

BfR 2 GO

The Science Magazine
of the German Federal Institute for Risk Assessment
Issue 1/2022



20 Years of the German Federal
Institute for Risk Assessment

Hunting for risks

Lupin seeds

**Bitter makes
poisonous**

Poisoning

**Five hazards
for children**

Cancer research

**Centrosomes
direct cell division**

Dear readers,

It's been 20 years since the German Federal Institute for Risk Assessment was founded. Looking back at 2002, we almost feel nostalgic in view of our crisis-ridden present – but only almost. It was hardly a perfect world back then either. Mad cow disease, or BSE, was the quite alarming catalyst for founding the BfR. There was concern that BSE could also spread to humans, and this suspicion was unfortunately confirmed. Nevertheless, in the end it fortunately did not turn out as badly as some had predicted.



Identifying risks, assessing them and looking for ways to reduce them: this is our institute's contribution to making the world safer for people. To mark the anniversary, we dedicate this issue's main focus to the BfR's working methods in the article "Hunting for risks". This article examines the Institute's key issues as well as future developments and trends in risk assessment. It shows that the quest to identify risks is, first and foremost, a quest for scientific knowledge.

One example of this is the COPLANT study, which the BfR is involved in together with the Max Rubner-Institut and numerous other partners. It seeks to answer the question of how vegan or vegetarian diets affect health. This is the largest study to-date on plant-based nutrition among German-speaking countries. About 6,000 participants are being sought from the end of 2022 onwards – more about this in this issue. Also in this issue, we explore the current situation regarding tattoo inks. Many ingredients were banned at the beginning of this year, and further restrictions are to follow. The BfR has long been a pioneer in researching the risks of tattoo inks and has proposed minimum requirements for their safety.

The report on defective cell division under the influence of hormonally active substances shows a completely different facet of the BfR. This is basic research that can and should help to replace animal experiments. When you open this issue, you will get to know many more aspects of our work. We hope you enjoy reading it.

**Professor Dr Dr
Andreas Hensel**
President of the BfR

**Professor Dr
Tanja Schwerdtle**
Vice President of the BfR

...KINDERTAG...
...Blick in die...
...Der Zauber...
...Mehr Nachtflüge...
...Joseph (6)...
...Vom Kanzler...
...Bergrisse auf...
...Gute Vorsätze...
...So wert's...
...Blicke...
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...Erste deutsche...
...Krisensitzung...
...EXPRESS...
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...BSF

Rhein-Zeit

UNABHÄNGIGE TAGESZEITUNG

Frankfurter Tages Anzeiger

Fertig zum Gipfelfest
Blick in die Abgründe
Der Zauber des Advent

Eilverordnung Tiermehl verbieten
Die BSE-Rinder

Zeitung

deutschland

Erste deutsche Rinder unter BSE-Verdacht

Frankfurter-Nachrichten
21.4.2000
1690,-

Mehr Nachtflüge, w
Flughafen überli

Joseph (6) - sein unfa
Vom Kanzler zum Pr
Bergrisse auf Wanders
Gute Vorsätze zum Fe

So wert's

Blicke

Zu gewinnen: Traum-
Reise nach Teneriffa

Ich rede nie mehr mit Calmund
Doch! Glas: Sohn mit Koks erwischt

EXPRESS
70,-
Samstag, 25. November 2000



Liebe & Glück: Ihr Wochenhor Abendzeitung

FC Bayern: Hoeneß watscht alle ab



Hier lebt der kleine Kaiser

BSE Nun auch bei uns!

Rinderseuche bei zwei deutschen Kühen entdeckt / Seite 3



BSE-Schock Deutsche

Kühe

VERSCH... SASzeitung



BFR2GO



Born from crisis

Mad cow disease (BSE)? Many will barely remember the deadly animal disease that turns the brains of infested cows into a hole-ridden sponge. More than two decades ago, the disease transmitted via infectious feed was the prevailing topic for months – and the trigger for a crisis in consumer protection. When the first case of BSE in a German-born cow was announced at the end of 2000, uncertainty, fear and panic immediately spread. It had been known since 1996 that BSE could also infect humans and cause a new variant of Creutzfeldt-Jakob disease. Trust in the food industry, regional authorities and politics plummeted. The BSE crisis was the final catalyst for a reform of administrative consumer protection. Hedda von Wedel, then President of the Federal Court of Auditors, was commissioned with a corresponding expert opinion. It was published in July 2001 and recommended that risk assessment and risk communication should henceforth be separated from risk management. The Federal Institute for Consumer Health Protection and Veterinary Medicine (BgVV), which was dissolved in November 2002, gave rise to the German Federal Institute for Risk Assessment (BfR) and the Federal Office of Consumer Protection and Food Safety (BVL). This established a clear demarcation between the areas of risk assessment and risk management. Independent and free from external influence, the BfR examines the health risks that can emanate from food, everyday products and chemicals. The BVL and other consumer protection institutions can use these assessments as a guide, as can ministries, authorities and the public. BSE has long since disappeared from the headlines. However, new crises have followed, such as the contamination of food with a highly dangerous EHEC strain in 2011. More recently, the health risks of Listeria, dioxin and Sars-CoV-2 have also been under discussion. Even 20 years after its foundation, the BfR is not running out of topics.

CONTENTS



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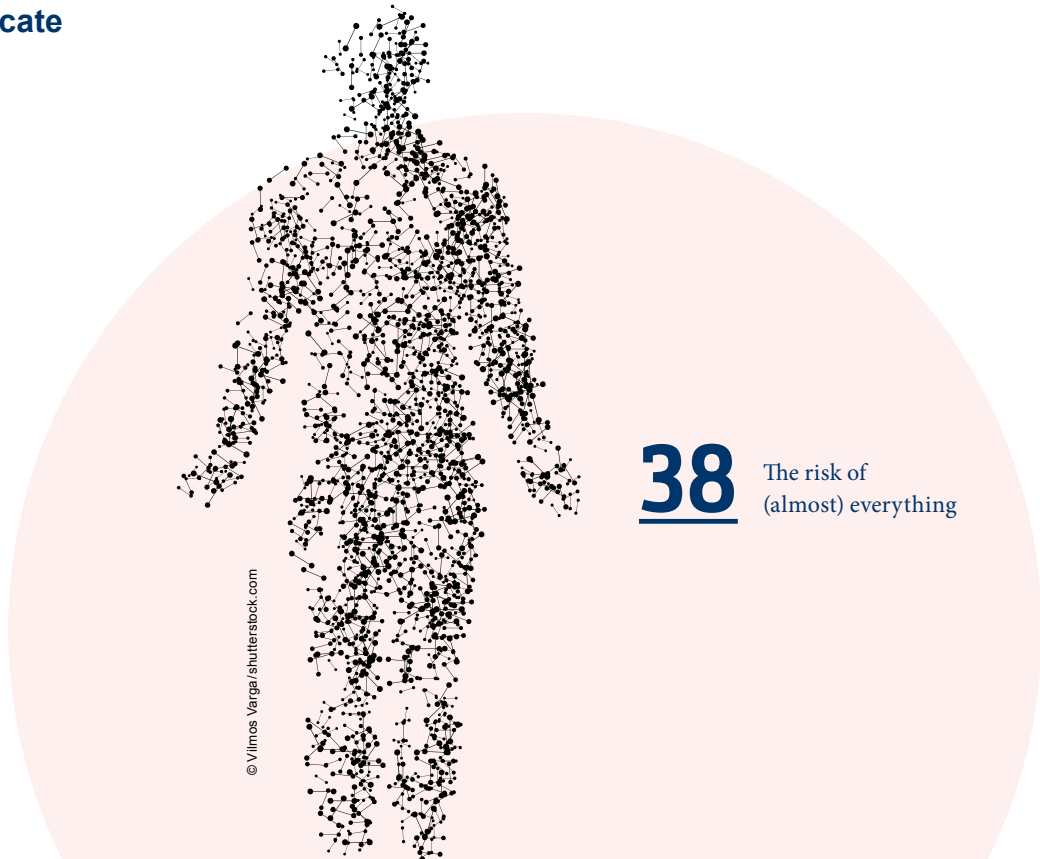
Main topic:
Hunting for risks **6**

28 COPLANT study
on plant-based nutrition



**Assess
Research
Communicate**

We need to communicate
science more honestly **18**



38 The risk of
(almost) everything

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06 Main topic

06 Hunting for risks
The German Federal Institute for Risk Assessment turns 20

12 Mission: a safe everyday life
Insights into the work of the BfR

16 Risk perception

16 Pills instead of vegetables?
Infographic on vitamins as food supplements

18 “We need to communicate science more honestly”
Interview with Dagny Lüdemann

20 Is sugar = sugar?
Facts about the sugars glucose, fructose and lactose

21 Spectrum
BfR video series on kitchen hygiene, waxed fruit and vegetables, BfR Consumer Monitor

22 Food safety

22 Bitter makes poisonous
Quinolizidine alkaloids in lupin seeds

24 Substantia non grata
Ethylene oxide in food

25 Consume without regrets
What people travelling in the tropics and subtropics should bear in mind

26 In everyone’s mouth
Substance portrait: fluoride

28 Popular, but largely unresearched
COPLANT study on plant-based nutrition

30 How to prepare powdered milk correctly
Infographic on the preparation of powdered infant formula

31 Spectrum
Poisoning risk of raw beans, titanium dioxide ban in food, coronaviruses on drinking glasses

32 Safety of products and chemicals

32 The end of colours?
BfR research on tattoo inks

36 Practical in everyday life – dangerous for children
Five poisoning hazards at a glance

38 The risk of (almost) everything
The BfR concept to estimate the exposure of chemical mixtures

40 Protection of laboratory animals

40 Aberrant mitosis
Faulty chromosome distribution as a cause of cancer

43 Where it counts
Annual laboratory animal statistics

44 Inside the Institute

Imprint

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Hunting for risks

The BfR combines practice-oriented science with health assessment.

Listeria are adaptable and widespread bacteria. They are mostly harmless, but *Listeria monocytogenes* is extremely undesirable. This species is the cause of listeriosis, an infectious disease associated with diarrhoea and abdominal pain, which can be severe. It is caused by contaminated food. Long-lasting outbreaks of listeriosis are a regular occurrence, and invariably the question arises: which product is the source of the epidemic? Solving the problem requires not only scientific tools but also a detective's intuition.

This was the case from 2012 to 2016, for example, when a listeriosis outbreak in southern Germany puzzled scientists. 78 people fell ill, eight of them died. The search for the origin remained unsuccessful – until the method of genome sequencing, which deciphers the entire genetic material of the bacterium, led to a breakthrough in March 2016. A sample from smoked pork belly revealed exactly the same genetic information as that of the pathogen found in those infected with the disease. The sale of meat products from the producer was halted and the cause eliminated.

This episode is not an isolated case. Since 2016, more than 60 listeriosis outbreaks have been traced in this way in Germany. It's an example of how successful consumer protection works: with modern scientific methods and through close cooperation between state and federal authorities, in this case with the National Reference Laboratory for Listeria at the German Federal Institute for Risk Assessment (BfR) in Berlin.



Detecting everyday health risks, assessing them and pointing out ways to reduce the risk – these tasks have been the focus of the BfR since its foundation 20 years ago. Whether it's food-borne pathogens, cosmetics and toys or cleaning agents, plant protection products and kitchen appliances: the Institute's approximately 1,200 employees deal with it all.

Identifying risks to protect health

The legal mandate of the BfR is to “assess and evaluate risks of food and feed, substances, microorganisms and products (...) to human health”. This is stated in the Institute’s “Guideline for the Assessment of Health Risks”. Furthermore, one of its central tasks is to provide information about health risks and to recommend countermeasures. “Identify Risks – Protect Health”: the Institute’s motto sums it up. The BfR comes is part of the portfolio of the German Federal Ministry of Food and Agriculture (BMEL).

At the same time, the practice of the BfR has changed profoundly in some domains over the past 20 years. This concerns both health risk assessment (see box on page 11) and other key areas of the Institute’s work. For example, new regulations for the assessment of plant protection products and pesticides (biocides) have made the Institute’s assessments much more detailed. “To put it bluntly: 20 years ago, an assessment fit on a sheet of paper,” says Head of Department Dr Tewes Tralau, who is responsible for the safety of pesticides at the BfR. “Today, we prepare assessment reports that can be 1,000 pages long per active ingredient.” This enables a comprehensive classification of the hazard potential and is one reason why plant protection products have become considerably safer.

How safe are cosmetics?

Product safety was established as a new field at the BfR about a decade and a half ago. It focuses on the health risk assessment of products such as toys, clothing, cosmetics, packaging material, e-cigarettes and tattoo ink. In short: pretty much everything we deal with in everyday life.

Consumer and media interest is high. Yet it’s not always possible to find simple answers to all questions. Often, the test objects contain several different substances, not just one single suspicious chemical. In addition, there needs to be investigation into how much of a substance is actually absorbed on contact. “Both the material properties and the chemical safety have to be tested,” says Head of Department Professor Dr Dr Andreas Luch. “That’s why we are collaborating in a multidisciplinary way here at the BfR.”

Analytics: measuring what’s inside

As the example of listeriosis shows, detection methods – known as analytics in the technical language – have become extremely refined. This applies to pathogens as well as chemical substances or impurities (contaminants). These days, one can detect the equivalent of a single drop of an undesirable substance in Lake Constance.

The further development of analytical procedures is one of the important scientific tasks of the BfR. Especially the National Reference Laboratories located at the Institute are entrusted with this. “These facilities help to increase food safety and to locate outbreaks better and faster,” explains Professor Dr Karsten Nöckler, whose department (Biological Safety) includes the Reference Laboratory for Listeria.

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Perceived and actual risks are sometimes worlds apart



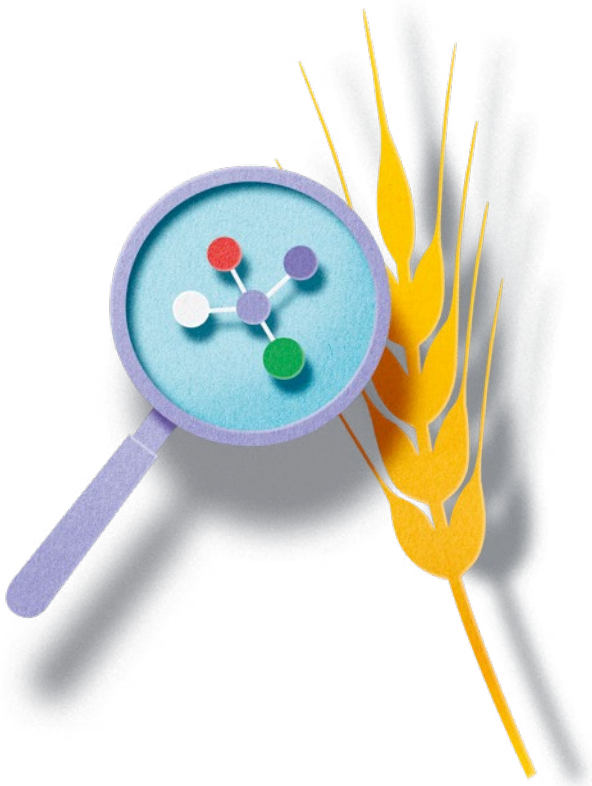
“Good analytics is the basis of any good risk assessment,” says Dr Carsten Faulh-Hassek, Head of the Department Safety in the Food Chain. Despite all the accuracy, it’s always necessary to become even more accurate, as his colleague, private lecturer Dr Robert Pieper, points out. “An example of this is the group of PFAS chemicals, for which the health-based guidance values have been greatly lowered in the EU,” says Pieper.

PFAS stands for per- and polyfluorinated alkyl substances. As stable compounds, they are found in such things as non-stick pans and outdoor clothing, making them water, grease and dirt-repellent. The chemicals accumulate in the environment and end up in our food. This is where detection methods need to be significantly refined, for example to be able to accurately determine the PFAS concentration in food. Analytics is the basis for answering the question of how extensive the PFAS contamination actually is.

Major goal: having data at hand even faster

Whether it’s listeria, tattoo inks or PFASs: access to reliable data, such as that generated by high-quality analytics, is crucial for the Institute’s work. (Almost) everything at the BfR revolves around good data. They are the main foundation for any serious risk assessment. This always revolves around the question of how high the exposure is, i.e. how much a person is exposed to a substance. The basic rule behind this is that the dose determines the toxicity of a substance. A weak toxin in a high dose can be more dangerous than a strong one that’s only ingested in small amounts.

Especially in the event of a crisis, it’s crucial to be able to quickly access important data, be it the detection of germs or the concentration of an unwanted chemical. This information makes it possible to assess exposure and determine the risk. In most cases, such measurements take place outside the BfR (for example, by authorities of the federal states), so they’re often not immediately at hand. “We’re working on making data available even faster,” says BfR President Professor Dr Dr Andreas Hensel. “That is one of our most important goals in scientific risk assessment.”





What’s really in our food

Reliable data are also important when it comes to the question of what’s really in our food. The BfR’s MEAL study provides a comprehensive and realistic picture of which substances are consumed in Germany in what quantities. For this purpose, ingredients are purchased nationwide, prepared in a specially equipped kitchen and then analysed – it doesn’t get much closer to reality than that.

On the one hand, the food itself is analysed for nutrients, mycotoxins (fungal toxins) or residues of plant protection products. On the other hand, impurities that occur during preparation (such as acrylamide produced during roasting), substances that have migrated into the food from the packaging and authorised additives are also examined. “The MEAL study is an example of how the BfR generates its own scientific data and uses these for health risk assessments,” explains Head of Department Professor Dr Matthias Greiner.



Cause and effect – a complicated relationship

Even now, animal experiments remain an important basis for assessing the safety of a substance. New perspectives for toxicology (the science of toxins) and risk assessment also arise from substitute methods for animal experiments. Great progress has been made in this area in recent years, for example in the development of organoids or “mini-organs”. These provide a link between animal experiments and cell culture. “Organoids enable us to study the influence of chemical substances on human tissue and to detect potential risks,” says Professor Dr Gilbert Schönfelder, head of the German Centre for the Protection of Laboratory Animals (Bf3R) at the BfR.

In addition, information from studies with human study participants is increasingly being used for risk assessment at the BfR. Such “human data” often come from epidemiological studies. They have the advantage of being literally closer to humans. Yet human studies do not only have advantages. For example, it’s often difficult to clearly assign cause and effect. Is a connection between a health disorder and a harmful substance really causal, or is it coincidental instead? “Such questions are a challenge for risk assessment,” says BfR Vice President Professor Dr Tanja Schwerdtle. “We need to develop new guidelines to get clarity about and for the future handling of human data.”

Complete safety remains out of reach

The health risk posed by a substance is determined by relating its inherent hazard potential to exposure. In other words, to the question of how much a person is exposed to the substance, how high the “toxic dose” is. If the dose is large enough, any substance becomes a poison. However, this assessment framework of toxicology is increasingly being called into question.

One current trend is to focus on hazard potential instead of exposure. According to this approach, a chemical can be withdrawn from the market even if it’s safe when

Examined hazard – this is how risks are assessed



Generally speaking, a health risk assessment consists of five steps.

First, a health hazard must be identified.

This can be a micro-organism or a chemical, for example.



Afterwards, the harmful effect must be characterised and assessed. Is there a relationship between dose and effect?



Following this, reliable data and methods are used to estimate how much a person is exposed to the hazard. Only once it has been established how much of the hazardous substance a person absorbs, for example through food, skin or the respiratory tract, can the risk be determined.



Based on this information, the risk characterisation is carried out: how likely are health impairments from a potential hazard?



The final result is the assessment report, which summarises the steps and may include recommendations on how to reduce the risk.



used as intended. The idea of making the potential hazard posed by a substance the main criterion for its assessment is met with scepticism at the BfR. The whole world is chemistry – the decisive factor is whether and to what extent humans come into contact with a substance. There's no such thing as zero risk, but there are acceptable and unacceptable risks.

Risk from the consumer's perspective

Weight the risks, don't play them up or down: The scientific approach of the BfR is also the guiding principle for the Institute's communication. This is extremely important, since educating the public about health risks is a central part of the Institute's mandate. "We inform the general public in a factual but clear way," explains private lecturer Dr Gaby-Fleur Böl, Head of the Risk Communication Department. In extensive social science studies, her research team also investigates how consumers perceive health risks in everyday life. "Perceived and actual risks are sometimes worlds apart – we bring these together."

Communication, be it of research findings or of recommendations, is a major challenge in the age of social media. Messages need to be concise and visual while remaining accurate. This can also be tricky because when focusing on health risks, the benefits are sometimes not sufficiently taken into account. Fish, for example, contains undesirable substances such as mercury compounds, but it's also a valuable food with healthy ingredients. And then there are those substances that some interest groups believe should be banned, but for which there are no equivalent substitutes.

Risk and benefit are sometimes closely intertwined. Can and should we weigh the pros and cons here? There's no shortage of challenges for the BfR in the future. ■

More information:
www.bfr.bund.de/en > 20 Years BfR



Mission: a safe everyday life

Whether it's e-cigarettes, tattooing products or antimicrobial resistance – the BfR's spheres of activity are as diverse as life itself. The focus is always on human health.

Cooking for science

The identification and characterisation of substance-related risks are part of the BfR's assessment work. The key question is to what extent we are exposed to potentially harmful substances. In what quantities do we ingest on average not only undesirable, but also desirable substances through our food? Do certain foods vary in their levels of substances depending on the season, cultivation method or region? And what health effects does the type of preparation have on food? Answers are provided by the BfR-MEAL study (meals for exposure assessment and analysis of foods) – Total Diet Study in Germany, launched in 2015. This scientific method is being used to determine the average levels of substances present in already prepared foods. The aim is to obtain representative occurrence data for the German diet and to better identify and quantify food risks. The study team purchased around 60,000 foods during the course of the study, prepared them and analysed them for nearly 300 substances, including mycotoxins, plant protection product residues and nutrients. This makes the BfR MEAL study a highly comprehensive Total Diet Study by global standards.

More information:
www.bfr-meal-studie.de > English



Plant substances: Not all are without health risks

Plant-based foods are often automatically regarded as natural and harmless. However, some ingredients of plant origin can be harmful to our health. Take pyrrolizidine alkaloids, for example. Some plant species use these substances – over 660 are known – to ward off their natural predators. Since these plants often grow in the fields alongside crops, the substances also end up in our food when they are harvested. In addition, pollen containing unsaturated pyrrolizidine alkaloids can get into honey through bees. Since they can impair the liver and lungs, and animal studies have shown that some of these substances induce changes in the genetic material and trigger cancer, pyrrolizidine alkaloids are undesirable in feed and food. In 2013, the BfR detected high concentrations in teas for the first time and identified health risks for people who regularly consume teas and honey. Current findings show that the concentrations in many types of tea have been significantly reduced. Yet there are still food groups that have high contents of unsaturated pyrrolizidine alkaloids. For this reason, the BfR continues to recommend lowering these contents by refining cultivation, harvesting and cleaning methods, particularly for highly contaminated food groups such as certain seasoning herbs.

More information:
www.bfr.bund.de/en > A-Z Index: Pyrrolizidine alkaloids





Tracking down germs in food

Bacteria, viruses and other microbes are omnipresent and can also cause food-borne illnesses. The “EHEC crisis” made this clear in 2011. This disease outbreak was the most serious to date in Germany, caused by enterohaemorrhagic Escherichia coli bacteria. More than 4,000 people fell ill and 53 died. At the time, the BfR, in exchange with national and international health authorities, identified imported fenugreek seeds as the cause with a high degree of probability. Since then, software programmed by the BfR has helped to track suspicious foodstuffs and trace outbreaks. Finding the exact product that caused the infections is particularly difficult. The BfR uses whole genome sequencing for this: experts regularly decode and store the genetic make-up (sequence) of bacteria from food samples and other sources. They then compare these with sequences of bacteria isolated from people who have fallen ill. This method has been used to trace around 60 outbreaks of listeriosis in Germany since 2016. These bacteria are particularly hazardous for pregnant women, newborns, immunocompromised people and the elderly. In 2021, the BfR also applied the principle to 45 incidents of infection with Salmonella. Incidentally, the most frequently reported bacterial gastrointestinal disease nationwide is the campylobacteriosis, caused by Campylobacter. To identify infection chains and track down unknown or altered germs, the BfR researches Campylobacter from samples taken from animals, food and the environment. Strategies for the prevention and control of infections are also being developed.

More information:
www.bfr.bund.de/en > A-Z Index: Food infection

Inseparable: People, animals and the environment

The health of humans, animals and the environment is closely linked. Each “system” influences the others. This is why health problems can only be solved with the cooperation of all disciplines. This “One Health” concept is also becoming increasingly important for the work of the BfR. In 2018, the BfR joined forces with 40 European partners in the European Commission’s “One Health European Joint Programme”, which is investigating these interrelationships. Research is being conducted on the aspects antimicrobial resistance, novel infection risks and pathogens that are transmitted from animals to humans. The One Health approach also guides the BfR in its work on antibiotic-resistant germs that are transferred to humans via food and complicate the treatment of infections. For this purpose, the BfR is examining bacterial isolates from animal and food samples regarding their resistance properties. The data represent a contribution to the German and European antibiotic resistance strategy. By the way: in the context of animal health and food safety feed obviously also plays a central role. Using concepts based on the One Health approach, the BfR is also assessing how living conditions and the health of wild animals, for example, are related to the safety of game meat and honey.

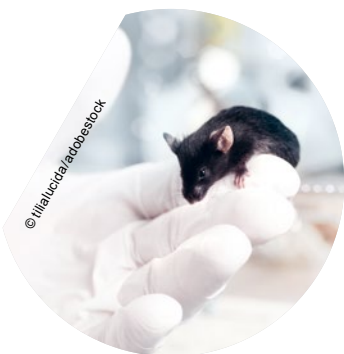
More information:
www.bfr.bund.de/en > A-Z Index: One Health



Putting animal welfare first

Since 2015, the BfR has been fulfilling the function of the “German Centre for the Protection of Laboratory Animals (Bf3R)”. It coordinates nationwide activities with the aim of limiting animal experiments to a necessary minimum. Furthermore, laboratory animals should be guaranteed the best possible protection and handling. The Centre’s work intends to stimulate national and international research activities and to promote scientific dialogue. In addition, the Bf3R supports the development, validation and use of alternative methods to animal experiments. For example, the team is researching innovative cell and tissue cultures to replace animal experiments. The goals of the Bf3R also include transparent information and open communication about animal experiments in science. For many years, the BfR’s database “AnimalTestInfo” has been providing information about authorised animal experiments in Germany. Since 2021, Bf3R has also been responsible for publishing the annual laboratory animal statistics. The Bf3R has taken over this task from the Federal Ministry of Food and Agriculture (BMEL).

More information:
www.bf3r.de > English





Global network

Global trade is growing at a rapid pace, and food crises do not stop at national borders. International relations, scientific exchange and joint research are therefore becoming increasingly important. The BfR cooperates closely with the European Food Safety Authority (EFSA) and maintains links with all EU Member States. As the EFSA's focal point in Germany, it has coordinated its exchange with the German institutions for food and feed safety since 2008. The BfR also maintains close contacts with governmental and non-governmental institutions across EU borders. It pursues research and cooperation projects with partners around the world. From 2021 to 2025, for example, the BfR, together with the Federal Office of Consumer Protection and Food Safety (BVL), is supporting Tunisia in reforming its official structures for food safety and consumer protection and adapting them to international standards. In Uganda, the BfR is currently participating with partners from Germany and Kenya in an international project to promote the development of agricultural animal facilities (BUILD). The aim is to improve people's knowledge about and awareness of animal diseases. After all, the loss of livestock can quickly threaten the livelihoods of entire families.

More information:
www.bfr.bund.de/en > The Institute > Co-operation

Answers to a new virus

When the novel coronavirus SARS-CoV-2 changed our lives in early 2020, the question also arose as to how the virus could be transmitted – such as via food or objects. Early on, the BfR came to the conclusion that infection with coronaviruses via surfaces such as door handles, toys, mobile phones or food in the supermarket is unlikely – as long as basic rules of hygiene are complied with. The BfR also assessed whether vitamin D can protect against infection. The data situation on this is unclear. So far, it has not been shown that people who are well supplied with vitamin D benefit from supplemental intake. Therefore, a general recommendation for prevention of a coronavirus infection by taking vitamin D supplements is not justifiable at present. In March 2020, the BfR also began researching how the population perceives the risk from the virus. Since then, 1,000 randomly selected people have been interviewed by telephone at two-week intervals on the following questions, including: what protective measures do you take? How does corona affect your daily life? Do you feel safe, and how do you stay informed? Using this "BfR Corona Monitor", the BfR is creating a representative picture of public opinion on which politicians and the media can base their decisions.

More information:
www.bfr.bund.de/en > A-Z Index: COVID-19/Corona



Plant protection products: safety in ingestion and use

What are the health risks associated with the ingestion of residues of various pesticide-active substances? To ensure that food is safe BfR is working on concepts for the assessment of "multiple residues". The respective approaches ensure safe consumption also if different combinations of active substances are taken into account. To this end, BfR evaluates available data on food consumption, data of the German food monitoring programme, and conducts its own studies. Moreover, it provides advice to authorities and politicians and supports the European Food Safety Authority (EFSA). Plant protection products are also neither to harm the health of people working with the substances ("users") nor of those living near treated areas. Whether they are sufficiently protected is checked prior to product authorisation by estimating the highest expected intake. The respective estimates were based on varying models across the EU until their harmonisation in 2016. The corresponding harmonised model was developed by a working group initiated and led by the BfR and has been used since for the authorisation of plant protection products at EFSA. The model is adapted on a regular basis and, as such, forms a milestone for European risk assessment.

More information:
www.bfr.bund.de/en > A-Z Index: Plant protection products



More than just hot vapour

E-cigarettes enjoy great popularity. Instead of tobacco, as in conventional cigarettes, they usually contain liquids with nicotine. A heating element heats up this liquid, producing a vapour that is inhaled. Even though less harmful substances are produced when “vaping” than when smoking, a health risk for the respiratory tract still exists. This is difficult to assess given the variety of liquids and device models. The BfR has been monitoring the available data and is conducting its own research projects. One focus is given to the addictive substance nicotine – and how much of it is found in the vapour. Another focus is given to components that turn into harmful substances when heated, such as vaporising agents, flavourings and other additives. Some substances are now banned for use in e-cigarettes. But the market is evolving: the technology is changing, and new formulations are constantly being developed, especially for products without nicotine.

More information:

www.bfr.bund.de/en > A-Z Index: Electronic cigarette

Tiny particles, huge challenges

Nanomaterials are present in countless products such as cosmetics, food packaging, paints and clothing. Their particles have a maximum size of only 100 nanometres and are invisible to the naked eye. Their diversity in terms of materials, size and shape, as well as altered and sometimes new properties, pose enormous challenges for science. To identify risks to health and the environment at an early stage, the foundation for risk assessment at BfR was laid already in 2006 with broad-based expert interviews on the use of nanotechnology in food and everyday products. Since then, the BfR has been involved in several national and international projects on nanosafety research. In these, the focus has been primarily on intentionally manufactured nanomaterials, but also on substances with naturally nanosized particles (for example, food ingredients), as well as “weathered” plastics. Test methods are being developed for these materials, guidelines are being developed and recommendations published. The intake of nanoparticles into the body via the intestine or lungs, for example, is also being investigated. The BfR is also playing a leading role in establishing the concept of nanomaterial grouping. This involves assessing similar nanomaterials collectively. These approaches will have a decisive influence on risk assessment in the future. In addition, the Institute has regularly used sociological studies, repeated surveys of citizens and the media and representative surveys to capture the mood in society towards nanomaterials.

More information:

www.bfr.bund.de/en > Questions and answers: Nanomaterials



Making fish safe

Fish are an important source of nutrients. However, consuming certain fish species, mostly from tropical and subtropical oceans, can pose a risk to human health. In Germany, the consumption of imported fish from these regions, for some years now, have been the source of repeated cases of food poisoning, triggered by marine biotoxins of the ciguatera group. These toxins cause ciguatera – one of the world’s most common fish poisonings, symptoms of which can be severe diarrhoea, vomiting and a commonly reported peculiarity reported as a temperature sensitivity (“cold-warm reversal”). The National Reference Laboratory for Marine Biotoxins at the BfR has developed detection methods to track down these toxins – a challenge given the extremely low concentrations at which the compounds are biologically active. These methods can reliably detect ciguaterins in fresh and frozen fish and even after meal preparations. This method can also solve poisoning cases: with the test strategy, used for the first time in Germany, the BfR and its partners succeeded in deciphering a ciguatera outbreak from 2017. To further develop the test strategy, the BfR is cooperating with a number of partners, including an institute from Japan.

More information:

www.bfr.bund.de/en > A-Z Index: Ciguatera



Pills instead of vegetables?

Tablets, capsules and powders – the market for vitamin products is huge and continues to grow. A representative survey by the German Federal Institute for Risk Assessment (BfR) shows what the population thinks about vitamins and their intake via food supplements.



1 in 3

of the respondents mention a high vitamin content as a **typical characteristic of healthy food**. The fact that healthy food is natural and unprocessed follows with a greater distance in second place (24%).



24 %

Just under a quarter think that food supplements are important to cover the vitamin needs of the human body. Fruits and vegetables, on the other hand, are listed as the most important sources of vitamins (93% and 94%).



Once a week

35 per cent report taking vitamins via food supplements at least once a week.

The most common: vitamin D, vitamin B12 and vitamin C.



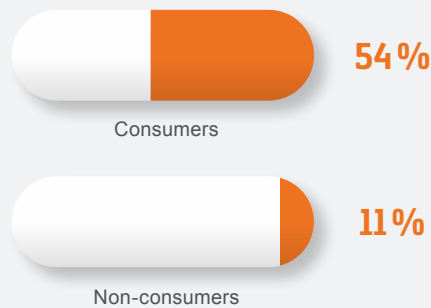
17 %

rate the **health risk** of vitamins as food supplements as high – a **potential overdose** is mentioned most frequently.

Underlying study:
Representative online survey with 1,023 people (German-speaking population aged 16 and above) in November 2021

Vitamins as food supplements

Vitamins from A to K: they strengthen our immune system, promote the development of cells, bones and teeth and are essential for many bodily functions. In healthy people who eat a varied diet, an undersupply of vitamins is very rare. On the contrary, the health risk of oversupply increases if high doses of vitamins are taken without a medical recommendation. Food supplements are food and are not subject to approval for the German market. Nevertheless, they must not endanger health – the responsibility for this lies with the food companies. So far, only non-binding regulations exist on how high the maximum levels of vitamins in food supplements should be. To provide a basis for future legal regulations at the EU level, the BfR has issued recommendations for maximum levels of vitamins in food supplements.



More than half of all respondents who consume vitamins via food supplements attribute a **high health benefit** to them. Among those who do not consume them, only about one in ten does so. The main benefits mentioned are **compensation of deficiencies** and **protection from or overcoming diseases**.

More information:
www.bfr.bund.de/en > Publications > BfR Consumer Monitor > BfR Consumer Monitor 2021, Vitamins as food supplements

BfR Opinion no. 009/2021 issued 15 March 2021



© Michael Pfister/ZEITonline

Biologist and journalist **Dagny Lüdemann** is chief reporter for the knowledge section at “ZEIT online”. She headed the science department for ten years until 2021 and also trained science editors.

“We need to communicate science more honestly”

Mrs Lüdemann, you have been following the Corona pandemic as a journalist at “ZEIT online” from day one. What was your experience of this time?

For me, the outbreak marked the beginning of the most exciting, successful and instructive period of my career. Never before had my work been in such demand. Everyone had finally come to the realisation that science is not just a place for nerds, a place for rocket science, gene therapies for rare diseases or fascinating animals. It’s something on which the lives of millions depend. I also saw an opportunity in that.

What was this opportunity?

This resonance confirmed to us how important our job is. All of a sudden, people beyond the small scene of science journalism were asking themselves: What makes a study meaningful? What makes a good expert? We thought: now is the time to show people what we can do. But I didn’t realise then how much would go wrong in the media.

What went wrong?

When the epidemic broke out, everything got chaotic. Journalists from the worlds of politics and business

as well as culture and sport were now reporting on COVID-19. Assessments of the state of research, expert debates on aspects of individual studies, political disputes about what measures to take – all this got mixed up and turned into total cacophony and hardly anyone could filter out what was important from what was unimportant and what was well documented from what was nonsense. In the clash of opinions, facts were often misrepresented

What were the consequences of this?

To the general public, it seemed as if science was fundamentally at odds with itself, and findings that initially seemed set in stone were now crumbling. This mood fuelled fears and mistrust and opened up space for conspiracy theories and misinformation.

During the first lockdown, the vast majority of the media covered the measures favourably.

In the absence of other sources and being stuck in home offices themselves, editors relied heavily on the institutions and reported what was officially recommended. This was partly out of concern that they would be complicit in people’s deaths if they did not issue clear enough warnings. When the press realised



When people are exposed to misinformation on a daily basis, we need to ensure informed knowledge

that it was becoming too uncritical, it deliberately looked for dissenting voices. But in doing so, it also created false balance.

How does this false balance come about?

When an assertion that is well documented is juxtaposed with a minority opinion as if both were equally valid. This is what happens when, for example, a medical doctor who explains why homoeopathy cannot work on the body is juxtaposed on a talk show with a homoeopath who claims that globules cure diseases. In the end, people think there are equally good arguments from scientists for both views. Homoeopathy, however, does not work any more than a placebo. That's a fact – not a matter of opinion. Studies claiming otherwise have always turned out to be dubious. Similarly, in the pandemic, erroneous minority opinions were given as much space as things that are indisputable among researchers.

So this confused the public more than providing it with guidance?

Definitely. The Cosmo study, for which people in Germany were representatively surveyed, and the BfR Corona Monitor prove this. It's paradoxical: the more knowledge we had about the virus, the less informed the population felt.

What conclusions should journalists draw from the pandemic?

Science communication must become even more honest when it comes to what is unknown and uncertain. This should always be stated transparently. Moreover, science journalism should not shy away from political interpretation. Traditionally, we like to refer to facts. Along the lines of: this we know, but for that we need long-term studies and we won't know the answer for another 200 years. But people need sound advice today.

When it comes to the media, they say “bad news is good news”. Is that why gloomy forecasts have received the most attention?

This pandemic was also unpredictable for journalists and researchers. I think many were over-cautious rather than reckless. And everything that seems threatening

generates a lot of attention and thus higher ratings. Yet we have also found that people are longing for good news.

Too pessimistic, too optimistic – is there a middle ground?

Journalism should be more constructive while remaining critical. We cannot paint the world more beautiful than it is. But we should look where there are solutions to problems.

What can science learn from the pandemic?

First of all: how important it is for everyone. I find it fascinating that people who normally don't have much contact with research are now discussing what's proven and what's not. Researchers should have more courage to share responsibility for political and social issues instead of retreating into their own world.

Researchers involved in politics?

Scientific expertise must influence politics. But on an interdisciplinary basis. Ethical, psychological, social and economic issues – all of these must be factored into political decision-making. In the pandemic, it seemed for a long time as if there were only virologists on one side and an unscientific world on the other. How long should schools be closed? How many seriously ill people are we prepared to accept? All the sciences should join in the debate here. And we should be aware that people act more on the basis of emotions than on facts.

Traditional media are no longer gatekeepers to the world of information. The internet has opened this gate for everyone. How do you react to this at “ZEIT online”?

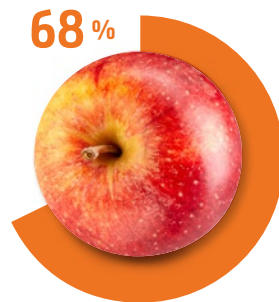
With transparency, openness and the courage to repeat. During the pandemic, I've been constantly experiencing déjà vu: ventilation is more important than disinfecting hands. Vaccinations help. How many more times? I'd say: as long as it takes to get there. If people are exposed to misinformation every day, we have to make sure that they also find well-founded knowledge every day: in the form of infographics, analyses or videos on TikTok. ■

Is sugar = sugar?

Glucose, fructose, lactose – sugars we are all familiar with. Aren't we? A survey by the German Federal Institute for Risk Assessment (BfR) shows that there are gaps in our knowledge. Although the three sugars sound similar, there are slight differences.



Correctly classify glucose as dextrose*.



Correctly classify fructose as fruit sugar*.



Correctly classify lactose as milk sugar*.

Glucose (dextrose)

Glucose, also known as dextrose, naturally occurs primarily in honey and sweet fruits such as apples, dates and grapes, and to a lesser extent in sweet vegetables such as carrots. Glucose can also be produced from the starch of potatoes, maize or wheat. The crystalline type of sugar consists of only a single carbohydrate ring and is therefore considered a simple sugar. Dextrose, fruit sugar and household sugar are used as added sugars to sweeten lemonades, pastries and ready-made meals. They are also used in the kitchen or in catering, for example to sweeten tea or desserts.

Fructose (fruit sugar)

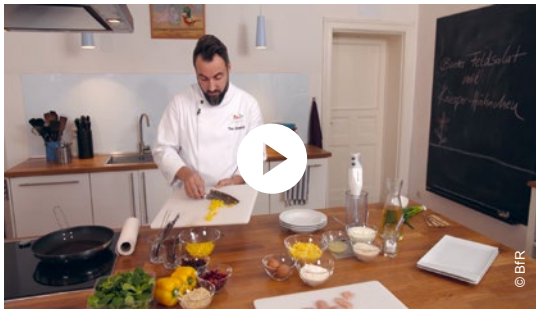
Fructose – fruit sugar – is, like glucose, a simple sugar consisting of only one carbohydrate ring and naturally occurs in honey as well as sweet fruits and vegetables. It is the sweetest naturally occurring type of sugar. Scientific studies indicate that high fructose consumption can have a detrimental effect on metabolism, possibly leading to obesity, fatty liver and type 2 diabetes, among other things. By the way: Chemically combined, fructose and glucose form the disaccharide sucrose, i.e. ordinary household sugar. Glucose-fructose and fructose-glucose syrups, which sweeten many foods such as jams, pastries and ice creams, are mixtures of the two simple sugars.

Lactose (milk sugar)

Compared to glucose and fructose, lactose, or milk sugar, is a less sweet type of sugar naturally found in milk and dairy products such as cream, yoghurt and curd. However, lactose can also be added to other foods such as crisps, liverwurst and crispbread. Lactose is a disaccharide consisting of the simple sugars glucose and galactose. Some people cannot break down lactose because they do not have sufficient amounts of the digestive enzyme lactase. The lactose then reaches the large intestine without being broken down, where it is fermented by the intestinal bacteria. Common consequences include flatulence, abdominal cramps and diarrhoea.

* based on familiarity with the terms glucose, fructose, lactose and the correct estimation of the concentrations in glucose, fructose and lactose.

Underlying study:
Representative online survey with 2,000 people (German-speaking population aged 16 and above) in May 2021



“Tasty with safety” – Educational videos on kitchen hygiene

What aspects of hygiene should you bear in mind when cooking? Which work steps can lead to poor hygiene? With the three-part video series “Mit Sicherheit lecker” (“Tasty with safety”), the BfR takes a closer look at hygiene practices in the kitchen: A professional chef commits a number of hygiene errors when preparing a simple dish, which can lead to food infections. The videos reveal the errors and also demonstrate the basic rules of kitchen hygiene. The format was developed by the BfR with the aim of raising awareness of kitchen hygiene and associated health risks. After all, insufficient hygiene can quickly lead to the transfer of pathogens to hands, household appliances and surfaces, as well as to other food. The videos are available free of charge on the BfR website and can be used – individually or sequentially – to raise awareness and for educational purposes on the topic of kitchen hygiene. They are also available with English subtitles. In addition, a guide for the use of the video series and further supporting materials can be found online.

More information:
www.bfr.bund.de > Publikationen > Begleitmaterialien
 (in German)

Waxed fruit and vegetables in focus

Wax-like coatings are edible protective coatings that help to preserve fruits and vegetables for as long as possible. They are considered food additives – thus, it must be ensured that they are not harmful to health before they are approved. Also, consumers must not be misled by their use. In this context, in the summer of 2021, the BfR examined specifically the question of whether the stronger gloss resulting from treatment with wax-like coatings is falsely associated with high product quality. The results of the representative survey show that the likelihood of potentially being misled by the use of wax-like coatings can be considered low: The majority of respondents correctly associate gloss with the use of wax-like coatings. In comparison, just under a third think that gloss is indicative of intense flavour or high nutritional content of fruits and vegetables. By the way, consumers can determine if a product has been treated with wax-like coatings by the label “waxed”.

© Maxim Loskutnikov/AdobeStock



Food and everyday products: what is the population concerned about?

The BfR Consumer Monitor shows that the German population currently considers certain nutrients such as sugar, fat or salt to be the greatest health risks. An unhealthy lifestyle and diet rank second by a wide margin, followed by risks due to insufficient consumer information, undesirable substances, and smoking. Despite fears due to some nutrients, half of the respondents consider food that can be bought in Germany to be safe. 44 percent of the respondents also think that food safety will continue to increase. The highest level of trust on the topic of consumer health protection is currently given to consumer centres and organisations (71 %) and science (69 %). Coming last are the media, politics and the economy (less than 20% respectively). The Consumer Monitor is a regular population survey conducted by the BfR – around 1,000 people living in private households, and who are at least 16 years old, are interviewed by telephone on behalf of the institute every six months.

More information:
www.bfr.bund.de/en > Publications > BfR Consumer Monitor



© Jim Hept/AdobeStock

Bitter makes poisonous

Lupin seeds are a popular ingredient, especially in vegetarian and vegan cuisine, and everyone is referring to them these days as a “protein bomb”. However, they can also trigger allergic reactions and severe poisoning.

Once it becomes apparent that a tentative dietary trend is becoming a lasting change, the food industry also starts to move on a large scale. The number of people who are eliminating meat or even all foods of animal origin from their menus is growing steadily. This is opening up new market niches that are looking to be filled with plant-based products. Alongside established imported alternatives such as soy, rice or coconut, lupin is enjoying increasing popularity. As the legume becomes better known and more widely accepted, its use in food products is also increasing: Well-stocked market shelves now offer a large and constantly growing range of products, from lupin drink (as a milk substitute) to lupin patties (as a meat substitute) to lupin flour and coffee. Besides a wealth of protein, the bean is also rich in fibre and

minerals, while at the same time containing few calories and low cholesterol. Since it can be grown and harvested in Germany, the plant also enjoys a better reputation ecologically than soy products, for example. Other properties of this plant, however, urge caution.

Allergen on the rise

For people who have to avoid classic wheat products because of a gluten intolerance, the gluten-free legume with its light yellow, corn-like beans is a good substitute. Yet while some praise lupin seeds as a valuable “superfood” because of their high protein content, others fear them for that very reason. These are people with an allergy to lupin protein. Lupin protein is one of the 14 allergens that currently have to be listed



A bitter taste indicates lupin alkaloids that have adverse health effects

on food packaging if they are contained in the food. Lupin seeds are used, among other things, in milk and soy substitutes, dietary foods and sauces. Since lupin flour extends the shelf life of baked products, small amounts of it are sometimes added to a wide variety of these products. However, consumers don't always expect to find it in pizza or gingerbread. The increased use of lupin flour could thus lead to an increase in allergic reactions. So it's important for lupin protein allergy sufferers to keep a watchful eye, because the allergy can cause skin reactions, breathing difficulties, abdominal cramps or even a life-threatening allergic reaction (anaphylactic shock).

Defensive wolf

Depending on the botanical species and the geographical origin of the lupin (or "wolf's bean" in English), the seeds can also contain varying concentrations of bitter quinolizidine alkaloids. There are over 170 different types of these defensive substances in lupins, which the plant produces to protect itself from predators. The substances also cause symptoms of poisoning in humans, affecting the nervous, circulatory and digestive systems. Typical reactions to lupin alkaloids include dizziness, confusion, palpitations, nausea, dry mouth, loss of motor control, and in high doses even cardiac arrest and respiratory paralysis. There is no current information on how often people in Germany experience complaints after eating lupins in food. A rough extrapolation of the reports of poisonings and suspected cases at the seven German poison information centres in 2016 yields an annual number of about 80 to 100 cases involving parts of the lupin plant. Mainly children are affected. However, most cases do not lead to symptoms or trigger only mild discomfort.

Debitting poses risks

The concentration of quinolizidine alkaloids in the seeds varies depending on the lupin variety from which they originate. "Bitter lupins produce seeds that have

high concentrations of quinolizidine alkaloids and are therefore not suitable for human consumption without suitable pre-treatment," says Professor Dr Bernd Schäfer, Food Toxicologist at the German Federal Institute for Risk Assessment (BfR). To ensure that the beans can be consumed safely, the amount of alkaloids contained in most lupin species must first be sharply reduced. Apart from the "sweet lupin", which has been specially bred to be almost free of them and whose seeds can be eaten without hesitation, the unwanted passengers in other lupin species must first be professionally removed in a "debitting process". Such processes are well established in industrial production. When buying unprocessed lupin seeds, however, it's usually not really obvious to consumers whether they're sweet or bitter. However, if lupin seeds or products made from them have a bitter taste, this can be a clear indication of the presence of lupin alkaloids, which are undesirable for health.

Consumers need considerable expertise to debitter unprocessed lupin seeds correctly and adequately. The BfR therefore advises them to refrain from doing so. "Instead, they should only buy products that are clearly labelled as sweet lupin seeds or as bitter lupin seeds that have already been debittered," says Bernd Schäfer. Otherwise, poisoning can occur if the concentration of quinolizidine alkaloids is too high and the debittering process has not been carried out properly in one's own kitchen. Incidentally, the soaking water used in this process tastes bitter because the alkaloids pass into it. For this reason, it should not be consumed or used in any way, just like the water used to boil potatoes. ■

More information:
www.bfr.bund.de/en > A-Z Index: Lupin protein



Substantia non grata

Undesirable substance: in 2021, retailers recalled numerous food products that contained ethylene oxide and its conversion product 2-chloroethanol. What was the problem with bars, snacks and salad toppings?

Ethylene oxide is an active substance with antibacterial and antiviral properties. It was used in pesticides to protect fruits and vegetables from bacteria and fungi after harvest. Since 1991, however, any food-related uses of this sweet smelling gas have been banned throughout the EU. The reason - it can be mutagenic or carcinogenic.

Due to increased evidence, among others in sesame seeds and locust bean gum, the German Federal Institute for Risk Assessment (BfR) has assessed whether and to what extent ethylene oxide residues are problematic for human health. The result confirms the previous assessment: based on current data there is no intake level for ethylene oxide without a health risk. The substance therefore is considered undesirable in food.

Conversion product also problematic?

Ethylene oxide is very reactive and is, amongst other things, rapidly converted to 2-chloroethanol. Usually it is only 2-chloroethanol which is detected in plants and foods treated with ethylene oxide. The human health risk associated with 2-chloroethanol is the subject of further

research. Also for this substance there are indications for potential mutagenicity in vivo. Producers must therefore avoid residues of ethylene oxide or 2-chloroethanol in food as far as technically possible. If the food monitoring authorities nevertheless detect residues above the legally defined maximum residue level, the products are recalled.

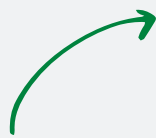
When assessing health effects, the authorities need to know how to classify the corresponding detections in food. The BfR has therefore determined the daily intake level for ethylene oxide as means of guidance. At this level, daily intake would potentially lead to one additional case of cancer for one in 100,000 people. This estimate is based on the assumption of a lifelong average consumption. Irrespective of this, the following applies: any avoidable entry of "genotoxic and carcinogenic" substances such as ethylene oxide into food should be omitted. ■

More information:
www.bfr.bund.de/en > A-Z index: ethylene oxide

Consume without regrets

Different countries, different customs – but also different pathogens and different water quality conditions. What travellers should bear in mind when handling food in the tropics and subtropics.

Follow the recommendations of the tour guide and avoid places with a bad reputation.



Select packaged drinking water



Cook it, peel it or leave it!

If you want to protect yourself from food-borne infections, peel raw fruit and vegetables before consumption and avoid leafy salads. Eat animal products such as meat, seafood and eggs only cooked.

Packaged ice cream only

It's best to avoid ice cream which is sold on the street for hygiene reasons. Industrially produced, packaged ice cream is preferable.



Cold drinks

Drinks cooled with ice cubes can contain pathogens. Therefore, ice cubes should be made from hygienically safe (boiled) drinking water. But you don't usually know that.



Hot and tasty food only

It's best to return lukewarm food or food that tastes strange, bitter or fermented. It may contain pathogens or toxins (toxins formed by bacteria) because it has not been heated sufficiently or has been kept warm for a long time.

Fish gourmets beware

Fish and shellfish in (sub-)tropical waters can contain toxins – ciguatoxins – that cause gastrointestinal, neurological and cardiovascular disorders. Ciguatoxins are not inactivated by heating. Those who inform themselves locally about affected species and do not eat fish they have caught themselves are on the safe side.

More information:

www.bfr.bund.de/en > A-Z Index: Ciguatera
www.rki.de > Infektionsschutz > Infektionskrankheiten A-Z (in German)

www.auswaertiges-amt.de > Sicher reisen > Reisen und Gesundheit (in German)



In everyone's mouth

**The mineral fluoride is good for your teeth.
Yet a lot does not always help a lot.**

From the foods we eat, we get trace elements that keep our body healthy. Fluoride is one of those. According to current knowledge, fluoride is not essential for human life, but small amounts are beneficial for dental health and help to protect against tooth decay.

Natural sources

Traces of fluoride are found everywhere in nature, including in water and foods. Seawater, for example, contains about one milligram (mg) of fluoride per litre, whereas concentrations in drinking water in Germany are usually below 0.3 mg per litre. Drinking water is not fluoridated in Germany. Mineral water, on the other hand, may contain higher amounts of fluoride – it pays to look at the label.

Foods naturally contain only very small amounts of fluoride. But, fish, and especially black tea, can be

rich in fluoride. The only food product in Germany to which fluoride may be added deliberately is table salt for household use. It is labelled, and it usually contains 250 mg of fluoride per kilogram of salt. This means that 0.5 mg of the trace element is obtained from use of about 2 grams of salt per day at home.

Tiny amounts are enough

The use of fluoride is important for caries prevention, along with tooth brushing and a tooth-healthy diet. Studies show that fluoride has a protective effect on tooth enamel and is able to inhibit the growth of acid-forming bacteria in the mouth. All in all, our body only needs tiny amounts for healthy teeth: according to the European Food Safety Authority (EFSA), a daily intake of 0.05 mg of fluoride per kilogram of body weight from all sources, including dental care products, is sufficient to prevent tooth decay. This value applies to children

from six months of age and adults, including pregnant and lactating women. It is equivalent to 3 mg of fluoride per day for a person weighing 60 kilograms.

Risk of excessive intake in children

In Germany, reliable data on the intake of fluoride are not available so far. To gain more credible information on this, in the BfR MEAL study (Mahlzeiten für die Expositionsschätzung und Analytik von Lebensmitteln – “meals for exposure assessment and analysis of foods”), the BfR is currently quantifying fluoride in a wide range of foods. It can be assumed that the daily tolerable upper intake level of 0.1 mg per kilogram of body weight, derived by the EFSA, is not normally reached here.

While there is generally no cause for concern for adults, caution is advised when dealing with fluorides in infants and young children. This is because young children are more likely to achieve the tolerable upper intake level because of their lower body weight; and the intakes from several sources quickly add up in everyday life. “Excessive fluoride intake over a long period of time increases the risk of dental fluorosis, especially during tooth development up to the age of about 8 years,” says Dr Anke Weißenborn, nutritional scientist at the German Federal Institute for Risk Assessment (BfR). Initially, they appear as white spots on the teeth; in more severe cases, however, discolouration and even loss of tooth enamel can occur. In Germany, it is estimated that mild fluorosis occurs in up to 20 per cent of 15-year-old children.

Also be careful with fluoridated salt

To ensure that fluoride strengthens the teeth from the very beginning, infants should be given fluoride tablets from the second week of life until their teeth erupt. As soon as the first tooth appears, very gentle brushing with fluoridated toothpaste should be started (see box). Parents should keep in mind: by swallowing toothpaste, whether intentionally or accidentally, young children can ingest plenty of fluoride. The BfR therefore advises parents to use only one source of fluoride to prevent tooth decay in their children. “As soon as fluoridated toothpaste is used, the intake of fluoride through tablets should be discontinued,” emphasises Anke Weißenborn. Parents should also be careful with fluoridated salt. In the first years of life, generally no or only little amounts of salt are consumed. However, results from the BfR Children’s Nutrition Study KiESEL, which investigated the food consumption of children aged six months to five years, show that around 50 per cent of the respondents prepare their children’s meals with salt fortified with iodine and fluoride or with iodine, folic acid and fluoride. ■

More information:
www.bfr.bund.de/en > A-Z Index: Fluoride



Be mindful

If the water used for preparing infant formula contains 0.3 mg of fluoride per litre or more, infants should not be given fluoride tablets in the first months of life, and from the first tooth until 12 months of age, only once a day a grain-of-rice-sized amount of fluoride-containing or fluoride-free toothpaste should be used. Otherwise, from the first tooth until 24 months of age, a grain-of-rice-sized amount of toothpaste containing 1,000 ppm fluoride should be used: up to twice a day in the first year, later twice a day. Then, until the age of six, a pea-sized dab can be used for brushing up to three times a day. This is the recommendation of the “Healthy Start – Young Family Network” at the Federal Centre for Nutrition (BZfE). It also includes that in the early childhood, parents should apply the toothpaste in correct doses and brush the teeth together with the child.

More information:
www.gesund-ins-leben.de > Für Familien > Baby > Karies vorbeugen (in German)

99
Always use only one fluoride source for caries prevention



Popular, but largely unresearched

How does a vegan or vegetarian diet affect health? This is what the COPLANT study is investigating on a large scale. Researchers are looking for around 6,000 people across Germany to participate starting at the end of 2022.

Interest in vegan and vegetarian diets is growing – especially among younger people. Nevertheless, hardly any scientifically reliable data exists on the effects of a plant-based diet on the body so far. The COPLANT study aims to change this. It is intended to close data gaps, thus allowing scientifically based dietary recommendations for a healthy and sustainable lifestyle. COPLANT (COhort on PLANT-based diets) until now is the largest planned study on plant-based nutrition in the German-speaking world – a project of the German Federal Institute for Risk Assessment (BfR), the Max Rubner Institute, the Research Institute for Plant-Based Nutrition and the Universities of Jena, Bonn, Heidelberg, Regensburg and Kiel. The Thünen Institute is involved in the topic of sustainability. Partners in Austria and Switzerland also want to participate. The project is being supported by the German Federal Ministry of Food and Agriculture.

Starting at the end of 2022, the BfR and its partners are looking for around 6,000 people aged 18 to 69 who would like to participate.

Hot lead

A smaller preliminary study at the BfR conducted in 2020 provided initial evidence that a vegan diet could have an impact on bones and nutrient supply: the vegans studied had lower bone health in terms of density and elasticity. Furthermore, vegans had conspicuously low levels of iodine in their urine – an element vital for growth, bones and the brain. On the other hand, they were well supplied with vitamin B12, which is essential for nerve and blood cells, although it is seldom found in plant-based diets. The reason: those who follow a vegan diet usually supplement vitamin B12 in the form of tablets, capsules or drops.

Comprehensive data will now be collected within the COPLANT study, which will run for several years. The study’s main questions are: which vitamins and minerals are consumed sufficiently or too little? What happens in the metabolism when we abstain from foods of animal origin and consume novel vegan foods? What is the effect of individual diets on muscle mass, fat content and bones? In addition, research will be conducted into the extent to which a plant-based diet differs from a mixed diet with regard to heavy metals, mould toxins and other undesirable substances.

Who can join?

The project is looking for women and men who are between the age of 18 and 69 and have been following a vegan (no animal products), vegetarian (no meat and fish, but dairy products and eggs), pescetarian (like vegetarians plus fish) or omnivorous (plant and animal products) diet for at least one year. Those who take part can make an important contribution to research in the field of plant-based nutrition and gain valuable information about their own health. ■



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What is a plant-based diet?

From vegan to flexitarian – so far there is no uniform definition of which diets constitute a plant-based diet. The consensus is that its main components should be of pure plant origin, including vegetables, fruits, nuts, seeds, oils, grains and legumes. Depending on the diet, dairy products, eggs, fish and seafood may be added. The research focus of the COPLANT study is on vegan, vegetarian and pescetarian diets.

COPLANT

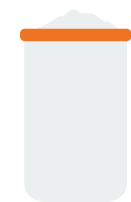
Participate in the study:
coplant@bfr.bund.de

More information:
www.bfr.bund.de > A-Z Index: COPLANT study
 (in German)

How to prepare powdered milk correctly

Hygiene is crucial in the production of powdered infant formula. Nevertheless, pathogenic germs can survive and multiply in the finished formula or be transferred via spoons, teats or bottles. Therefore, maximum hygiene must be observed during preparation.

Preparation



Powdered milk

and

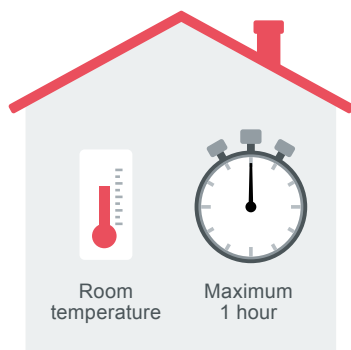


Sterile water

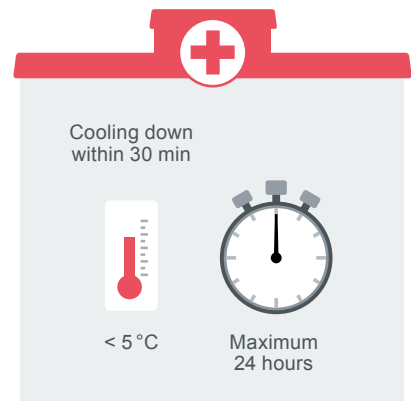
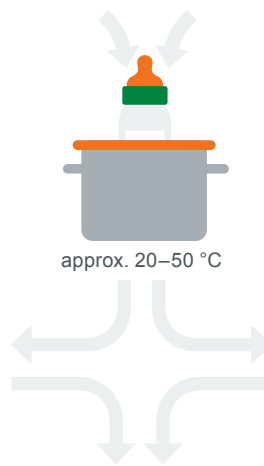
or



Boiled water

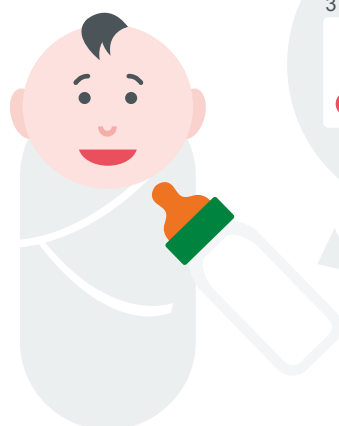


Private households



Professional baby care

Feeding



37 °C

Recommendation:
Wrist test



Feed within
1 hour



Dispose of all leftovers

Tips when out and about

- ▶ Pre-portion powder in bottle
- ▶ Take along hot water with you in an insulated bottle
- ▶ Mix only just before feeding
- ▶ Cool to drinking temperature and feed as described above

More information:
Updated BfR Opinion no. 009/2022 of
29 March 2022



Only enjoy well cooked beans

In modern kitchens, gentle steaming or simmering is often preferred – this keeps vegetables crunchy and fewer vitamins are lost. However, caution is advised with some vegetables. French beans, for example, should not be eaten raw. When preparing them, it's essential to ensure sufficient heating and cooking time, the BfR advises. The seeds and pods of the green French bean contain phasin, which is a lectin protein. The protein is harmful to human health. It can cause symptoms even in small doses and is only destroyed by high temperatures. Typical symptoms after eating raw or insufficiently cooked beans include abdominal pain and nausea; in severe cases, bloody diarrhoea, fever and a drop in blood pressure are possible. Children are particularly at risk due to their low body weight. Such lectins are also found in other types of beans. Anyone who grows beans in their own garden should educate children about the danger or make sure that they do not have unsupervised access to the plants.

More information:
BfR Press Release No. 32/2021 of 09 July 2021

Titanium dioxide: no longer a food additive

Chewing gums and fine bakery wares used to have one thing in common: they could contain the white colour titanium dioxide, labelled E171. The white pigment makes food look more appetising. However, the use of titanium dioxide as food additive E171 will no longer be permitted. The EU Commission revoked the authorisation in January 2022 because its use can no longer be considered safe. The Commission based its decision on an opinion of the European Food Safety Authority (EFSA). It came to the conclusion that genotoxic effects cannot be excluded with sufficient certainty. The BfR mainly agrees with the expert opinion, but also points out gaps in knowledge. It's still unclear to what extent and how titanium dioxide can damage genetic material. What role do the size, shape and crystalline composition of the particles play? Answers to these questions still need to be found.

More information:
www.bfr.bund.de/en > A-Z Index > Titanium dioxide



Coronaviruses on glasses: just wash them away?

Whether you're at home, in the canteen or in a restaurant – during the coronavirus pandemic, many have wondered whether coronaviruses such as SARS-CoV-2 could also be transmitted via drinking glasses. How stable are coronaviruses on glass? And how can they be removed? Researchers at the BfR have investigated this in a study. The results show: coronaviruses can remain infectious for days to weeks after drying on glass, depending on the exposure to light. While they were detected for up to seven days in daylight, they were stable for up to 21 days in the dark. It's therefore important that drinking glasses are cleaned sufficiently. The good news: most commercially available dishwashing detergents could sufficiently inactivate coronaviruses after only 15 seconds at room temperature (23 °C). No infectious coronavirus could be detected after cleaning with a manual glass washer as well. Generally, care should be taken when cleaning drinking glasses to change the rinsing water, to use the concentration of rinsing agent recommended by the manufacturer, and to sufficiently remove dirt from the glass.

More information:
Schilling-Loeffler, K. et al. 2022. Coronaviruses are stable on glass, but are eliminated by manual dishwashing procedures, Food Microbiology, doi: 10.1016/j.fm.2022.104036



© limlimphoto/AdobeStock

The end of colours?

Since the beginning of 2022, certain substances have been banned in tattooing products. What's behind this? What health risks are being discussed? Where is more research needed?

According to the statistics database “Statista”, roughly 17 per cent of the German population are tattooed, and the trend is rising! Few of us think about the health consequences, and many even consider tattoos to be harmless. Although science is making great progress and more and more health risks are being explored and identified, little is known about the long-term effects of tattoo ink ingredients in the body.

As of 4 January 2022, certain ingredients in tattoo inks are now banned, with further restrictions to follow in early 2023. The topic has been widely discussed in public for months. Does it mean the provisional end of colourful tattoos?

Scientists point to a wide range of health risks associated with tattoos, from the occurrence of carcinogenic substances to allergies and infections. In Germany, tattoo inks are subject to the regulations of the Tattoo Inks Ordinance (see box on page 35). This contains a list of ingredients that may not be contained in tattoo inks. These include, for example, pigments that are harmful to health and certain carcinogenic compounds from azo dyes, a group of industrially produced dyes. Similar national regulations also exist in other EU Member States.

Over 4,000 ingredients regulated

With the aim of achieving uniform regulation at the European level, the European Chemicals Agency (ECHA) has drawn up a restriction proposal for certain ingredients in tattooing products on behalf of the European Commission. This is based on the European chemicals regulation REACH (see box, page 34).

This regulation generally prohibits substances that have been proven to be carcinogenic and mutagenic or to damage the development of (unborn) children and reproduction. In addition, substances that irritate the eyes and skin and trigger allergies are banned along with substances already banned or restricted via certain annexes of the EU Cosmetics Regulation. The rationale: substances that are not permitted for use on the skin shouldn't get under the skin either.



In the lab: biotechnologist Dr Ines Schreiber researches the safety of tattoo inks.

What is REACH?

REACH stands for Registration, Evaluation, Authorisation of Chemicals and is the EU chemicals regulation. In force since 2007 as REACH Regulation (EC) No. 1907/2006, it's an important tool for chemical safety in the European Union. If a substance or group of substances poses an unacceptable risk that cannot be adequately controlled, the authorities responsible for REACH in the EU Member States can propose restricting its use: this can then be subject to certain conditions in all EU states or be generally prohibited.

Finally, as of 4 January 2022, approximately 4,200 substances for use in tattoo inks have been banned or only allowed in very small quantities, including certain pigments as well as binding and preserving agents. A transitional period has been granted for the pigments "Blue 15:3" and "Green 7", so that the restriction will only apply starting 4 January 2023.

The ECHA's restriction proposal was developed jointly with the EU Member States Denmark, Italy and Norway and with the participation of Germany and the German Federal Institute for Risk Assessment (BfR). Basically, however, the insufficient data situation is making the assessment of the health risks and a final regulation

difficult. Especially with regard to the pigments "Blue 15:3" and "Green 7", the BfR concludes that the currently available data only shows comparatively low toxicity. However, the data is incomplete and needs to be refined.

BfR research team examines skin samples

At the BfR in Berlin, the safety of tattoo inks has been researched for years. At the "Dermatotoxicology" study centre, biotechnologist Dr Ines Schreiber has been in charge of the "Tattoos" subsection since February 2021 and has reason to be proud: "We're the only research group worldwide that conducts full-time research on tattoo inks," she explains. For example, her team is using skin samples to investigate which colour pigments trigger allergies. It is known that red pigments in particular can cause this. In addition to actual skin samples, specially developed skin models are also used to observe the interaction between cells and colour pigments under UV irradiation.

How are colour pigments and other ingredients of tattoo inks distributed in the body? Where and how heavily are they deposited in the body and organs? There is still a need for research here. The question of the substances' metabolism has also not yet been sufficiently investigated. To improve the study situation concerning the distribution of tattooing ingredients, the BfR is already in the process of obtaining human data. "We're currently conducting a bioavailability study. We want to find out how many of the soluble tattooing ingredients actually enter the body," explains the scientist. For this purpose, blood and urine samples from human subjects are analysed shortly after the tattooing process.

The research at the BfR will contribute to improving the scientific data and the safety of tattoo inks. Commenting on the future of tattoo research, Schreiber adds: “There are still some side effects with unknown causes, so we’ll certainly be continuing our research here at the BfR for years to come.” ■

More information:

www.bfr.bund.de/en > A-Z Index: Tattoo



www.youtube.de > BfR
> Feature: Research on tattoos at the BfR
> 3 questions about tattoos
> Statements 2. International Conference on the Safety of Tattoo Inks

What legal provisions apply to tattoo inks in Germany?

In Germany, food and feed, tattoo inks, cosmetic products and consumer products are subject to the German Food and Feed Code (Lebensmittel- und Futtermittelgesetzbuch, LFGB). Accordingly, products must be safe for consumers and must not harm human health. The respective manufacturer is responsible for their safety. Tattoo inks in Germany are also subject to the provisions of the Tattoo Inks Ordinance (Tätowiermittelverordnung).

BUZZ TALK

“A large proportion of the colour pigments remain in the body for life”



Dr Peter Laux is head of the Product Properties and Nanotechnology unit at the BfR

Where do the pigments wind up after getting a tattoo?

The pigments from the tattoo inks do not all stay exactly where the tattoo was applied. We know from clinical studies that the lymph nodes of tattooed people are coloured. This means that some of the pigments are found there. It’s not yet known how pigments accumulate in other organs and what effects this has. There’s a great need for research in this area.

How can we increase the safety of tattoo inks?

We can already significantly increase the safety of tattoo inks. To this end, the BfR has proposed the introduction of minimum requirements that would have to be met by manufacturers on a voluntary basis. The minimum requirements include consistent purity. The impurity profile must remain the same during different phases of the manufacturing process. Secondly, we propose the introduction of in vitro testing – that is, non-animal testing methods. For example, these might be used to test the light-mediated toxicity or allergenic properties of pigments.

Dr Laux, what are the greatest health risks of a tattoo?

The greatest health risks of getting a tattoo are allergic reactions such as redness and swelling. These can occur even years after being tattooed. When you get a tattoo, pigments are pricked into your skin. They come into contact with lymph fluid as well as blood. A large proportion of the pigments remain in the human body for life and the long-term effects are still completely unexplored.

Practical in everyday life –

Once in the hands of children, seemingly harmless products can cause serious poisoning accidents. Five sources of hazard at a glance.



Laundry detergent pods

They smell good, they feel soft and they're brightly coloured – we're talking about laundry detergent pods (liquid caps). For children, they look like sweets, and it is fun to squeeze the caps. But beware: the liquid detergent is only packed in a water-soluble film that can quickly burst. The highly concentrated detergent can easily leak and, even in small quantities, causes severe irritation of the mucous membranes, which can lead to nausea and vomiting.



Hand sanitiser

When applied to the skin, disinfectants kill bacteria or alter viruses so that they are no longer infectious. If swallowed or splashed in the eye, they can be harmful to health. Since the beginning of the pandemic, many poison centres have reported an increase in cases related to disinfectants. One problem, for example, is that dispensers are often located at face level of children or are hanging in small bottles on prams. This is how splashes can get into the eye. Often this only hurts for a short time. Sometimes, however, it can lead to temporary damage to the cornea.



Liquids for e-cigarettes

The German Federal Institute for Risk Assessment (BfR) is aware of 851 cases of poisoning and suspected poisoning in connection with e-cigarettes from 2015 to 2019. In 82 per cent of the cases, the affected persons – predominantly children – had drunk refill solutions (liquids) of the popular lifestyle product. Most of these contain nicotine, which can cause severe vomiting and other symptoms if swallowed – even in small quantities. Large amounts of nicotine can cause fatal poisoning. Special care should be taken with self-mixed liquids, as they are often stored in unlabelled containers without child-proof caps.



“Poisoning Accidents among Children” app from the BfR

To provide parents and caregivers with information and support in emergencies, the BfR has developed the app “Poisoning Accidents among Children”. In addition to valuable tips, it provides direct telephone contact to the seven German poison centres of the federal states. Important: while the app does provide information on first aid measures, it is no substitute for medical advice and treatment in the event of an emergency.

More information:

www.bfr.bund.de > Presse > BfR-Apps: Vergiftungsunfälle bei Kindern (in German)

hazardous for children



Toilet cleaners

To make sure that toilet cleaners reach the hard-to-access edges of toilets, their bottle necks are often curved. Their shape is reminiscent of ducks and, to children's eyes, looks like a toy. Yet appearances are deceptive: the cleaners can cause severe burns to the eyes and skin. Swallowing such corrosive products can cause lifelong symptoms and even be fatal. Although household products that are classified and labelled as being corrosive to the skin must have a child-resistant closure, accidents often happen.



Liquids for barbecues, garden torches and oil lamps

Summertime is barbecue time. But be careful: don't put down liquid barbecue lighters or oily fuels for torches or oil lamps carelessly. Small children may mistake them for drinks. If the paraffin-containing oils are swallowed, they can "crawl" into the lungs and cause coughing, shortness of breath or fever and lead to suffocation.



© ruslanita/AdobeStock



Avoiding poisoning

Keep household chemicals out of the reach of children, do not decant them into seemingly harmless containers such as beverage bottles and avoid corrosive and other products classified as hazardous as much as possible.

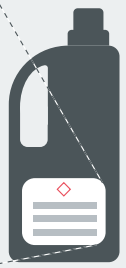
More information:
www.bfr.bund.de/en > A-Z Index: intoxication/poisoning

Reiniger  Achtung

Beispielfirma GmbH Tel: 123 4567890
 Musterstraße 123 Beispielfirma@online.de
 45678 Beispielstadt www.beispielfirma.com

Verursacht schwere Augenreizungen. Ist ärztlicher Rat erforderlich, Verpackung und Kennzeichnungsetikett bereithalten. Darf nicht in die Hände von Kindern gelangen. Vor Gebrauch Kennzeichnungsetikett lesen. Nach Gebrauch Hände gründlich waschen.
 BEI KONTAKT MIT DEN AUGEN: Einige Minuten lang behutsam mit Wasser spülen. Eventuell vorhandene Kontaktlinsen nach Möglichkeit entfernen. Weiter spülen. Bei anhaltender Augenreizung ärztliche Hilfe hinzuziehen.

UFI: A123-B456-X780-CH16

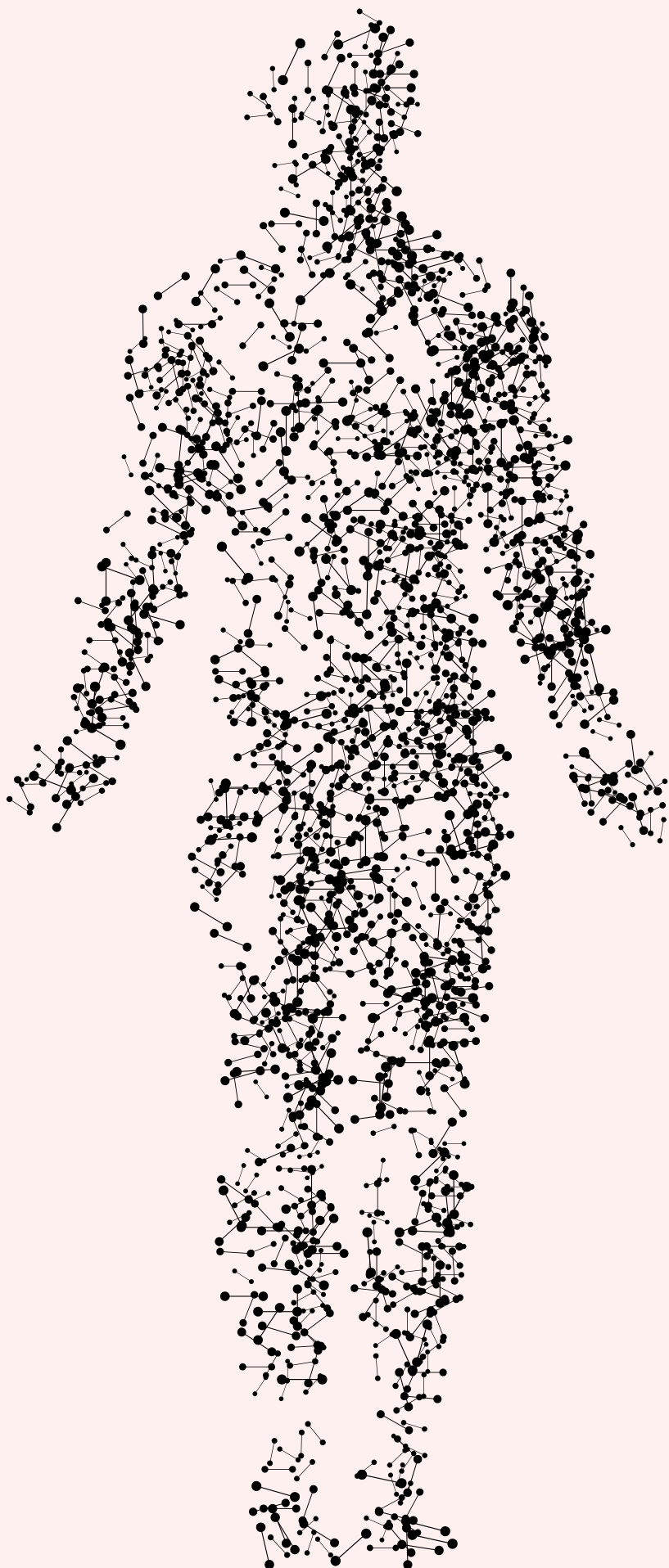



UFI code: the alphanumeric lifesaver

The first contact in an accident is with the emergency number 112 or poison centre. However, they are often unable to clearly identify the product concerned. This is why the "UFI" was created: UFI stands for 'Unique Formula Identifier'. The 16-digit code on the label comprising numbers and letters links the product with full information about its ingredients and properties which has been transmitted to the poison centres. In the event of an emergency, the advisors at the poison control centre can use the UFI to provide fast and specific information on the risk of poisoning and the best medical care. The BfR helped to initiate the code 11 years ago and has been involved in its development and technical implementation ever since.

The risk of (almost) every- thing

The BfR is working on a concept to estimate and assess the exposure to chemical mixtures in advance.



In the course of his or her life, every human being comes into contact with countless chemical compounds, microorganisms, radiation and other environmental influences. This confrontation is part of our existence, but it is also the origin of diseases. In 2005, the scientist and cancer researcher Christopher Wild coined the term “exposome” which he defined as the totality of all environmental factors and influences to which we are exposed.

It is no coincidence that the exposome is reminiscent of the genome, the totality of the genetic make-up of an organism. In the context of Wild’s definition the genetic causes of disease are hidden within the genome, the non-genetic causes in the exposome. A group of scientists at the Federal Institute for Risk Assessment (BfR) has now for the first time presented a concept on how to use this approach for the identification and assessment of health risks from exposure to predictable and unpredictable mixtures of chemicals as well as food.

More than 350,000 chemical compounds or mixtures are produced worldwide. One way or another they can find their way into the food chain and hence form a sizeable part of the exposome. Correspondingly, assessing the resulting health risks is of high priority for consumer health protection.

Providing knowledge in advance

“In a perfect world you could record all the chemicals a person comes into contact with and do so from the time of conception,” says Dr Tewes Tralau, an expert on plant protection products at BfR. “Of course this is practically not feasible. Still, with regard to the exposome, one can and should try to make use of whatever actually is possible.” The decisive factor of the new approach is that it is designed to identify health risks prospectively. This is in contrast to the current practice of retrospective analyses which are predominantly based on measurements in blood and tissue.

The concept, which was presented by the BfR team in the scientific journal “Nature Food”, is based on several steps. First, all available information on significant chemical substances is collected. Data collected originate, for example, from dossiers within the framework of the EU chemicals regulation REACH or from the registrations of plant protection products.

Identification of possible interactions

Following data collection and compilation it will be necessary to determine which substances are likely to be taken up together, for example in the form of mixtures – and to what extent people are realistically exposed. In order to do so it is helpful to consult, amongst others, data from monitoring programmes, scientific studies on the intake of chemical substances, surveys on consumer behaviour as well as sales information.

”

In a perfect world, you could record all the chemicals a person comes into contact with and do so from the time of conception

“We want to know what chemicals are being circulated and which populations are affected,” Tralau explains. “For example, it would be useful to know who buys which cleaning products and chemicals in the supermarket – such anonymised data would be a good starting point for estimating the exposure of normal households. It would also help to identify which substances are most likely to be used in parallel.”

Like thousands of mosaic pieces

From the data, an overall picture of a small exposome can be compiled, similar to putting together thousands of mosaic pieces. The respective information would provide clues about important possible mixtures or jointly used chemical compounds and help to generate consumption profiles. Depending on the data, this can be done for specific consumer or occupational groups but also for sensitive individuals such as pregnant women or children. In a next step, mixtures identified as potentially relevant can then be compared with existing toxicological data or be examined further in the laboratory. Novel methods enable precise tests on cells, for example. Also, it can be determined whether the individual substances increase each other’s effect.

In Tralau’s view, the concept not only has the advantage of identifying risks in advance but it also makes it easier to identify major hazards and lays a scientific foundation for risk assessment as a precondition for targeted action. “Decisions based on this approach are based on solid data, not conjecture,” says Tralau. Now it’s a just a matter of putting the idea into action. ■

More information:

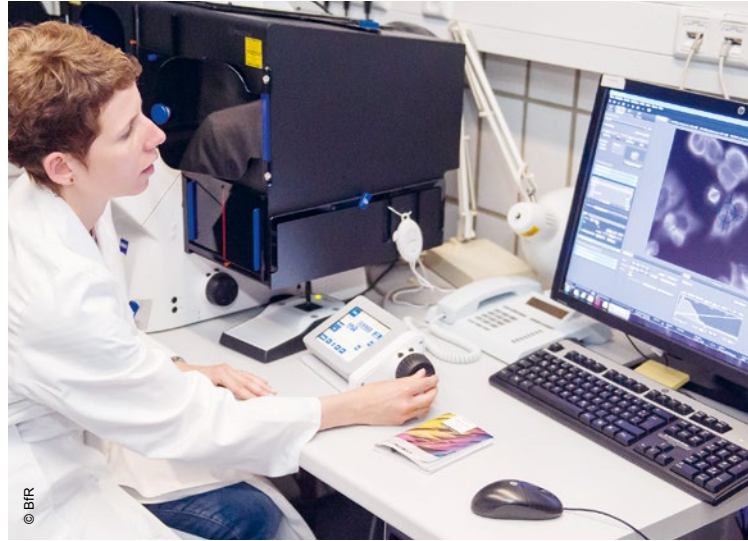
Tralau, T. et al. 2021. A prospective whole-mixture approach to assess risk of the food and chemical exposome. *Nature Food* 2, 463-468. DOI: 10.1038/s43016-021-00316-7

mitosis

Aberrant

Making two out of one?
Cell division under the
microscope

Centrosomes direct cell division and ensure that each cell carries the same genetic material. Hormones or hormone-like substances can disrupt this process – thus promoting cancer.



Cancer research at the BfR: cell biologist Dr Ailine Stolz-Ertych examines the distribution of chromosomes.

Sometimes life hangs by a thin thread. Or more precisely: on thin spindle threads. When a human cell divides, it's vital that the duplicated genetic material is distributed equally to the two newly emerging daughter cells. This is ensured by a "spindle apparatus" consisting of many filigree fibres. The chromosomes, which carry the genetic information, attach themselves to the spindle fibres and are then pulled to the two opposite poles of the spindle. This way, a completely identical set of genetic material assembles at each pole and cell division can begin – thanks to the spindle fibres.

Billions of cells divide in the human body every day. At the German Centre for the Protection of Laboratory Animals (Bf3R) of the German Federal Institute for Risk Assessment (BfR), cell biologist Dr Ailine Stolz-Ertych and her team are investigating how hormones and hormone-like substances affect cell division. "We have discovered that certain hormone-active substances can promote the uneven distribution of chromosomes to the daughter cells," says Stolz-Ertych. "This uneven distribution is a major feature of cancer cells."

Centrosomes: the poles of the spindle

The "central body" or centrosome is of great importance in cell division. It is a small cell organelle that is duplicated just like the genetic material. The two centrosomes form the two opposite poles of the spindle. From here, they

guide the equal division of the chromosomes via the spindle fibres to the daughter cells that are to be formed – making two out of one.

In human cancer cells, this process is often disturbed. One major cause involves the fact that tumour cells often have more than two centrosomes. "If there are three centrosomes, for example, we can observe the temporary formation of three spindle poles under the microscope. This makes cell division impossible," says Stolz-Ertych. To avoid total chaos – and thus death – a cancer cell has the ability to turn three poles back into two. "This often results in erroneous attachment of the chromosomes to the spindle fibres. The distribution of chromosomes is a game of chance then, and one reason why tumour cells often have either too many or too few chromosomes," the scientist adds.

Bisphenol A under the microscope

Ailine Stolz-Ertych has been working at BfR since 2016 and is researching healthy cells of the intestinal mucosa as well as intestinal cancer cells. She is studying the effects of oestrogens (female sex hormones) or oestrogen-like substances such as bisphenol A (BPA) on cell division. BPA is a compound commonly found in plastic food contact materials and used as a starting substance for polycarbonate plastics and epoxy resins, for example in the manufacture of food cans. Due to

The substance bisphenol A is a starting material for the production of epoxy resins, which are often used to coat food cans.



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We assume that the effects are minor, but they must nevertheless be taken seriously

adverse effects arising from the hormone-like action of BPA, the substance has been classified as “of very high concern” by the European Chemicals Agency (ECHA) and its use in many plastic materials such as baby bottles or thermal papers (sales receipts, for example) has been banned throughout the EU. Stolz-Ertych discovered that oestrogens, like BPA, can promote the uneven distribution of chromosomes in intestinal mucosa and colon cancer cells. “We assume that this effect is caused by an increase in the number of centrosomes,” says the scientist.

How does an excess of centrosomes occur? To understand this, you have to take a closer look at the centrosome. Inside it, there are two identical cylindrical tubes made of protein molecules that are linked together at right angles and, with a little imagination, resemble a bent drainage pipe. These tubes are called centrioles. They are effectively the heart of the centrosome and responsible for the outgrowth of the spindle fibres. Oestrogens or oestrogen-like substances can disrupt the regulated doubling of the centrioles, leading to a tripling, for example – and a corresponding increase in the number of centrosomes.

Ailine Stolz-Ertych wants to elucidate the mechanisms of this “disturbance” in the intestinal cells. This sounds easier than it actually is, as hormonal effects are sometimes difficult to grasp. Like all hormones, oestrogens are messenger substances. They act by attaching to suitable docking sites (receptors) on or in the cell. Stolz-Ertych is particularly interested in these hormone receptors.

Results provide important clues

“Results from cell experiments such as the ones we are conducting cannot be applied one-to-one to humans,” says Stolz-Ertych, limiting the scope of her experiments when it comes to the question of how hazardous substances with oestrogenic activity such as BPA are. “We assume that the effects are small, but they must nevertheless be taken seriously because they can have a carcinogenic effect,” adds doctoral student Miriam Bühler.

The basic research of Stolz-Ertych and her team not only aims to better understand the effect of hormones, but could also lay the foundation for new test methods for chemicals that do not involve animal experiments. For example, it could be tested whether a chemical compound leads to centrosome proliferation and unevenly distributed chromosomes. Stolz-Ertych and her team are relying on extremely high-resolution microscopy technology that can be used to detect even single molecules. After all, the aim is to find the thin thread on which life can hang. ■

More information:

Bühler, M., A. Stolz. 2022. Estrogens – Origin of centrosome defects in human cancer? *Cells* 11: 432. DOI: 10.3390/cells11030432

Where it counts

The German Federal Institute for Risk Assessment (BfR) has been publishing the annual laboratory animal statistics since 2021.

The German Animal Welfare Act sets strict requirements for animal experiments and the handling of laboratory animals in Germany. The competent authorities at the federal state level are responsible for the approval and control of experiments. The publication of annual laboratory animal statistics is also regulated: since 2021, this task has been the responsibility of the German Centre for the Protection of Laboratory Animals at the BfR. Previously, the Federal Ministry of Food and Agriculture was responsible for this.

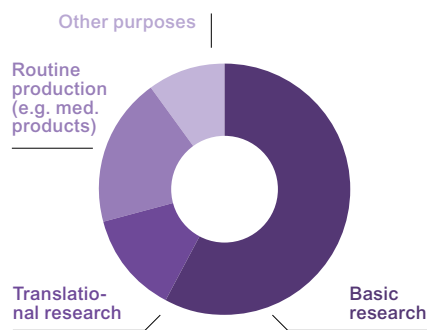
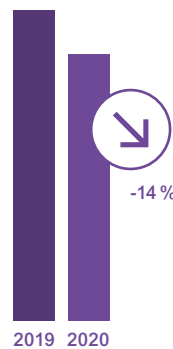
Number of laboratory animals used decreases significantly

According to the statistics, the number of laboratory animals used in 2020 fell significantly by about 14 per cent compared to the previous year. A total of around 1.9 million vertebrates and cephalopods were used in experiments (according to Section 7 para. 2 of the German Animal Welfare Act). The statistics list which, and how many, laboratory animals were used and for what purposes experiments were carried out. About 58 per cent of the laboratory animals used were for basic research (for example, for studies of the immune and nervous systems) and about 13 per cent for research into diseases (for example, cancer) in humans and animals. About 19 per cent of the animals were used in the production or quality control of medical products or for toxicological safety tests (for example on the efficacy or safety of drugs and vaccines). About 10 per cent were needed for other purposes, such as education and training, or for breeding genetically modified animals.

Strictly regulated procedure

What data are the statistics based on? Scientists in Germany are obliged to report the number of laboratory animals used as well as other information, such as the species and origin of the animals, the purpose of the experiments or the severity of the exposure, to the competent authority at federal state level. The state authorities send all reports from the respective German federal states to the BfR in Berlin. And so in the end, the figures from all over Germany are compiled there. The team led by Professor Dr Gilbert Schönfelder, head of the German Centre for the Protection of Laboratory Animals at the BfR, checks the data for plausibility, processes it and sends it to the EU Commission in Brussels. The Commission in turn publishes the figures of all EU Member States in the freely accessible international statistics database ALURES. The “ALURES NTS” database contains the information on approved animal experiments in the EU. In addition to this, there is also the BfR’s “AnimalTestInfo” portal, which provides information on approved animal testing projects in Germany. “When deciding whether to approve an animal experiment, the responsible authorities al-

ways check beforehand whether the objective cannot be achieved by other methods or procedures,” Schönfelder emphasises. ■



More information:
www.bf3r.de > English > Offers > Laboratory animal numbers 2020

INTERNAL AFFAIRS

Targeted research

In January 2022, the BfR established two new junior research groups to expand existing core research areas. In the area of risk communication, one team will in future be conducting research on the topic of reputation and confidence building, while the second group will focus on methods for the assessment of mixture toxicities in the area of pesticide safety. The Study Centre for Social Science Risk Communication Research was also newly established. Study centres at the BfR work cross-institutional and seek to refine risk assessment and communication and thus consumer protection

Promoting science in Berlin

The non-university institutes and centres bundled in the “Berlin Research 50” network have presented the Berlin Senate with a joint list of demands for future non-university research in Berlin. The network demands, for example, that joint appointments be simplified and that the infrastructure for excellent research be promoted. The initiative was launched in 2020 and aims to strengthen the capital as a science location. The more than 50 members represent research areas from all scientific fields – the BfR has also been a member since its founding.

More information: www.br50.org > EN > Topics > Interest Groups > IG Program

**From the university laboratory to research**

What substances change human cells? This question was explored by Heidi Frank, a student at the Berlin University of Applied Sciences (HTW), during an internship for her final thesis at the BfR. In the Chemical and Product Safety Department, she was able to apply the knowledge from her Life Science Engineering degree programme to a concrete research project. The HTW and the BfR work closely together, especially on student research projects and theses, giving students regular opportunities to get a taste of practical experience. Exciting reports about the exchange can be found in the HTW’s online magazine “Campus Stories”.

More information: www.htw-berlin.de > Search: Campus Stories (in German)

SOCIAL MEDIA

The fridge is alive

- only in our series on the topic of “Correct Refrigeration”, however. Here, our comic characters provide tips on how cooling food properly can prevent infections in the home: Keeping your fridge in order the right way? – Ms Cucumber, Mr Leek and the Berry Gang know the ropes. How long does minced meat keep? – Ms Lettuce and Mr Cress explain the use-by date and when minced meat has to be cooked on the same day it’s purchased. These likeable characters explain interesting facts about refrigeration, storage and the proper chilling of food. Video tutorials on YouTube bring the cartoon characters to life.



More information (in German):
[youtube.de](https://www.youtube.de) > Bundesinstitut für Risikobewertung
[instagram.de](https://www.instagram.de) > BfRde

INTERNATIONAL NEWS

Together for more chemical safety

In May 2022, the Partnership for the Assessment of Risk from Chemicals (PARC), established with around 200 European institutions and organisations, including the BfR, started work. PARC is part of the EU-wide research and innovation programme. The members will work together over the next seven years to identify knowledge gaps in the risk assessment of chemicals and to better manage hazards using new data, knowledge and methods. It is coordinated by the French Agency for Food, Environmental and Occupational Health & Safety (ANSES).

How safe are edible insects?

In Germany, the idea still takes some getting used to, but in other cultures they have been on the menu for a long time. To better identify health impairments that could result from consuming them, the BfR and Jomo Kenyatta University in Nairobi/Kenya have launched the ContamInsect project. The international team is researching whether and to what extent Kenya's most commonly consumed insect species are contaminated with undesirable substances and whether mould toxins (mycotoxins) are transferred from the feed into the insects. The project is funded by the German Federal Ministry of Food and Agriculture (BMEL).

More information:
BfR Communication No. 006/2022 of 2 February 2022

Cooperation

Since March 2022, a framework collaborative agreement has strengthened cooperation and joint applied research between the Helmholtz Centre for Environmental Research (UFZ) in Leipzig and the BfR. Together, they are investigating the effects of substances and mixtures on human health and environmental organisms. The focus is on the areas of experimental toxicology and analytics with the aim of developing new risk assessment strategies for the safety of chemicals and strengthening consumer and environmental protection. In addition to events, the cooperation aims to apply for and carry out collaborative projects and to jointly supervise student research projects and theses.

Flagship project on digitalisation

For institutes to work well together on a digital level, cross-agency data infrastructures are needed. Within the framework of the pilot project "Digitisation Laboratory for Food, Agriculture and Consumer Protection", the Julius Kühn Institute (JKI) in Quedlinburg and the BfR will in future pool their expertise in digitisation and tackle digitisation projects as a team. One example of this collaboration is the approval and evaluation of plant protection products, for which both institutions are working on partial aspects. They are thus interested in joint solutions for data transmission, storage and availability.

EVENTS



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Off to the Nectar Hectare!

What's an average work day for bees? How does the pollination of plants work? And how is honey actually produced? Visitors to the 5th interactive BfR Plant Labyrinth on the subject of bees – the BfR Nectar Hectare ("BfR Nektar Hektar") – will find answers to these questions. From 25 August to 30 September between 10.00 a.m. and 6.00 p.m. on Tuesdays to Sundays – they can go on a discovery tour through a large field of maize, sunflowers and other plants in Berlin-Marienfelde and learn interesting facts about the insect. Admission is free of charge.

More information: www.bfr-akademie.de/en



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