The cocktail-effect is about all types of chemicals

We cannot deal with the risks from chemicals by considering only a limited part of our daily exposure. A study focusing only on fruit and vegetables is not enough, write the Professors in a reply to the so-called cocktail-effect.

Martin Larsson from the company Bayer Crop Sciences writes in an opinion article in SvD (link) that the risk of the chemical cocktail that we are exposed to daily is “nonexistent”. His opinion is based on a study that he published earlier this year in the scientific journal Food and Chemical Toxicology (link). Unfortunately, he takes the study results far too far, as explained in the following:

First: the study concludes that Danish consumers are being exposed to pesticides equivalent to 13-26 percent (adults) and 44 percent (children) of the acceptable daily intake (ADI). However, these are just *average* values. The study does not answer the more relevant and important question: How often, and how many consumers – adults and children – are being exposed to *unacceptable high levels* of pesticides through food?

It is simply not sufficient to protect an “average” person from an “average” risk. Consider for example the scenario that 5 percent of all pedestrians crossing the street at a certain crossing would be hit by a car. The crossing would then be rebuilt to improve the security for pedestrians. Even if the average pedestrian manages to cross the street without being hit.

Second: The exposure that is analyzed in the study only includes pesticides found in fruit and vegetables. Even then, the average Danish child already is exposed to 44 percent of the ADI. But if we evaluate chemical exposures, we need to look at the bigger picture. How high is the exposure if we also consider the residues of veterinary medicines found in the meat that we eat? And how high does the total exposure become if we add the exposure from other industrial chemicals, such as fluorinated substances in drinking water? Air pollution? Chemicals in indoor air that contains a mixture of, for example, different flame retardants? Chemicals from plastics, food packaging, textiles and personal care products?

A similar and maybe more familiar example: We know that the climate is changing and that we must decrease the emissions of green-house gases. But it is obvious that it is insufficient to only decrease the emission from air traffic. We also need to consider green-house gas emissions from cars, waste incineration, production of electricity, animal farming, etc. Similarly, it is not sufficient to deal with chemical risks by considering only a limited part of the chemical cocktail that we are exposed to on a daily basis.

This is not about flagging a particular group of chemicals as being especially problematic. The reason for our concern is that humans and the environment are being continuously exposed to a large number of chemicals, from a large number of sources. Current legislation focuses almost exclusively on estimating the risks of one chemical at a time. And we know that this systematically underestimates the true risks of chemical exposure.

Martin Larsson also argues that the ADI values have a significant “inbuilt” safety margin. True, but these margins are supposed to account for the uncertainty encountered when data

from animal experiments are used to estimate risks for humans. In other words, the safety margin used for the ADI is supposed to account for the fact that humans might be more sensitive than the laboratory animals. They are certainly *not* set up to deal with the fact that we only test and assess one chemical at a time.

Martin Larsson concludes his opinion article by dismissing the existence of the "cocktail effect", which simply flies into the face of the scientific state of the art. Which is why basically every organization or authority working in the area of chemical safety – including for example the OECD, the World Health Organization (WHO), the European Food Safety Authority (EFSA) and the European Chemicals Agency (ECHA) –work intensively on developing suitable methods to better consider the cocktail effect during the risk assessment of chemicals. It is obvious that, in contrast to Larsson, many national and international experts actually take the "cocktail effect" quite serious.

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