Meredy Birdi Mar 27 11 min read

Is turmeric safe to eat for people with hormone-sensitive cancers?

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Turmeric is a bright yellow spice commonly used in cooking, especially in Indian and Southeast Asian cuisines. It comes from the root of the turmeric plant and has a warm, bitter taste. Turmeric contains curcumin, which is its main active component. Curcumin has been widely studied for its potential health benefits, most notably its anti-inflammatory and antioxidant properties.

The amount of curcumin in turmeric root is relatively low (typically less than 5%), and it is poorly absorbed in the gut (1). For this reason, supplements with high concentrations of curcumin are often used to study its effects and much of the research on the health benefits of turmeric have focussed on curcumin supplements.

Why might turmeric be beneficial for overall health and living with cancer?

As a potential anti-inflammatory and antioxidant compound, curcumin may be beneficial to supporting overall health when living with cancer, as well as managing some symptoms, and treatment related side effects.

Research compiling large amounts of data to analyse the effects on inflammation in the body, from a wide range of foods and nutrients, shows that turmeric has one of the strongest anti-inflammatory effects (2). While this is of interest, it is important to note that we see the greatest health gains in whole dietary patterns, where the diet contains a diverse and abundant range of 'anti-inflammatory' plant foods (3). Therefore, consuming turmeric alongside other plant foods, herbs and spices is more likely to be beneficial rather than focusing on turmeric in isolation.

Human clinical trials using curcumin supplements have shown mixed findings on its ability to successfully reduce inflammation in the body (4),(5),(6). The variable results could potentially be because different forms and dosages of curcumin are used in the trials, alongside differences in participants' health, diet, and lifestyle. Additionally, there are many factors that affect inflammatory processes in the body, and as a result, it is very difficult to isolate and examine the effects of one supplement or one nutrient independently. Our overall diets and lifestyle are key.

Some laboratory studies on cancer cells have shown that curcumin has anti-cancer properties. It appears to be able to kill cancer cells and prevent more from growing. Curcumin is being looked at in clinical trials and some of the results have been promising. Larger studies are needed. At the moment, there is no clear evidence in humans to show that turmeric or curcumin can prevent or treat cancer (Cancer Research UK).

What's the worry about turmeric for people with hormone-sensitive cancers?

Curcumin has been shown to have weak oestrogen-like effects in some laboratory studies. For people with hormone-sensitive cancers, such as breast, ovarian, or prostate cancer, exposure to compounds that can affect hormones might therefore be a concern. As curcumin can act as a phytoestrogen (meaning it is a plant compound that can mimic some of the effects of oestrogen on the body) could it potentially stimulate the growth of hormone-sensitive cancers?

What are phytoestrogens and are they friend or foe?

Phytoestrogens are compounds that occur naturally in a wide range of plant foods, including several wholegrains, legumes, seeds, apples, red grapes, citrus fruits, berries, cruciferous vegetables, herbs, spices, and tea (7). Phytoestrogens have a similar structure to our own body's oestrogen and can bind to the same receptors that our own oestrogen does.

Anything purported to 'mimic oestrogen' is understandably concerning with regards to hormone-sensitive cancers. However, evidence shows that phytoestrogens and oestrogen are not as similar as their name suggests.

Laboratory studies looking at different phytoestrogens (8) have shown that there are a variety of ways phytoestrogens can interact with oestrogen and its mechanisms in the body; the majority of which appear to be protective for hormone-sensitive cancers. For example, as phytoestrogens are less potent than the hormone oestrogen, when they attach to oestrogen receptors on our cells, they can render the receptors unavailable to oestrogen, producing a weaker overall effect.

Nevertheless, it is important to note that laboratory studies look at single mechanisms between isolated phytoestrogen compounds at very high doses. This is not directly comparable to the many different mechanisms and compounds acting together from whole foods in the human body. Therefore, to ascertain the actual health effects of these compounds we need to look to human evidence.

Phytoestrogens are abundant in plants and only a plant-free diet would eliminate exposure to them. A cornerstone of global dietary recommendations for cancer prevention, and for risk-reduction following a cancer diagnosis, is to '*make whole-grains, vegetables, fruit, and pulses such as beans and lentils a major part of the usual daily diet'* (9). When looking at observational studies in large populations, plant foods are associated with either beneficial or neutral outcomes in cancer, including hormone-sensitive cancers (10),(11),(12).

Of all dietary phytoestrogens, soy has the most human evidence available currently and combining results from many different studies (a meta-analysis) shows this food may be protective in cancer both pre- and post-diagnosis (13),(14),(15). In studies that examined hormone responsive cancers specifically, the worst-case scenario was that soy had no effect on cancer outcomes, either positive or negative – importantly, it did not increase risk. Lab studies show some compounds in soy may be protective in isolation, whereas some may be problematic. Yet when they're looked at in whole foods, in whole diets, the overall effect is beneficial or neutral. This is potentially due to the balanced, synergistic effect of soy's several phytoestrogens and other beneficial nutrients and is a good example of phytoestrogens being a friend and not foe when it comes to oestrogen and cancer.

"Current evidence suggests that a diet containing naturally occurring phytoestrogens is safe if you've had breast cancer and may be beneficial"
Breast Cancer Now

What about research on turmeric specifically?

Like other phytoestrogens, most studies on turmeric (curcumin) have been performed in laboratory cell experiments and in rodents. The studies typically examine isolated compounds, and look at one specific mechanism, at supplemental doses (e.g. 3000mg per day). This is far beyond the amounts we consume by simply adding turmeric as a culinary spice. Therefore, any protective or detrimental effect inferred in these studies is not relevant to looking at food sources in real diets, in real people. However, we can combine findings from laboratory studies with human evidence to gain an overall understanding of its potential effects.

- Laboratory studies

A 2010 cell study examining curcumin demonstrated a very weak oestrogenic effect (16). This was at 100nm blood concentrations, which is unachievable from food-based consumption. 100nm curcumin is far beyond concentrations seen in human studies from diet alone, including in blood analysis of Asian populations with high dietary intakes of turmeric (17). Even at these high concentrations, the study showed curcumin had significantly weaker effects than the hormone oestrogen and had no significant effect on any genetic mechanism influenced by oestrogen (16).

Other laboratory studies have used even higher concentrations of curcumin to explore its effects at these doses (18),(19),(20). Overall, they report mild oestrogenic effects, which appear to be beneficial, as the weaker phytoestrogen counteracts and interrupts the actions of our stronger hormone oestrogen on our cells, genes,

and bodily processes. Consequently, several protective effects from curcumin in hormone-sensitive cancer processes have been observed including increased cell death (apoptosis), decreased growth of new blood vessels that tumours need to grow (angiogenesis), and cancer spread (metastasis).

- Human studies

Observational studies have shown that incidence rates of hormone-sensitive cancers are generally higher in Western populations compared to Asian populations (21). This variation in incidence is influenced by multiple factors, including dietary factors. Spices, such as turmeric, are a key difference in Asian diets compared to Western diets and have been suggested to have cancer-protective properties. Although observational studies can only establish associations and not causation, the lack of supporting trends in such studies for any significantly negative effects of turmeric in overall diets suggests that it does not increase the risk of hormone-sensitive cancers.

While there are no human clinical trials examining turmeric as a potential phytoestrogen, there are a few examining the safety of curcumin at supplemental doses, including in people with hormone-sensitive cancers. One trial showed improved responsiveness to cancer treatment when combined with supplemental curcumin – including separate analysis in oestrogen responsive subtypes (22). No serious adverse effects or safety issues were identified, and no progression or survival outcomes were worse in those who received supplemental curcumin.

In prostate cancer sensitive to the hormone testosterone, a supplement containing curcumin produced improvements in PSA levels, with no adverse effects compared to the placebo group (23).

While a few studies are not sufficient to draw firm conclusions, combined with existing observational evidence, these studies give a good indication there is no problematic oestrogenic effect from curcumin in turmeric, even at supplemental doses, never mind from low food source quantities.

Please note taking curcumin supplements while undergoing cancer treatment is not recommended without consultation with your Oncologist or Oncology Pharmacist. Curcumin supplements may alter the effect of chemotherapy and cancer treatment drugs. High dose curcumin supplements can also have anticoagulant or antiplatelet (blood thinning) effects, as well as inhibiting iron absorption.

A note about Tamoxifen

There is no evidence that food source phytoestrogens consumed as part of a balanced diet have any negative impact on Tamoxifen's actions and effectiveness. Interestingly, the available evidence suggests the opposite may be true. For example, soy-based phytoestrogens have been shown in laboratory studies to enhance Tamoxifen's effectiveness. (24),(25). This is supported by a large analysis of human trials on soy foods and breast cancer, where no negative outcomes or safety issues were observed, including in a significant proportion of participants taking Tamoxifen (26).

For those taking Tamoxifen it is important to note that the liver plays a key role in converting it into its active form. Turmeric in supplemental form can affect how well the liver performs this conversion which could mean that the effects of the Tamoxifen are lost or weakened. Supplementing with turmeric as opposed to dietary intake through food is not recommended if taking Tamoxifen.

Conclusion

Despite some understandable concern regarding phytoestrogens, including turmeric, when we combine all levels of evidence, from the laboratory to clinical trials, we see **no evidence of harm** from these plant foods in our diets. In fact, we are increasingly understanding the many potential benefits that a diet rich in fruit, vegetables, herbs, and spices may offer, when living with cancer and for overall health.

Consequently, culinary turmeric is considered a safe addition to a balanced diet by many leading voices in cancer care and research including Cancer Research UK, Mayo Clinic, and Memorial Sloan Kettering.

The good news is that due to the growing evidence on curcumin's anti-inflammatory and antioxidant effects, with no evidence of negative outcomes from its phytoestrogen properties, research is increasingly focussing on the role of curcumin supplements as a potential adjunct to cancer treatment. Watch this space as we learn more about its effectiveness and safety alongside different treatments.

Written by

Meredy Birdi & **Kim Wilcox**

Meredy Birdi
The Cancer Dietitian
BSc (Hons) Dietetics, DipNT, mBDA, mBANT
HCPC registered, CNHC registered

Kim Wilcox
Registered Associate Nutritionist
MSc, ANutr
UKVRN registered

We would like to acknowledge the following individuals for their valuable contributions to the creation of this article:

Dr Catherine Zollman *BA Physiol (Oxon), MBBS, MRCP, MRCGP, Fellowship in Integrative Medicine (University of Arizona), Committee member of College of Medicine, BSIO, SIO Medical Lead, Penny Brohn UK*

Deborah Grayson BSc Pharm, DipNT, rGPHc, mBant
Pharmacist and Nutritional Therapist

Dr Penny Kechagioglou MBBS, MRCP, CCT (Clin Onc), MPH, MBA, DBA, FMLM, AFMCP
Co-Chair of British Society of Integrative Oncology (BSIO)
Consultant Clinical Oncologist, Chief Clinical Information Officer, and Deputy Chief Medical Officer at the University Hospitals Coventry and Warwickshire

Dr Carol A Granger DProf, MSc, MRSB CBiol, FBANT
Registered Nutrition Practitioner, Director at British Society for Integrative Oncology (BSIO)

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