

Scientists discover how iron levels and a faulty gene cause bowel cancer

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High levels of iron could raise the risk of bowel cancer by switching on a key pathway in people with faults in a critical anti-cancer gene, according to a study published in *Cell Reports* today.

Cancer Research UK scientists, based at the University of Birmingham and the Beatson Institute for Cancer Research in Glasgow, found bowel cancers were two to three times more likely to develop in mice with a faulty APC gene that were fed high amounts of [iron](#) compared to mice who still had a working APC gene.

In contrast, mice with a faulty APC gene fed a diet low in iron did not develop [bowel cancer](#) at all.

Study author Professor Owen Sansom, deputy director of the Cancer Research UK Beatson Institute for Cancer Research in Glasgow, said: "We've made a huge step in understanding how bowel cancer develops. The APC gene is faulty in around eight out of 10 bowel cancers but until now we haven't known how this causes the disease.

"It's clear that iron is playing a critical role in controlling the development of bowel cancer in people with a faulty APC gene. And, intriguingly, our study shows that even very high levels of iron in the diet don't cause cancer by itself, but rely on the APC gene."

Co-author Dr Chris Tselepis, a Cancer Research UK scientist at the University of Birmingham, said: "Our results also suggest that iron could

be raising the risk of bowel cancer by increasing the number of cells in the bowel with APC faults. The more of these cells in the bowel, the greater the chance that one of these will become a starting point for cancer.

"We're now planning to develop treatments that reduce the amount of iron in the bowel and so could lower the risk of developing bowel cancer. We hope to start using these in trials in the next few years in people who are at a greater risk."

The study could also explain why foods such as [red meat](#), which have high levels of iron, are linked to an increased risk of bowel cancer.

When the APC gene is deleted, two proteins are switched on that cause iron to build up in bowel cells. When this happens, a key cancer signalling pathway called wnt is switched on, causing cells to grow out of control.

In mice fed a diet with no iron, cells with a faulty APC gene were killed and bowel cancers did not develop. Mice with a fully functioning APC gene did not develop bowel cancers, even when fed a diet high in iron. In these bowel cells, the iron accumulation proteins are turned off and wnt signalling remains inactive.

Dr Julie Sharp, senior science information manager at Cancer Research UK, said: "Bowel cancer is the third most common cancer in the UK. These findings suggest a potentially effective way of reducing the chances of bowel cancer developing in people who are at high risk. Finding ways of 'mopping up' the iron that is in the bowel could have a real impact on the number of people who develop the disease.

"This research is a great example of scientists coming together and sharing their different expertise to find new ways of understanding and

potentially preventing cancer."

More information: *Radulescu, S et al. Luminal iron levels govern intestinal tumourigenesis following Apc loss in vivo, *Cell Reports* (2012)

Provided by Cancer Research UK

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