

# Pan-fried meat increases risk of prostate cancer, new study finds

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Research from the University of Southern California (USC) and Cancer Prevention Institute of California (CPIC) found that cooking red meats at high temperatures, especially pan-fried red meats, may increase the risk of advanced prostate cancer by as much as 40 percent.

Mariana Stern, Ph.D., associate professor of preventive medicine at the Keck School of Medicine of USC, led analyses for the study, "[Red meat and poultry, cooking practices, genetic susceptibility and risk of prostate cancer](#): Results from the California Collaborative Prostate Cancer Study." The study, which is available online in the journal *Carcinogenesis*, provides important new evidence on how red meat and its cooking practices may increase the risk for prostate cancer.

Previous studies have emphasized an association between diets high in red meat and risk of prostate cancer, but evidence is limited. Attention to cooking methods of red meat, however, shows the risk of prostate cancer may be a result of [potent chemical](#) carcinogens formed when meats are cooked at high temperatures.

Researchers examined pooled data from nearly 2,000 men who participated in the California Collaborative Prostate [Cancer Study](#), a multiethnic, case-control study conducted in the San Francisco Bay Area by Esther John, Ph.D., CPIC senior research scientist, and in Los Angeles by Sue A. Ingles, DrP.H., associate professor of [preventive medicine](#) at the Keck School of Medicine of USC. [Study participants](#) completed a comprehensive questionnaire that evaluated amount and

type of [meat intake](#), including poultry and processed red meat. Information regarding cooking practices (e.g., pan-frying, oven-broiling and grilling) was obtained using color photographs that displayed the level of doneness. More than 1,000 of the men included in the study were diagnosed with advanced prostate cancer.

"We found that men who ate more than 1.5 servings of pan-fried red meat per week increased their risk of advanced prostate cancer by 30 percent," Stern said. "In addition, men who ate more than 2.5 servings of red meat cooked at high temperatures were 40 percent more likely to have advanced prostate cancer."

When considering specific types of red meats, hamburgers—but not steak—were linked to an increased risk of prostate cancer, especially among Hispanic men. "We speculate that these findings are a result of different levels of carcinogen accumulation found in hamburgers, given that they can attain higher internal and external temperatures faster than steak," Stern added.

Researchers also found that men with diets high in baked poultry had a lower risk of advanced prostate cancer, while consumption of pan-fried poultry was associated with increased risk. Stern noted that pan-frying, regardless of meat type, consistently led to an increased risk of prostate cancer. The same pattern was evident in Stern's previous research, which found that fish cooked at high temperatures, particularly pan-fried, increased the risk of prostate cancer.

The researchers do not know why pan-frying poses a higher risk for prostate cancer, but they suspect it is due to the formation of the DNA-damaging carcinogens—heterocyclic amines (HCAs)—during the cooking of red meat and poultry. HCAs are formed when sugars and amino acids are cooked at higher temperatures for longer periods of time. Other carcinogens, such as polycyclic aromatic hydrocarbons

(PAHs) are formed during the grilling or smoking of meat. When fat from the meat drips on an open flame, the rising smoke leaves deposits of PAHs on the meat. There is strong experimental evidence that HCAs and PAHs contribute to certain cancers, including prostate cancer.

"The observations from this study alone are not enough to make any health recommendations, but given the few modifiable risk factors known for prostate cancer, the understanding of dietary factors and cooking methods are of high public health relevance," said Stern.

**More information:** Joshi, A.D, Corral, R., Catsburg, C., Lewinger, J.P., Koo, J., John, E.M., Ingles, S., & Stern, M.C. (2012). Red meat and poultry, cooking practices, genetic susceptibility and risk of prostate cancer: Results from the California Collaborative Prostate Cancer Study. *Carcinogenesis*. Published online July 20, 2012; [doi:10.1093/carcin/bgs242](https://doi.org/10.1093/carcin/bgs242)

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