New research could provide better food and faster analysis of blood tests

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Anne Bech Risum and Rasmus Bro next to the gas chromatograph at the Department of Food Science, at the University of Copenhagen (UCPH FOOD) in Denmark. Credit: Morten Vormsborg Christiansen

Gas chromatography is a method of analysis that most people have experienced at one time or another without necessarily knowing it. For example, gas chromatography can be used to reveal food fraud, find out where a particular batch of cocaine was produced or monitor the fermentation of cheese.

"The new interpretive method of gas chromatographic analysis can make this type of analysis accessible to many more, which means that better and cheaper decisions can be made in a number of areas in society," says Professor Rasmus Bro, Department of Food Science at the University of Copenhagen (UCPH FOOD), who is one of the researchers behind the new interpretive method.

The method can also be used to measure flavour and aroma in gastronomy and to examine blood samples taken in the hospital.

"Gas chromatography is one of the most widely used analytical methods and it provides a chemical profile that can reveal thousands of things. The

analysis shows most of the chemical components in a sample of biological material in a particular pattern that can then be interpreted in terms of the specific things you want to examine. You could say that you take a chemical "fingerprint" of the material," says Rasmus Bro.

Gas chromatography is generally important when talking about safety and improving the quality of global food production. And monitoring by means of measurements and artificial intelligence is one of the topics at a new major food conference in Copenhagen later this month, Food Day 2019, under the heading "The role of online monitoring and artificial intelligence in sustainable food production."

Use of gas chromatographic analysis in the food industry

It is quite expensive to interpret the analyses, as it requires highly specialised workforce.

"There is a great deal of manual work behind the interpretation of many gas chromatographic analyses and in some cases it takes several weeks to get the results from the measurements. With this research, we show that some of the most time consuming tasks can be done automatically by a computer," says Ph.D. student Anne Bech Risum, who is also one of the researchers behind the method of interpretation.

The computer can make a number of decisions that usually require a chemist.

"The interpretation consumes a great deal of work because you work through the data bit by bit. A computer can do this much more efficiently and reproducibly," explains Anne Bech Risum.

Gas chromatography using mass spectrometry (GC-MS) is widely used in the food industry. For example, all large companies that work with

fermentation will use this method of [analysis](#) to measure how the microorganisms in a fermentation develop and affect the final product.

"If you, for example, produce a cheese, the taste and aroma develop differently depending on the microbiological culture you add and how you treat the cheese during production. Gas [chromatography](#) can be used to measure the chemical elements that together form the aroma profile of the cheese. So if you, for example, want a more fruity or nutty aroma, you could try to change the production and then measure whether you have formed more of the chemicals behind the desired flavour profile," says Anne Bech Risum.

The method of interpretation could also help give smaller [food](#) companies access to highly advanced analytical methods that can help companies with product optimisation, quality assurance and raw material identification.

More information: Anne Bech Risum et al, Using deep learning to evaluate peaks in chromatographic data, *Talanta* (2019). [DOI: 10.1016/j.talanta.2019.05.053](#)

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