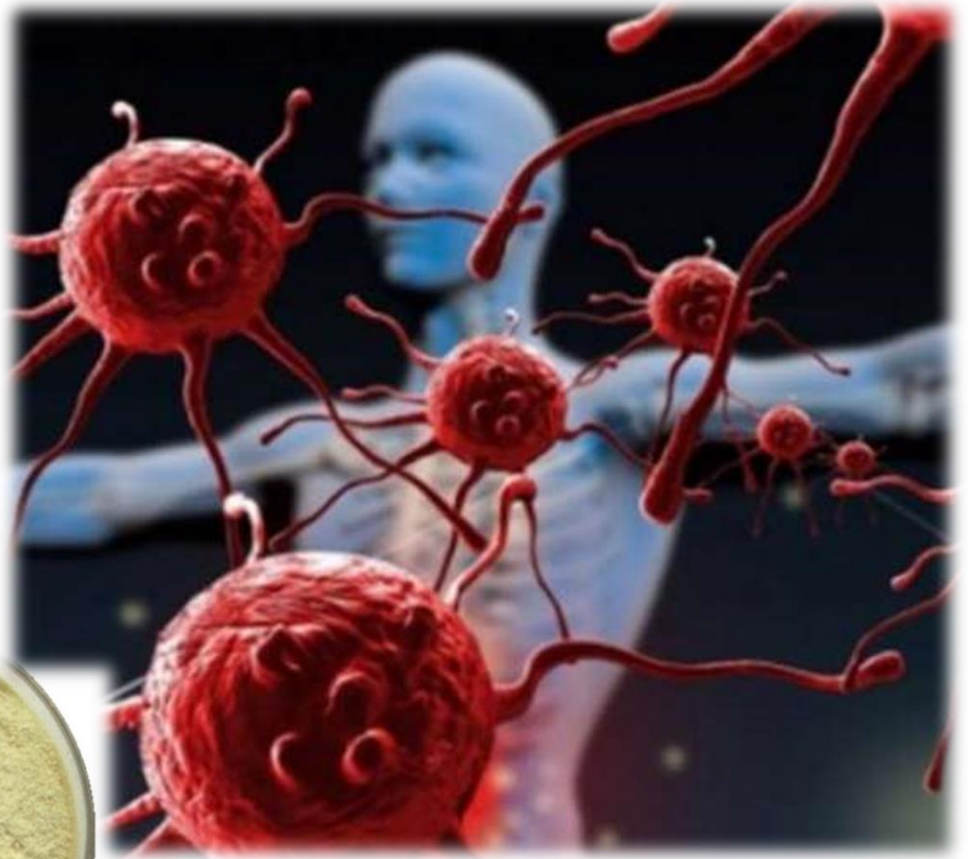


# Lemon Fruit & Anticancer Properties



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# 1. Abstract

Lemon is mainly used in daily consumption in many diets, and in the production of juices. It is also widely used in alternative medicine due to its anti-bacterial, anti-cancer, anti-diabetic, anti-fungal, anti-hypertensive, anti-inflammatory, anti-lipid properties. and antioxidants. Moreover, it can protect the heart, liver, and bones, and prevent urinary tract diseases.

Many of us are keen to get rid of the lemon peel immediately after using its fruit, although some medical studies have proven that it represents a natural medical miracle, so it has many benefits; It fights cancer cells because it contains flavonoids and salvestrol Q40 that are resistant to cancer cells, so eating lemon peel helps prevent several types of cancer, such as breast, colon, skin and others.

Other important components such as apigenin, hesperetin, kaempferol, limonoids, quercetin, naringenin, nobiletin and rutin, all contribute to its healing properties.



# 2. Introduction

**Cancer is a general term that includes a wide range of diseases that can affect any part of the body. Other terms used are malignant tumors and neoplasms. A hallmark of cancer is the rapid generation of abnormal cells that grow outside their usual boundaries and can then invade neighboring parts of the body and spread to other parts of the body. The latter process is called metastasis, and widespread metastases are the most important cause of death from cancer.<sup>i</sup>**



One of the things that gives us hope to defeat cancer is lemon. Scientific studies have recently proven the possibility of lemon extract eliminating malignant cells, which cause many types of cancers in the body, such as: breast cancer, colon cancer, and lung cancer, while not affecting healthy cells in any way. Harm or negative activity, and these studies have indicated the benefit of eating lemon, or lemon juice with warm water on an empty stomach in fighting cancer, and inhibiting the activity of cancer cells, because lemon contains limonoids, which play an effective role in this regard, and citrus fruits also contain In general, it contains twenty-two anti-cancer compounds, and the use of lemon is not limited to fighting Cancer only eats its juice, but eats the pulp, peels and seeds as well . ii



# Cont.

Most studies have focused on the fact that the substance found in lemons and citrus fruits in general that helps fight cancer cells is called lemon, which is a major active ingredient found in lemon peels and citrus fruits in general, as this substance contains strong antioxidant and anti-inflammatory properties. It is anti-cancer and has many health benefits.

Lemon may have the ability to reduce the risk of squamous cell carcinoma of the skin as well as stabilize the disease in colorectal cancer patients, and it may also have anticancer effects in breast cancer patients. In vitro studies also indicate its ability to synergize with Berberine and Docetaxel to inhibit gastric cancer and prostate cancer, respectively.

Limonene: a chemical found in lemon peel and the white membrane beneath it, it has great antitumor activity. Limonene is now being investigated for its potential use as a preventative treatment for cancer, particularly breast cancer.

Limonene inhibits the growth of breast cancer



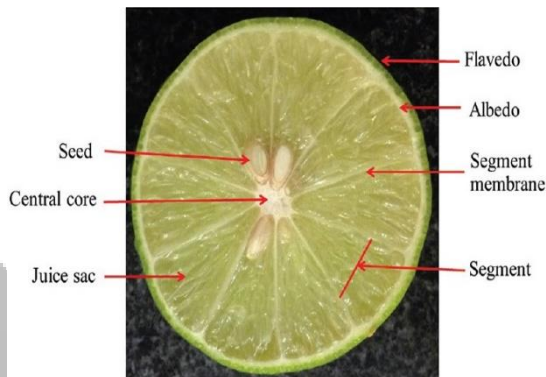
cells under laboratory conditions. It also causes estrogen to break down into a weaker form in the body which is important because estrogen levels are linked to an increased risk of breast cancer.

Limonene also enhances the liver's ability to remove potential carcinogens from the blood. Lemons are safe and have the same benefits in humans. It is a major component found in the oil extracted from lemon peels or other citrus fruits such as oranges, tangerines and grapefruit. It is also one of the most common terpenes (aromatic compounds found in plants) in nature and is often known as a "fragrance" terpene. . Lemon is also used as a flavoring agent and is found in fruit juices, soft drinks, baked goods, and candy. D-limonene exhibits powerful anti-inflammatory, antioxidant, and anti-carcinogenic properties. It is also considered a chemical with a fairly low toxicity. They are available as nutritional supplements in the form of citrus fruit extract, and in capsule and liquid form.<sup>iii</sup>

# 3. Studies

- \* A recent study conducted by scientists from the University of Arizona in the United States revealed the presence of a therapeutic substance in lemon useful in the treatment of cancer, according to the Russian website Rambler.

Lemon contains a high percentage of vitamin C and useful chemical elements for the body, as well as the oily substance d-limonene, which is found in the peel of various types of citrus, which was tested on 43 women suffering from breast cancer, who ate two grams of de-limonin every day before they



underwent surgery, and it turned out that this substance greatly helped in their recovery. The researchers confirmed, "The development of malignant tumors decreased after taking this substance by 22%, and the concentration of cyclin D1, which strongly affects the rates of development of cancerous diseases, decreased by 22%."

After conducting a set of medical and biochemical studies, information was obtained about the effectiveness of D-

limonene in regulating hormones and cleansing estrogen from toxins, by stimulating the secretion of required enzymes in the liver. This particular property is linked to the effectiveness of D-limonene in the fight against cancer <sup>iv</sup>.

- \* A case-control study conducted by researchers from the University of Arizona, which evaluated the relationship between eating citrus peels, major sources of D-Limonene and the risk of squamous cell carcinoma of the skin. skin, compared to those who ate only citrus fruits or juices. The study also found that the lower the risk of skin cancer increased with the increased intake of citrus peels <sup>v</sup>.
- \* An in vitro study by researchers from Northeastern Ohio Universities Colleges of Medicine and Pharmacy in the US found that D-Limonene enhanced the anti-tumor effect of Docetaxel against prostate cancer cells without being toxic to normal prostate epithelial cells..<sup>vi</sup>
- \* Research by Texas Agricultural Experiment Station scientists shows that citrus compounds called limonoids target and stop neuroblastoma cells in the lab. They now hope to find out the reasons for the downtime behavior and eventually try the citrus mixture on humans.

# Cont.

\* Neuroblastomas are responsible for about 10 percent of all cancers in children, Harris said, usually a solid tumor in the neck, chest, spinal cord or adrenal gland. The discovery in citrus is promising not only for its ability to stop cancer, but because limonoids cause no side effect, according to Dr. Ed Harris, a biochemist at Experiment Station who collaborated on the study with Dr. Bhimu Patil, a plant physiologist in Texas. A&M University - Kingsville Citrus Center in Weslaco.vii

Harris explained that the flavonoids and limonoids found in lemon peels or citrus in general—the nutrient-packed pigments that

give fruit color and taste—may work against cancer in any of three ways: preventing it from forming, slowing the growth of existing cancer, or killing cancer cells.

- \* A study revealed that those who drink tea regularly, especially those who add lemon to it, have a reduced risk of developing certain types of skin cancer. A possible explanation is that lemon enhances the activity of the enzyme glutathione S-transferase, which detoxifies carcinogenic compounds.viii
- \* Hot lemon can release a bittersweet substance that is anti-cancer cells, and it is the latest research and development for an effective treatment for cancer in the medical field. It affects healthy cells



# 4. Results

Lemon contains erostrol, histobridin and flavonoids that help protect the body from cancer in general, and lemon contains vitamin C, which stimulates flavonoids to confront cancer cells and protect the body from them, and this process is done by stimulating glutathione in your body and glutathione is The enzyme responsible for removing and expelling tumors and toxins from the body

Lemon peels, one of the most common citrus fruits used worldwide, are loaded with bioactive compounds and have great nutritional value. And consuming lemon peels in different forms - fresh, frozen, powdered, dried may have powerful antioxidant, anti-cancer and immune-stimulating effects .. ix

**Lemon peel supplements contain several active ingredients including Acacetin, Apigenin, Auraptene, D-Limonene, and Vitamin C at various concentration levels. Molecular pathways regulated by lemon peel include non-coding RNA signaling, carbohydrate metabolism, and stem cell signaling. These cellular pathways directly or indirectly regulate specific molecular end points of cancer such as growth, proliferation, and death. Because of this biological regulation of cancer nutrition, the right choice of supplements such as lemon peel individually or in combination is an important decision to make. When making decisions about using a lemon peel cancer supplement - consider all of these factors and interpretations. Because just as it applies to cancer treatments - using lemon peel cannot be a one-size-fits-all decision for all types of cancers..<sup>x</sup>**





## 4. Recommendations

- \* **Stop eating sugar and its derivatives. Without sugar in the body, cancer cells will die because cancer feeds on sugar, as it stops the activity of an enzyme called gluten, which transports sugar to cells. If this enzyme stops working, cancer cells die of starvation; Where they feed on the sugar in the cells. This enzyme is concentrated in vitamin C, so it is recommended to take lemon or lemon supplements that are free of any chemical or modified additives. This is because lemon juice extracts the entire fruit from the peel, pulp and seeds, not the lemon juice alone.**
- \* **Mix whole lemon fruit or natural lemon supplement with a glass of hot water and drink it.**
- \* **Cancer patients are generally advised to avoid drinking lemon juice or ready-made drinks, preferably without any local additives (sugar).**
- \* **Focus on taking natural lemon supplements or citrus fruits that contain vitamin C that strengthen immunity against many diseases, including cancer and also kill cancer cells ..**



