Cleveland's Center for Healing
HYPERION™
Functional Medicine

RENAL CELL CARCINOMA, KIDNEY CANCER

The incidence rates of renal cell carcinoma (RCC) have been increasing over the last 20 years, particularly in the United States. Mycotoxins or molds are possible contributing factors for kidney cancer development. Mycotoxins are toxic metabolites produced by fungi that contaminate crops. These fungi have the capability to produce mycotoxins; important mycotoxin producers are Aspergillus, Fusarium, and Penicillium. These fungi have a worldwide geographical distribution and are contained in many of our food products. The main mycotoxins produced by these fungi are aflatoxins and ochratoxin A, trichothecenes, zearalenone, and citrinin.

These mycotoxins are potentially present in a wide range of vegetable products, in processed foods, beverages, feed, and animal products. They contain protective properties which enable them not to be destroyed during the different food processing procedures to remove them. The International Agency for Research on Cancer (IARC) classifies mycotoxins according to the evidence of carcinogenicity in humans. All aflatoxins are carcinogenic to humans, having the ability to cause cancer[1].

Molds grow on a variety of foods including cereals, nuts, and fruit. Oral exposure to these toxins via contaminated food or feed is considered the predominant exposure route and represents a serious health issue in humans and animals. Low or moderate mycotoxin exposure over many years is cumulative and can result in severe health effects. Serious health risks are increasing because of increasing toxic fungi spreading worldwide because of climate change. All these mycotoxins are metabolized in the liver and are excreted via the kidneys, causing potentially severe injuries and abnormalities in these organs[2].The international agency for research on cancer (IARC) has classified aflatoxins as a risk for cancer[3]. Mycotoxins are the toxic metabolites from fungi, they can cause diseases and death in humans and animals. Mycotoxins induce cell damage, even at low concentrations, that may be one of the major causes of mitochondrial dysfunction[4]. Mitochondrial alterations are a common feature of many kidney cancers, and the underlying mitochondrial abnormalities vary among different kidney cancer types[5].

Mycotoxins such as citrinin, aflatoxin, and T-2 toxin exert sword-like effects causing mitochondrial dysfunction. Mycotoxins can induce oxidative stress even at low concentration/dose that may be one of the major causes of mitochondrial dysfunction[6]. Oxidative stress occurs when there are too many molecules that are unstable become free radicals, and then there's not enough antioxidants to get rid of them. This leads to damage to cells[7].

Mycotoxins with the potential to produce cancer reported in the literature are also genotoxic: they can cause damage to DNA and produce chromosomal abnormalities. Aflatoxin B1 is the most carcinogenic among all mycotoxins. Aflatoxin B1 and its metabolites have been reported in the kidney. It alters the genome because it enters the cell membrane and connects itself to its DNA. After it penetrates the cell membrane, it alters the cell cycle and affects the P53 gene. The P53 gene, known as a tumor suppressor, encodes the tumor suppressor protein which then obstructs the growth of tumors and cancers[8]. If the p53 gene is altered, it cannot act as a tumor suppressor and cancers can grow.

Tumor cells in kidney cancers are assisted by mitochondria that have been damaged leading to reprogramming of their functions. This reprogramming increases energy needed for kidney cancer cells and other types of cancer cells by switching to a specialized form of metabolism known as the "Warburg Effect" for growing the tumor. These results of reprogramming favor tumor progression, blood vessel growth for the tumor, and suppression of the immune system. This enables cancer cells to survive and multiply more effectively. In addition, reactive oxygen species generated by toxin exposures promote cancer's initiation and progression because of these mutations in mitochondrial DNA. More simply stated, our genetics are modified due to environmental insults that involve mitochondrial dysfunction[9].

In Hyperion functional medicine, we test mold exposure through urine samples and then know the levels of the toxic molds defined above: aflatoxins and ochratoxin A, trichothecenes, zearalenone, and citrinin.

A targeted detoxification and diet plan is put together in detail for patients exposed to and under treatment for mold toxicity.

Other environmental pollutants which target the kidney include heavy metals, chemical solvents and naturally occurring compounds, such as aristolochic acid from plants. Trace elements and/or heavy metals play a significant role in kidney function. Excessive amount of these trace elements can cause toxic effects leading to serious health risks, including cancer. The kidney is a major organ for filtration and excretion of toxins, this makes the kidney highly vulnerable to any type of toxic elements we are exposed to. In a study published in 2022, heavy metal concentrations in kidneys of cancer patients were significantly altered when compared to kidneys of healthy patients[10].

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