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A Serenade for Marinade Food safety study singing praise for spice extracts

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Article Text:

Hold that cookout, and find the **marinade!**

University of Tennessee scientists have found that marinating food is not only good for taste, it apparently can be good for your health -- as in killing some of the harmful bacteria that make food unsafe.

UT microbiologist Dr. F. Ann Draughon, co-director of the UT Food Safety Initiative, said she approached the project full of skepticism. Sixty days later -- when a piece of raw fish still smelled fresh -- Draughon began to believe in the power of spice.

"I was interested in doing something like this because of all the newspaper information on 'nutra-ceuticals,' or beneficial herbal supplements," said Draughon, who headed the research team.

"I wanted to show that using any kind of herbs was a useless endeavor, and I actually didn't think they would have any effect at all.

"So I went into this from the standpoint of doing something to show an approach doesn't work, instead of that it will. But they were so effective it totally changed my thinking. I was actually kind of shocked."

UT officials said the study involved marinating fresh fish in the extracts of 12 household spices, then checking for the presence of nine food-borne microbes: *Listeria monocytogenes*, *Staphylococcus aureus*, *Escherichia coli* 0:157:H7 (commonly known as "E. coli"), *Yersinia enterocolitica*, *Pseudomonas aeruginosa*, *Lactobacillus plantarum*, *Aspergillus niger*, *Geotrichum* and *Rhodotorula*.

The **marinades** included essential oils of angelica, basil, carrot, celery, cardamom, coriander, dill weed, fennel, oregano, parsley and rosemary. Essential oils are substances extracted from the spices that give them their characteristic flavor and aroma, Draughon explained.

Fresh fish was selected for the experiments because of its high tendency to spoil and to be contaminated by pathogens.

UT officials said the study found oil of oregano was the most effective at killing all pathogens, followed by oils of coriander and basil. Anise oil was effective against molds but did little against various bacteria, officials said.

"What we found was that certain spices added to foods would be useful in preventing and even killing organisms like E. coli that can cause disease," Draughon said. "Under refrigeration with a **marinade**, we could completely kill *Listeria* and E. coli 0:157. That's pretty impressive."

Draughon said the lab results were consistent, with the spices showing a dramatic effect from the first try. It took several repeats of the process by her research assistant before Draughon was convinced, however.

"You hear about in the old-timey days, people wearing garlic cloves around their necks supposedly to prevent illness," Draughon said. "I've always figured that probably didn't do anything for the illness but more likely kept people -- sick and otherwise -- out of your face.

"I figured these spices would have an aromatic quality and nothing helpful otherwise. When I finally was convinced that oregano would completely inhibit organisms associated with food-borne disease, that's when we looked at some of the other extract oils."

A second study tested the preservative properties of black cumin extract. Research assistant Mona Elgayyar found the extract was "moderately effective" at limiting the growth of *Salmonella typhimurium*, E. coli 0:157:H7 and other microbes. Black cumin is a spice common to Egyptian cooking.

"I would recommend a teriyaki-type **marinade** or an olive oil or Italian dressing that you can add these oils to, because they give the foods a lot of flavoring," Draughon said. "It's important to distribute the oil so that the entire surface would be decontaminated."

Most **marinades** involve the combination of an acidic component (lemon juice, orange juice, vinegar) with herbs (thyme, dill rosemary) and a distinctive flavoring (onions, garlic, soy sauce), officials point out. They suggest marinating be done in a refrigerator, using a glass, plastic, stainless steel or lead-free ceramic dish.

Once boiled, **marinades** can be used for basting during cooking or made into sauce for vegetables and pasta.

The study doesn't mean powdered versions of the spices provide the same protection as the extracts, Draughon said. "We didn't look at the dry spices. It might take a lot more of the dry spice to get the same effect."

Further study is necessary to determine which component of the oils had the desired effect, Draughon said. At the moment, she's pretty busy trying to return "a tremendous number of calls" from seasoning companies. "I think in the next 10 years, we're going to see a lot of natural materials help people improve their health, like we're already seeing," Draughon added.

More testing is needed "to make sure they don't have harmful effects, that they cause mutation or cancer at high levels. A lot of people are taking them internally, and they've not been widely tested."

Meanwhile, it turns out that **marinade** also does more than flavor grilled meats.

The American Institute for Cancer Research says that "even a brief bath in the simplest of **marinades** can impede the formation of heterocyclic amines," or HCAs. Those are the carcinogenic compounds that normally result when meat is cooked at high temperatures, particularly when it is burned or charred.

Officials explain that the heat of flame-cooking causes creatine -- a compound within muscle meats -- to react with amino acids and produce HCAs. They say the precise way that marinating inhibits this process isn't yet understood. Scientists believe the higher acidity of **marinade** recipes plays a large role, however.

According to the institute, researchers marinated beef, pork, chicken and fish for varying lengths of time prior to grilling. When the grilled meats were tested for the presence and concentration of specific HCAs, the carcinogens were found to have dropped by 92 to 99 percent.

Meats that had marinated only 40 minutes showed the same reduction in HCAs as samples that soaked for two days.

The institute offers other tips for decreasing the possible cancer risk posed by grilling: Pre-cook meat in a microwave oven to reduce grilling time. Remove any fat which may drip onto the flames and cause flare-ups, and use tongs to turn meat carefully.

Marinades used in the clinical trials were taken from a variety of standard recipes.

The institute says the fact that different **marinades** showed the same HCA-inhibiting effect "would seem to indicate that exact proportions are less important than the basic blend of ingredients."

The Tennessee Food Safety Initiative is a research program jointly supported by the U.S. Food and Drug Administration and the UT Agricultural Experiment Station.

The initiative is focusing on the top four food-borne pathogens: E. coli 0:157:H7, Y. enterocolitica, Salmonella and C. jejuni, and their presence in the products of private farms.

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Caption:

(Color) Dr. F. Ann Draughon, a University of Tennessee microbiologist, is studying the affect of herbs on food safety. Clay Owen/News-Sentinel staff

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