Capsaicin and Cancer

In the U.S., one person dies from cancer each minute, and one out of three people will eventually die from cancer. Normally when the body is injured, cells divide to replace the damaged ones and "know" when to stop dividing. Cancer cells, however, divide uncontrollably and for no obvious reason. Eventually, cancerous growths interfere with normal body functioning, often resulting in death.[1]

Capsaicin (8-methyl-N-vanillyl-6-nonenamide) is the active chemical compound found in the seeds and fruit of chili peppers of the *Capsicum* genus such as cayenne pepper. This pepper provides numerous health benefits. Capsicum is traditionally used for muscular pain, headaches, to improve circulation and for its gastrointestinal protective effects.[2] It is also commonly added to herbal formulations because it acts as a catalyst for other herbs and aids in their absorption.

Many scientific studies have revealed the exciting potential anti-cancer abilities of capsaicin. Although the exact mechanism(s) is unclear, capsaicin has been shown to induce apoptosis in many different types of cancer cells. Apoptosis is a natural form of cell death that occurs in old or damaged cells that need to be replaced by new, healthier cells.[3]

Capsaicin has been shown to protect the stomach from various types of damage by affecting gastric mucosal blood flow as well as mucosal and bicarbonate secretions. It also has been shown to cause DNA fragmentation and subsequent apoptosis in human gastric adenocarcinoma cells by reducing the expression of a cellular protein that inhibits apoptosis (Bcl-2). Research shows that the number of abnormal cells killed increased with greater doses of capsaicin.[3] According to this study, capsaicin induces apoptosis in abnormal cells by inhibiting NADH- plasma membrane electron transport system by acting as a quinine analog.[3] Cells generate most of the energy (ATP) that they need to survive and reproduce via this electron transport chain, which occurs in the mitochondria (also known as the powerhouse) inside cells. If this system is disrupted, the cell cannot generate enough ATP to sustain itself, and the cell dies. By disrupting the electron transport chain, capsaicin decreases the amount of energy that is available to cancer cells, and these cells cannot continue to proliferate. Cancer cells require more energy than normal cells, because they are growing and dividing more rapidly than normal cells. A reduced supply of energy caused by capsaicin can have a major impact on abnormal cells.

In a recent study conducted at the University of Nottingham, capsaicin was shown to bind to proteins in the mitochondria of abnormal cells and trigger apoptosis without being harmful to surrounding normal cells.[4]

This anti-carcinogenic mechanism is surprisingly similar to how NSP Paw Paw Cell- Reg works.

Dr. Pramod Srivastava and his colleagues conducted a study in which they discovered that capsaicin triggered apoptosis in human pancreatic cancer cells, one of the most difficult types of cancer to treat. Capsaicin increased the number of apoptotic proteins and reduced tumor size in cancerous pancreatic cells but did not negatively affect normal pancreatic cells.[5]

Another study showed that capsaicin inhibited the growth of leukemic cells possibly by causing an increase in the production of reactive oxygen species inside the abnormal cells, which leads to apoptosis. Capsaicin did not inhibit the growth of normal cells.[6]

Capsaicin has also shown effectiveness in inhibiting ovarian and breast cancer cells in vitro by decreasing the activity of NADH oxidase, an enzyme needed for the production of ATP or cellular energy.[3]

A recent study has shown that capsaicin induced human prostate cancer cells to undergo apoptosis by inhibiting NF-Kappa Beta, a mechanism that leads to the expression of certain genes that are involved in inflammation and the development of cancer. This same study demonstrated that capsaicin slowed prostate cancer cells by regulating androgen receptors on the cells and decreased the production of PSA produced by the abnormal cells.[7]

Recent studies have also demonstrated that capsaicin inhibited the ability of some chemical carcinogens to bind to DNA[3], suggesting that capsaicin may have cancer preventative properties.

Capsaicin is generally recognized as safe (GRAS) by the FDA in the United States when used orally and topically in an appropriate manner.[8] Capsaicin is found in foods that have a long history of being used in the human diet without harm. This fact lends support to its good safety profile.

Capsaicin and other vanilloid compounds show strong evidence of having promising potential in the fight against many types of cancer. However, more research is needed to determine if capsaicin extracts are safe and effective for use in humans as a treatment or preventative for cancer.

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