inhibitors as Anticancer Drugs by Targeting the Thioesterase Domain of Human Fatty Acid Synthase.” As the title implies, it was determined that PPIs directly inhibited FASN through an interaction with the thioesterase (TE) domain on the enzyme. Methods utilized to reach this conclusion include the \textit{in silico} screening process of 2417 FDA-approved drugs, fluorogenic TE activity assay, colony formation survival and apoptosis assays, ELISA, Western blot analysis, $[^{14}\text{C}]$ acetate incorporation assay, Folch extraction method, and a serine hydrolase probe displacement assay. Prior studies have also shown that there is an overexpression of FASN in cancer cells, and this study chose to focus their work on pancreatic ductal adenocarcinoma in particular because of the lack of treatment options and the great necessity for innovation of new therapies.

SHP-2 and the Role it Plays in Colon Cancer
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SHP-2 is a phosphatase (PTP), so it plays an important part in the proliferation, differentiation, and regulation of cells. Encoded by gene PTPN11, protein-tyrosine phosphatase SHP-2 has been found to be a significant factor of tumor-promotion in several different types of solid tumors. Before the work of Peifen Cai et.al., there had been few findings on the significance and expression of SHP-2 in colon cancer; in 2013, Cai and his group began research on SHP-2 and the role it plays in colon cancer. Using several different methods of research, including mice and self-matched adjacent peritumor tissues, Cai and his colleagues found that SHP-2 levels were significantly decreased in tumor tissues. Furthermore, their findings suggested that patients with a higher level of SHP-2 in their tumor would have a better prognosis. These findings are important for the prognosis and treatment of many tumor tissues, but colon cancer in particular.
Cross-linked Human Serum Albumin Dimer has the Potential for Use as a Plasma-retaining Agent for Fatty Acid Conjugated Antidiabetic Drugs
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Albumin is a key protein in the blood as it reversibly binds to endogenous ligands such as fatty acids and exogenous ligands such as warfarin and other drugs. Many diabetic patients who have nephropathy also have hypoalbuminemia, a medical condition in which there are abnormally low levels of albumin in blood plasma. This study reviews a dimer made from two human serum albumin (HSA) monomers chemically linked with 1,6-bis(maleido)hexane (BMH) that have the capability of retaining plasma and can be used in future therapeutic strategies to extend half-life of antidiabetic drugs.

Enhancement of Drug Design as Enzyme Inhibitors through Growing Advancements in Technology
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Enzyme inhibitors have been heavily studied by chemists for many years due to their ability to recognize and hinder specific enzyme through selective specificity. As studies in enzyme inhibitors progressed, medicinal chemists became more and more involved in the design of enzyme inhibitors as potential drugs. Previous studies have tackled this idea using several approaches including, transition-state analogues, suicide/mechanism based analogues, and multisubstrate analogues, to synthesize an inhibitor/drug capable of inactivating an enzyme through heightened specificity to the enzyme as well as the isozyme, unfortunately with many failures to report. This study aims to review the past and recent inhibitor drug designs and identify the errors made in the failures through comparison of the recent successes.