

Flavoring additive puts professional cooks at risk

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America's favorite breakfast is bacon and eggs -- and often it is cooked in a product that contains the same chemical that has damaged and destroyed the lungs of hundreds of popcorn and food-flavoring plant workers.

A study commissioned by the [Seattle P-I](#) shows that top-selling butter substitutes, when heated, release vapor from a chemical additive called diacetyl. When inhaled, this vapor has been linked to a rare, sometimes fatal respiratory disease called bronchiolitis obliterans.

The diacetyl vapors from some of the products are released in such volume that they could pose a significant risk to professional cooks who stand over hot grills or skillets for hours and use large amounts of these butter substitutes, according to the analysis.

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About 21 million eggs are cracked open every morning and become the stars of the high-speed breakfast ballet performed in diners, greasy spoons, classy restaurants and quick food purveyors in about every community in the country.

Some cook in pure butter. Many spoon out a soft or liquid margarine. Others slather their grills and skillets with a buttery soy, corn, vegetable or canola oil. Most of them likely aren't aware of the potential risks from diacetyl in these products.

The P-I's study may be the first to examine how much diacetyl could be rising from those skillets and grills.

The newspaper commissioned a lab to test the amount of professional cooking oil needed to fry or scramble a dozen eggs or grill two hefty orders of hash browns -- a bit less than 4 ounces. Now, consider the diacetyl in 30 times that amount, the oil that the average short-order cook would use to prepare the 720 eggs that some Seattle eateries serve during a four-hour breakfast shift.

"Without a comprehensive evaluation it's impossible to assess the actual risk, but there is no doubt that this group of workers should be studied," Dr. [Richard Kanwal](#) said.

He's a medical officer with the [National Institute for Occupational Safety and Health](#), the research arm for worker health and safety for the national [Centers for Disease Control and Prevention](#).

"It is possible that the amount of diacetyl being released in commercial kitchens where these butter-flavored products are being used could equal or perhaps exceed what was found in the popcorn plants," Kanwal said.

The newspaper's tests did find the potential for exposures that could match hazardous workplace levels. In one test, for example, the amount of diacetyl in what's known as "pan and grill" oil was measured at 234 parts per million as it left the test skillet. It is estimated that diacetyl levels of 2 or 6 ppm entered the worker's "breathing zone" above the skillet.

As low as these "breathing zone" estimates appeared to be, the amount of artificial butter flavoring released could result in exposures for professional cooks at levels that are as high or higher than some severely ill workers at a Jasper, Mo., popcorn plant were exposed to in their eight-hour shift.

Where are the sick cooks?

There are about 3.7 million cooks of all types and another 2.5 million other kitchen workers in food preparation, according to the [Bureau of Labor Statistics](#).

So, if the inhalation of large amounts of diacetyl is dangerous and products containing it are so prevalent, where are all the sick cooks?

Physicians are familiar with only two cases of cooks being injured by inhaling vapor from cooking products. One goes back to 1985. The more recent surfaced in the mid-1990s and was presented in a conference at Denver's [National Jewish Medical Center](#). Dr. [Talmadge King](#) briefly discussed a young short-order cook with severe lung disease who used PAM cooking spray on the job.

"It was an enigma," said Dr. [Kathleen Kreiss](#), chief of the [Respiratory Disease Field Studies Branch of NIOSH](#), who attended the talk. "That's why it was presented. Nobody knew why this woman had terrible lung disease. It was known that she used PAM in her cooking but then no one thought to link it to diacetyl."

(Butter-flavored PAM, which is used by many cooks, was one of the 22 products analyzed for the P-I. A two-second spray into a heated test pan released a high level of diacetyl in laboratory tests. During interviews this week, [Jim Astwood](#), ConAgra's vice president of scientific and regulatory affairs, said that the corporation "plans to have all PAM products containing diacetyl off store shelves by next month.")

Kreiss said she and her colleagues have been concerned about a possible hazard from diacetyl to kitchen workers since three peer-reviewed studies reported that workers in food production professions have an unexplained high prevalence of obstructive lung disease. That is what breathing diacetyl vapors can cause.

The studies were done in Europe, New Zealand and the United States.

"I have been suggesting for several years now that this (use of flavorings and food production and service workers) needs to be examined," Kreiss said.

One problem in determining the extent of the problem, according to union health officers, is that kitchen workers often are underinsured or uninsured and frequently conceal health problems because they don't want to anger their employers. The pressures on the line cook or the line chef are significant and the turnover rate is high, making occupational disease hard to identify.

Dr. [Allen Parmet](#), a Kansas City occupational medicine physician who first identified the disease among popcorn plant workers, calls it "the healthy worker effect."

"People work until they're too sick to continue work, and they come in with their cough, because they can't breathe, and they think it's because they were smoking while they were cooking," Parmet said. "They have no reason to suspect they're being made sick because of the products they're using."

Dr. [Phil Harber](#), chief of UCLA's division of occupational and environmental medicine, said, "The obvious answer may be that nobody is looking. We cannot conclude that the absence of cases means the absence of disease." Harber has diagnosed several cases of bronchiolitis obliterans among workers in flavoring plants in Southern California.

The testing

Hundreds of brands of cooking oils, butter substitutes and sprays use diacetyl to provide or enhance the flavor of butter. Oils marketed by Cargill, Archer Daniels Midland and Ventura were among the most frequent brands spotted in commercial kitchens and mentioned by cooks and food managers questioned in the Pacific Northwest.

The laboratory hired by the P-I examined 22 of the more popular cooking products. LabCor, a Seattle-based certified analytical laboratory frequently used by the Environmental Protection Agency, found diacetyl in air samples captured from a heated skillet in which the products were tested.

In this type of testing, the concentration of the chemical present is measured in parts per million. The analysis found:

- Two real butters were analyzed and diacetyl was found in a range of 7 ppm to almost 16 ppm.
- In all the margarine and shortening products, levels of 7 ppm to almost 180 ppm were present.
- A butter-flavored cooking spray released more than 164 ppm of diacetyl.
- Butter-flavored cooking oils used by professional cooks ranged from 23 ppm to 234 ppm.
- Two brands of oil for popping corn came in at 1,062 ppm and 1,125 ppm.

The test results were surprising not only because some of the levels of diacetyl were so high, but also that diacetyl, beyond what exists naturally in all dairy products, was found to have been added to the pure sweet butter that was tested as a baseline.

"Diacetyl is added to all but salted butter throughout the industry," said [Mark Wustenberg](#) at the Oregon-based Tillamook Creamery. "If you don't salt it, you have to add something to keep it from spoiling, and lactic acid and diacetyl is a way of stabilizing it."

In Seattle, at Darigold headquarters, [Randy Eronymous](#), director of marketing, agreed. Both men said the levels of diacetyl they add to their butters shouldn't pose health problems.

Measuring the risk

Occupational health specialists have said that repeated exposure to diacetyl has led to the deaths of at least three workers, destruction of the lungs of scores more and sickened hundreds of others who worked in plants that produce flavorings, microwave popcorn, candy, beverages, oils and other products.

Interviews with several victims of the disease show many similarities. Most were young, non-smokers, healthy and active. But as their disease worsened, their damaged lungs imprisoned them in an oxygen-starved world where any activity led to the sensation of strangulation, where tussling with their kids is an impossibility and even talking is interrupted for gasps of air.

DIACETYL EFFECTS

It is impossible to equate the amount of diacetyl released in the P-I's testing to a degree of risk faced by those who cook with the products because of other variables.

- [View a graphic illustrating the effects of diacetyl on the lungs.](#)

When measuring the danger of exposure to a substance, toxicologists consider the toxicity of the material and how long and to what amount of that chemical has a person been exposed.

Good ventilation can reduce the exposure. But observations made while researching this story found that many commercial cooks reduced or even shut off the ventilators above their grills because of the noise.

In some restaurants, oil, butters or sprays are used in skillets lined along the edge of the stoves or grills quickly sautéing the shrimp, chicken breasts or vegetables. In some kitchens the pans were not under the ventilating hoods.

"It is very important to protect cooks from exposure to diacetyl as (bronchiolitis obliterans) is a very serious lung problem that cannot be reversed," said Dr. [Robert Harrison](#), professor of occupational medicine at the University of California-San Francisco.

"If there are safer alternatives for cooking oils, the prudent step would be to eliminate the use of any products that contain diacetyl," Harrison said.

As master chef Julia Child fervently espoused, butter is better. But it costs more than oil and it burns or breaks down at a lower temperature (butter smokes at 304 degrees, Canola oil at 460 degrees and corn oil at 459 degrees).

In a high-volume, fast-moving restaurant, these are important differences. Many of the cooks interviewed almost wistfully said they'd rather use only butter but almost all said that the butter-flavored oils and margarines came "close" in taste.

Government approved?

Without exception, statements issued by the manufacturers of the products tested for the P-I said the [Food and Drug Administration](#) has ruled that diacetyl is safe.

"Our customers can rest assured that we only use ingredients in our products that have been approved by the FDA," said Liz Feldman, a spokeswoman for Nucoa and Smart Balance.

"Diacetyl has been used as a flavor ingredient for many years in many products and is approved for this use by the FDA," said Anita Larsen, director of media relations for Unilever USA, which makes I Can't Believe It's Not Butter, Brummel and Brown, Country Crock, Promise and Imperial.

"The amounts of added diacetyl found in Unilever food products pose no threat to public health," she added.

"The FDA classifies diacetyl as 'Generally Recognized As Safe' for consumption," said Lori Fligge, media relations director for Cargill, which made the pan and grill oil that released 234 ppm of the chemical when heated.

ConAgra makes Parkay, Fleischmann's, Blue Bonnet, PAM, and Act II and Orville Redenbacher corn popping oils.

"ConAgra sees no risk to cooks using any of its margarines and oils" and this is based not only on the FDA designation but also on in-house testing, said corporate spokeswoman [Stephanie Childs](#). On Wednesday, Childs told the P-I that the corporation was taking diacetyl out of its popcorn oil.

Safeway's spokeswoman [Teena Massingill](#) said that Safeway brand Butterlicious has a "small amount" of diacetyl added but its "Lucerne Spreadable Butter contains none."

"Our in-house research has shown that there is no risk from diacetyl in using these products," Massingill added.

The J.M. Smucker Co. markets Crisco. Maribeth Badertscher, director of corporate communications, said, "The FDA considers diacetyl to be safe for food products and has indicated that there is no need for consumers to avoid products with the ingredient." However, she told the P-I that efforts were under way to remove diacetyl from butter-flavored Crisco.

But the studies to which all refer were done for FDA more than a half century ago and again in the 1980s to attain the "Generally Regarded as Safe" designation for diacetyl. That means the chemical combination could be added to food without undergoing the far more extensive and costly premarket safety testing. The tests that were done examined only the hazard from eating diacetyl, not inhaling its vapor.

"GRAS is an imaginary regulatory mechanism that gives the appearance of real protection," said Dr. David Egilman, a professor at Brown University and the head of Never Again Consulting, a research group that has investigated many worker safety issues, including diacetyl. "Companies do not have to do any testing to label a substance added to food as GRAS.

"Diacetyl is just one of scores of substances that shouldn't be allowed to carry what is in effect a government-sanctioned anti-warning giving the false impression that untested food additives are safe," said Egilman, who has testified on behalf of many popcorn workers injured by exposure to the butter flavoring agent.

The problem in discussing the hazard from exposure to diacetyl is that beyond a handful of animal studies, little research has been done to quantify how much of the chemical it takes to harm humans.

Governmental indifference to the possible threat posed by breathing diacetyl is epidemic. The Consumer Product Safety Board repeatedly has said it's not its problem. For at least three years the FDA has been ignoring the question and only now, almost eight years after the first solid links between diacetyl and workers, has the Occupational Safety and Health Administration said it will attempt to set standards for worker exposure, and this only after repeated hammering by unions and Congress.

Risks at home unclear

Manufacturers of these products insist that home users face no risk, and they could be correct. Home cooks are exposed, but the duration of their exposure is much shorter and they use lesser amounts of the diacetyl-releasing items. However, no one knows what the risks are because the government has never conducted tests.

"Many people don't use the hood over their home stove in the interest of energy conservation or noise reduction. Without air testing and the knowledge of what exposure levels are harmful, we don't know whether there is a risk," NIOSH's Kreiss said.

Her colleague Kanwal added: "Any health risk always boils down to how it's used. It's not just the agent, it's how people handle it or are exposed to it. If you have somebody at home who cooks for large families or groups at home, maybe they're getting a lot of exposure."

Dr. Greg Kullman, a senior industrial hygienist with the group at NIOSH that has been doing most of the diacetyl investigations, says the information just isn't there to say one way or the other if there is consumer risk and how much of a risk it is.

"You could downplay it but that could be wrong," Kullman said. "The whole consumer use risk is an unknown. If some of these products have substantial releases of a chemical we know is bad, it is something that the public health community should examine."