

# Xanthan Gum Mediated Nanocarriers in Cancer Therapy

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## ABSTRACT

A study in mice with melanoma found that it significantly slowed the growth of cancerous tumors and prolonged life. Xanthan gum has been used in the food, pharmaceutical, and cosmetic industries. Xanthan gum may help lower or stabilize blood sugar—Xanthan Gum in synthesizing gold nanoparticles. Xanthan gum is a complex exopolysaccharide produced by the plant-pathogenic bacterium *Xanthomonas campestris* and is used as a thickener or viscosities. We examined in this study the antitumor effects of xanthan gum. In foods, xanthan gum is common in salad dressings and sauces. It helps to prevent oil separation by stabilizing the emulsion. Xanthan Gum was used as both a reducing and stabilizing agent. Xanthan gum is a substance used in making some foods and medications. Xanthan gum is produced by fermenting a carbohydrate a substance that contains sugar.(1,2,3).

**Keywords:** Novel Drug Delivery System, Xanthan Gum, Carboxymethyl xanthan gum, Capped gold nanoparticles, Microwave synthesis, Doxorubicin

## INTRODUCTION

This study aimed to evaluate the effect of adding xanthan gum to the diet of rats on the production of cytokines and pro-inflammatory factors and tumor development in rats inoculated with Walker 256 tumor cells. (1) Xanthan gum may help treat some forms of cancer by slowing their growth. A 2009 study, for example, looked at mice with melanoma, a type of skin cancer. Mice treated with xanthan gum lived longer, and their tumors grew more slowly.

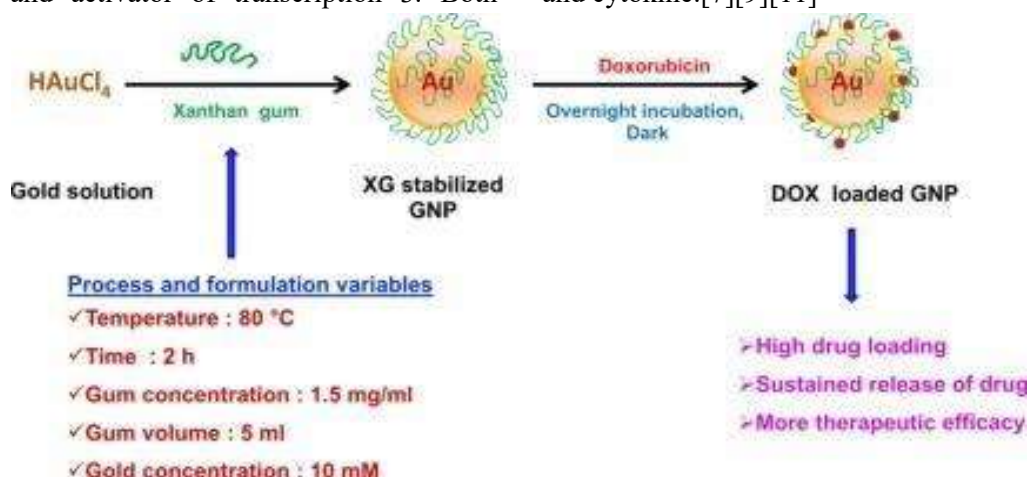
**Cancer-fighting properties:** A study in mice with melanoma found that it significantly slowed the growth of cancerous tumors and prolonged life. No human studies have been completed, so the current evidence is weak. The primary objective of this study was to evaluate the effect of xanthan gum in the diet of rats on the production of cytokine and pro-inflammatory factors, as well as on tumor development in rats. It's created when sugar is fermented by a type of bacteria called *Xanthomonas campestris*. When sugar is fermented, it creates a broth or goo-like substance, which is made solid by adding alcohol. It is then dried and turned into a powder. **Weight loss:** People have noted increased fullness after consuming xanthan gum. It may increase fullness by delaying stomach emptying and slowing digestion. Drug delivery applications in

cancer are inert, biocompatible, passively accumulate in the tumor, and can be fabricated into various-sized particles. In 1969 xanthan gum was cleared as a food additive by the FDA for the US market. In 1980 the EC approved xanthan gum and registered it as E415. Many countries have set specific rules concerning the use of food additives. We therefore advise you to carefully investigate them before the use of xanthan gum in your application. Cancer is one of the main causes of death. Its etiology is multifactorial and may be associated with a combination of genetic and environmental factors related to lifestyle. Systemic inflammation is recognized as a hallmark in the development and progression of cancer. Inflammation is a process that includes injury and resolution. In response to tissue damage, a multifactor network of chemical signals initiates and maintains a response to repair the affected tissue. This involves the activation and targeted migration of leukocytes from the venous system to the sites of damage, in addition to mast cells and neutrophils, which also play an important role in the repair of these lesions. Cell proliferation per se is known to not be a determining factor in tumor development. However, sustained cell proliferation in a rich environment rich in inflammatory cells, growth factors, and DNA-damaging agents certainly potentiates or promotes the increased risk of

**Relevant conflicts of interest/financial disclosures:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

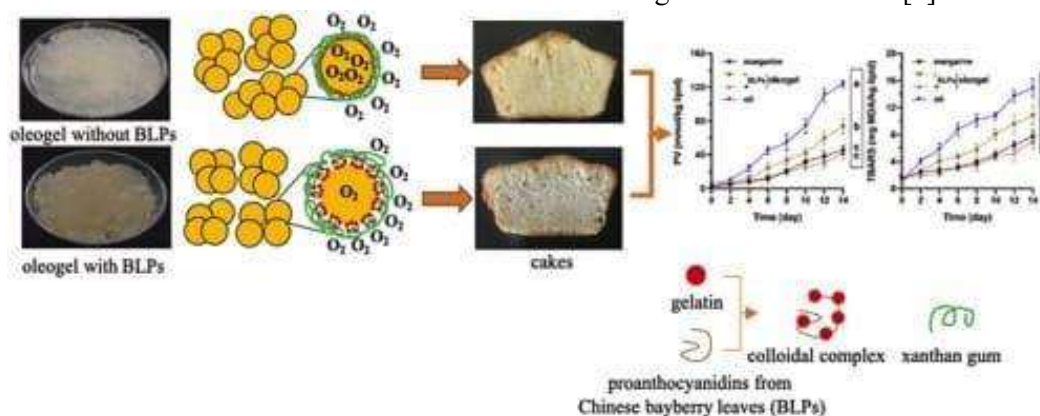
neoplasms. Pro-cancer events two major cell signaling pathways – nuclear kappa factor and signal transducer and activator of transcription 3. Both

transcription factors are linked to initiating inflammation and cell growth factors angiogenesis, and cytokine.[7][9][11]



**Method:**

Fifty-six rats were divided into 4 groups: control diet, control diet with tumor, xanthan gum diet, and xanthan gum diet with tumor.[1]



**Uses:**

- Use as a bulk-forming laxative to treat constipation.
- Lowering blood sugar in people with diabetes.
- Lowering cholesterol levels in people with diabetes.
- Use as a saliva substitute for dry mouth.
- Constipation.
- Xanthan gum seems to reduce constipation.
- Xanthan gum seems to improve swallowing and reduce the risk of aspirating food.
- Xanthan gum is used for diabetes, constipation, dry eye, and many other conditions. [5][6]

**Side-effects:**

- Xanthan gum is safe when up to 15 grams per day are taken. It can cause some side effects such as intestinal gas (flatulence) and bloating.
- People who are exposed to xanthan gum powder might experience flu-like symptoms, nose and throat irritation, and lung problems.

- Xanthan gum can cause migraines or skin irritations.
- Its side effects also include intestinal gas, flatulence, diarrhea, and bloating. Increased exposure can make the symptoms worse.[5][6]

**Dose:**

- The World Health Organization (WHO) has set the maximum acceptable intake for xanthan gum as a food additive at 10 mg/kg per day and as a laxative at 15 grams per day. For safety and effectiveness, bulk laxatives such as xanthan gum require extra fluids.
- For diabetes: a typical dose is 12 grams per day as an ingredient.[6]

**Health Benefits:**

- Lower cholesterol: A study had five men consume 10 times the recommended amount of xanthan gum per day for 23 days. Subsequent blood tests found that their cholesterol decreased by 10%.

- Weight loss: People have noted increased fullness after consuming xanthan gum. It may increase fullness by delaying stomach emptying and slowing digestion.
- Cancer-fighting properties: A study in mice with melanoma found that it significantly slowed the growth of cancerous tumors and prolonged life. No human studies have been completed, so the current evidence is weak.
- Improved regularity: Xanthan gum increases the movement of water into the intestines to create a softer, bulkier stool that's easier to pass. Studies have found that it significantly increases the frequency and amount of stool.
- Thickens liquids: It is used to thicken liquids for those who have difficulty swallowing, such as older adults or people with neurological disorders.
- Saliva substitute: It is sometimes used as a saliva substitute for individuals suffering from dry mouth, but studies on its effectiveness have found mixed results. [7]

#### **Precautions and Warning:**

- When taken by mouth: Xanthan gum is **LIKELY SAFE** in the amounts found in foods. It is also **LIKELY SAFE** when taken as a medicine in doses up to 15 grams per day. It can cause some side effects such as intestinal gas and bloating.
- Pregnancy and breast-feeding: Not enough is known about the use of xanthan gum during pregnancy and breast-feeding. Stay on the safe side and avoid using amounts larger than those normally found in foods.
- Nausea, vomiting, appendicitis, hard stools that are difficult to expel (fecal impaction), narrowing or blockage of the intestine, or undiagnosed stomach pain: Do not use xanthan gum if you have any of these conditions. It is a bulk-forming laxative that could be harmful in these situations.
- Surgery: Xanthan gum might lower blood sugar levels.
- There is a concern that it might interfere with blood sugar control during and after surgery. Stop using xanthan gum at least 2 weeks before a scheduled surgery. [5][6]

#### **Interaction:**

- Medications for diabetes (Antidiabetes drugs) Interaction Rating: Moderate Be cautious with this combination. Talk with your health provider.

- Xanthan gum might decrease blood sugar by decreasing the absorption of sugars from food. Diabetes medications are also used to lower blood sugar. Taking xanthan gum with diabetes medications might cause your blood sugar to be too low. Monitor your blood sugar closely. The dose of your diabetes medication might need to be changed.[5][6]

#### **CONCLUSION**

The continuous use of xanthan gum triggered a pro-inflammatory response, promoting an increase in pro-inflammatory cytokines in the adipose tissue, but it did not have an effect on the tumor development in the animals inoculated with Walker 256 tumor cells.

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