Toxification of chemicals by microorganisms on the skin

The skin is our largest organ and harbours a microbial population with a density second to the gut. Yet, little is known about the effects of this microbiome metabolism on the human host. Using benzo[*a*]pyrene (B[*a*]P) as a model, the BfR has examined for the first time the extent to which skin microbes contribute to the toxification of chemicals. B[*a*]P is a polycyclic aromatic hydrocarbon (PAH). As combustion products PAHs are contaminants that occur everywhere, in the air as well as in consumer products. Certain PAHs, such as B[*a*]P, are highly carcinogenic. Skin swabs of randomly selected volunteers yielded several B[*a*]P-degrading microorganisms. The isolated organisms convert B[*a*]P fully or partially depending on the degradative pathway used. Degradation resulted in the excretion of a mixture of metabolites, several of which unknown. Tests showed these metabolites to have much stronger cytotoxic and genotoxic effects than the corresponding human metabolic products. Studies in microbially competent 3D models confirm this, as well as a possible inhibition of DNA repair in the human host. It now needs to be clarified which effects microbial toxification of B[*a*]P and other PAHs can have on human health.

More information:
Sowada et al. 2017. Toxification of polycyclic aromatic hydrocarbons by commensal bacteria from human skin. Arch Toxicol 91 (6): 2331–2341.

Release of aluminium from uncoated menu trays into foods

In a research project, the BfR showed that aluminium ions are released into acidic foodstuffs from uncoated aluminium menu trays during heating and to a higher extent during warm keeping. Some of the determined concentrations were significantly higher than the specific release limit (SRL) defined by the Council of Europe. The observed aluminium release alone does not result in a harmful intake level, but due to the natural background level of aluminium in drinking water and in untreated foods, exposure is already within the range of the tolerable weekly intake level. Furthermore, consumers may be exposed to aluminium from improper use of other food contact materials consisting of aluminium as well as from cosmetics. In light of this already high intake, the BfR recommends minimising any preventable additional aluminium exposure. This applies in particular to vulnerable consumer groups such as small children and elderly people. Both population groups may – for example in care facilities – consume meals that have been heated and kept warm in aluminium menu trays on a daily or very regular basis.

More information:
BfR Opinion No. 007/2017 of 29 May 2017 (in German)

Contamination of feed: Digital tools allow a fast response

Computer tools developed at the BfR help to predict the accumulation and elimination of potentially harmful substances such as per- and polyfluoroalkyl substances (PFAS) in fattening pigs and dairy cows. Should animal feed become contaminated with PFAS, these substances can be passed on to the animals and thus into foods of animal origin. How much ends up on our tables can vary greatly depending on the particular substance and the kind of food. The BfR has developed the digital tools RITOPS and PERCOW. They can calculate the levels of specific PFAS to be expected in foods in the event of animal feed contamination. In this way, the computer tools help the responsible surveillance authorities during cases of feed contamination with PFAS to quickly estimate the associated health risks of consumers. The algorithms used are based on experiments on the transfer of substances from feed conducted at the BfR.

More information:
Numata et al. 2017. Risk tools for ready-to-use modeling of PFAS transfer from contaminated feed into foods of animal origin. Organohalogen Compd. 79.