

Red meat and colorectal cancer

Colorectal cancer (CRC), also called bowel cancer, is the second most common cancer in the UK for men and women with around 41,000 cases reported in 2014¹. CRC rates have increased in recent decades, linked to our ageing population as old age is a major factor in the development of the disease. Overall, 84% of people diagnosed with bowel cancer are aged 60 or over².



Risk factors for CRC include obesity, lack of physical activity, low fibre intake, alcohol and smoking. High consumption of red and processed meat has been identified as a key dietary risk factor but what does this mean for the British diet, and where does the evidence come from?

Expert opinion

In the past decade, three expert bodies have considered in detail the relationship between CRC and red and processed meat.

The World Cancer Research Fund³ classed the evidence for the association as 'convincing' and recommended that people eat less than 500 grams of cooked red meat per week, and avoid processed meats which are higher in salt than fresh meat and typically contain preservatives called nitrites and nitrates.

The Scientific Advisory Committee on Nutrition (SACN)⁴ a few months later downgraded the evidence as 'probable' and noted that "*it is not possible to quantify the amount of red and processed meat that may be associated with increased colorectal cancer risk because of limitations and inconsistencies in the data*". Taking a precautionary approach, which attempted to safeguard iron and zinc intakes, SACN advised that high consumers of red meat, defined as eating more than 90

¹ <http://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/bowel-cancer>

² Cancer Research UK (2010)

³ <https://www.wcrf-uk.org/uk/preventing-cancer/cancer-prevention-recommendations/limit-red-meat-and-avoid-processed-meat>

⁴ <https://www.gov.uk/government/publications/sacn-iron-and-health-report>

grams daily, should reduce their intake to less than 70 grams per day. No specific advice was given about processed meats. This advice has now been adopted by the UK government⁵.

More recently, the International Agency for Research on Cancer (IARC)⁶ reported that the evidence on processed meat and CRC could be classified as 'sufficient' Grade 1 and that a high intake (>50 grams daily) was linked to an 18% (1.18) increase in relative risk for CRC. The evidence on total red meat was weaker and less consistent and was given a 'limited' Grade 2A classification. Here, an intake of >100 grams per day of red meat was linked to a 17% (1.17) relative increase in CRC risk. The classifications were based on the amount of evidence, not the level of risk posed. This is an important point which was missed by the media at the time.

Why would meat be linked to CRC?

There is no consensus on why fresh unprocessed red meat might be linked to CRC and this weakens the argument. Theories include saturated fat intakes, inflammation and haem iron levels. However, there is no convincing evidence that this is the case, particularly since the fat content of red meat has fallen by around 30% in recent decades thanks to changes to animal breeding, feedstuffs and modern butchery trimming of meat. Another idea could be high temperature frying which leads to the production of chemicals called PAHs and heterocyclic amines⁷ However, these potentially carcinogenic compounds occur when any protein food is fried, including poultry and fish, and are not confined to red meat.

More evidence is available on processed meat as this is preserved with chemicals which contain nitrite or nitrate salts. The purpose of these is to inhibit bacterial growth, keeping the meat safe. Animal and human studies suggest that these salts could interact with gut bacteria to form carcinogenic compounds. Interestingly, antioxidant vitamins and polyphenols reduce the formation of gut carcinogens

⁵ <http://www.nhs.uk/Livewell/Goodfood/Pages/red-meat.aspx>

⁶ https://www.iarc.fr/en/media-centre/iarcnews/pdf/Monographs-Q&A_Vol114.pdf

⁷ <http://blogs.plos.org/publichealth/2014/11/17/red-meat-biological-evidence/>

indicating that a varied meat-based diet with plenty of vegetables and fruit may be one way to manage CRC risk⁸.

Where does the evidence come from?

All of the expert committees had to work with the same raw data which arose from observational studies. These are studies where thousands of people complete questionnaires about their diet and lifestyle before being tracked for several years to see which diseases and conditions develop. While the studies can produce useful information, there are some key drawbacks:

- The studies are not controlled so it is impossible to look at the individual risk attributed to different foods in the diet, particularly as many of these foods are commonly eaten together e.g. steak and chips, or burger in a white bun.
- Complex statistics have to be used to separate all the different factors thought to influence disease. But this isn't a perfect method of isolating the risk from one food or nutrient.
- Some important factors are completely ignored by studies, especially fibre intake and physical activity which both relate strongly to risk of CRC.
- The dietary questionnaires can be rather basic and often don't identify amounts eaten, or differentiate between varying qualities of meats, e.g. fatty meat pies with pastry vs. lean red meat.

All of this means that observational studies are a blunt tool for deciding whether one food in the diet, i.e. red meat, causes cancer and by how much.

What does the risk mean?

If you ate 50 grams of processed meat every day (that's two rashers of bacon or two thin slices of ham), how would this affect your risk of CRC?

Currently, in the UK, six out of 100 adults are predicted to develop CRC over a lifetime. If these 100 individuals now ate more than 50 grams of processed meat daily for life, you would see seven out of 100 cases, i.e. one extra case per 100. Putting this into context, the risk for smoking is 35 times higher so that out of 100

⁸ <http://www.sciencedirect.com/science/article/pii/S0309174014000564>

smokers, 20 are predicted to develop lung cancer. So, eating red meat is nowhere near as risky as cigarettes and those headlines that claimed that eating meat was as bad as smoking got it badly wrong.

Do we eat too much red meat?

Given that IARC highlighted 100 grams of red meat as 'high', how does the UK's diet compare? The government's own statistics from the National Diet and Nutrition Survey⁹ show that red meat intakes have fallen considerably over the past few years. Nowadays, the average daily intake in adults is just 65 grams per day – so well within 100 grams.

IARC also highlighted 50 grams of processed meat as 'high' and, again, the UK is well within the band with an average daily intake of 17 grams – less than one rasher of bacon a day. Adults would, therefore, have to treble their current processed meat intake to exceed the 50 gram cut-off identified by IARC.

Of course, within these averages, some people eat too much red meat while others eat very little or avoid it completely. The Department of Health in 2010¹⁰ reported that four out of ten men, but only one in ten women, ate more than the 'risky' intake of 90 grams a day. That means that most people in the UK are eating the right amount of red and processed meat and don't need to make further reductions to intake.

Since red meat is acknowledged as one of the best dietary source of iron and zinc and provides a rich source of B vitamins and protein, it is even the case that some groups of people, e.g. girls and women, could eat more red meat to benefit their health.

In conclusion

Red meat is not confirmed as a 'cause' of bowel cancer, in the same way that cigarette smoking *causes* lung cancer. Instead, high red meat intakes, especially

⁹ Bates B et al. (2016) National Diet and Nutrition Survey, years 5-6. FSA/PHE, London.

¹⁰ <http://www.nhs.uk/Livewell/Goodfood/Pages/red-meat.aspx>

processed meats, are statistically linked with bowel cancer risk. However, it isn't proven that red meat is driving this association since observational studies don't fully account for lifestyle characteristics such as low fibre intake and physical activity levels.

Expert groups have given a clear guide that eating up to 500 grams of red meat per week is consistent with good health, and could confer an advantage in terms of iron and zinc status. At present, the average adult in the UK is well within this limit. In the same way, IARC has highlighted a risk when daily intakes of processed meat exceed 50 grams. Again, UK adults on average are well within this limit, at around 17 grams per day.

For those who want to continue enjoying red meat in their diets, it is sensible and appropriate to stick to the recommendation of up to 500 grams red and processed meat per week, avoid burning any type of meat, choose lean cuts which are lower in fat, and serve these with plenty of vegetables which will boost antioxidant nutrients.

Please visit www.meatandhealth.com for more information.