Regular meat consumption linked with a wide range of common diseases

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Regular meat consumption is associated with a range of diseases that researchers had not previously considered, according to a large, population-level study conducted by a team at the University of Oxford.

The results associate regular meat intake with a higher risk of various diseases, including heart disease, pneumonia and diabetes, but a lower risk of iron-deficiency anemia. The study is published today in *BMC Medicine*.

Consistent evidence has shown that excess consumption of red meat and processed meat (such as bacon and sausages) may be associated with an increased likelihood of developing colorectal cancer. But up to now, it was not clear whether high meat consumption in general might raise or lower the risk of other, non-cancerous diseases.

This has been investigated in a new large-cohort study which used data from almost 475,000 UK adults, who were monitored for 25 major causes of non-cancerous hospital admissions. At the start of the study, participants completed a questionnaire which assessed their dietary habits (including meat intake), after which they were followed-up for an average period of eight years.

Overall, participants who consumed unprocessed red meat and processed meat regularly (three or more times per week) were more likely than low meat-eaters to smoke, drink alcohol, have overweight or obesity, and eat less fruit and vegetables, fiber, and fish.

However, after taking these factors into account, the results indicated that:

- Higher consumption of unprocessed red meat and processed meat combined was associated with higher risks of ischaemic heart disease, pneumonia, diverticular disease, colon polyps, and diabetes. For instance, every 70 g higher red meat and processed meat intake per day was associated with a 15% higher risk of ischaemic heart disease and a 30% higher risk of diabetes.
- Higher consumption of poultry meat was associated with higher

risks of gastro-oesophageal reflux disease, gastritis and duodenitis, diverticular disease, gallbladder disease, and diabetes. Every 30g higher poultry meat intake per day was associated with a 17% higher risk of gastro-oesophageal reflux disease and a 14% greater risk of diabetes.

- Most of these positive associations were reduced if body mass index (BMI, a measure of body weight) was taken into account. This suggests that regular meat eaters having a higher average body weight could be partly causing these associations.
- The team also found that higher intakes of unprocessed red meat and poultry meat were associated with a lower risk of iron deficiency anemia. The risk was 20% lower with every 50g higher per day intake of unprocessed red meat and 17% lower with every 30g higher per day intake of poultry meat. A higher intake of processed meat was not associated with the risk of iron deficiency anemia.

The research team suggest that unprocessed red meat and processed meat may increase the risk of ischaemic heart disease because they are major dietary sources of saturated fatty acids. These can increase low-density lipoprotein (LDL) cholesterol, an established risk factor for ischaemic heart disease.

Lead author Dr. Keren Papier, from the Nuffield Department of Population Health at the University of Oxford, said: "We have long known that unprocessed red meat and processed meat consumption is likely to be carcinogenic and this research is the first to assess the risk of 25 non-cancerous health conditions in relation to meat intake in one study."

Additional research is needed to evaluate whether the differences in risk we observed in relation to meat intake reflect causal relationships, and if so the extent to which these diseases could be prevented by decreasing

meat consumption. The result that meat consumption is associated with a lower risk of iron-deficiency anemia, however, indicates that people who do not eat meat need to be careful that they obtain enough iron, through dietary sources or supplements."

The World Cancer Research Fund recommends that people should limit red meat consumption to no more than three portions per week (around 350–500g cooked weight in total), and processed meat should be eaten rarely, if at all.

This study was based on 474,985 middle-aged adults, who were originally recruited into the UK Biobank study between 2006 and 2010, and were followed-up for this study until 2017. These participants were invited to complete a dietary questionnaire with 29 questions on diet, which assessed the consumption frequency of a range of foods. Participants were then categorized into subgroups based on their meat intake: 0-1 times/week; two times/week; three to four times/week and five or more times a week. The information on each participant's meat intake was linked with hospital admission and mortality data from the NHS Central Registers.

More information: Keren Papier et al. Meat consumption and risk of 25 common conditions: outcome-wide analyses in 475,000 men and women in the UK Biobank study, *BMC Medicine* (2021). DOI: 10.1186/s12916-021-01922-9

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