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Negative Effects of Acrolein on the Body

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Abstract: Acrolein is a clear or yellow liquid that burns quickly and breaks down quickly. This substance has a strong unpleasant odor and is mainly used in the synthesis of acrylic acid. The process of its formation (vegetable oil) is the combustion of various air pollutants, such as tobacco smoke, some fuels, gasoline, oil. Acrolein can be absorbed by the body by consuming a variety of fried foods. If a person breathes air containing acroelin, it enters these cells in a matter of seconds. Swallowing it or pushing it on the skin also causes it to be quickly absorbed into the body. Acrolein causes oxygen deficiency in the cell. The use of antioxidant phytopreparations against its damage is very effective.

Key words: Oxidative Stress, Inflammation, Irritation, Antioxidants

General side effects of acrolein

First, acrolein is converted to metabolites when it enters the cell. This can happen in minutes or hours. Some metabolites are excreted in the urine. Acrolein causes inflammation, itching and irritation of the eye, inflammation of the respiratory system, causes symptoms of allergies, headaches, vomiting, high levels in the lungs can damage the tissues and cause shortness of breath. Acrolein air inhalation can cause hypertension and tachycardia. Acrolein may have the potential to be immunotoxic. Children are born with a well-developed immune system and are highly sensitive to chemicals. Acrolein causes cracking of the lips, inflammation of the mucous membranes of the mouth, throat, esophagus and stomach. Sometimes it causes nausea, vomiting and diarrhea. Acrolein causes mutations and plays a role in the formation of oncogenes. It causes inflammation of the respiratory, eye, and gastrointestinal tracts by stimulating the release of peptides at the nerve terminals that innervate these systems.

Binding of acrolein to proteins

Acrolein, an unpleasant and problematic by-product of overheated organic matter, appears everywhere as a pollutant in the environment, such as incomplete combustion of plastic materials, smoking, and overheating of fried oils. Acrolein is also a metabolite formed in the biotransformation of allyl compounds and is a widely used anti-cancer drug cyclophosphamide. Its high reactivity makes acrolein a dangerous substance for living cells. Consider that this popular aldehyde is not only a pollutant but also a lipid peroxidation product that can occur anywhere in biological systems. The effects of acrolein on the gastrointestinal mucosa in animals include epithelial hyperplasia, ulcers, and bleeding. The severity of the impact depends on its dose. Acrolein causes irritation of the respiratory, eye, and gastrointestinal tract by stimulating the release of peptides at the nerve terminals that innervate these systems. If it is incubated with BSA (bovine serum albumin), acrolein was rapidly added to the protein and, under oxidative stress, formed a protein-bound carbonyl derivative, which is an approximate marker of oxidatively modified proteins (Koji Uchida, 1998). This compound is also formed endogenously as a product of lipid peroxidation. Acrolein toxicity is involved in the etiology of many fatal diseases, including human neurodegenerative diseases. Treatment of the cellular and molecular effects of acrolein helps to effectively attenuate its toxicity. Allyl alcohol is oxidized in cells by the action of alcohol dehydrogenase to form aldehyde acrolein. Oxidation of circulating low-density lipoproteins (LDL) in atherosclerosis and their proliferation by receptors promotes the deposition of lipid-filled macrophages in the vascular wall.

Lipid peroxidation is associated with the pathogenesis of many diseases such as atherosclerosis, diabetes, cancer and rheumatoid arthritis, as well as drug-related toxicity, postishemic reoxygenation injury and aging. Lipid peroxidation proceeds through a free radical chain reaction mechanism and provides lipid hydroperoxides as the main initial reaction product. Subsequently, the degradation of lipid hydroperoxides

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forms a number of degradation products with various harmful effects. Among them, there is more evidence that aldehydes are the cause of many pathophysiological effects associated with oxidative stress in cells and tissues. Aldehydes in lipid peroxidation have been adopted as the end products of lipid peroxidation. However, they are still active, exhibit easy reactivity with various biomolecules, including proteins and phospholipids, and form stable products at the end of a series of lipid peroxidation reactions that may contribute to the pathogenesis of various diseases.

Properties of phytopreparations against acrolein induced stress

Oxidative stress has been identified as a major cause of a number of diseases. Adding exogenous antioxidants or boosting the body's endogenous antioxidant defenses is a promising way to combat the unwanted effects of reactive oxygen species (ROS) on oxidative damage (Deepak M. Kasote, 2015). Plants have the ability to biosynthesize a wide range of non-enzymatic antioxidants that attenuate oxidative damage caused by ROS. Buckwheat contains many biologically active components and is rich in flavonoids, including orientin, vitexun, quercetin and rutin. Especially in tartar buckwheat it is known that these compounds *(Fagopyrum tataricum)* are about 80 times higher than ordinary buckwheat *(Fagopyrum esculentum)*. Buckwheat has been widely studied for its antioxidant, hypocholesterolemic and anti-inflammatory effects. Buckwheat *(Fagopyrum esculentum Moench, F. tataricum Gaertner)* is recognized worldwide as a nutritious food due to its high content of proteins, polyphenols and minerals (Chia-Ling Liu 1, 2008). The biological presence of nutrient compounds is based on their composition. Polyphenols form the most abundant and ubiquitous group of plant secondary metabolites and are usually involved in stress protection such as oxidative stress. Research has been conducted on the ability of buckwheat, which is often consumed around the world, to protect against age-related diseases through various important mechanisms. Evidence suggests that dietary polyphenols have the ability to alleviate oxidative cell damage and have antioxidant abilities.

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