This Food Additive Is Banned in the EU — But Widely Used in the U.S. to Whiten Gum, Candies, Breads and Ice Cream

Titanium dioxide, the most widely used whitening pigment in the world, is linked to adverse health effects, particularly genotoxicity and intestinal inflammation.

By U.S. Right to Know

By Mikaela Conley

Titanium dioxide (TiO2) is the most widely used whitening pigment in the world and has been linked to adverse health effects, particularly genotoxicity and intestinal inflammation.

It is applied as a food coloring and a whitening agent to a wide variety of foods, including chewing gum, cakes, candies, breads and ice cream.

Because of health risks, France banned titanium dioxide as a food additive in 2020. Two years later the European Union (EU) also banned titanium dioxide as a food additive.

But in the U.S., titanium dioxide is found all over the grocery shelves.

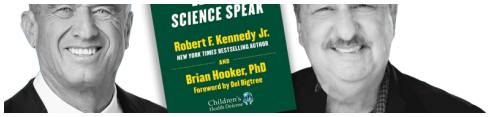
Candy like Skittles and Starburst, Jell-O, gum like Trident White Peppermint Gum and Mentos Freshmint Gum, cake products like Duncan Hines Creamy Vanilla Frosting, and Nabisco Chips Ahoy! cookies are just a few of the myriad of food items that contain the additive.

A significant body of research, mostly from rodent models and in vitro studies, has linked titanium dioxide with health risks related to the gut, including intestinal inflammation, alterations to the gut microbiota and more.

It is classified by the International Agency for Research on Cancer in Group 2B, as possibly carcinogenic to humans.

As a food additive, titanium dioxide and its nanoparticles in particular have been associated with DNA damage and cell mutations, which in turn, have the potential to cause cancer. When used as a food coloring, it is known as E171.

With the rise of nanotechnology, research in recent years has also shown the dangers of titanium dioxide nanoparticles and their genotoxicity, which refers to a chemical agent's ability to harm or damage DNA in cells, thus potentially causing cancer.



Nanoparticles

Over the last several years, nanoparticles have come under scrutiny for adverse health effects. Nanoparticles are ultrafine particles between 1 to 100 nanometers in diameter. (To put this in perspective, the average human hair is around 80,000 nanometers thick.)

Because of their size, which can be engineered and manipulated at the atomic or molecular level, nanoparticles exhibit unique physical, chemical and biological properties. Titanium dioxide is one of the most commonly produced nanoparticles in the world.

Studies of titanium dioxide as a food additive suggest health dangers

Genotoxicity and cytotoxicity

Numerous studies have linked titanium dioxide to genotoxicity and cytotoxicity. Genotoxicity refers to a chemical's potential to cause DNA damage, which can, in turn, lead to cancer. Cytotoxicity is a general term that refers to a characteristic of being harmful to cells.

French researchers studied how and where E171 nanoparticles enter the bloodstream, first studying the route through pigs and then in vitro with human buccal cells, for a 2023 study published in the journal Nanotoxicology.

The research showed that the nanoparticles absorbed quickly through the mouth and then into the bloodstream, before damaging DNA and hindering cell regeneration.

In a 2016 study published in Scientifica (Cairo), Egyptian researchers examined the effects of titanium dioxide nanoparticles on the organs of mice by orally administering the food additive daily, for five days. The results showed that the exposure produced "mild to moderate changes in the cytoarchitecture of brain tissue in a time dependent manner."

Furthermore, "Comet assay revealed the apoptotic DNA fragmentation, while PCR-SSCP [polymerase chain reaction single-strand conformation polymorphism] pattern and direct sequencing showed point mutation of Presenilin 1 gene at exon 5, gene linked to inherited forms of Alzheimer's disease."

The researchers wrote:

> "From these findings, 'the present study concluded that TiO2NPs [nanoparticles] is genotoxic and mutagenic to brain tissue which in turn might lead to Alzheimer's disease incidence.'"

For research published in 2022 study in the journal Food and Chemical Toxicology, scientists examined "the genotoxicity and the intracellular reactive oxygen species induction by physiologically relevant concentrations of three different TiO2 nanomaterials [NM] in Caco-2 and HT29-MTX-E12 intestinal cells, while considering the potential influence of the digestion process in the NMs' physiochemical characteristics."

They found a "DNA-damaging effect dependent on the nanomaterial," along with the micronucleus assay suggesting "effects on chromosomal integrity, an indicator of cancer risk, in the HT29-MTX-E12 cells, for all the tested TiO2 nanomaterials."

Researchers concluded that the results showcase “evidence of concern” regarding titanium dioxide used as a food additive.

In a study published in the journal Toxicology, researchers examined the effects of exposing the human colon cancer cell line (HTC116) to titanium dioxide food additives in vitro.

“In the absence of cytotoxicity, E171 was accumulated in the cells after 24 hours of exposure, increasing granularity and reactive oxygen species, inducing alterations in the molecular pattern of nucleic acids and lipids, and causing nuclei enlargement, DNA damage and tubulin depolymerization,” the scientists wrote.

Researchers removed the additive from the culture and then examined the results 48 hours later.

They found, “The removal of E171 was unable to revert the alterations found after 24 h of exposure in colon cells. In conclusion, exposure to E171 causes alterations that cannot be reverted after 48 h if E171 is removed from colon cells.”

A review published in 2022 in the journal NanoImpact evaluated the latest research related to the genotoxic effects of titanium dioxide through in vivo studies and in vitro cell tests. Researchers summarized the results by stating that TiO2 nanoparticles “could induce genotoxicity prior to cytotoxicity,” and “are likely to be genotoxic to humans.”

Inflammation of the intestines

Animal studies have shown that, when consumed as a food additive, titanium dioxide can induce intestinal inflammation.

In a 2019 study published in the journal Nanotoxicology, researchers recreated the first phase of digestion in mice and fed them titanium dioxide, then examined whether accumulation occurred in the organs.

The researchers wrote:

> “Significant accumulation of titanium was observed in the liver and intestine of E171-fed mice; in the latter, a threefold increase in the number of TiO2 particles was also measured.
>
> “Titanium accumulation in the liver was associated with necroinflammatory foci containing tissue monocytes/macrophages. Three days after the last dose, increased superoxide production and inflammation were observed in the stomach and intestine.

> "Overall, [this] indicates that the risk for human health associated with dietary exposure to E171 needs to be carefully considered."

A study published in the Journal of Agricultural and Food Chemistry in 2019 sought to examine the effects of titanium dioxide on intestinal inflammation. Researchers did this by feeding rats titanium dioxide nanoparticles and found that, after the course of two to three months, the animals had lower body weights and induced intestinal inflammation.

The researchers also found the nanoparticles altered gut microbiota composition and aggravated chronic colitis. The rats also experienced reduced populations of CD4+T cells (which are cells that help organize immune responses by prompting other immune cells to fight infection), regulatory T-cells and white blood cells in mesenteric lymph nodes.

The researchers wrote:

> "Dietary TiO2 nanoparticles could interfere with the balance of the immune system and dynamic of gut microbiome, which may result in low-grade intestinal inflammation and aggravated immunological response to external stimulus, thus introducing potential health risk."

For a mini-review published in the journal Particle and Fibre Technology in 2021, scientists wanted to evaluate whether TiO2 particles contributed to the development and/or exacerbation of irritable bowel disease and whether they altered the four elements of intestinal barrier function (IBF): the intestinal microbiota, the immune system, the mucus layer and the epithelium.

The breakdown of these four elements can contribute to autoimmune, neurological, inflammatory, infectious and metabolic diseases.

Following their review, the researchers concluded: "Data indicate that TiO2 is able to alter the four compartments of IBF and to induce a low-grade intestinal inflammation associated or not with pre-neoplastic lesions."

Neurotoxicity

Scientists analyzed research that examined how titanium dioxide nanoparticles interact with the brain for a 2015 review published in Nanoscale Research Letters.

The researchers wrote:

> "Once the TiO2 NPs are translocated into the central nervous system through [certain] pathways, they may accumulate in the brain regions. For their slow elimination rates, those NPs could remain in the brain zones for a long period, and the Ti contents would gradually increase with repeated exposure."

After reviewing dozens of studies, the scientists concluded: "Long-term or chronic exposure to TiO2 nanoparticles could potentially lead to the gradually increased Ti contents in the brain, which may eventually induce impairments on the neurons and glial cells and lead to CNS dysfunction as a consequence."

For research published in the Archives of Toxicology in 2020, scientists fed one group of mice a solution containing titanium dioxide for one month and compared it to those that did not receive the additive.

They found “the richness and evenness of gut microbiota were remarkably decreased and the gut microbial community compositions were significantly changed” in the titanium dioxide group when compared with the control group.

The tests also revealed that titanium dioxide exposure could cause locomotor dysfunction, or mobility issues “by elevating the excitement of enteric neurons, which might spread to the brain via gut-brain communication by vagal pathway.”

The researchers concluded:

> “These findings provide valuable insights into the novel mechanism of TiO2NP-induced neurotoxicity. Understanding the microbiota-gut-brain axis will provide the foundation for potential therapeutic or prevention approaches against TiO2NP-induced gut and brain-related disorders.”

In a 2020 study published in the Journal of Trace Elements in Medicine and Biology, researchers conducted an in vitro experiment to analyze the effects of TiO2 nanoparticles on a human neuroblastoma (SH-SY5Y) cell line. The scientists evaluated “reactive oxygen species (ROS) generation, apoptosis, cellular antioxidant response, endoplasmic reticulum stress and autophagy.”

The results showed that exposure to the nanoparticles “induced ROS generation in a dose-dependent manner, with values reaching up to 10-fold those of controls. Nrf2 nuclear localization and autophagy also increased in a dose-dependent manner. Apoptosis increased by 4- to 10-fold compared to the control group, depending on the dose employed.”

Promotion of obesity-related metabolic disorders

For a review published in 2023 in the journal Environmental Pollution, researchers examined E171 as a possible factor promoting obesity-related metabolic disorders.

Because gut microbiota plays an important role in immune function maintenance and development, and because titanium dioxide as a food additive has been shown to alter gut microbiota, researchers wanted to review “the dysregulations along the gut microbiota-immune system axis after oral TiO2 exposure compared to those reported in obese or diabetic patients, and to highlight potential mechanisms by which foodborne TiO2 nanoparticles may increase the susceptibility to develop obesity-related metabolic disorders.”

The study authors discovered recurrent changes in the gut microbiota composition when exposed to titanium dioxide nanoparticles, with an imbalance of intestinal symbiotic microbiota.

These changes and imbalances were also reported and played a role in the development of obesity, the authors wrote. This highlights "foodborne TiO_2 nanoparticles as an endocrine disruptor-like chemical promoting obesity-related disorders," the authors concluded.

Colorectal tumors and preneoplastic lesions

In a study published in the journal Food and Chemical Toxicology in 2016, researchers investigated whether titanium dioxide exposure led to an increase in colorectal tumor creation in mice by using a colitis-associated cancer model.

By measuring tumor progression markers, the researchers found that mice given titanium dioxide experienced enhanced tumor formation in the distal colon.

There was also a decrease in cells that act as a protective barrier in the colon.

The researchers wrote: "These results suggest that E171 could worsen pre-existent intestinal diseases."

In a 2017 study published in Scientific Reports, researchers exposed rats to human-relevant levels of E171 to examine the effects of intestinal inflammation and carcinogenesis.

They saw that "a 100-day E171 treatment promoted colon microinflammation and initiated preneoplastic lesions while also fostering the growth of aberrant crypt foci in a chemically induced carcinogenesis model."

They continued:

> "Stimulation of immune cells isolated from Peyer's Patches [which are clusters of lymphoid follicles found in the intestine] showed a decrease in Thelper (Th)-1 IFN-γ secretion, while splenic Th1/Th17 inflammatory responses sharply increased.
>
> "A 100-day titanium dioxide treatment promoted colon microinflammation and initiated preneoplastic lesions."

The scientists concluded:

> "These data should be considered for risk assessments of the susceptibility to Th17-driven autoimmune diseases and to colorectal cancer in humans exposed to TiO_2 from dietary sources."

Alterations in gut microbiota

Research has shown that, when ingested as a food additive, titanium dioxide and its nanoparticles can impact, alter and/or damage important protective bacteria in the gut, along with the metabolic pathways of gut bacteria.

In a 2023 study published in the journal Environmental Research, scientists examined the effect of titanium dioxide nanoparticles on important gut bacteria in mice.

Their results showed that "the growth inhibitory effects could be associated with cell membrane damage caused by titanium dioxide nanoparticles to the bacterial strains. Metabolomics analysis showed that TiO_2 NPs caused alterations in multiple metabolic

pathways of gut bacteria, such as tryptophan and arginine metabolism, which were demonstrated to play crucial roles in regulating gut and host health."

The researchers also found that four different neuroprotective metabolites "were significantly reduced" in urine and in vitro bacteria and vivo urine samples.

The researchers concluded:

> "Increasing evidence implies that the gut microbiome plays a profound role in regulating host metabolism. Our results illustrated that TiO2 NPs hindered the growth of four beneficial gut bacterial strains."

Australian researchers examined how titanium dioxide as a food additive affected gut microbiota in mice by orally administering it in drinking water.

The study, published in the journal Frontiers in Nutrition in 2019, found the treatment could "alter the release of bacterial metabolites in vivo and affect the spatial distribution of commensal bacteria in vitro by promoting biofilm formation. We also found reduced expression of the colonic mucin 2 gene, a key component of the intestinal mucus layer, and increased expression of the beta-defensin gene, indicating that titanium dioxide significantly impacts gut homeostasis."

The changes were then linked to colonic inflammation, along with a higher expression of inflammatory cytokines, which are signal proteins that help with regulation. The researchers concluded that titanium dioxide "impairs gut homeostasis which may in turn prime the host for disease development."

In a small study published in the European Journal of Nutrition in 2020, researchers examined the effects of several food additives, including titanium dioxide, along with artificial sweeteners and cleaning products by testing the fecal samples of 13 people. Titanium dioxide was among the samples that "induced significant shifts in microbiome community structure."

The growth of the bacterium species belonging to C. leptum, which has been shown to decrease in patients with inflammatory bowel disease, "significantly decreased in the presence of … titanium dioxide" among other additives and sweeteners tested.

In a study published in the journal Environmental Toxicology and Pharmacology in 2020, researchers examined the effects of food additives titanium dioxide and silica on the intestinal tract by grouping and feeding mice three different food-grade particles — micro-TiO2, nano-TiO2 and nano-SiO2.

With all three groups, researchers observed changes in the gut microbiota, particularly mucus-associated bacteria. Furthermore, all three groups experienced inflammatory damage to the intestine, but the nano-TiO2 displayed the most pronounced changes.

The researchers wrote:

> "Our results suggest that the toxic effects on the intestine were due to reduced intestinal mucus barrier function and an increase in metabolite lipopolysaccharides which activated the expression of inflammatory factors downstream.

> "In mice exposed to nano-TiO2, the intestinal PKC/TLR4/NF-κB signaling pathway was activated. These findings will raise awareness of toxicities associated with the use of food-grade TiO2 and SiO2."

Increased severity of ulcerative colitis

A 2023 study published in the journal Particle and Fibre Toxicology set out to examine the impact of titanium dioxide nanoparticles in mice "on the course and prognosis of ulcerative colitis," by creating an ulcerative colitis disease model. Researchers found that the titanium dioxide nanoparticles significantly increased the severity of colitis.

They also "decreased the body weight, increased the disease activity index and colonic mucosa damage index scores, shortened the colonic length, increased the inflammatory infiltration in the colon."

Researchers concluded: "Oral intake of TiO2 nanoparticles could affect the course of acute colitis in exacerbating the development of ulcerative colitis, prolonging the ulcerative colitis course and inhibiting ulcerative colitis recovery."

Atherosclerosis

In a 2022 study published in the Journal of Hazardous Materials, scientists wanted to examine the effects of titanium dioxide as a food additive on atherosclerosis in mice. (Atherosclerosis refers to a hardening of the arteries.)

Researchers fed mice 40 milligrams/kilograms of the food additive every day for 4 months and found that it not only altered gut microbiota but also led to a significantly increased atherosclerotic lesion area, especially in animals that consumed a high-choline western diet.

Promotion of noncancerous tumors

Mexican researchers sought to evaluate the effects of E171 across a span of conditions in mice, including its influence on behavior, along with the effects on the colon and liver.

The research, published in 2020 in the journal Food and Chemical Toxicology, showed that E171 promoted anxiety and induced adenomas, or noncancerous tumors, in the colon.

They also found that E171 heightened goblet cells hypertrophy and hyperplasia, which is typically seen in asthma patients and triggered by smoking or external pollutants and toxins. They also noted mucins overexpression in the mice, which can be linked to cancer cell formation.

Breathing problems in offspring

In a study published in 2022 in the journal Particle and Fibre Technology, researchers examined the impact of maternal exposure to titanium dioxide nanoparticles in newborn offspring mice.

They found that "a chronic exposure to TiO2 NPs during pregnancy alters the respiratory activity of offspring, characterized by an abnormally elevated rate of breathing." Breathing was also shown to be "significantly and abnormally accelerated," and the ability for neural circuitry to effectively adjust breathing rates was impaired.

The researchers concluded:

> "Our findings thus demonstrate that a maternal exposure to TiO2 NPs during pregnancy affects the normal development and operation of the respiratory centers in progeny."

Decreased vitamin D bioaccessibility

In 2021, Chinese researchers examined the impact of E171 on lipid digestion and vitamin D3 bioaccessibility in a simulated human gastrointestinal tract model.

They examined vitamin D's bioaccessibility, or the amount it was released in the gastrointestinal tract, becoming available for absorption, and found it "significantly decreased from 80% to 74%" with the addition of E171. In the experiment, E171 decreased lipid digestion dose-dependently.

The researchers wrote:

> "The findings of this study enhance our understanding toward the potential impact of E171 on the nutritional attributes of foods for human digestion health."

The study was published in the Journal of Agricultural and Food Chemistry.

Exposure to titanium dioxide in utero and in breastfeeding children

In a review published in 2022 in the journal Archives of Toxicology, researchers found that the ingestion of E171 is "a definite health risk for consumers and their progeny."

After reviewing dozens of in vivo, ex vivo and in vitro studies on the toxicity of E171, the researchers wrote that two facts must be noted:

> "First, reprotoxicity studies show that animals of both sexes are impacted by the toxicity of these nanoparticles, underlining the importance of conducting in vivo studies using both male and female animals.
>
> "Second, human exposure begins in utero via maternal-fetal transfer and continues after birth by breastfeeding. Children are then chronically re-exposed due to their food preferences. To be relevant to the human in vivo situation, experimental studies should therefore consider nanoparticle exposure with respect to the age or life period of the studied population."

What exactly is titanium dioxide?

Titanium dioxide is a chemically inert inorganic compound and an insoluble white solid that occurs naturally in several minerals, including rutile, anatase and brookite. It is created synthetically from the mineral ilmenite.

It is an insoluble white solid. Anatase, when compared to brookite and routine, has the most industrial applications, but it is the most toxic form of TiO2.

There are several manufacturers of titanium dioxide as a color agent; the largest include Delaware-based Chemours (a spin-off of DuPont Chemical, U.K.-based Venator, Texas-based Kronos, and Connecticut-based Tronox.

As a color agent, it is called Pigment White 6, titanium white, or CI 77891.

In the U.S., titanium dioxide is legal and used extensively as an additive in foodstuff; it is categorized as GRAS, or "generally recognized as safe," under U.S. Food and Drug Administration (FDA) guidelines.

Nanotoxicology

Nanotoxicology "focuses on determining the adverse effects of nanomaterials on human health and the environment."

In general, nanoparticles have been shown to accumulate in the body, particularly in organs in the gastrointestinal tract, along with the liver, spleen and capillaries of the lungs.

Titanium dioxide nanoparticles are commonly found in a wide range of consumer goods, including cosmetics, sunscreens, paints and colorings, ceramics, glass, textiles, construction materials, medicine, food, food packaging and more.

In Europe, cosmetic companies are required to label products that contain nanoparticles. In the U.S., companies are not.

In 2017, French researchers from the Institut National de la Recherche Agronomique were among the first to examine the effects of E171 nanoparticles on the body.

They fed rats a dose of 10 milligrams of E171 per kilogram of body weight per day, which was similar to human exposure in food.

The research, which was published in Scientific Reports, showed that E171 was able to traverse the intestinal barrier, pass into the bloodstream and reach other areas of the body in rats.

Researchers also found a link between immune system disorders and the absorption of titanium dioxide nanoparticles.

Titanium dioxide nanoparticles have also been found in human placentae and in infant meconium, indicating its ability to be transferred from mother to fetus.

A 2012 study published in the journal Environmental Science & Technology noted that children are especially exposed to titanium dioxide because of the food that contains the food additive and is particularly marketed to children, including candy and cakes.

Recent policy changes in regard to titanium dioxide

EU ban on titanium dioxide

The European Commission banned titanium dioxide as a food additive in the EU in 2022 after the European Food Safety Authority (EFSA) conducted an updated safety assessment of E171 and concluded the panel could not eliminate concerns about its genotoxicity.

EFSA scientific conclusion on E171

Following a request for assessment in 2020 by the EU, the EFSA assessed E171, particularly for its genotoxicity. In 2022, the agency deemed the food additive no longer safe for use.

Maged Younes, Chair of EFSA's expert Panel on Food Additives and Flavourings, wrote of the decision:

> "Taking into account all available scientific studies and data, the Panel concluded that titanium dioxide can no longer be considered safe as a food additive.
>
> "A critical element in reaching this conclusion is that we could not exclude genotoxicity concerns after consumption of titanium dioxide particles. After oral ingestion, the absorption of titanium dioxide particles is low, however they can accumulate in the body."

Matthew Wright, chair of EFSA's working group on E171, noted:

> "Although the evidence for general toxic effects was not conclusive, on the basis of the new data and strengthened methods we could not rule out a concern for genotoxicity and consequently we could not establish a safe level for daily intake of the food additive."

FDA's response

Following the EU's ban on E171, the FDA told the Guardian that, based on current evidence, titanium dioxide as a food additive is safe:

> "The available safety studies do not demonstrate safety concerns connected to the use of titanium dioxide as a color additive."

Currently, titanium dioxide as a food additive is classified as GRAS, or "generally recognized as safe."

The FDA has not updated its general guidance on safety assessments since 2007.

Within that time, there has been a significant increase in research on the confluence of toxicology, nanotechnology and human health.

The EU updates its guidance regularly with new science available to offer proper safety assessments, with its most recent update published in 2021.

As for titanium dioxide, the FDA approved titanium dioxide for use as a food additive in 1966. The last time the agency reviewed the additive's safety, according to the Guardian, was in 1973.

States looking to ban titanium dioxide as a food additive

In 2023, California and New York proposed banning several food additives that are banned in Europe but legal in the U.S. Titanium dioxide was among the five proposed to be banned, but in September, the additive was removed from the list of additives from the California ban list.

Australia and New Zealand review of TiO2

In 2022, a year after the EFSA recommended against the use of E171, Food Standards Australia New Zealand conducted its own reassessment of titanium dioxide as a food additive.

The agency concluded that titanium dioxide was indeed safe to use as a food additive. The U.K. and Canada came to similar conclusions.

Originally published by U.S. Right to Know.

Mikaela Conley is a science journalist at U.S. Right to Know.

SUGGEST A CORRECTION

U.S. Right to Know

Children's Health Defense Comment Policy

We welcome relevant and respectful comments. Off-topic comments may be removed.

Please read our Comment Policy before commenting.

Got it

12 Comments 1 Login ▾

G Join the discussion…

LOG IN WITH OR SIGN UP WITH DISQUS ?

Name

♡ 1 Share Best Newest Oldest

P **Polly Green**
3 months ago edited

FYI buccal cells are the cells inside your mouth, as in “buccal swabs” which is a method of grabbing cells for genetic sequencing. People should be aware—I was not—that even “titanium” joint replacements and other orthopedic hardware isn’t a pure metal. It’s an alloy which includes nickel, and nickel is one of the most common solid material allergens. After I had a knee replacement I developed widespread inflammation all over my body, inside and out. Anything with white frosting or “creme” in it (like Oreos) will have titanium dioxide in it. Think of the gut-brain axis and how our gut micro biome is known to affect mood, so it’s pretty scary that we’ve been fed this gunk for decades as a “GRAS” additive when it’s clearly not.

11 0 Reply • Share ›

BChristine ↗ Polly Green
3 months ago

I question ANYTHING GRAS-labeled. This is a term for chemicals or substances added to food which FDA coined

and deems as "safe". Considering the FDA's history of lies and deception, I typically stay away from any ingredient I can't pronounce or have to research ...

6 0 Reply • Share ›

P **Polly Green** → BChristine

3 months ago

Yes. I gave up on anything that cannot be grown in dirt or butchered more or less locally.

6 0 Reply • Share ›

BraveNewWhirled → Polly Green

3 months ago

...and all TiO2 does, is make our "food" more attractive. In other words it's useless to us but very helpful from a marketing standpoint, to the giant corporations.

1 0 Reply • Share ›

P **Polly Green** → BraveNewWhirled

3 months ago

Unless chronic illness is one of the goals of their stockholders (Vanguard, BlackRock, State Street).

2 0 Reply • Share ›

L **LS**

3 months ago

Yep, also found in vitamins and most pharmaceutical drugs. Thank you for bringing attention to this! Love CHD!

3 0 Reply • Share ›

ConnectingDots → LS

3 months ago

I found "titanium dioxide (color)" as the final listed ingredient in vitamin-C softgels sold by a major online vitamin shop.

0 0 Reply • Share ›

J **Jennifo**

3 months ago

Swollen colon...yep I'm not surprised since so many people have a dysfunctional digestive system & have very little knowledge about how to fix it. Once I improved mine & eliminated 98% of processed

how to fix it. Once I improved mine & eliminated 98% of processed & garbage foods & did a strict elimination diet did my microbiome & health drastically improve. It's a long path but well worth it especially in these dark days of health.

2 0 Reply • Share ›

C

Christine Jahnig

3 months ago

Of course. Our government is more interested in supporting the profit margins of corporations than it is in ensuring the health of U.S. citizens.

1 0 Reply • Share ›

Hemlock and Glint → Christine Jahnig

3 months ago edited

They are also co-united in the nefarious front to weaken the strong, bring everyone to their knees to the caduceus which is the symbol adopted by the medical and veterinary organizations and WHO. We are attacked from all angles including the various adulterating strengths of titanium dioxide.

Eat local organic micro nutrient rich food and drink clean unadulterated spring water.

Think ahead 7 generations for your family.

Go natural, support your neighbours who study and live and breathe the natural health of remedial plants, crystals, manipulations, touch, foods, midwifery, energies... There are many disciplines of natural health and preventive care. Notice how difficult it is getting to obtain info from the Internet even with blocking ads and cookies and tags.

see more