Slash your cancer risk through diet

What you should know about food and cancer

What is cancer?

Cancer is the development of abnormal cells anywhere in the body that divide uncontrollably and don't have a natural expiry date. Cancer cells can grow in any tissue and can gradually destroy it or impair its normal function.

A cancerous growth is called a tumour and it can be localised in one place or it can spread and form other tumours – metastasis.

Cancer starts when a cell's genetic code is altered to change its behaviour – this can happen through an error during normal cell division or when the cell's DNA (genetic material) is damaged by harmful substances – from the diet, the environment, or other lifestyle factors, such as smoking. It can also happen if we inherit a faulty gene but that's relatively rare – only five to 10 per cent of cancers are due to genetics (Anand *et al*., 2008).

Cancer statistics

There are around 375,000 new cancer cases in the UK every year – around 1,000 every day (Cancer Research UK, 2023). Every two minutes someone in the UK is diagnosed with cancer, while every four minutes someone in the UK dies from cancer. Breast, prostate, lung and bowel cancers together accounted for over a half of all new cancer cases in the UK between 2016 and 2018 (Cancer Research UK, 2023).

Lifestyle and cancer

In 2018, the World Cancer Research Fund compiled a list of cancer prevention recommendations based on scientific data showing what increases and what lowers your risk (WCRF, 2018). They include recommendations to eat a diet based on wholegrains, pulses, fruits and vegetables, strictly limit red and processed meat, fast foods, sugary drinks and alcohol, be physically active, maintain a healthy weight, avoid supplements that claim to prevent cancer and, for mothers, to breastfeed their baby if possible.

There's no doubt that diet is one of the biggest lifestyle factors that affects your risk of cancer (Key *et al*., 2020). According to scientific studies, 30 to 40 per cent of cancers could be prevented if we all lived healthy lifestyles, including maintaining a healthy weight, being physically active and eating a healthy diet (Key *et al*., 2002; Anand *et al*., 2008; Allen, 2022).

Of course, another major risk factor is smoking but while we can all stay away from tobacco, no one can survive without food. What we choose to eat daily can have a huge effect on our cancer risk.

Why meat increases cancer risk

There are many harmful components in meat that may increase the risk of cancer over time. Some people are more susceptible, some less but in general the more processed and red meat you eat, the bigger the risk.

In 2015, the World Health Organisation (WHO) classified processed meat as carcinogenic (causing cancer) and red meat as probably carcinogenic (Bouvard *et al*., 2015). Eating 100 grams of red meat (beef, pork, lamb, veal, mutton and goat) a day increases bowel cancer risk by 17 per cent, while just 50 grams of processed meat (ham, sausages, salami, bacon) daily increases it by 18 per cent (Bouvard *et al*., 2015). These portion sizes are very small and people tend to eat more than that in just one sitting.

The chemicals used to preserve processed meat, such as nitrates and nitrites, can create carcinogenic N-nitroso compounds, and haem iron from red and processed meats can damage the cells that line our intestines, cause DNA damage and even gene mutations leading to bowel cancer (Fiorito *et al*., 2020; Key *et al*., 2020; Chazelas *et al*., 2022).

The industrial pesticides, polychlorinated biphenyls (PCBs), were banned worldwide more than 40 years ago because of their toxicity but they are still present in the environment. Once in the body, PCBs can cause cancer. In commonly consumed foods, fish, dairy, hamburgers and poultry are the most contaminated foods (Crinnion, 2011).

Cooking any meat at high temperatures produces dangerous compounds called polycyclic aromatic hydrocarbons (PAH) and heterocyclic amines (HCA), which may cause cancer (Abid *et al*., 2014). It's because

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they are mutagenic, that is, they cause changes in DNA that may lead to cancer. One HCA, called PhiP, also has strong hormone-stimulating effects, increasing the risk of hormone-sensitive cancers such as breast, ovarian and prostate cancer. Fried, roast and grilled chicken can contain particularly high amounts (Sinha *et al*., 1995).

All these compounds, when consumed regularly over long periods of time, can contribute to cancer. And not just bowel cancer – even small amounts of red and processed meat can also increase your risk of stomach, lung, kidney, bladder, pancreatic, thyroid, breast and prostate cancer (Grant, 2014; Wolk, 2017; Huang *et al*., 2021). One of these studies also highlighted that while meat increases the risk of cancer, it doesn't offer any benefits (Huang *et al*., 2021).

Dairy and cancer

Mammalian milk isn't just a simple food, it is a fluid specifically designed to meet the needs of a rapidly growing and developing young being, whether it is a baby, calf or puppy. It is filled with various hormones and bioactive substances fine-tuned to the precise needs of the species it comes from.

Cow's milk contains insulin-like growth factor 1 (IGF-1) and also stimulates IGF-1's production in the human body (Melnik *et al*., 2023). It is a growth hormone naturally produced by our liver but increased levels can promote cancer cell growth – so it doesn't cause cancer but it stimulates the growth. It has been linked to prostate, ovarian and breast cancers (Harrison *et al*., 2017, Jiang *et al*., 2021, Melnik *et al*., 2023).

Another group of potentially dangerous hormones in cow's milk are oestrogens – the same hormones that your own body produces. And because cows are pregnant most of the time they are milked or they've just given birth, the levels of oestrogens in their milk are very high and like IGF-1, are not affected by pasteurisation (Melnik *et al*., 2023). According to scientists, these oestrogens may trigger cancerous changes in the breast or promote the growth of existing breast cancer cells (Melnik *et al*., 2023). In a study of over 50,000 women, high milk consumption was linked to a 50 per cent greater risk of breast cancer (Fraser *et al*., 2020). It made no difference if the milk was full fat or reduced fat.

What's more, when IGF-1 and oestrogen are both active in the same place, the added effect is even greater. The researchers also note that milk contains a range of other dangerous compounds, such as toxins from contaminated feeds, pesticides, drug residues and microplastics and that these may increase cancer risk too (Melnik *et al*., 2023).

When Harvard University scientists (Ding *et al*., 2019) examined dairy intake and the risk of dying from cancer, they found that every half-serving of whole milk increased the risk by 11 per cent. This relationship was strongest between whole milk and ovarian and prostate cancer and the authors suggested that it may be due to IGF-1. They also looked at swapping other foods for dairy and discovered that while nuts, pulses or wholegrains lower the risk, red and processed meat increases it.

Several other large studies confirmed the link between milk and prostate cancer and it is thought that IGF-1 may be to blame (Lu *et al*., 2016; Harrison *et al*., 2017; Tat *et al*., 2018).

Eggs and cancer

Eggs have been linked to cancer in a number of studies, particularly to hormone-sensitive cancers, such as breast, prostate and ovarian cancer (Keum *et al*., 2015). The reason could be that egg cholesterol provides material for the increased production of sex hormones and higher levels of these hormones are a known risk factor for hormone-sensitive cancers. At the same time, both cholesterol and choline from eggs supply building materials for cell membranes and this may also help cancerous cells to grow (Richman *et al*., 2012; Keum *et al*., 2015). Although choline is an essential nutrient vital for healthy metabolism and cell membranes, eggs supply too much and these high amounts can be harmful.

Independently, egg consumption seems to increase the risk of dying from cancer in general. Several studies showed that eating one egg a day increases the risk by 15 to 52 per cent (Nakamura *et al*., 2018; Ruggiero *et al*., 2021; Zhuang *et al*., 2021).

Why vegans have a lower risk of cancer

There are a number of reasons why vegans tend to have a lower risk of cancer compared to people who eat animal-based foods. Firstly, they avoid the harmful compounds found in meat (including processed meat – a known carcinogen), fish, eggs and dairy. In addition to this, they tend to consume more of the protective compounds, eg vitamins, minerals, antioxidants and fibre, found in fruit and vegetables, wholegrains, pulses, nuts and seeds.

Professor Colin T. Campbell – the author of hundreds of scientific papers and co-author of The China Study – believes that animal-based foods lead to an increased cancer risk while wholesome plant-based foods reduce the risk (Campbell and Campbell, 2005). A large body of scientific evidence supports this

view; vegans have a 16 to 19 per cent lower risk of all cancers (Huang *et al*., 2012; Tantamango-Bartley *et al*., 2013; Key *et al*., 2014). When it comes to stomach cancer, the risk is lower by 59-63 per cent (Key *et al*., 2014; Bai *et al*., 2023)!

By default, a vegan diet doesn't contain many of the cancer-causing chemicals found in meat nor the hormones found in cow's milk. Vegans have lower levels of IGF-1 circulating in their blood than meat-eaters, which may be one way in which a vegan diet reduces the risk of cancer (Allen *et al*., 2002). Plants also do not accumulate pesticides and other pollutants in their tissues like animals do.

A healthy vegan diet contains more cancer-fighting antioxidants than a meat-based diet and antioxidants help to protect DNA from damage that can lead to cancer (Miles *et al*. 2019). Fruit and vegetables, pulses, wholegrains, mushrooms, nuts and seeds are all rich in antioxidants and other health-beneficial compounds that support your immune system and protect your health.

Vegans tend to eat more soya than non-vegans and this may also play a protective role as research shows that regular soya consumption can reduce cancer risk (Yu *et al*. 2016; Applegate *et al*., 2018; Boutas *et al*., 2022).

Plant wholefoods contain plenty of fibre that's great for our digestive system but it can do even more – studies show there is a 10 to 13 per cent decrease in the risk of bowel cancer for each 10 grams of fibre consumed (Aune *et al*., 2011; Murphy *et al*., 2012; Key *et al*., 2020). The current UK recommendation is that adults should eat at least 30 grams of fibre a day, average intakes are around 20 grams but vegans tend to eat more.

Overall, a healthy vegan diet contains a lot of health-protective nutrients and lacks a whole lot of nasties that come with animal products.

What to eat to slash your risk

It's important to eat a balanced diet that supplies all the essential nutrients. At every meal, you should have a source of good carbohydrates, such as wholegrains (wholemeal bread, wholewheat pasta, brown rice, oats) or root vegetables (potatoes, sweet potatoes), accompanied by protein-rich foods, such as pulses (lentils, beans, chickpeas, tofu, mock meats) and healthy fats, such as nuts and seeds, avocado, rapeseed or olive oil.

However, all these foods contain a wide variety of nutrients – for example wholegrains are also a source of protein, pulses also have good carbohydrates and nuts and seeds also supply protein. All are great sources of essential vitamins and minerals and a range of healthful antioxidants.

With each meal, you should have fruit and/or vegetables – ideally, fruit as snacks and vegetables with every main meal but it's not a strict rule. Fruit and vegetables are important sources of vitamins, minerals, antioxidants and a range of cancer-fighting phytochemicals, which are natural substances that help to protect your DNA, cells and tissues from damage.

There's one type of vegetables that you should have daily – cruciferous vegetables (broccoli, kale, cabbage, rocket, Brussels sprouts). These greens have been shown to have a strong preventative effect against many types of cancer, in particular cancers of the mouth, pharynx, oesophagus, bowel, lung, kidney, prostate and breast (Bosetti *et al*.,2012; Abdull Razis and Noor, 2013).

Cruciferous vegetables contain substantial amounts of natural compounds called glucosinolates and their breakdown products, such as isothiocyanates, are believed to be responsible for their health benefits. They promote programmed cell death in cancer cells, can prevent cancer cells from multiplying, reduce inflammation and stimulate the liver to produce enzymes that decrease your susceptibility to carcinogens (Nandini *et al*., 2020).

And lastly, soya foods consumption has also been shown to be useful in cancer prevention. Not long ago, some people believed that soya can cause cancer. It was because of animal experiments but human data show the opposite – soya consumption can reduce your risk of the disease! Regular soya intake may lower your risk of hormone-sensitive cancers – particularly breast and prostate (Applegate *et al*., 2018; Boutas *et al*., 2022). It's best to choose the less processed soya foods, such as tofu, soya milk, tempeh and yoghurt but soya-based mock meats can also count.

As The World Cancer Research Fund recommends, avoid supplements marketed with claims such as "helps to prevent cancer" (WCRF, 2018). However, take the basic supplements that all vegans need – vitamin B12 and vitamin D – and make sure you have a daily dose of omega-3 fats, either from foods (flaxseed, chia seeds, hempseed, walnuts, rapeseed oil) or take an algae-derived supplement containing the omega-3 fats EPA and DHA.

While a vegan diet can be super healthy, it doesn't happen automatically – avoid eating too many sweets, sugar-sweetened drinks, ultra-processed and deep-fried foods and artificial additives. The occasional treat is fine, but a vegan diet based mainly on junk food will not protect your health.

Take home message

The ideal diet is a little different for everyone, based on our preferences and culture but a varied, balanced vegan diet tailored to your needs is the best one to slash your risk of cancer. Try to eat a wide variety of fruit and vegetables over the week – eat the rainbow!

Learn more about a healthy vegan diet at:
viva.org.uk/health/balanced-vegan

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