

Steaming fish better than boiling for eliminating cyanotoxins

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The authors of the study in their laboratory. Credit: University of Seville

A group of researchers from the University of Seville has published a study that shows that steaming freshwater fish for more than two minutes reduces the presence of cylindrospermopsin, a cyanotoxin, by



up to 26 percent. However, if boiled, the reduction is smaller, 18 percent, with a corresponding increase in risk for the consumer. Another important conclusion from the research was that these biotoxins pass into the water used for cooking.

This study, which has been published in *Food Control*, centers on a species of <u>freshwater fish</u>, tilapia. And specifically, the cyanotoxin analysed was cylindrospermopsin.

"Cyanotoxins are produced by a group of bacteria called cyanobacteria, which are mainly found in freshwater. They are emerging toxins that currently need to be tested to evaluate the risks that their presence in <u>water</u> and <u>food</u> might cause for humans and for the environment," explains researcher Ana María Cameán.

In the published study, it was also observed that the concentration of cylindrospermopsin after cooking would not have consequences for public health, as established by the Provisional Tolerable daily Intake established by the WHO. "Our results show that it is not recommended to eat raw freshwater fish, that it should be cooked, and better steamed than boiled for more than two minutes, and that the water used for cooking should not be used for stocks, as it contains water-soluble toxins, which are transferred from the fish to the water."

International Regulation

Cyanotoxins can be found in plant-based foods that have been cooked with <u>contaminated water</u>. The same is true of cereals, fish and shellfish that have been contaminated before becoming part of the food chain. It has been shown that cylindrospermopsin, which is increasingly more common globally, can affect organs like the liver, kidneys, heart, intestines, lungs and brain, among others, in animals. In humans, the effects of ingestion include hepatoenteritis, headaches, diarrhoea,



dehydration, and kidney damage, among others.

The European Food Safety Authority has recently published a report in which it brought to attention the lack of scientific studies on the transference and bioaccumulation of cyanotoxins in <u>fish</u> and other foodstuffs, as well as the absence of a thorough evaluation of their toxicity.

"It is fundamental to continue investing research resources in this area, as the real exposure to consumers is not known, and therefore the risk is also unknown," say the researchers, who add that they are working on the evaluation of other cooking techniques such as cooking on a griddle and in microwaves.

"We wanted to know what would happen to cylindrospermopsin after cooking. To discover this, we used a hybrid quadrupole-orbitrap mass spectrometer capable of acquiring a resolution higher than 70,000 FWHM at 200 megahertz with a UHPLC chromatography system. This allowed us to determine the molecular formula of the compounds with a tolerance of less than 5 ppm," explains researcher Rocio Valderrama from the Mass Spectrometry Cryogenics Service at the University of Seville.

More information: Remedios Guzm?n-Guill?n et al, Changes on cylindrospermopsin concentration and characterization of decomposition products in fish muscle (Oreochromis niloticus) by boiling and steaming, *Food Control* (2017). DOI: 10.1016/j.foodcont.2017.02.035

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