

Red and Processed Meat Products: No Safe Amount

PHYSICIANS COMMITTEE FOR RESPONSIBLE MEDICINE

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More than half of the meat products Americans consume are red meat, and nearly a quarter are processed meat.¹ Processed meat products include bacon, deli slices, sausage, hot dogs, and any other meat products that have been preserved with additives or otherwise manipulated to alter color, taste, and durability. Current dietary guidelines recommend limiting red and processed meat products, but eliminating them may be the safest option, because scientific research continues to identify health hazards these products pose.

What Makes These Meat Products Dangerous?

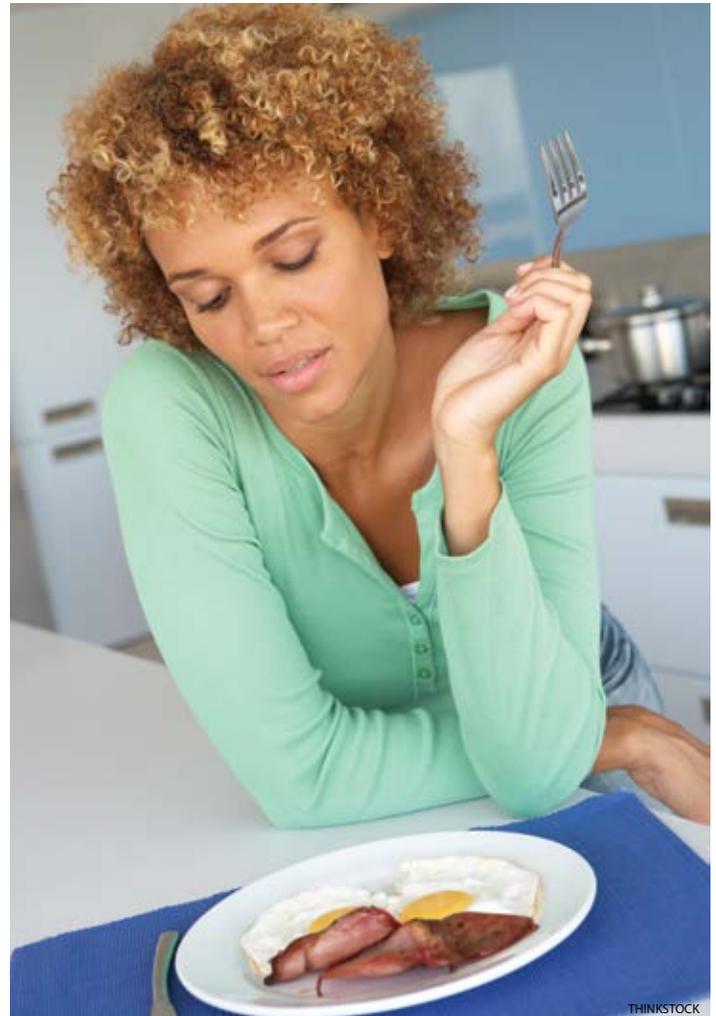
Both red and processed meat products contain high levels of DNA-damaging n-nitroso compounds. Heme, the iron component of animal products, promotes the formation of n-nitroso compounds.² Processed meat products contain these compounds because they are preserved with nitrites. N-nitroso compounds are also associated with increased cancer risk.³

Processed meat products are extremely high in sodium, which is used as a preservative. Studies show a direct link between high-sodium diets and high blood pressure.^{4,5} Because about 80 percent of dietary salt comes from processed foods,⁶ avoiding these products is critical for decreasing overall sodium intake. High blood pressure can lead to kidney failure, heart failure, heart attack, and stroke.⁶

Red and processed meat products are also high in saturated fat, which can lead to increased risk of cardiovascular disease, obesity,⁷ and diabetes.⁸

Cardiovascular Disease

Cardiovascular disease (CVD) remains the number one killer of Americans. Nearly a quarter of deaths from CVD are avoidable,⁹ and dietary intervention is a major factor for prevention. The sodium and saturated fat content of both red and processed meat products contribute to the risk of heart disease.



In the European Prospective Investigation into Cancer and Nutrition (EPIC), which followed 448,568 men and women, researchers found a strong correlation between consuming processed meat products and risk of dying from CVD. Those consuming more than 160 grams per day of processed meat products had a 30 percent increased risk of death from CVD, compared with those who consumed 10 to 20 grams per day.¹⁰

Results from the Health Professionals Follow-up Study (HPFS) and the Nurses' Health Study (NHS) indicate that eating just one serving of a processed or

unprocessed red meat product a day increases risk of death from diseases such as cancer and heart disease. These studies tracked the diets of 37,698 men from the HPFS and 83,644 women from the NHS for up to 28 years. All participants were free of CVD and cancer at the start of the study. Risk of death increased by 20 percent for those consuming processed meat products, and for those who had one serving of a red meat product a day, the mortality rate increased by 13 percent.¹¹

Diabetes

Fat accumulation within muscle cells can lead to insulin resistance,¹²⁻¹⁴ which then contributes to the development of type 2 diabetes. The high-fat content, particularly saturated fat, in red and processed meat products is a potential risk factor for type 2 diabetes.

In a 17-year follow-up study conducted with 8,401 Seventh-day Adventists, researchers found that those who ate meat products at least once a week were 29 percent more likely to develop diabetes, compared to those who reported eating no meat products. Processed meat product consumption alone caused a 27 percent increased risk for diabetes.¹⁵ These findings supported the research of other studies.^{16,17} Seventh-day Adventists are an ideal research population because they avoid tobacco, alcohol, and caffeine. Thus, there are fewer factors to consider when analyzing the relationship between diet and disease risk.

Moreover, in the Adventist Health Study-2 which examined 60,903 individuals, nonvegetarians were twice as likely to be diagnosed with type 2 diabetes compared with those avoiding meat products.¹⁸

In a 2011 meta-analysis of 442,101 participants, consumption of both unprocessed and processed red

meat products was significantly associated with risk of type 2 diabetes. For consumption of 100 grams per day of unprocessed red meat products, there was a 19 percent increased risk for type 2 diabetes. For consumption of 50 grams per day of processed meat products, about the size of one hot dog, there was a 51 percent increased diabetes risk.¹⁹⁻²¹

Diabetes is a particularly challenging health problem in the Native American population. A recent study following more than 2,000 Native Americans living in the Southwestern United States for a five-year period, found that those who ate processed meat products were more likely to develop diabetes.²²

Cancer

Red and processed meat products can increase risk for various cancers, including pancreatic,²³ stomach,²⁴ bladder,²⁵ and most significantly, colorectal cancer.²⁶ The risk is higher for processed meat product consumption, though it is still significantly increased with unprocessed red meat products consumption.

The World Cancer Research Fund (WCRF), in conjunction with the American Institute of Cancer Research (AICR), found, in a comprehensive and ongoing analysis of research, that red and processed meat products are, together and individually, “convincing” as risk factors for colorectal cancer. The combination of evidence indicates a 30 to 50 percent increased risk for colorectal cancer when consumption of these meat products is highest.^{26,27} Specifically with regard to processed meat product consumption, investigators in the EPIC study discovered an 11 percent increased risk of dying from cancer with the consumption of 50 grams per day.¹⁰



Researchers also recently investigated the dose-response nature of red and processed meat product consumption and colorectal cancer risk and found that a dose-response relationship does exist. Risk increased by 29 percent for every 100 grams of red meat product consumed per day and by 21 percent for every 50 grams per day of processed meat product consumed.²⁸

Conclusions

There is strong evidence that consumption of both unprocessed red meat products and processed meat products can lead to increased risk for many diseases, including CVD, diabetes, and cancer.

In order to practice the best measures for disease prevention, these unhealthful meat products should be avoided altogether. In substitution studies, it was found that replacing one serving of red or processed meat product a day with nuts decreased risk for disease by 19 percent and replacement with legumes decreased risk by 10 percent.¹¹ Therefore, when replacing a meat product, it is best to choose healthful, high-fiber foods such as beans and lentils. Ultimately, a plant-based diet eliminates the health risks of meat product consumption and is ideal for disease prevention.

References

1. Daniel CR, Cross AJ, Koebnick C, Sinha R. Trends in meat products consumption in the USA. *Public Health Nutr.* 2011;14: 575-583.
2. Cross AJ, Pollock JR, Bingham SA. Haem, not protein or inorganic iron, is responsible for endogenous intestinal N-nitrosation arising from red meat products. *Cancer Res.* 2003;63:2358-2360.
3. Loh YH, Jakszyn P, Luben RN, Mulligan AA, Mitrou PN, Khaw KT. N-Nitroso compounds and cancer incidence: the European Prospective Investigation into Cancer and Nutrition (EPIC)-Norfolk Study. *Am J Clin Nutr.* 2011;93:1053-1061.
4. He FJ, MacGregor GA. Effect of modest salt reduction on blood pressure: A meta-analysis of randomized trials: implications for public health. *J Hum Hypertens.* 2002;16:761-770.
5. Johnson AG, Nguyen TV, Davis D. Blood pressure is linked to salt intake and modulated by the angiotensinogen gene in normotensive and hypertensive elderly subjects. *J Hypertens.* 2001;19:1053-1060.
6. Appel LJ, Brands MW, Daniels SR, Karanja N, Elmer PJ, Sacks FM. Dietary approaches to prevent and treat hypertension: a scientific statement from the American Heart Association. *Hypertens.* 2006;47:296-308.
7. Phillips CM, Kesse-Guyot E, McManus R, et al. High

8. van de Laar F, van de Lisdonk E, Lucassen P, et al. Fat intake in patients newly diagnosed with type 2 diabetes: a 4-year follow-up study in general practice. *Br J Gen Pract.* 2004;54:177-182.
9. Centers for Disease Control and Prevention (CDC). Avoidable deaths from heart disease, stroke, and hypertensive disease: US 2001-2010. *MMWR Morb Mortal Wkly Rep.* 2013;62:721-727.
10. Rohrmann S, Overvad K, Bueno-de-Mesquita HB, et al. Meat products consumption and mortality-results from the European Prospective Investigation into Cancer and Nutrition. *BMC Medicine.* 2013;11:63-75.
11. Pan A, Sun Q, Bernstein AM, et al. Red meat products consumption and mortality: results from 2 prospective cohort studies. *Arch Intern Med.* 2012;172:555-563.
12. Petersen KF, Dufour S, Befroy D, Garcia R, Shulman GI. Impaired mitochondrial activity in the insulin-resistant offspring of patients with type 2 diabetes. *N Engl J Med.* 2004;350:664-671.
13. Krssak M, Petersen KF, Dresner A, et al. Intramyocellular lipid concentrations are correlated with insulin sensitivity in humans: a 1H NMR spectroscopy study. *Diabetologia.* 1999;42:113-116.
14. Perseghin G, Scifo P, De Cobelli F, et al. Intramyocellular triglyceride content is a determinant of in vivo insulin resistance in humans: a 1H-13C nuclear magnetic resonance spectroscopy assessment in offspring of type 2 diabetic parents. *Diabetes.* 1999;48:1600-1606.
15. Vang A, Singh PN, Lee JW, Haddad EH, Brinegar CH. Meat products, processed meat products, obesity, weight gain and occurrence of diabetes among adults: findings from Adventist Health Studies. *Ann Nutr Metab.* 2008;52:96-104.
16. Snowdon DA, Phillips RL. Does a vegetarian diet reduce the occurrence of diabetes? *Am J Public Health.* 1985;75:507-512.
17. Fraser GE. Associations between diet and cancer, ischemic heart disease, and all-cause mortality in non-Hispanic white California Seventh-day Adventists. *Am J Clin Nutr.* 1999;70:532S-538S.
18. Tonstad S, Stewart K, Oda K, Batech M, Herring RP, Fraser GE. Vegetarian diets and incidence of diabetes in the Adventist Health Study-2. *Nutr Metab Cardiovasc Dis.* 2013;23:292-299.
19. Pan A, Sun Q, Bernstein AM, et al. Red meat products consumption and risk of type 2 diabetes: 3 cohorts of US adults and an updated meta-analysis. *Am J Clin Nutr.* 2011;94:1088-1096.
20. Aune D, Ursin G, Veierod MB. Meat products consumption and the risk of type 2 diabetes: a systematic review and meta-analysis of cohort studies. *Diabetologia.* 2009;52:2277-2287.
21. Micha R, Wallace SK, Mozaffarian D. Red and processed meat products consumption and risk of incident coronary heart disease, stroke, and diabetes mellitus: a systematic review and meta-analysis. *Circulation.* 2010;121:2271-2283.
22. Fretts AM, Howard BV, McKnight B, et al. Associations of processed meat products and unprocessed red meat products intake with incident diabetes: the Strong Heart Family Study. *Am J Clin Nutr.* 2012;95:752-758.
23. Nöthlings U, Wilkens LR, Murphy SP, et al. Meat products and fat intake as risk factors for pancreatic cancer: the multiethnic cohort study. *J Natl Cancer Inst.* 2005;97:1458-1465.
24. Wang X, Terry PD, Yan H. Review of salt consumption and stomach cancer risk: Epidemiological and biological evidence. *World J Gastroenterol.* 2009;15:2204-2213.
25. Ferrucci LM, Sinha R, Ward MH, et al. Meat products and components of meat products and the risk of bladder cancer in the NIH-AARP Diet and Health Study. *Cancer.* 2010;116:4345-4353.
26. World Cancer Research Fund (WCRF)/American Institute for Cancer Research (AICR). Food, nutrition, physical activity and the prevention of cancer: a global perspective. Continuous Update Project. Washington, DC: AICR; 2011.
27. Vargas AJ, Thompson PA. Diet and nutrient factors in colorectal cancer risk. *Nutr Clin Pract.* 2012;27:613-623.
28. Chan DSM, Lau R, Aune D, et al. Red and processed meat products and colorectal cancer incidence: meta-analysis of prospective studies. *PLoS ONE.* 2011;6:e20456.

