

Molds, Mycotoxins, and Coffee
By Chris Kornman

Bob & Max's Note: If you are a coffee roaster doing wholesale business with any number of large-format retailers in the United States, you've probably been hearing the phrase "HACCP" with more regularity. In an effort to provide the best customer service we can, even after we've sold you the coffee, Royal is taking steps to educate and assist our clients with this [Hazard Analysis and Critical Control Points](#) compliance. We've recently created a new "Certifications Specialist" position, in-part to do just that. As Royal begins fielding questions about HACCP, we've redoubled our efforts to pay attention to (and avoid) the kinds of situations both here or abroad that can put coffee at risk. Below, Chris Kornman, our Education and Lab Manager, shares Part I of a two-part series on mycotoxin in coffee, and how its associated risks can be minimized.



PART I - Good News & Bad News.

Every so often, I get a question about mycotoxins and moldy coffee. Words like "mold" and "toxin" tend to elicit some visceral responses, so it's not surprising to me that there is a lot of concern and some misunderstanding and misinformation. I'm going to attempt to set the record straight.

First, the Bad News

Coffee, like nearly every other agricultural product commercially available, is at risk for mold. Not all molds are toxic, but there are common strains of molds, genera *Aspergillus* and *Penicillium*, known to cause serious health problems that can be found in a wide array of food and drink products. Those molds produce a specific mycotoxin (the term for a toxin produced by a fungus) called Ochratoxin-A (OTA, for short). It is a known cause of kidney failure, DNA damage, and a suspected carcinogen as well as a probable neurotoxin.

There is a very good likelihood that you and everyone you know have been exposed to minuscule amounts of OTA through any number of products readily available on any grocery store aisle. Studies in open market samples of commodities reveal [shocking figures](#): 90% of cereal derived products, nearly half of dried figs, more than 1 in 3 of the commercial chili powder samples, a quarter of grape juice products, and 28% of red wine samples all tested positive for detectable levels of OTA. Oh, and over half of instant coffee samples tested positive in multiple studies. [Food Safety Watch](#) has noted that doses of 200 micrograms of OTA per kg of food over 3 months was sufficient to cause acute kidney failure in rats and pigs.



I don't state all this to scare you, but rather to highlight that coffee is not the sole culprit here. If you search the web for Ochratoxin, Mycotoxin, and coffee, you'll find some scary stuff. [Multiple studies published](#) indicate that coffee is a contributor to Ochratoxin intake. And there's a certain coffee source making a business out of "[hacking](#)" the coffee process to "provide you with a cup of coffee that has a minimized level of performance-robbing mold-toxins."

Now, the Good News

Before we get any further, I have to spoil the end of the story for you: the coffee you're drinking isn't going to kill you, no complicated elixir required. Briefly, let's filter out the noise and understand what is really at stake when it comes to coffee production, consumption, and the health of everyone involved in the process.

With regard to OTA, a recent broad survey in Catalonia, Spain, studied the mycotoxin intake in multiple age groups across 12 cities in foods and beverages ranging from baby food to beer. Though low level exposure was present in many participants, the study found that [none of its participants exceeded just 11% of the daily maximum limits for OTA exposure](#). That's a good start. A separate article notes "[there are no documented cases of acute OTA toxicity in humans](#)."

When it comes to coffee, a Food Safety Watch cites a European report [noting that](#) "the major contributors to OTA in the diet... are cereals and wine. Coffee was thought to be important in this respect, but is now considered less significant." The report I mentioned earlier with "shocking" figures actually ends up discrediting many of them in its own test results. Their analysis produced relatively non-shocking figures: after testing 142 coffee samples, just 14 showed detectable levels of OTA. Of those 14, only one exceeded regulations at 6.5 micrograms per kilo. And of those 14 samples, **100% were decaffeinated coffees**.

In 2001, the International Coffee Organization, in conjunction with the UN, and the Food and Agricultural Organization launched a [6.5 million dollar program](#) to [improve practices](#) worldwide specifically related to [reduction of OTA](#) in coffee production, and as of 2006, [more than 30 nations had adopted the recommended practices](#).

Worst-Case Scenario

That same year in 2006, [a task force assessed the average risk of consumers](#), and established a recommended safety limit of no more than 120 nanograms of Ochratoxin exposure, per week, per kilogram of bodyweight.

I was curious how this would translate in a worst-case real-world scenario. A nanogram seems like a pretty small amount and I was concerned that crunching numbers would end up discrediting my thesis... but I was wrong.

The highest level I found in coffee mentioned in any study was 7.8 micrograms (7800 nanograms) of OTA in 1 kg of ground coffee (back in 1995, before the ICO/FAO project). To approach that 120 ng/kg per week limit suggested above, a 150 lb adult would need to consume over 1 kg of high-OTA coffee per week... but that's ground coffee. If brewing at a fairly standard 1-to-15 ratio of coffee-to-water (and assuming no loss of OTA in the brewing process), that means that same adult would have to drink **over 2 liters** of brewed coffee **per day** to risk toxicity levels, roughly 11 eight-ounce cups. **Per day. Every day.**



Let's not forget that coffee is an important source of antioxidants and has been widely recognized as having a positive correlation to overall health. The New York Times [noted impressive medical consensus](#) on wide-ranging health associations for coffee consumption including reduced risk of diseases ranging from heart and liver afflictions, Parkinson's, and Type 2 Diabetes.

I'm not going to try and turn this into an argument for coffee as a health-beverage, but it seems clear from the wide array of sources cited in the NYT article that the benefits of drinking coffee in amounts ranging from three to five cups per day outweigh the potential risks.

The second part of this series will focus on ways to avoid the risk of Ochratoxin throughout the supply chain, from producer to consumer.