Are there favorite foods that may cause cancer?

By Victor Christianto, email: victorchristianto@gmail.com

Abstract
Acording to an article, there are some favorite foods that may cause cancer, including but not limited to: burgers, steak, fried chicken, french fries, bacon, canned foods, etc. See for instance: http://www.healthyyounaturally.com/edu/top10foodhazards.htm

Some of these harmful effects come from acrylamide, a substance that is formed during high-temperature processing of foods. According to Mathilda Bongers etc. at PlosOne journal (2012), acrylamide has correlation with cancer.

So do you think, that we should take radical shifts towards avoiding these favorite foods that may cause cancer? And why are they not prohibited from our food list?

Answers:
[1] **Chithan C Kandaswami**
Acrylamide, an industrial chemical, used in paper, plastic and manufacturing, is a suspected carcinogen in animals. It is generally safe at lower concentrations. In monkeys, toxic effects of acrylamide are seen when given at 10 mg/kg body weight/day for up to 12 weeks. Acrylamide is soluble in water, and so can be easily excreted from the body.

Your favorite foods: burgers, steak, fried chicken, French fries, bacon, etc. undergo incomplete combustion during cooking; products thus generated are known as pyrolysis products. If you consume them in moderation there is no problem.
The process produces carbon based products. These carbonaceous products containing carbon and hydrogen are known as polycyclic aromatic hydrocarbons (PAHs). PAHs are found in high amounts in cigarette smoke, ambient air and automobile emissions, and are particularly generated from barbecuing of meats. They are detoxified in the body by liver enzymes. They are known to be animal carcinogens.

[2] **Chithan C Kandaswami**
Victor,

It is safe up to the threshold found in acute and subchronic and chronic studies with rats. For monkeys, one would see discernible effects at 10 mg/kg body weight/day.

No substance is totally safe including table sugar!

[3] **Craig Uthe**
I'm skeptical that there's been any test of a specific food exclusively for the entire 80+ year lifespan of a human, both during young health and during the growing impairment of functioning that occurs due to aging. So instead we model our experiments for shorter periods of time in laboratory animals.

When it comes to cancer, I think the assumption of a "safe" level if flawed because there is always a random chance that a single molecule can make a oncogenic change and a usually-good chance that natural processes will deal with that to fix or eliminate the problem. So it probably takes many attempts at damaging DNA before there are enough changes in a cell to evade natural defenses, and the risks of this both increase and accumulate as one ages. I don't think it is possible for one to say that a

carcinogen never makes any oncogenic DNA changes below a given dose level, though the statistical risk may be extremely low for most people so it takes a lot of exposure (or lots of exposure to other random-DNA-changing carcinogens) before a statistically measurable impact would be seen.

Seeing a significant impact might also require multiple different carcinogens that humans expose themselves to cumulatively over a lifetime, each able to affect DNA a little differently rather than testing one single carcinogen at a time. If you want a more precise model, there's patients who are successfully on mutation-targeted inhibitor drugs -- there adaptation paths to drug-resistance but also mutational paths, so in the latter case they are already only 1 further-mutation away from a new road to cancer death.

I'm not saying people should avoid every food that could ever cause any mutational damage. Today's world's economy and food supply would suffer badly if that happened because it probably applies to most things we like to consume. We tend to accept that humans blindly accept a lot of risk (maybe most unknown even to scientists) and that will always work out badly for some small % of people. We can try to limit our risks but cannot eliminate risk, which is why many people who live a good health-conscience lifestyle with no environmental or inherited risk factors still get things like cancer, just not as many of them. So government-set levels of carcinogen don't mean they are safe to consume, but just that the economy and food supply system won't be damaged significantly by the damage they cause . . . for the vast majority of people . . . in the short-run. Maybe in the year 3014 we'll all be eating carcinogen-free synthetic food, but it won't be cheap and maybe not even palatable.

Like the man at the casino says, you place your bets and take your chances.

[4] **Victor Christianto**
Craig, thank you for your answer. I mean, if we know that favorite foods like burgers and steak contain acrylamide, then perhaps eating vegetables and fruits will be a safer choice..? Thanks

[5] **Paul Taylor**
I would argue that eating fruits and vegetables cooked the same way grilled meat products are prepared would be equally threatening. They contain proteins as well and therefore would run the same risks. As noted before, moderation is one aspect of reducing the exposure.

The other concern with many foods is the nature in which they were grown. Many commercially produced fruits and vegetables have high exposure to pesticides, herbicides, and may also be GMO. Many pesticides and herbicides have know carcinogenic effects. GMOs are a virtually unknown at this point. While touted as safe, these GMO plants often incorporate pesticidal properties from other plants and even animal species not typically consumed by humans.

As such a well balanced diet would seem the most prudent and provide a stable source of nutrition. Furthermore balancing the way in which food is prepared may have an impact. None of these solutions really has a double blind cross-over controlled method for study as the number of factors to control would be astronomical. If we were to eliminate all risks, there would be little if anything we could eat. Even foods available to our ancestors had inherent risks. Undercooking gave us parasites, over cooking carcinogen exposure, hunting and gathering put us on the food chain of other high level predators, Do we wish to trade our general life expectancy and infant mortality rates today for that of say 5,000 years in the past? Each choice carries with it some properties whether endogenous or exogenous that could negatively affect our health, propensity for cancer, infection, or other disease. As one colleague put it in a lecture he gave, "fresh vegetable are better than canned, fresh grass fed beef or free range chickens (like what we grew on a small farm), etc are better than overly processed packaged foods that we can buy in our freezer or canned goods sections at the supermarket. But even

canned/processed foods are better that an energy drink full of artificial sweeteners or loads of added sugar.

It may be less the problem of eating a grilled meat or vegetable or even the pesticides that are used in safeguarding our foods but the myriad of other choices we make that overload our bodies defenses or rob it of the nutrients needed to take care of the insults that come from our food itself. Things such as over eating refined sugar, overindulging in artificially or naturally sweetened beverages with no nutrient value rather than choosing water.

Concluding Remarks

One should be careful before eating burnt and red meat, because they may get acrylamide.

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