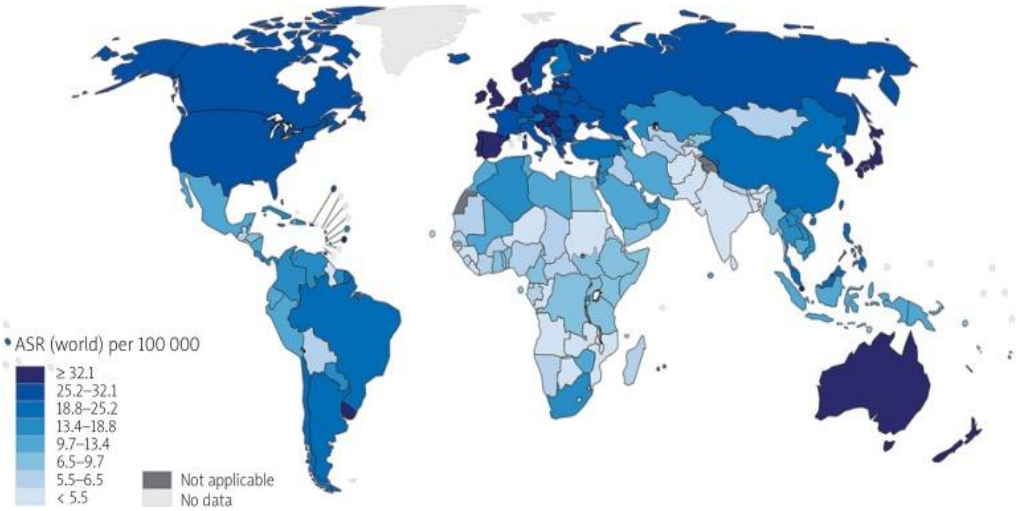
# Grilled red meats

Being a medical writer sometimes also means becoming a party pooper. There is a growing awareness that certain foodstuffs and the way we preserve and prepare them is causing a hazard for our health.

Bowel cancer is the 4th most common cancer in the UK, accounting for 11% of all new cancer cases (2017-2019). 90% of all colorectal cancer (CRC) cases are diagnosed in people 50 years or older, but some people have increased risk factors. Colorectal cancer is also rising sharply in people under 50.




Map showing estimated age-standardised incidence rates (world) in 2018, colorectum, both sexes, all ages.

Colon cancer incidence has been steadily rising worldwide, especially in developing countries that are adopting the "western" way of life. For colon cancer, Southern Europe, Australia/New Zealand, and Northern Europe are the regions of highest incidence. Observers have been trying to raise concerns for many years but our lifestyles and culture, abetted by the food industries and commercial sectors make it difficult to penetrate.

### So, what is causing all the alarm?

Growths in the bowel lining, known as polyps, can develop gradually for 10–20 years before becoming cancerous. Certain dietary and lifestyle choices can promote intestinal inflammation and modify the intestinal microflora to promote an immune response, both of which can help polyp growth and conversion to cancer. Those with a first-degree relative with the disease suffer a 2–4 times higher risk.

Increases in obesity and physical inactivity in the developed world appear to correlate with the growth of colorectal cancer incidence. Added to that, our diet can play an adverse or protective role in the development of colon cancer. The relative risk is significantly raised among those who consumed the most red and processed meats. The bulk of carcinogenesis probably comes from high-temperature cooking, curing, and smoking of meat.

A chronic intake of high levels of nitrates, nitrites or their derivatives (such as nitrosamines) may be another significant factor. The food additives potassium nitrite (E 249), sodium nitrite (E 250), sodium nitrate (E 251) and potassium nitrate (E 252) are now widely used as preservatives. It is not all bad news, as nitrites are effective in reducing Clostridium botulinum, responsible for inducing botulism, a foodborne disease with a high mortality rate. They originate from the use of saltpetre (nitrate salts) to preserve meat for centuries.

The difference now is that we are wealthier and living longer than before, which permits us to consume more red meats and prepare them in a way that raises the risk of inducing cancer in our bowels.

The first indigenous tribes Christopher Columbus encountered on the island he named Hispaniola had developed a unique method for cooking meat over an indirect flame, created using green wood to keep the food (and wood) from burning. The Spanish referred to this new style of cooking as barbacoa.

Cooking in this manner is not exclusively a Pan-American phenomenon, as it is also to be found in Africa (word braai is Afrikaans for grill). Korea and Australia have both taken it up in their own ways. Al-fresco cooking and eating has become a hugely important part of British culture – industry statistics say around 137 million barbecues were held in the UK in 2019.

The microbial safety of meat does not depend on the introduction of nitrites, but on a combination of additional factors, such a heat-treatment, pH, salt, water content and hygienic preparation to reduce the initial numbers of bacterial spores. The way in which we cook it also influences its properties. The difference now is that the modern method of barbecue involves exposing the meat to intense heat and flames.

One toxic mechanism is the formation of nitrosamines during heating of the foods into which nitrite food additives have been introduced. Nitrosamines are generated during heating of cured meat products at home (e.g. frying bacon or baking salami on a pizza). Grilling meat at high temperatures can also burn the fat to produce other carcinogenic chemicals known as heterocyclic amines. These substances can damage our DNA in the lining of our guts.

## The research

As far back as 2010, researchers at Vanderbilt University, concluded that “the majority of studies had shown that high intake of well-done meat and high exposure to meat carcinogens, particularly HCAs, may increase the risk of human cancer.”

In 2015, researchers at the University of Southern California main concerns were a positive association with CRC for pan-fried beefsteak. They were the first to observe a direct link with the cooking method. Other studies since that time have extended the advice to include limiting the total consumption of red meats, however they are cooked.

In 2019, a study of nearly 500,000 people published in the *International Journal of Epidemiology* found that people who ate red or processed meat four or more times a week had a 20% higher risk of colorectal cancer than those who indulged less than twice a week.

As with all doom-laden predictions that are subject to variable interpretations, it is unlikely that the culture of the summer barbecue will cease, as it is now well-established part of our annual social calendar. There are perhaps some measures that we can all take to reduce our risk and continue to enjoy the social benefits amongst our families and friends. Here are some suggestions:

- Don't grill the meat over direct heat. If you have multiple burners, put the meat over the burner that doesn't have a flame, cooking instead with indirect heat.

- If the meat has to be grilled over a direct flame, turn the meat over frequently to reduce exposure to carcinogens.

- If the meat has charcoal parts, trim them off before serving.

- Serve the meat with fruits and vegetables, which contain antioxidants that counteract the effects of the cancer-causing chemicals.

- Similarly, consider marinating the meat in a citrus-based marinade before grilling. The meat will absorb the citrus, with the antioxidants offsetting the chemical effects of the carcinogens.

Lastly, consider taking up the screening offered by your doctors. The NHS offers screening for bowel cancer using a faecal immunochemical test (FIT). The test is sent to men and women aged 56, 58, and those between 60-74 years who are registered with a GP, every two years. The lab looks for blood in your stools, which can be a sign of bowel cancer among other conditions. Screening for bowel cancer should be offered every 2 years to men and women between the ages of 50 and 74 in the UK using the faecal-immunochemical test (FIT).

Dr Peter Smith - March 2025


Bowel cancer incidence statistics | Cancer Research UK
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