Name _____ Cancer

PI3K and Cancer

Phosphoinositide-3-kinase (PI3K) is a once unknown enzyme that was identified in the eighties by Dr. Lewis C. Cantley, then of Tufts University School of Medicine, as a "sort of master switch for cancer." The normal job of this protein is to alert cells to the presence of insulin so that they will then intake glucose (a form of sugar), which provides fuel to the cells. This signaling mechanism is important in order for cells to grow and survive. If signaling occurs too slowly, the body becomes insulin resistant and cannot take in enough glucose, a condition known as Type II diabetes. In the disease we call cancer, this signaling occurs too quickly, providing excess glucose to tumors, which makes the grow larger.

PI3K is the most frequently mutated cancer-promoting gene is humans. Since Dr. Cantley's discovery, it has been identified as playing a role in 80% of cancers. The PI3K signaling mechanism has been targeted by cancer drugs, including a breakthrough drug treatment for lymphoma and leukemia which was approved by the FDA in 2014. Today, Dr. Cantley continues his investigations into PI3K at Weill Cornell Medicine.

The thinking behind PI3K cancer drugs is that blocking the enzyme will disrupt the signals that provide cancer with high levels of glucose, but this is not always the case, and not all clinical trials of PI3K-inhibiting drugs have been successful. Some elevate blood sugar, prompting the liver, which stores excess glucose as glycogen, to send more sugar into the bloodstream, triggering the release of more insulin, causing tumors to grow. Dr. Cantley's team hypothesized that the excess insulin might be turning the glucose signaling mechanism back on. They theorized that limiting dietary intake of carbohydrates, preventing spikes in blood sugar and forcing the body to fuel itself with fat and protein instead (a state called ketosis), might allow the drug to work, and this research is ongoing.

Name _____ Cancer

QUESTIONS: PI3K and Cancer

Circle the correct answer.

1. PI3K is considered a kind of what?
   A. cancer
   B. master switch for cancer
   C. enzyme
   D. tumor

2. The normal job of PI3K is to:
   A. alert cells to the presence of insulin
   B. alert cells to the presence of glucose
   C. provide fuel to the cells
   D. mutate genes

3. PI3K has been implicated in _____.
   A. all cancers
   B. lymphoma
   C. 80% of cancers
   D. glucose levels

4. The first FDA-approved PI3K cancer drug is for:
   A. tumors
   B. Type II diabetes
   C. Lymphoma
   D. Lymphoma and Leukemia

5. Today, Dr. Cantley and his team are researching the role of ____ in cancer treatment.
   A. limiting dietary intake of glucose
   B. limiting dietary intake of sugar
   C. limiting dietary intake of protein
   D. limiting dietary intake of carbohydrates