

# Hot Tea Does Not Cause Cancer - Despite IARC's Belief, It Never Did



By *Chuck Dinerstein, MD, MBA* — February 5, 2018



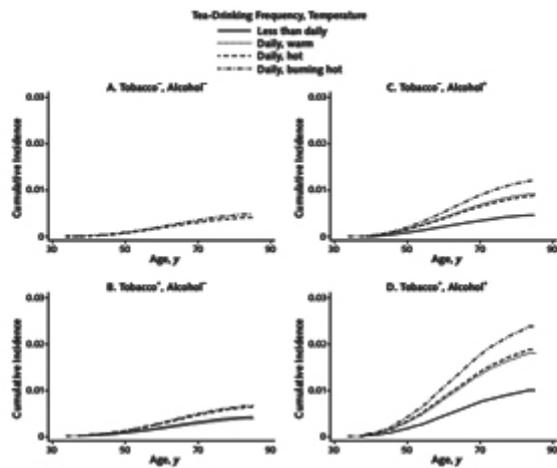
Carcinogen or Taste Treat? Courtesy of Takkk [1]

In June 2016, the International Agency for Research on Cancer (IARC) published their findings on coffee, mate and hot beverages and their role in carcinogenesis. [1] Their most contentious claim, [discussed](#) [2] previously by my colleagues, was that “drinking very hot beverages probably causes cancer of the esophagus in humans.” So when our preprint source had this headline, “Drinking hot tea associated with a 5-fold increased risk for esophageal cancer” I felt that IARC, like the proverbial blind squirrel, had found its nut. Unfortunately, the headline is very, very misleading.

The prospective study is from China which has both a high incidence of esophageal cancer [2] and tea drinking. They looked at 456,155 individuals, and the temperature of the tea was self-reported ranging from room temperature warm, to hot and to burning hot. No actual temperatures were measured, a flaw in most of these studies. The stated purpose of the study was to study the effect of high-temperature tea drinking, in association with alcohol and tobacco use, the two acknowledged lifestyle causes, in the development of esophageal cancer. So they went to great lengths to quantify the amount of tea, alcohol, and tobacco consumed.

This chart neatly summarizes their findings.

Figure. Adjusted cumulative incidences of esophageal cancer for participants with different combinations of tea, alcohol, and tobacco consumption.



The upper left is the baseline incidence of esophageal cancer in those participants that only drank hot tea. The other graphs show dramatic increases as participants smoked or drank, especially the combination. Tobacco and alcohol in a synergistic way, result in more cases of esophageal cancer. The researchers concluded

*“However, in the absence of both excessive alcohol consumption and smoking, daily tea drinking was not associated with esophageal cancer risk, regardless of tea temperature or other consumption metrics.”*

suggesting that those individuals with excessive alcohol consumption and tobacco smoking might want to cut back on the scorching hot tea. The fact that there was no temperature measurement makes any use of this study to defend or detract from IARC’s opinion wishful thinking, not science. No one knows whether scorching hot in this study was at IARC’s magic 160™°F.

An accompanying editorial acknowledges that tea temperatures were self-reported and “assessed only once and probably in error.” But this doesn’t deter them from promoting IARC’s conclusion, “Despite inconsistencies in the literature, a clear pattern is emerging.” They go on to cite a different study in humans and animal studies to defend the role of hot beverages in promoting esophageal cancer. The only clear pattern emerging from the inconsistencies of data is to continue to support IARC irrespective of what information is provided.

### IARC’s Carcinogenic Worldview

IARC believes hot beverages promoted cancer presumably with a repetitive thermal injury. The evidence was limited in humans but sufficient in animals for them to conclude hot drinks were “probably carcinogenic.” [3] The other option within the same category is “possibly carcinogenic;” linguistically, probably sounds more definitive than possibly. In IARC’s words, there is “no quantifiable difference,” in the terms, only the evidence for probable is greater.

Consider the animal data IARC believes is sufficient. Rats were given 0.75ml/kg of 168™F hot water directly to their esophagus along with a chemical known to induce esophageal cancer. This treatment was so brutal that 15% of those mice died within the first two weeks just from the

thermal injury, the remainder developed esophageal lesions. The researchers found that below 168 °F there was “no hyperplasia, dysplasia, or esophageal tumors.” So 168 °F is crucial, and it makes you wonder why IARC lowered the value to 149 °F in their conclusions - after all the study reported no esophageal tumors at that temperature.

### **Is 0.75ml/kg of 168 °F hot water a realistic measure of drinking scorching hot tea?**

Let’s pretend, like this current study and IARC that participants actually drank tea at 168 °F. There are older studies from the 70’s on hot beverages, the human esophagus, and actual temperature measurements. There is a linear relationship between the temperature of a drink and the subsequent temperature in the esophagus, more affected by the volume sipped than the temperature itself. For a 20ml sip of 168 °F hot beverage the esophageal temperature was 118 °F. In imaging of humans swallowing only half of a 20ml swallow reaches the esophagus right away, the rest is found in the upper throat.

Extrapolating from IARC’s sufficient animal data, for a 70 kg human to ingest the same amount of hot water as the rats would roughly require swallowing 3 ounces of 176 °F liquid at once. [4] Water at 140 °F will cause a burn in 5 seconds, do you think it is realistic to consider swallowing 3 ounces of 176 °F water?

IARC found coffee was not carcinogenic by their standards, nor was mate and now tea joins the safe hot beverage team. Precisely to what other hot beverages is IARC referring? Maybe IARC’s as yet to be published monograph will identify the culprit or will it again demonstrate IARC’s overreach in the name of expert opinion.

[1] The full monograph has yet to be published 18 months later.

[2] Even in a country where esophageal cancer is very frequent it is difficult to find sufficient cases to consider. There were 1731 cases of esophageal cancer detected in the nine years of the survey. That works out to an incidence of about 0.38% By way of comparison, the incidence of breast cancer in the US is 12.4% a 30 fold difference.

[3] [IARC's Classification System](#) [3]

Group 1	Carcinogenic to humans
Group 2A	Probably carcinogenic to humans
Group 2B	Possibly carcinogenic to humans
Group 3	Not classifiable as to its carcinogenicity to humans
Group 4	Probably not carcinogenic to humans

[4] 0.75ml/kg translates into 52.5 ml in a mythical 70 kg human and for that volume to reach the esophagus, you must sip twice that amount 105 ml, roughly 3 ounces. The temperature of the beverage must be higher before it reaches the esophagus, estimated at 176™oF.

Source: Effect of Hot Tea Consumption and Its Interactions With Alcohol and Tobacco Use on the Risk for Esophageal Cancer Annals of Internal Medicine DOI:10.7326/M17-2000

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**Links**

[1] [https://upload.wikimedia.org/wikipedia/commons/8/80/Hot\\_China-tea.jpg](https://upload.wikimedia.org/wikipedia/commons/8/80/Hot_China-tea.jpg)

[2] <https://www.acsh.org/news/2016/12/14/second-day-christmas-acsh-gave-me-two-killer-coffees-10580>

[3] <http://monographs.iarc.fr/ENG/Classification/>