Cases of Poisoning Reported by Physicians

2009

Bundesinstitut für Risikobewertung

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Cases of Poisoning Reported by Physicians in 2009

Centre for Documentation and Assessment of Poisonings
at the Federal Institute for Risk Assessment – 16th Report (2009)

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Preface

Professor Dr. Dr. Andreas Hensel

Dr. Axel Hahn

Dear Reader,

On 12 November 2009, the National Committee for the Assessment of Poisonings at the Federal Institute for Risk Assessment (Bundesinstitut für Risikobewertung – BfR) marked its 45th anniversary with a celebration. It had been established in 1964 at the former German Federal Health Office (Bundesgesundheitsamt), modelled on the US-American Food and Drug Administration (FDA) committee National Clearing House for Poison Control Centres. Simultaneously, the Centre for Documentation and Assessment of Poisonings was established which today is affiliated with the Federal Institute for Risk Assessment. Almost at the same time, the regional poison information centres (Giftinformationszentren – GIZ) were founded. These poisons centres are of prime importance for health protection of the population, providing a 24-hour medical hotline service on poisoning emergencies.

Since it came into existence, the Committee for the Assessment of Poisonings, formerly often referred to as the German Poisons Committee, has made a decisive contribution to the creation of the most important fundamentals of human toxicology and to the establishment of clinical toxicology as a discipline. As suggested by the Committee, or with its support, numerous position papers were prepared and important legislative procedures initiated. Thus, on 1 August 1990, the Chemicals Act came into force, introducing for the first time regulations stipulating the compulsory reporting of product formulations by manufacturers/distributors for the purpose of emergency health consultancy, and the compulsory reporting of cases of poisoning by attending physicians.

Being guided by the model, in a way, of the German legislation on chemicals, the compulsory reporting of formulations of hazardous products was adopted under Article 45 of the CLP Regulation. The CLP Regulation (Regulation (EC) No. 1272/2008 of the European

Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures) has been in force since 20 January 2009 and is of legal validity in the countries of the European Union. This means that there has been a substantial progress, on the European level, towards protection of the population from health impairments caused by chemical substances and products. The positive effects of such progress cannot yet be fully assessed.

The present 16th Report by the Centre for Documentation and Assessment of Poisonings will provide the reader with some information on the work of the Committee for the Assessment of Poisonings. Like its predecessors, this report also features selected case reports that were prepared with the active support of physicians and also of patients. In the 2009 edition, the thematic focus is on health hazards from mistaking poisonous plants for harmless ones, being a risk that should not be underestimated.

Therefore, the cover illustration of the present report shows plants that can easily be mistaken for each other. We would like to ask you:
Are you able to reliably identify the three plant species shown?

Try to solve the riddle and form your own opinion on how easily the leaves of the edible bear's garlic can be mistaken for those of lily of the valley and the deadly poisonous meadow saffron. Explanations regarding the individual plant species are found in Chapter 2.1. For the solution to the riddle see Chapter 4.6.

Please continue to support our activities by your cooperation in the prevention of poisonings.

Professor Dr. Dr. Andreas Hensel
President of the Federal Institute for Risk Assessment

Dr. Axel Hahn
Head of Unit
Product and Poison Documentation – Centre for Documentation and Assessment of Poisonings

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1 Introduction

1.1 Legal basis of activities: § 16 e Chemicals Act

On 1 August 1990, the requirement of compulsory reporting of poisonings by attending physicians within the framework of the Chemicals Act (Chemikaliengesetz – ChemG) came into force. This compulsory reporting is a meaningful counterpart to the reporting of adverse reactions to medicinal products. In addition to cases of poisoning, also dangerous preparations (formulations) became subject to compulsory reporting. Poisons centres became obliged to report their relevant knowledge on the situation with regard to poisoning incidents in Germany. All these activities merge at BfR at the Centre for Documentation and Assessment of Poisonings where also the office of the Committee for the Assessment of Poisonings is hosted.

The purpose and objective of this German legal provision in the Chemicals Act has been to receive from physicians acting "on the scene" well documented findings on human health complaints caused by chemical products. It serves to provide valuable human data on the incidence of poisoning accidents, doses and effects of chemicals and products involved. On the basis of such data, effective measures of prevention can be recommended at a very early date. It has been the specific purpose of legislation that the toxicological assessment of products should not rely on toxicological data from animal studies only. The data obtained from cases of poisoning in humans are intended to be used as far as possible to minimize toxicological studies in animals and thus, make an active contribution to animal welfare.

This legal regulation is useful for both humans and animals, and it is unique on the global level. The cases of poisoning reported by physicians have been compiled, assessed and evaluated at BfR in direct cooperation with attending physicians and the German poisons centres (PCs) for more than 20 years now. The annual reports published also in English have met with a very affirmative response among the scientific community owing to their topicality with regard to toxicological issues, their proposals of preventive measures and presentation of individual case reports.

In addition, ministries, companies and industrial associations are informed about adverse effects of chemical products (toxicovigilance) either immediately (in severe cases of poisoning) or at annual intervals (in all other cases) through a well-working product information system.

Compulsory reporting

According to the Chemicals Act, reporting refers to illnesses or suspected poisonings as well as unintentional exposures that are associated with the following substances or toxicants:

- Chemical substances and products used in the household, e.g. detergents and cleaning agents, hobby and DIY articles;
- Cosmetics;
- Detergents and cleaning agents;
- Pesticides;
- Plant protection products;
- Wood preservatives;
- Chemicals used at the workplace;
- Harmful chemical substances found in the environment, also after industrial accidents;
- Poisonous plants including mushrooms; and
- Poisonous animals.

1.2 What does the term of poisoning mean?

The term of poisoning refers to illnesses caused by exposure of the body to substances or products and determined by their chemical and physical properties. In the majority of cases, the substances involved are not isolated substances but chemical products composed of several single substances in the sense of a formulation. For many poisons of animal or plant origin, the specific toxic effects are not yet sufficiently known and need to be subjected to further toxicological research.

The practice of human toxicology, particularly the assessment of cases of poisoning, requires special scientific knowledge and a long-standing experience. For the assessment of cases of poisoning in humans, toxicological findings and knowledge obtained from animal studies may be helpful to a limited extent only.

Within the meaning of the Chemicals Act, the term of poisoning designates all cases in which health impairment has occurred. Reporting is also required for suspected cases of poisoning. Poisoning may occur through a variety of routes of exposure to a product, e.g. after oral or inhalational exposure or after contact with the eyes or the skin.

Health impairments in the sense of adverse effects or allergic reactions occurring during or after the common use of a product are to be reported to BfR, irrespective of its proper or improper use. BfR may also be informed of accidents involving a product which did not result in any health impairment. Information on asymptomatic cases with documented exposure may provide useful information with regard to a possible risk and help to describe a safe field of use of a product.

In addition, poisons centres are legally obliged to inform BfR about their knowledge of general importance so that trends may be identified early enough and considerations made with regard to prevention.

1.3 Principles of clinical toxicology

The assessment of poisoning is based on the established principles of clinical toxicology in the sense of an expert judgement. The following queries have to be answered.

- Does the patient suffer from a disease or health disorder showing signs and symptoms that can be clearly described?
- Is there any evidence existing or to be established that exposure to specific substances or products has taken place? Is it possible to confirm such exposure by laboratory evidence?
- Is there any evidence of an association, i.e. a causal relationship between the disease or health disorder/symptoms, and the exposure?

Assessment should be based on objective criteria, taking into account also considerations of differential diagnosis. For the medical assessment of a case, it has been particularly helpful to consider the individual signs and symptoms as entities in their own right where the degree of severity of the health disorder is weighted correspondingly. For the field of poisonings on an international level, health disorders are assessed on the basis of the international Poisoning Severity Score (PSS) (see Chapter 1.3.1), which has also been the basis for assessments carried out at BfR.

1.3.1 Poisoning Severity Score (PSS)

The PSS[1] is a standardized and generally applicable scheme for grading the severity of poisoning. It was developed by the International Programme on Chemical Safety (IPCS) in collaboration with the European Commission and has been recommended for the assessment of poisoning by the European Association of Poisons Centres and Clinical Toxicologists (EAPCCT).

By means of the PSS, health disorders due to poisoning are graded as (0) none, (1) minor, (2) moderate, (3) severe, and (4) fatal (see Table 1).

PSS grade		German (BfR)	
0	None	keiner	No symptoms or signs
1	Minor	leicht	Mild, transient and spontaneously resolving symptoms or signs
2	Moderate	mittel	Pronounced or prolonged symptoms or signs
3	Severe	schwer	Severe or life-threatening symptoms or signs
4	Fatal		Death

Table 1: Poisoning Severity Score (PSS)

[1] *Hans E. Persson, Gunilla K. Sjöberg, John A. Haines, Jenny Pronczuk de Garbino*
Poisoning Severity Score. Grading of Acute Poisoning
Clinical Toxicology, Volume 36, Issue 3, April 1998, pages 205–213

1.3.2 The three-level model

In analogy to the assessment of the causal relationship in the recording of adverse effects of medicinal products, a three-level model was developed to assess individual cases of health impairment due to poisoning.

The three-level model has been most successfully applied to the assessment of each individual case reported by physicians since 1990. The advantage of the three-level model assessment consists in the reduction of assessment efforts to three single levels which are logically interconnected.

- Is there a justifiable temporal and spatial association between the exposure and the occurrence of health impairment?
- Are the signs and symptoms known from other case reports, or is it possible to explain the mode of action?
- Is there an association between symptomatology and exposure, i.e. are the signs and symptoms temporally associated with dechallenge (symptomatology subsiding after termination of exposure) or rechallenge (symptomatology worsening on reexposure)?

Based on this model, the following classifications may be derived:

- No relationship (1st level: No)
- Relationship exists (1st level: Yes, and 2nd and 3rd levels: Yes; or 1st level: Yes, and 2nd level: No, and 3rd level: Yes)
- Relationship cannot be assessed: (no clear statement possible)

In cases that are particularly difficult to assess, it is also possible to evaluate the exposure or the relationship between exposure and symptomatology experienced in a more detailed way in order to make a final assessment of the case (see Chapter 1.3.3).

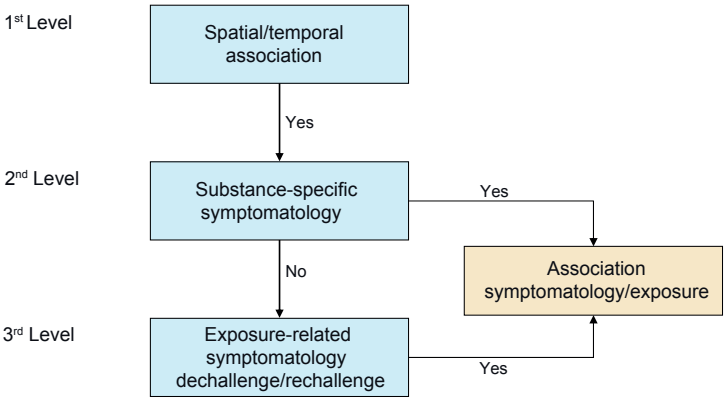


Fig. 1: The three-level model

1.3.3 Detailed assessment of exposure and health disorder

Experience from previous assessment work has demonstrated that in particular cases associated with chronic exposure to low doses or chronic exposure to toxicologically so far unknown toxicants are difficult to assess. In these cases, it has become an established practice to assess, in a first separate step, the degree of probability of exposure. Subsequently, i.e. in a second step, the association between health disorders/symptoms and exposure is assessed. Plausible data to estimate the exposure are derived from the following sources: Routes of exposure, measurements in the environment (ambient monitoring, e.g. ambient air measurements) and measurements in body fluids (human biomonitoring, e.g. measurements of blood parameters).

The approach is shown in Table 2. The most important input values include estimates by experts, but also objective parameters such

		Estimation		Measurements			
Probability of exposure		Contact with substance		extracorporeal		intracorporeal	
		Source(s)	Potential exposure	Single value	Representative measurements	Single value	Exceeding of limit values
No	None	+	-	-	-	-	-
Yes	Possible/ cannot be reliably excluded	+	+	+	-	-	-
	Probable	+	+	+	+	+	-
	Definite	+	+	+	+	+	+
?	Cannot be assessed	e.g. insufficient data, state of knowledge					

Table 2: First Step: Matrix to assess the extent of absorption of a substance (probability of exposure)

Causal relationship exposure/symptoms		Absorption of a substance plausible	Partially specific symptoms	Specific symptoms	Specific laboratory analysis	Other diagnoses
No	None	-	-	-	-	+
Yes	Possible/ cannot be reliably excluded	+	+	-	-	+
	Probable	+	+	+	-	-
	Definite	+	+	+	+	-
?	Cannot be assessed	e.g. insufficient data, state of knowledge				

Table 3: Second Step: Matrix to assess the causal relationship between health disorder/signs and symptoms and exposure

as measurements in the sense of ambient monitoring and/or biomonitoring. The degrees of probability of exposure described by "possible", "probable" and "definite" are then integrated into one criterion, namely "Exposure: yes". This means that a plausible absorption of a substance or toxicant has taken place.

Based on the input value "plausible intake of a substance or toxicant", each case of poisoning may then undergo a more detailed assessment in a second step (see Table 3), which will lead to a final result. The data required for this include: partially specific/ specific symptoms, specific laboratory analyses of body fluids/tissues and carefully considered differential diagnoses that have been discussed with experts.

Again, the results "possible", "probable" and "definite" are integrated into one criterion, namely "Causal relationship: yes". This means that a relationship exists between exposure and the health disorder/symptomatology. These results are then included in the assessment of the individual case. They are recorded in the BfR poison information database and made available for further analysis. In order to make the above single criteria more objective, a score has been developed by BfR which is not discussed in detail in the present publication.

1.4 Processing of cases of poisoning at BfR

A systematic, uniform and harmonized documentation of reports of cases of poisoning by physicians and their assessment are the essential prerequisites for adequately confirmed and early hazard identification. An important element in the assessment of acute and chronic poisoning consists in a proper substantiation of the spatial and temporal relationship between the health impairment and the incriminated toxicant. Particularly in respect of signs and symptoms that are not observed in an immediate temporal relationship with the exposure to a chemical toxicant it is very difficult to assess the causal relationship between the symptomatology and an alleged exposure. This will apply in particular to cases of exposure that typically occur within the low-dose range (e.g. in the field of environmental health) and/or show dynamic variations or redistribution (e.g. in indoor environments). The causal relationship between the toxicant absorbed and the symptomatology observed is assessed by the above criteria (see Chapters 1.3.2 and 1.3.3), and as a result,

recorded as “possible”, “probable”, “definite”, “none” or “cannot be assessed”. After their assessment, all individual reports by physicians are recorded according to a standardized and harmonized procedure. As a result, they become available for future reference. Single cases of particular interest will be described in detail and included, as case reports, in the Cases of Poisoning Reported by Physicians annual report. Information on identified risks is passed on to the responsible ministries, manufacturers and industrial associations in the form of rapid communications or to the manufacturers in the form of annual summa-

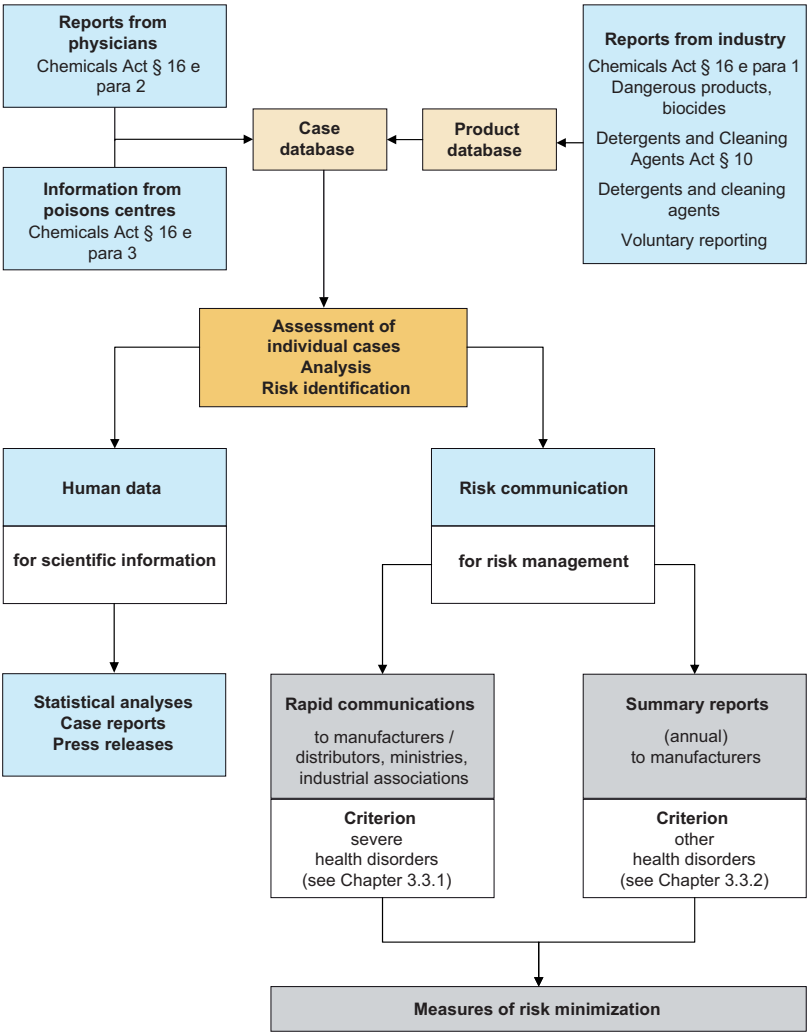


Fig. 2: Terms of reference of the Centre for Documentation and Assessment of Poisonings

rizing reports by way of the product information system PRINS (see Chapter 3.3). The responsible manufacturers and/or distributors are requested to transmit to BfR information on measures envisaged by them to improve product safety.

The knowledge gained during this process is published by BfR in its annual reports entitled Cases of Poisoning Reported by Physicians. These reports and other publications are available on request by writing to Pressestelle, Bundesinstitut für Risikobewertung, Thielallee 88–92, 14195 Berlin, Germany. These publications may also be accessed on the internet (www.bfr.bund.de).

1.5 Poison information database

The BfR poison information database serves to support the poisons centres in providing consultation and treatment in cases of poisoning by making available product formulations reported by manufacturers/distributors for the purpose of emergency health response. Until 2007, also formulations of cosmetics were submitted to the PCs (see Fig. 4).

Until late December 2009, 78 661 documents with product information (formulations of cosmetics excluded) were recorded in the database. Of these, 7 760 were new reports on products added in 2009

So far, the poisons centres have been submitted a total of 42 329 reports on products that are subject to compulsory reporting under §16 e para 1 of the Chemicals Act and §10 of the Detergents and Cleaning Agents Act (Wasch- und Reinigungsmittelgesetz - WRMG). Of these, 9 732 referred to dangerous preparations, 12 549 to biocides and 20 048 to detergents and cleaning agents (see Fig. 3 and Fig. 4). In addition, 36 332 products reported on a voluntary basis were submitted to the PCs.

Under the Detergents and Cleaning Agents Act, these data are to be submitted by electronic file transfer in XML format. The major part of other product data on dangerous preparations and biocidal products as well as of the voluntary reports by manufacturers, distributors and importers received by BfR is submitted on paper or as a PDF document. All product data reported are edited by BfR, using well established methods, for transmission to poisons centres.

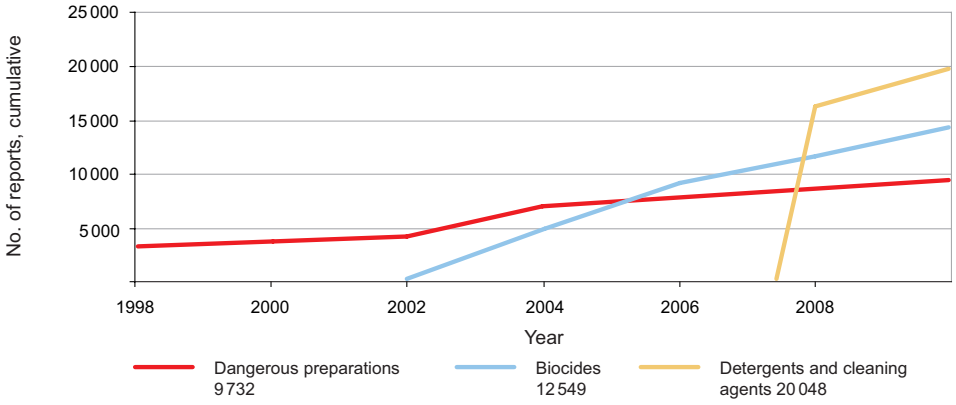


Fig. 3: Development of reports legally required under § 16 e para 1 of the Chemicals Act as well as under § 10 of the Detergents and Cleaning Agents Act

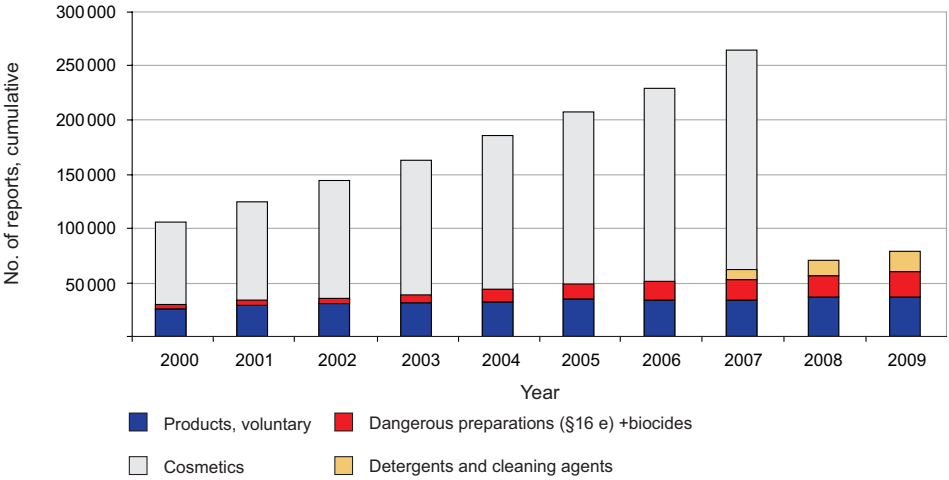


Fig. 4: Reports on products received since 2000 and transmission of information to the German poisons centres

1.6 National Committee for the Assessment of Poisonings

45 years of successful preventive work by the BfR Committee for the Assessment of Poisonings (also cf. BfR Information No. 047/2009 of 15 December 2009)

The German National Committee for the Assessment of Poisonings located at the Federal Institute for Risk Assessment (BfR) marked its 45th anniversary with a celebration. The Committee was established in 1964 within the former German health authority (Bundesgesundheitsamt – BGA), modelled on the American Food and Drug Administration (FDA) committee National Clearing House for Poison Control Centers, together with a Centre for Documentation and Assessment of Poisonings. At the same time, poisons centres were established in the German federal Länder according to the American model.

Renowned experts were appointed to the Committee who supported the German poisons centres' consultation and treatment of patients

Fig. 5: Celebration of the 45th anniversary of the National Committee for the Assessment of Poisonings

involved in poisoning accidents. The tailor-made and individual treatment of such patients in collaboration with poisons centres contributed to an essential reduction of fatal cases of poisoning accidents in children. This gratifying result was also achieved by enhanced prevention and consumer protection, especially through new product compositions, warning labels and bans on sale.

Often, the National Committee for the Assessment of Poisonings has been referred to as

the German Poisons Committee. Since it came into existence in 1964, it has made a decisive contribution to the establishment of the most important fundamentals of clinical toxicology in Germany. During 45 years, about 70 meetings took place with more than 170 participating experts such as professors holding chairs of pharmacology and toxicology, head physicians of poisons centres, industrial toxicologists, staff members of consumer organizations, associations and ministries and numerous invited experts. They have compiled results of research, developed therapy recommendations and contributed to a decisive progress in the treatment and prevention of poisonings.

Already in 1965, a set of information sheets for the diagnosis and treatment of poisonings had been compiled in cooperation with the German industrial associations. In 1996, it was completely converted into an electronic database. In addition to information on substances and therapies, more than 300 000 formulations were included in the data processing. As suggested by the Committee, or with its support, numerous position papers were prepared and important legislative procedures (§ 16 e Chemicals Act, § 5 d Cosmetics Regulation, § 10 Detergents and Cleaning Agents Act) initiated and given technical support, such as the Cases of Poisoning Reported by Physicians and Reports of Formulations for Emergency Advice in Cases of Poisoning. For emergency advice, the nine German poisons centres meanwhile have access to the formulations of dangerous preparations, biocides, cosmetic products as well as of detergents and cleaning agents subject to compulsory reporting, as well as to formulations reported by manufacturers/distributors on a voluntary basis. The compulsory reporting of formulations of dangerous products for the purpose of emergency health consultancy under Article 45 of Regulation (EC) No. 1272/2008 (CLP Regulation) is of legal validity in all countries of the European Union. It was guided by the model of the German legislation on chemicals.

The Poisons Committee has initiated and supported a great number of research projects such as the studies on risks from cleaners containing hypochlorite, from corrosive automatic dishwasher detergents, impregnation or so-called “nano” sprays, poisonous plants and mushrooms. It was also decisively involved in the introduction of ISO and EU standards such as those on child-resistant fastenings, chemical toys, child-proof burners and (in 2007) the product identification element. Supported by the Poisons Committee, a number of important measures could be suggested and scientifically substantiated. These included, among others, the restriction of methanol in consumer products, changes to formulations, the introduction of warnings on products containing corrosive agents such as dishwasher detergents, the restriction of the use of halogenated hydrocarbons, and last but not least, the EU ban on dangerous lamp oils and grill lighter fluids. Essential progress was also achieved with regard to a harmonized documentation of cases of poisoning or reports on products, an enhanced identification of consumer products and a systematic documentation of individual cases of poisoning (case reports).

The equipment of poisons centres was another important subject dealt with by the Poisons Committee. A draft of administrative regulations was initiated by the Committee, which in 1994 served as a model for the staff resources and financing of the Joint Poison Information Centre (Gemeinsames Giftinformationszentrum – GGIZ) of the federal Länder of Mecklenburg-Western Pomerania, Saxony, Saxony-Anhalt and Thuringia located in the city of Erfurt, and has met with positive feedback also beyond Germany. However, these regulations have not yet been enforced.

The most important objective of the Committee’s future work will consist in establishing a national monitoring on poisoning incidents in collaboration with the German poisons centres

and the Society of Clinical Toxicology (Gesellschaft für Klinische Toxikologie e.V.). Similar to the monitoring of medicinal products, attention will focus on adverse health effects of products. These include for example mistaking of consumer products for foods ("look-alikes"), abusive application of products and the use of impregnation sprays. Considerations will also include risks that have almost fallen into oblivion, e.g. carbon monoxide poisoning due to indoor operation of charcoal grills. Also in the future, special poisoning risks to children will be of high priority in the Poisons Committee's activities.

Other important fields of work include the determination of scientific criteria to assess human cases of poisoning, particularly with regard to causality, evaluation of signs and symptoms and severity of poisonings and the scientific initiation and substantiation of possible legal regulations for consumer protection.

Fig. 6: Members of the National Committee for the Assessment of Poisonings in 2009

1.7 Current topics

1.7.1 Cases of poisoning reported to BfR and poison information provided by the Berlin poison information centre

Reports on cases of poisoning under § 16 e Chemicals Act received by BfR and the corresponding poison information by telephone provided by the Berlin poisons centre (Giftnotruf Berlin – Berlin poison information centre) in 2007 were reviewed under a project conducted in the context of a postgraduate course on Public Health at the Berlin School of Public Health, Charité, Berlin (Ms. Emine Kurtal, Berlin, summer term 2009).

Terms of reference

BfR receives reports on cases of poisoning under § 16 e Chemicals Act from attending physicians in medical surgeries and hospitals, from public health service physicians, from "transition doctors" (Durchgangsärzte) appointed by the professional insurance bodies (Berufsgenossenschaften) etc. Such information is also documented by the German poisons centres as part of their advisory activities on the phone. This is the reason why a study was to be conducted to compare the range of reports on cases of poisoning submitted to BfR in 2007 with the enquiries on poisonings received by the Berlin poison information centre during the same period. In the context of a subsequent MA thesis, it is envisaged to examine how such comparison of figures may be extrapolated for the entire Federal Republic of Germany. It will be the objective of this thesis to enable an adequate and reliable estimate of the number and severity of cases of poisoning involving chemicals in Germany.

Evaluation, comparison of figures and spectrum of reports received by BfR and the Berlin poison information centre

In 2007, BfR received 3925 reports on suspected cases of poisoning and those which

had been treated. In contrast, the Berlin poison information centre received 14 445 enquiries on products reportable under the Chemicals Act. It was concluded that obviously, a high number of cases remains unreported to BfR. At the Berlin poison information centre, 79.5 % of enquiries referred to children. The share of enquiries on cases of poisoning in adults was 20.5 %, with 90.7 % of these having suffered poisoning in the private sphere and 9.3 %, at the workplace.

Of the reports received by BfR, only 1.3 % referred to children. 98.7 % of cases reported referred to adults, with 1.5 % of cases originating from poisoning incidents in the private sphere and 98.5 %, from those at the workplace. Obviously, this has to be attributed to a responsible willingness of the Berufsgenossenschaften to report cases. More than 90 % of the reports transmitted to BfR by physicians originated from the Berufsgenossenschaften and thus, from the field of occupational medicine. Most frequently, the reports to BfR referred to primary substances, chemical products and pesticides. The lowest number of reports referred to narcotic drugs, plants and animals.

While the Berlin poison information centre received 11 480 telephone enquiries on poisoning in children, BfR recorded only 49 reported cases of poisoning in children. Poisoning incidents in the private sphere accounted for 9 589 telephone enquiries to the Berlin poison information centre, contrasted by a mere 79 reports to BfR.

Initial assessments

An initial analysis has shown an essential difference to exist between the reports under §16 e and the data recorded at poisons centres. PCs commonly give their advice to physicians and patients on the telephone at a time when circumstances, exposure and causal relationship are still unclear. Also, some enquiries are made just for preventive reasons. Hence, the PC statistics also include cases where no or only minor health effects occurred and the patients did not see a doctor.

In contrast, BfR will not receive the legally required reports from physicians before treatment has ended. As a consequence, BfR is informed only on cases of poisoning that actually occurred and were treated, and these may have been only those exhibiting a certain degree of severity.

It follows that PC statistics preferentially provide information on the frequency of exposure to chemical substances. It has remained subject to speculation whether the reports by physicians under the Chemicals Act tend to document only the cases of poisoning having taken a severe course. This cannot be proved due to the relatively low number of reports received. It will be the subject of further research. At present, the reports under the Chemicals Act and the corresponding advice given by all German PCs are being analyzed in detail and compared with one another in the context of an MA thesis. It is the aim of this thesis to reliably estimate the number of cases of poisoning involving chemical substances and products in the Federal Republic of Germany.

Obviously, there is no sufficient compliance with compulsory reporting (which is legally required under the Chemicals Act but not subject to prosecution), in spite of comprehensive public relations activities undertaken by BfR. Given the extended work load of physicians, compulsory reporting is not given sufficient attention in clinical practice, which may also be attributed to lacking economic incentives. Hence, it is assumed that probably, the number of cases of actual poisoning and of suspected cases is markedly higher than the number of cases reported so far to BfR.

1.7.2 Baby powder containing talc – a health risk

The use of baby powder containing talc may result in severe health impairment. Powder accidentally inhaled by babies may enter the lungs and cause respiratory disorder, even including severe lung damage. In a typical accident scenario, the baby is lying on the back for diaper changing, and the powder bottle inadvertently becomes opened above the baby's face.

The reason for BfR to recommend a ban on talc-containing baby powder was a severe case of poisoning in a two-year-old girl. The child had been playing with a closed powder bottle during diaper changing when suddenly the bottle opened. The powder spilled onto the girl's face and was inhaled by her. As a consequence, the child required intensive medical care for several days. BfR had been reported similar cases already in the past. In the 1979–2008 period, a total of 113 aspiration accidents involving baby powder were documented and evaluated by poisons centres in Germany, Austria and Switzerland.

The health risk associated with accidental inhalation of baby powder was considered both by the BfR Committee for the Assessment of Poisonings and the BfR Committee for Cosmetics. Both Committees concluded that the health risk posed by talc-containing baby powder justifies a ban.

The majority of experts are of the opinion that from the dermatological angle, there is no necessity to use baby powder. Also paediatricians and paediatric hospitals have ceased to recommend or use such powder for baby care. In many paediatric hospitals, baby powder has been removed from order lists without replacing it by another product.

2 Selected toxicological problems

2.1 Plant poisoning

So far, BfR has received 254 reports on cases of plant-associated poisoning. In 2009, BfR was submitted 17 reports on this topic.

In these reports, the most important plant species having caused poisoning was meadow saffron *(Colchicum autumnale)* in five cases, followed by bear's garlic *(Allium ursinum)*, foxglove *(Digitalis purpurea)* and golden chain *(Laburnum)* seed pods in two cases each.

One case of poisoning involving foxglove was classified as severe. A female patient, who was undergoing training to become a specialist in herbs ("Allgäuer Kräuterfrau"), had mistaken this plant for comfrey *(Symphytum)*. Another patient tried to poison himself with foxglove in an attempt to commit suicide, which resulted in minor poisoning only.

Two adolescents ingested golden chain seed pods. One of them did not experience any symptoms while the other showed signs of minor poisoning. Poisoning with golden chain seed pods is relatively frequently seen in sub-teenage children because these seed pods are very similar to pea pods. Younger children are mostly not tall enough to reach the seed pods of the golden chain shrub that may grow up to seven metres in height

One case each was reported of poisoning with the castor-oil plant *(Ricinus communis)*, the deadly nightshade *(Atropa belladonna)* and the snake's head fritillary *(Fritillaria meleagris)*. A young child accidentally ingested the bulbs of snake's head fritillary, however, without showing any manifestations of poisoning. An eight-year-old child ingested a seed of the castor-oil plant and subsequently, developed minor manifestations of poisoning. An adult mistook the deadly nightshade for another plant and suffered minor poisoning. Large amounts of leaves of the cherry laurel *(Prunus laurocerasus)* led to the death of a goat. In two persons exposed in their working environments, eye contact with horseradish and another, unknown plant caused minor manifestations of poisoning.

In 15 cases of poisoning, plant parts were ingested. The most frequent reasons for the ingestion of poisonous plants included mistake or other unfortunate circumstances (in five cases each). Two cases of poisoning occurred accidentally (castor-oil plant and snake's head fritillary), and another two cases were attributed to suicidal intent (foxglove and meadow saffron). In one case, the mode of poisoning remained unknown. It was a fatal case in an adult who had ingested meadow saffron.

In the majority of cases, the degree of severity was classified as minor (12 cases), in one case, as moderate, and in four, as severe. These included, among others, the case involving foxglove in a human and the one involving cherry laurel in an animal that have already been mentioned above: Ingestion of large amounts of leaves of the cherry laurel led to the death of a goat. Fatal outcomes

Fig. 7: Meadow saffron (Colchicum autumnale), very toxic

Fig. 8: Lily of the valley (Convallaria majalis), toxic

Fig. 9: Bear's garlic (Allium ursinum), edible

were also reported for two cases of poisoning involving meadow saffron.

Mistaking meadow saffron for a harmless plant poses a particular health risk. In a tragic case, an elderly couple had mistaken the leaves of meadow saffron for those of bear's garlic and used them for a meal. While the wife suffered only mild symptoms, her husband died from this poisoning. In another case, two persons had believed to have collected and eaten the leaves of meadow saffron instead of those of bear's garlic. Fortunately, this turned out to be a false alarm. Both experienced symptoms which, however, could be attributed to the fear of a fatal mistake.

Particularly in spring, the leaves of the two plant species look very much alike and are often confounded (see cover illustration). In a press release, BfR therefore drew attention to the risk of confounding one plant with the other (see press release 10/2005 of 15 April 2005). Also the media have regularly published warnings about this mistake.

Plant-associated poisoning affected all age groups, most frequently adults (eight cases). In four cases, the patients' age remained unknown. Further cases of poisoning affected two adolescents (golden chain), a young child (snake's head fritillary), a school child (castor-oil plant) and an elderly male (meadow saffron).

2.1.1 Meadow saffron *(Colchicum autumnale)*

Severe poisoning with fatal outcome and minor poisoning due to mistaking leaves of meadow saffron for those of bear's garlic
In spring, an elderly couple had a salad for lunch they had prepared from leaves of wild herbs. They themselves had picked the leaves, which they thought to be those of bear's garlic. The woman ate a smaller amount of this salad than did her husband. As late as about four hours after the meal, the couple noticed marked symptoms consisting of increasing episodes of vomiting and diarrhoea.

Case No. 1 (husband)
Manifestations/course
Due to persisting diarrhoea and severe deterioration of his general condition, the 70-year-old husband (a diabetic) had to be admitted to a hospital ca. 36 hours after the lunch.

On admission, the patient was found in an agitated state. Initially, he was still in a relatively well-oriented general condition, but already showing marked signs of exsiccosis, including dryness of mucous membranes. His body temperature was elevated (38.8 °C), blood pressure normal, associated with a marked increase in heart rate (110–120/min),

while cardiac action was initially normal and ECG findings were regular.

Within four hours, the patient's condition deteriorated dramatically. His state was characterized by a rapid drop in blood pressure and high catecholamine demand. Subsequently, he had to be intubated for artificial respiration and required maximal intensive therapy. Subsequent multiple organ failure resulted in pumping failure of the heart and a major increase in peripheral resistance. In addition, the patient developed acidosis and catecholamine refractority. Because of the uncontrollable acidosis, secondary detoxification was performed by means of haemodialysis. Analysis revealed extremely high D-dimer levels of 34 066 µg/L on admission, with a major increase within 24 hours to 75 418/ 87 157 µg/L FEU in the serum (normal value: up to 500 µg/L FEU [Fibrinogen Equivalent Units]). Colchicine was detected in the patient's urine.

About 48 hours after the meal, the patient developed progressive cardiogenic pulmonary oedema refractory to therapy, in spite of continued haemodialysis and consistent volume reduction. Although all available measures of intensive medical treatment were taken, the patient died ca. 64 hours after the accidental ingestion of the meadow saffron leaves, with a clinical picture of complete cardiovascular failure with cardiac arrest.

Case No. 2 (wife)

Manifestations/course

In contrast to her husband, manifestations in the wife came to a halt after one day. For precautionary reasons, however, she was admitted to hospital 36 hours after ingestion because the leaves which the couple had assumed to be those of bear's garlic could be unequivocally identified as those of meadow saffron. On admission to the hospital, the patient was still markedly exsiccated. All other findings of physical examination were normal, with stable vital signs. In the patient's urine and serum, colchicine could be detected on the day of admission. The serum level (3.1 µg/L) was clearly above the therapeutic range (up to 2.5 µg/L). The urinary colchicine level determined with a semiquantitative method was as high as 85 µg/L (no reference values available), although in general, only a minor share (10–30 %) is excreted in the urine, and mainly in the form of metabolites. Clinical chemistry revealed a mild leukocytosis (maximum value 10.83 x 10^9/L, normal value up to 9.0 x 10^9/L) and a slight increase in transaminases (GPT maximum value up to 44 U/L, normal value up to 35 U/L, GOT maximum value up to 41 U/L, normal value up to 35 U/L). As an expression of exsiccosis, a maximum haematocrit of 46.1 % was detected (normal value up to 43 %). As in the husband's case, an increase in the D-dimer value up to a maximum of 2 432 µg/L FEU was found (normal value up to 500 µg/L FEU). All other clinical findings and ECG were normal. The further course was uncomplicated so that the patient could be discharged on the following day.

The outpatient follow-up examination performed one day later did not reveal any signs of organ damage. Likewise, a follow-up examination performed one week later did not reveal in any abnormal findings.

Evaluation of the two cases described

Colchicine poisoning could be confirmed based on the history, the symptomatology, the increase in blood levels and the presence of colchicine in the urine.

Notes
It has to be assumed that both patients ate meadow saffron leaves, mistaking them for those of edible wild herbs. Evidence was provided by high serum levels and detection of colchicine in the patients' urine

The husband died from this poisoning ending with uncontrollable multiple organ failure ca. 64 hours after ingestion. All measures of intensive medical treatment including an attempt of continuous secondary detoxification by means of haemodialysis remained unsuccessful. On admission to the hospital, the symptomatology observed in the wife was already receding while that observed in her husband deteriorated rapidly and in an uncontrollable way. About four hours after admission to the hospital, his condition worsened so that he was already in a critical state. The mild leukocytosis in his wife had most probably to be attributed to stress. The minor increase in her transaminase levels may be interpreted as a sign of minor and temporary liver involvement. The latter may also have been expressed by the extremely pronounced increase in D-dimer levels seen also in the husband during the near-death period. Such increase is observed as a consequence of an activation of coagulation and the concomitant fibrinolysis. So far, the details of pathophysiological mechanisms with regard to colchicine poisoning have not been fully elucidated. Follow-up examinations of other cases of poisoning, ideally in correlation with the quantity absorbed, could possibly help to elucidate the pathophysiological and prognostic value of the D-dimer in the context of other clinical parameters. In contrast to a number of other cases of poisoning that had also been due to mistaking meadow saffron leaves for those of bear's garlic and treated in the same hospital, no decrease in serum calcium or serum phosphate levels was observed in these two patients. Certainly, the wife survived the incident because she had ingested a lower quantity of meadow saffron leaves than her husband.

Bear's garlic *(Allium ursinum)*, commonly also referred to as ramsons, wild or wood garlic, grows in fertile soils in shady deciduous and mixed woodlands, in parks and alluvial forests. Examples include the Glienicker Volkspark (People's Park), Pfaueninsel (Peacock Island) and the Tiergarten park in Berlin, the English Garden, the Isar floodplains and the Nymphenburg Palace garden in Munich. In early spring, two juicy green lancet-shaped leaves sprout from the small bulb. Due to their intensive aromatic garlic-like taste, they are used for cooking. In recent years, this tasty kitchen herb has gained in popularity. It is most suitable for seasoning of soups and sauces and as an ingredient of herb quark and salads. It is considered to be very healthy, and this notion has also been increasingly published via the media. Bear's garlic has met with growing popularity in contemporary cuisine (bear's garlic soup) both in the private and gastronomic spheres.

This is why in spring, when the plant fills the air with its characteristic flavour, more and more people take to parks and woodlands to pick the healthy and savoury plant of the Alliaceae family themselves. However, there are also other plants growing in the habitats of bear's garlic such as the poisonous lily of the valley or the extremely poisonous meadow saffron. Unfortunately, the young leaves of bear's garlic resemble those of the poisonous lily of the valley and of the very toxic meadow saffron plant. Unlike bear's garlic and lily of the valley, meadow saffron blooms in autumn. If two or more of these plant species grow in the same habitat, it is easy to confound them, as shown by the cover illustration of this brochure. In order to distinguish bear's garlic from its poisonous look-alikes, the careless advice is often given to rub a piece of the leaves between one's fingers. If the garlic-like smell typical of bear's garlic is not released, one should rather refrain from picking such leaves. However, such olfactory test will involve a high risk: The smell of bear's garlic picked or tested earlier may linger

on hands or fingers for a long time in spite of cleaning and thus, lead to wrong conclusions. In this way, a deceiving garlic-like smell may be perceived from leaves of the lily of the valley or meadow saffron. Each year in spring, such mistakes have regularly resulted in poisoning accidents, sometimes even with fatal outcome. For a long time already, BfR has therefore advised to exercise utmost caution (BfR press release of 15 April 2005).

Colchicine is contained in all parts of the meadow saffron plant (0.6–1.4 %). The doses considered as potentially lethal are 1.5 g seeds for children and 5 g seeds or 50–60 g leaves for adults. Meadow saffron flowers resemble those of the crocus. Most crocus species bloom in spring while meadow saffron blooms in autumn. There are, however, some crocus species blooming in autumn, whose flowers may be mistaken for those of meadow saffron. Unlike crocus blooms with three stamens, meadow saffron blooms have six stamens. Therefore and because of the low level of active substance in the flowers, poisoning caused by the flowers is a rare occurrence.

Therapeutic uses of colchicine include analgesic treatment of acute gout attack, prophylactic treatment for familial Mediterranean fever, treatment of scleroderma and of Behcet's disease. The daily maximum dose administered during gout attack is 6 mg. Since toxicity is very high, numerous fatal cases have been described as a consequence of therapy. The potential lethal dose in adults is stated to be about 10–40 mg. Single fatal cases have been reported already at doses of 7–8 mg. Fatal cases are said to have occurred at doses of 0.4 mg/kg body weight and above, even under conditions of appropriate intensive medical care. The therapeutic concentration in blood plasma is 0.3–2.5 µg/L, the toxic concentration, 5 µg/L, and severe courses with a fatal outcome have to be expected at 24 µg/L. Even in severe cases of poisoning, it is not always possible to detect colchicine in the urine because it is preferentially metabolized by the biliary route. Therefore, only 10–30 % may be detected in the urine, mainly in metabolized form. Hence, negative findings in urine do not exclude poisoning. This is also the reason why no reference values exist for urinary levels. The determination of concentrations is of no importance for the course. They mainly serve to provide toxicological evidence.

Fig. 10: Meadow saffron flowers with six stamens (left) and crocus flowers with three stamens (right)

If ingested, colchicine is quickly absorbed and will reach its maximum plasma level after 30–90 minutes. Its half-life is 10 minutes to one hour because it is readily absorbed by the tissue. It is subject to a pronounced enterohepatic circulation. Colchicine is mainly excreted by the intestinal route, a major part in metabolized and a minor part in unchanged form. At toxic doses, colchicine is a mitosis inhibitor, leading to irreversible and progressive death of cells in all tissues of the body, which will eventually result in multiple organ damage and progressive organ failure. Therefore, particularly tissues with high cell division rates such as the intestinal epithelium, bone marrow and hair follicles will be affected very early by the toxic effects of colchicine.

Signs and symptoms of colchicine poisoning will set in after 2–6 (maximum 14) hours. They will include nausea, vomiting, colicky abdominal pain, possibly already bloody stools and fever. As early as one hour after ingestion, first symptoms may be present such as a burning and sore sensation in the oral cavity. Such symptoms should give reason to consider colchicine poisoning and may be seen as an indication of having confounded bear's garlic with colchicum. Severe cases of poisoning involving lethal doses are characterized by successive organ failure as observed in the case of the 70-year-old patient described above. Intensive medical care should exploit any conceivable therapeutic potential because due to inhibition of mitosis in all cells, multiple organ failure is imminent. Neither special therapies nor antidotes are known. In most cases, death will occur within three to eight days.

Patients surviving acute colchicine poisoning may experience temporary changes in the blood picture, hair loss and organ dysfunction.

2.2 Glow sticks

Glow sticks are purely chemical illuminants. They work on the principle of chemiluminescence. They consist of a transparent plastic container of about 2–20 cm length containing two liquids in separate compartments. The container is filled with a solution of different chemicals, e.g. an oxalic acid ester, and a colorant. The exact composition will depend on the desired duration of light emission and colour shade of the glowing light. The surrounding plastic tube houses a glass tube which is thus protected. The glass tube contains a second liquid, mostly a 30 % hydrogen peroxide solution, which takes part in the chemiluminescence reaction. If the glass tube is broken, e.g. by bending the stick, the two liquids will merge, and a chemical reaction, namely the peroxyoxalate chemiluminescence reaction, takes place. The glow stick will glow.

Thus, glow sticks are used as easy-to-carry emergency lights. Anglers use them in order to be able to observe the float or the tip of their fishing rod in the dark. There are also golf balls that are equipped with a glow stick for playing in the darkness. When placed in a transparent

Fig. 11: Glow stick

helium-filled balloon, glow sticks permit a very impressive night launch of a balloon mail. For the game of speed badminton (speedminton), the shuttlecocks contain small glow sticks known as speedlights that allow playing also at night. There are other uses in the military and security sectors where glow sticks are used e.g. for marking. The U.S. Department of Defense uses more than 15 million glow sticks every year.

In Germany, glow sticks are mostly sold singly at concerts, fairs, discotheques and at other events. They have become a trendy fun accessory. In the 1990ies, they became very popular when they were used at techno parties. Glowsticking developed, which is a playful form of dancing and movement where glow sticks are waved to music mainly by the dancers' hands. As a fun device worn in the mouth and moved to and fro like a sweet, they have become very popular amongst adolescents. In this way, they produce very impressive and interesting visual effects in the dark at parties, children's birthday parties and in discotheques.

Since 2005, the Berlin poison information centre has recorded a major increase in accidents involving glow sticks. Persons affected included adolescents as well as their younger siblings. The latter may gain access to this attractive product because its use has become a widespread phenomenon. In 2005, 105 enquiries were recorded, while in 2008, this number already increased to 393. The poison information centre informed BfR on this subject. By late 2009, 31 cases of accidental ingestion were reported to BfR, in 1998, 2007 and 2008, only one per year. In 2009, BfR was informed about 28 cases of ingestion recorded by the Berlin poison information centre within a mere 10 days. In eight cases, the health impairment was rated as minor. In one case, the degree of severity could not be assessed, and in all other cases, no symptoms occurred.

Fig. 12: Glowing glow stick

Eye irritation, vomiting, or nausea were reported by two patients each. Disturbance of consciousness was observed in one case and dermal/mucosal swelling in another. The majority of reports referred to young children (20 cases), but the persons affected also included school children (9 cases) and two adults. Oral exposure was reported in 30 cases, contact of the liquid with the eye, in three cases, and contact with the skin, in one case. It has to be taken into account that for the portal of entry, repeat listing was possible.

If glow sticks are accidentally swallowed as a whole they will leave the body in a natural way, i.e. they are excreted in the faeces. This is not problematic as long as the glow sticks remain intact. They are not destroyed during digestion. However, the allegedly non-toxic glow liquid, which is malodorous and has a bad taste, may

leak, for instance as a result of chewing on the stick. This may result in a burning sensation on the oral mucosa and irritation of the gastrointestinal tract. In extreme cases, nausea and vomiting may occur. Contact with the skin of the coloured liquid may lead to mild skin irritation. All health complaints observed so far were temporary and of a minor degree.

If the liquid is ingested because a glow stick has accidentally become opened by chewing on it, an adequate first aid measure will consist in administration of fluid such as tea, fruit juice or water. There is no need to see a doctor. Liquid spilled on the skin should be washed off using water and soap. If an entire glow stick was swallowed, stools should be observed and intestinal passage stimulated by a diet rich in bulkage. Persons experiencing any symptoms should see a doctor. In case of cough, for example, it is necessary to exclude aspiration. Likewise, a doctor should be seen if there are indications that intestinal passage may be impeded (e.g. abdominal pain, constipation) after ingestion of a larger glow stick. However, such cases have not yet been described in medical practice.

Glow sticks are mostly imported products and therefore, no detailed information is normally found on these products as to the manufacturers or the ingredients. Glow sticks produced recently are often labelled as “non-toxic”. Nevertheless, the health risks involved are difficult to assess because as a rule, no information is available as to the exact composition of the products. In a press release, BfR has therefore pointed out, for precautionary reasons, that glow sticks should be kept out of the reach of young children.

2.2.1 Mild symptomatology after ingestion of liquid from a glow stick

Case No. 1
A two-year-old boy had discovered a glow stick in the evening at about 8 p.m. In an age-appropriate way, he tried to study this interesting object by putting it into his mouth. When he was chewing on the glow stick it cracked and as a result, he swallowed a small amount of the liquid leaking from it. Having become aware of this incident, his parents were concerned and presented him to a paediatric hospital.

Manifestations/course
On arrival at the hospital at about 9 p.m., the child was somnolent. Physical examination did not reveal any pathological findings. The parents had not yet made any therapeutic attempts. The hospital contacted a poisons centre, which did not recommend any further measures. Thus, the family could return home.

Evaluation
The young patient described above did not experience any typical complaints. So far, somnolence has not been described as a manifestation. Therefore, it could not be attributed to the accidental ingestion but rather, to the late time of day. Based on the information received on the temporal relationship between ingestion and the lack of manifestations, a causal relationship is possible.

Case No. 2
A seven-year-old girl had put a glow stick into her mouth on Halloween evening. When she was chewing on the glow stick it cracked and as a result, she swallowed a small amount of the liquid contents leaking from it. Shortly afterwards, a single episode of vomiting occurred. The parents were concerned and contacted a poisons centre for advice.

Manifestations/course
When the parents called the PC, the child's complaints had come to an end. The parents had not yet taken any therapeutic measures. The poisons centre gave an "all clear", and the parents were recommended to administer some fluid as the only remedial measure. There was no need to see a doctor.

Evaluation
The young patient under discussion developed a characteristic irritation of the gastrointestinal tract. Administration of fluid was sufficient as a therapeutic measure. Based on the information received on the temporal association between ingestion and the appearance of typical manifestations, a causal relationship is probable.

Case No. 3
A five-year-old boy had put a glow stick into his mouth on Halloween evening. When he was chewing on the glow stick it cracked and as a result, he swallowed a small amount of the liquid leaking from it. In addition, he rubbed some of the liquid into his eye producing reddening and a burning sensation in the eye. Therefore, his concerned parents brought him to a hospital.

Manifestations/course
On arrival at the hospital, the boy's eye was still reddened and the burning sensation continued. The further physical examination of the child did not reveal any pathological findings. As a therapeutic measure, he was administered fluid by the oral route.

Evaluation
Based on the data about the temporal relationship between ingestion and appearance of typical manifestations, a causal relationship is considered as probable in this case.

Notes
Glow sticks are very popular and their presence is widespread in households with children. This is why accidental ingestion of such products by young children is a quite frequent occurrence. Younger children mostly discover sticks belonging to their older siblings. Children aged up to three years of age are very inquisitive, and in order to explore subjects, they like to put them in their mouths. A glow stick may easily crack by chewing on it, resulting in leaking and ingestion of the bad tasting and irritant liquid. Such accident scenario is typical of this age group. Older children often put glow sticks into their mouths for fun at parties to produce visual effects. Poisons centres receive numerous enquiries on glow sticks particularly on Halloween evening. BfR has received 31 reports on accidents involving glow sticks so far, of which 28 occurred in 2009.

Ingestion of the irritant fluid may result in gastrointestinal manifestations. Accidental contact of the fluid with the eye may cause a characteristic irritation of the eye. Therapeutic measures recommended include oral administration of fluid and rinsing of the eye.

2.3 “Butterfish”

The name of “butterfish“ (“Butterfisch”) is a collective term (“trade name”) used to describe a family of perch-like fish (Pholidae) comprising about 13 species. They are found in the coastal waters of the northern Pacific, off the coast of Japan, on the southern part of the east coast of the USA and around Australia. In Europe, the “butterfish“ *(Pholis gunnellus)* is found in the coastal waters of the North Sea and the Baltic Sea, around Iceland and Norway, and in the Atlantic down to the Bay of Biscay in the south. Due to its small size (15–30 cm), the European “butterfish” is of no economic importance. In the USA, however, it is a very popular food fish. The name of “butterfish“ refers to its firm white meat with few bones whose appearance resembles that of butter. According to the Federal Research Centre for Fisheries in Hamburg, the meat of this fish contains an 18–21 % share by weight of oils, 90 % of which consist of poorly digestible or indigestible wax esters. These wax esters may have been produced by the fish itself or ingested by the fish with its food and remain undigested. This fact enables the fish to swim without the aid of a swim bladder. Often, strikingly high levels of mercury have been found in this type of fish.

In recent years, also fish species other than the one mentioned above have been marketed in Germany under the trade names of “Butterfisch” or “Buttermakrele” (butter mackerel), which are considerably larger in size and also rich in fat. Such fish species are caught as bycatch from deep-sea fishing off the South African and Southeast Asian coasts. They are sold mainly in a smoked state, for example on bread rolls, but also in a frozen or thawed state. The species involved are *Lepidocybium flavobrunneum* (escolar) and *Ruvettus pretiosus* (oil fish or escolar), both belonging to the Gempylidae family (snake mackerels).

In mid-2003, Australian health authorities reported health disorders associated with the

Fig. 13: “Butterfish”

consumption of escolar, also referred to as rudderfish or “butter mackerel”. During the 1999 to 2003 period, manifestations including cramps, headache, vomiting and diarrhoea had been reported after consumption in 98 cases. In addition, manifestations included orange oily stools. In a press release published in 2003, BfR therefore drew attention to the fact that after consumption of major quantities of fish of the species *Lepidocybium flavobrunneum* (escolar) and *Ruvettus pretiosus* (oilfish or escolar) (“Butterfisch” or “Buttermakrele”), particularly sensitive persons might suffer health impairments. Caution was suggested when consuming these products. In an expert opinion dated 30 August 2004, the Scientific Panel on Contaminants in the Food Chain stated the following regarding the toxicity of fishery products from fish of the Gempylidae family: On the basis of the case reports received, it is not possible according to EFSA (European Food Safety Authority) to fix daily intake levels for such fish which would warrant an absence of the side effects reported.

Although the meat of the oilfish *(Ruvettus pretiosus)* is edible, Japan and Italy have banned its importation due to the adverse health effects observed after consumption. Australia has banned sales of the meat of this fish species as a food. In 2006, Hong Kong’s supermarket chain PARKnSHOP sold canned oilfish under

the English name of "Cod Fish (Oilfish)". Many consumers ate the canned fish believing it was cod *(Gadus morhua)* and suffered diarrhoea as a result. Similar incidents were reported in early 2007 from Chinese supermarkets in Canada.

In Germany, no cases of health impairment had become known until 2003. However, after the opinion of BfR had been published on the internet in 2003, several consumers contacted BfR in order to give an account of their experiences and draw attention to the fact that such cases have also occurred in Germany. Case reports on this subject were published in the Cases of Poisoning Reported by Physicians 2004 and 2006 annual reports. These were again followed by enquiries or reports from the side of consumers affected.

During the 2004 to 2009 period, BfR was informed about a total of 39 cases of health disorders following the consumption of "butterfish" (five cases in 2004, six cases in 2005, three cases in 2006, three cases in 2007, five cases in 2008 and 17 cases in 2009). In 38 cases, the health disorders were rated as minor, and in one case, as moderate due to the simultaneous presence of an underlying disease. In the majority of cases, typical gastrointestinal manifestations were experienced which included nausea, colicky abdominal pain and diarrhoea with characteristic orange-coloured oily stools, dyspepsia, flatulence, vomiting and gastric pain. These occurred either singly or in combination with general symptoms such as headache, weakness, indisposition, tachycardia, and sweating.

Visual disturbance and reddening of the skin were observed rarely (one case each in elderly persons). The two female patients involved were admitted for inpatient treatment. The same applied to the patient who suffered moderate poisoning because of intestinal haemorrhage and a known underlying disease with anus praeter. Another patient was admitted to hospital in 2005 because the symptomatology observed could not yet be fully classified at that time. The latter case was reported to BfR by the attending hospital physician according to § 16 e Chemicals Act. In all other cases, BfR was informed by the affected consumers themselves. The majority of reports referred to adults. However, also children, one adolescent and two elderly persons were affected. As a rule, no treatment was required. If any, therapy depended on the symptoms and consisted in dietetic measures. In one case, a mother treated her children by administering a preparation to cure gastrointestinal disturbances. While in the first two years, the causal relationship had still been considered as "possible", it was rated as "probable" later on. Only in the two cases where manifestations had included tachycardia, visual disturbance and reddening of the skin without involvement of the gastrointestinal tract, the causal relationship was classified as "possible".

Experts have assumed the manifestations mainly to be caused by the wax esters. Although the latter are not "toxic", they are poorly digestible or even indigestible. Therefore, the gastrointestinal complaints may be attributed to these esters. In addition, one could think of other factors such as certain allergenic fish proteins. This is suggested by the fact that complaints were experienced irrespective of the quantity consumed. Biogenic amines (among others, histamine) in the fish meat, which may form during extended storage periods of fresh fish, may cause headache. Many consumers tolerate such fish without any problems. They would not develop any adverse effects after consumption. Thus, a certain predisposition could be the reason explaining why not every consumer would react by developing the corresponding symptoms. The symptomatology observed may be seen as a food intolerance reaction or adverse effect in predisposed persons which is caused by poorly digestible wax esters along with the formation of biogenic amines or allergens. Also the smoking process should be taken into

account because problems have mainly been caused by smoked fish. It may be possible to avoid an appearance of symptoms by suitable practices of preparation such as discarding the oil that has leaked from the food. Further studies are required.

In the 2004–2009 period, BfR was continuously contacted by consumers affected, and a strong increase in the number of enquiries was recorded in 2009. Therefore, the subject of "butterfish" is again discussed in the present brochure, also presenting corresponding case reports. The problem has also been taken up by the BfR working group for early risk identification. Since neither a ban nor warning labelling are possible solutions, information campaigns are the only way to protect consumers. This is the reason why the working group decided to update the 2003 press release, indicating the number of persons affected. In this way, BfR has intended to communicate the risk again and warn against the consumption of this type of fish because a considerable impairment of well-being may have to be expected. During a quality meeting of German-speaking poisons centres in 2009, BfR informed the consulting physicians about this problem by means of an oral presentation, to enable them to respond to enquiries by providing competent advice and information. In 2010, a poster on this topic was presented at the international conference of the European Association of Poisons Centres and Clinical Toxicologists (EAPCCT).

2.3.1 Health disturbance in three elderly patients associated with the consumption of "butterfish"

Three elderly female patients (aged 51, 58 and 81) had bought, prepared and consumed "butterfish". Subsequently, all of them experienced health complaints so that the two older women sought medical assistance at a hospital.

Because of a tentative diagnosis of histamine poisoning, the hospital had the samples examined by the responsible veterinary laboratory. However, no histamine could be detected in the deep-frozen and/or cured, "butter mackerel" fillets (same batch). Suspicion was raised by the fact that different persons experienced different health impairments in a temporal association with the consumption of "butterfish".

Case No. 1

Manifestations/course

About 45 minutes after the meal, the 81-year-old woman complained of tachycardia and visual disturbance. She went to a hospital for medical assistance where she was admitted as an inpatient and kept under observation. On the next day, she did no longer suffer from the complaints and therefore, could be discharged without any further differential diagnostic work-up.

Evaluation

The patient under discussion did not experience any typical gastrointestinal complaints. So far, neither cardiac symptoms nor visual disturbance have been described in the context of the consumption of "butterfish". They may have to be attributed to the patient's advanced age. It has remained unclear whether histamine played a causal role in this case. However, the manifestations experienced do not lend themselves to confirm such assumption. Based on the data about a temporal relationship between ingestion and simultaneous appearance of several unspecific manifestations in a number of persons affected, a causal relationship is considered as possible in this case.

Case No. 2
Manifestations/course
The 58-year-old patient complained of erythema on her arms and legs about 45 min after the meal. Together with another woman who also had joined the fish meal and was experiencing health complaints, she went to a hospital for medical assistance. She was admitted as an inpatient and kept under observation. On the next day, she did no longer suffer from the complaints and therefore, could be discharged without any further differential diagnostic work-up.

Evaluation
So far, redness of the skin has not been described after the consumption of "butterfish" but it is a possible symptom, among others, of poisoning caused by histamine. However, no histamine could be detected in the samples examined. Based on the data about a temporal relationship between ingestion and simultaneous appearance of several unspecific manifestations in a number of persons affected, a causal relationship is considered as possible.

Case No. 3
Manifestations/course
The 51-year-old woman complained of hot flashes and diarrhoea after the consumption of "butterfish". In spite of these complaints, she continued working and did not see a doctor.

Evaluation
The hot flashes described may not necessarily be associated with the consumption of "butterfish". However, they are a possible symptom, among others, of poisoning caused by histamine. In contrast, diarrhoea is typical of the clinical picture. Based on the data about a temporal relationship between ingestion and simultaneous appearance of several unspecific manifestations in all persons affected, a causal relationship is considered as possible.

2.3.2 Characteristic symptomatology after consumption of "butterfish"

Case No. 4
A female patient had bought smoked "butterfish" at a fish stand on a weekly farmers' market. She ate the very tasty fish at lunchtime. Subsequently, she felt well until the next day. Then she developed gastrointestinal symptoms.

Manifestations/course
About one hour after breakfast on the next morning, she noticed an urge to defecate. On her way to the toilet, she involuntarily lost some orange-coloured oily stools. Such diarrhoea persisted for about three hours. She did not complain of abdominal pain. Even two days later, orange-coloured oil patches were still seen on the stools.

Evaluation
Based on the data about the temporal relationship between ingestion and appearance of typical manifestations, a causal relationship is considered as probable in this case.

Cases No. 5 and 6
A father and his daughter ate "butterfish". Until then, they had been feeling well and had not been suffering from any digestive disorders.

Manifestations/course in the father
The father suffered from mild gastrointestinal symptoms; he complained of stomach cramps.

Manifestations/course in the daughter
One day after the butterfish meal, the young patient developed severe digestive distur-

bances. Almost every half hour, she lost characteristic yellow, oily stools, which were described by the father in a very illustrative way: “It looked as if oil had been poured into the toilet bowl“. In addition, the young patient experienced a general state of indisposition on the first two days. The child was therefore presented to the family doctor by her parents. Because no improvement was seen, she was also presented to a hospital paediatrician on the weekend that followed. At the hospital, even sonography was performed so that organic causes of the complaints could be excluded. The attending physicians suspected a gastrointestinal infection, and treatment of the child was performed based on the symptoms observed. After three days, diarrhoea stopped. Still, the girl complained of a strong sensation of inner heat and a bloated belly although she had been given a light diet of easily digestible foods such as potatoes, carrots, rice cake, grated apples and bananas.

Evaluation

Both patients experienced the typical gastrointestinal manifestations. Hence, based on the information on the temporal relationship with the ingestion, a causal relationship has been rated as probable. A dietary therapy would have been sufficient in the daughter’s case. Knowledge of the symptomatic picture could have made repeated visits to physicians as well as the sonography examination dispensable for the girl.

Notes

Gastrointestinal manifestations, particularly the oily and yellow-orange-coloured stools and diarrhoea are characteristic and are to be attributed to the consumption of “butterfish“. In many cases, the patients had been alerted to this problem by internet publications and were able to establish the cause of their complaints. If treatment is required at all, a dietary therapy is meaningful and sufficient. It may be supported by administration of charcoal.

Fig. 14: Dietary therapy – meaningful and sufficient

2.4 Poisoning by inhalation

2.4.1 Severe health impairment following aspiration of baby powder

In November 2009, BfR was informed about a case of severe health impairment in a two-year-old girl who developed aspiration pneumonia due to inhalation of baby powder containing talc. The child required intensive medical care.

Manifestations/course
The two-year-old girl had been playing with a closed powder bottle during diaper changing when suddenly the cap opened and a gush of powder spilled onto her face. No information was available to BfR as to the child's acute reaction, e.g. whether she had been coughing. As late as on the following day, the girl was presented to a paediatrician because of a slightly increased respiratory rate and marked redness of her eyes. The paediatrician immediately referred her to a hospital with a tentative diagnosis of powder aspiration.

On admission as an inpatient, the girl was in a slightly reduced general condition. Her skin appeared pale, and except for an increased respiratory rate requiring mild oxygen supply (0.5 litres), no other manifestations were observed initially. Both lung fields were equally aerated; auscultation revealed single coarse bubbling crepitation with extended expiration and suspicious slight crackles. At body temperatures of up to 39.0 °C, antibiotic treatment was initiated immediately. On the second day after the powder aspiration, the patient's respiratory function deteriorated markedly, and it was decided to perform bronchoscopy. During bronchoscopy, a number of "starch plaques" and "cast formations" could be removed, most of them from the right lower lobe. Nevertheless, the child still required

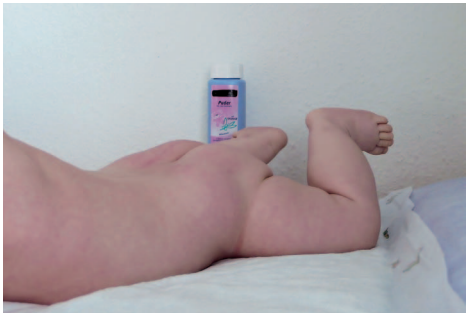


Fig. 15: Use of baby powder

artificial respiration and intensive medical care. Initially, she required 100 % oxygen. In addition, the therapy included i.v. administration of a corticoid and bronchodilators. On the same evening, the oxygen demand decreased to 50 %. On the two days that followed, however, bronchoscopy had to be repeated where more small mucosal plaques could be removed. In the further course, the patient developed temporary circulatory problems that required treatment. After four days of intensive medical care, the girl was successfully extubated and referred back to the general paediatric ward on the following day. X-ray performed after bronchoscopy revealed a non-ventilated area in the region of the right middle lobe with concomitantly reduced lung volume. Follow-up examinations revealed an obvious regression of this condition.

After a total of 10 days of inpatient treatment, the child was discharged in a well improved state. When an enquiry was made about seven months after the incident, it was stated that the child was well. There were no late sequelae whatsoever.

Notes
As a rule, baby powder mainly (more than 90 %) consists of talc (magnesium silicate hydrate). Talc is a mineral used for a variety of applica-

tions. It has a soapy or fatty feel and gliding properties. This is why it is used as a powder base in medicinal and cosmetic products. Further components include other fine powdery substances which are of low absorptive toxicity such as magnesium carbonate, zinc oxide, silicon dioxide, starch of rice, of maize and of wheat etc. They are toxicologically inert. Also colorant additives or fragrances are safe in terms of health. All powder components are poorly soluble or insoluble in water. Due to the properties mentioned, ingestion of powder is not expected to cause any serious health disorders. However, inhalation of powder has always to be taken seriously because powder aspiration may result in the development of life-threatening sequelae.

In the majority of cases, such accidents have involved baby powder. In a typical accident scenario, the baby is lying on her/his back for diaper changing. By chance or to divert attention, the baby gets a powder bottle in her/his hands for playing. The bottle cap opens, a considerable amount of powder is spilled into the baby's mouth and nose and is inhaled.

Typical manifestations observed in this case will include severe cough followed by dyspnoea, tachypnoea, stridor, cyanosis and vomiting. In cases of massive aspiration, even respiratory and circulatory arrest may occur. Deceitfully, symptoms will often disappear after a few minutes and an asymptomatic interval will follow that may last for 8 to 24 hours. Subsequently, swelling of the powder in the airways will result in obstruction. In the further course, atelectasis and bronchopneumonia may develop which are difficult to treat. In such cases, lethality has been up to 30 %. After massive aspiration, chronic lung damage such as pulmonary fibrosis may develop.

Due to the possible life-threatening consequences of powder aspiration, further medical

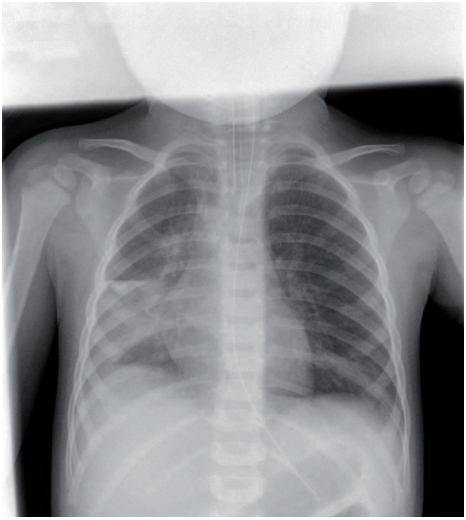


Fig. 16: Powder aspiration (Photo courtesy of the Freiburg poison information centre)

intervention after such an accident may only be omitted if aspiration can be completely excluded. This may be assumed if the baby is known not to have coughed at any time, pulmonary findings were completely normal and no traces of powder are found in the nose, mouth or throat.

In any cases of uncertainty, the children affected should be presented to a physician without delay. After contact with powder the first measure to be taken should consist in removing remnants of powder from the mouth and nose. For the onward approach after possible powder aspiration it is of decisive importance whether the child has been coughing or not. If the child is coughing or coughed even for a short time only, immediate presentation to a paediatric hospital is required. Care should be taken to keep the child in an upright position. Children suffering from severe cough should be transported by the emergency service. At the hospital, bronchoscopy should be performed as soon as possible, i.e. during

the asymptomatic interval. If the suspected powder aspiration is confirmed, bronchoscopic lavage with saline solution and simultaneous suction is the only possible choice to reduce the sequelae of aspiration. Such therapy should be performed by a very experienced paediatrician since possible remnants of powder may be flushed into deeper lung areas if suction fails to be consistent and continuous. In addition, antibiotic prophylaxis, administration of bronchodilators and systemic administration of corticoids are indicated.

Severe accidents involving baby powder are rather rare incidents. Nevertheless, the consequences of such accidents may be life-threatening. This is a good reason to consider the question of how such accidents can be prevented and whether the use of powder is at all necessary for baby care.

This subject was already considered in the past by the BfR Committee for the Assessment of Poisonings and the BfR Committee for Cosmetics. The members of both Committees concluded that nowadays, there is no necessity to use baby powder in baby care. At least powders containing talc should be banned. A change to better closure systems by manufacturers has already been achieved.

In the Committees' opinion, it would be more expedient to completely omit the use of baby powder in baby care. In many cases, powder is probably used for reasons of tradition without giving a thought to the health risk involved (see Chapter 1.7.2).

Evaluation
Based on the information given on the temporal relationship between exposure and the occurrence of the manifestations observed, and in the absence of other causes, a causal relationship has been rated as probable in the case described.

2.4.2 Stone sealer

Severe respiratory disorder after use of a stone stain protector
As part of his job, a 20-year-old tiler had been applying a surface sealer to a natural stone floor over a period of four hours. The product used consisted mainly (more than 90 %) of a mixture of aliphatic hydrocarbons and contained a fluorocarbon resin in dissolved form.

The tiler had used a commercial hand pump to apply the product. Subsequently, he had polished the stone floor using a polishing machine. Already a short time after termination of his work, the young man complained of increasing breathing difficulties. Therefore, he presented to the emergency ward of a hospital on the same day. Because of imminent respiratory failure, the patient had to be treated at the intensive care unit. He recovered relatively quickly, and after four days of inpatient treatment, he could be discharged in a well improved state and referred to his family doctor for further treatment

Manifestations/course
Shortly after spraying of the stone sealer, the patient experienced a sore throat and agonizing dry cough. He was suffering from increasing dyspnoea and had to be admitted to a hospital. On arrival at the intensive care unit, the 20-year-old patient was already found in a considerably reduced general condition associated with massive orthopnoea/dyspnoea. He was somnolent but still responsive, and his circulation was stable. His oxygen saturation level measured under indoor air conditions was 80 % and initially, could be increased to no more than 90 % even under high oxygen supply administered via mask. Auscultatory and radiological findings revealed the presence of pulmonary oedema. The patient was immediately

administered emergency treatment including high i.v. doses of prednisolone, as well as beclomethasone, salbutamol and ipratropium bromide by inhalation.

Nevertheless, his respiration initially remained markedly superficial due to the agonizing cough, with a massive increase in the respiratory rate to 60–70 breaths per minute. Accordingly, the patient's venous carbon dioxide partial pressure reached extremely pathological values (almost 50 mmHg) due to severe hyperventilation. However, repeated inhalation of bronchospasmolytics and cumulative i.v. administration of 10 mg morphine and furosemide soon resulted in a considerable improvement of tachypnoea so that intubation could be omitted.

Already on the following day, the patient could be transferred from the intensive care unit to a normal ward. However, from the onset of his severe symptoms, he required permanent oxygen supply over a total period of 36 hours. Radiological examinations performed on the first two days revealed essentially unchanged pathological findings including small patchy opacities at the right lung base. These findings and the clinical picture improved only after repeated administration of steroids and furosemide. On his discharge after four days of inpatient treatment, the patient was largely free of complaints. Lung function testing still revealed a mild restriction and a slightly reduced diffusion capacity.

Notes

Impregnation agents are widely used in the commercial and private spheres to achieve a water and dirt repellent effect on surfaces. These chemical products consist of the active substance proper which, as a rule, is a water-repellent fluorocarbon resin, and a solvent. They are applied either by means of a brush, roller or cloth, or by spraying, being the quickest mode of application.

With regard to a possible health risk, the mode of exposure is of great importance. If the product is applied by spraying (e.g. spray pump, spray gun, aerosol can), the physicochemical properties of the aerosols generated, particularly the droplet size, will be decisive for the inherent risk of a product to be respirable. According to the current state of scientific knowledge, a critical droplet size of less than 100 µm will only result from using corresponding spray heads and a propellant/compressed air. In contrast, the risk from using hand pumps is considered to be low.

For a number of years, there have been repeated reports on major health disorders to occur after the use of impregnation sprays. The cases reported were mainly due to risks from leather or textile impregnation sprays. However, also stone sealer products have been mentioned repeatedly in the same context. In the Federal Republic of Germany, cases of this type have become known since 1980. Series of such cases occurred also in Switzerland and again, in the Federal Republic of Germany.

In early 2003, the Swiss Federal Office of Public Health reported the occurrence of almost 100 of such cases of respiratory disorders that had been associated with the use of impregnation sprays. It was stated that in these cases, the toxicologically relevant mechanism was characterized by a combination of the active substance proper, which was a fluorocarbon, with heptane being used as a solvent in these products, which produced a particularly fine fog.

In 2006, a new series of cases associated with impregnation sprays was reported in Germany. Within a short period of time, the poisons centres in the German federal Länder reported more than 150 cases of poisoning. Some of

them involved severe respiratory problems or even massive pulmonary oedema. These series of cases resulted in a ban on sales of the incriminated products. Meanwhile, the formulations concerned have been changed and the products labelled with more conspicuous safety warnings.

The numbers of cases involved in these series have shown that health disorders associated with impregnation sprays are no singular events. The above case report is therefore intended to draw attention again to the special inhalation health risk posed by such chemical products if applied by spraying.

The patient mentioned above had used the product several times in his working environment without developing respiratory complaints. In the past, however, he had applied the stone sealer with a roller. In the present case of exposure described, the product was evenly distributed by means of spraying. Both procedures are described in the instructions for use of the product as follows: Apply the product liberally and evenly across the entire surface with a brush or floor cloth (care applicator) or by spraying. After a short period of action (5–10 minutes), the film which may have remained and not been taken up should be removed by polishing with a clean and dry cloth without leaving streaks until the surface has become dry. The packaging shows the following warnings about possible health damage: Avoid inhalation of aerosol; if product is applied by spraying, use appropriate respirator (filter A); ingestion may result in lung damage; do not induce vomiting after ingestion.

These occupational safety regulations had not been complied with by the young tiler. He had applied the product by means of a hand pump without wearing respiratory protection gear. The above case has been described in detail in order to draw attention to the fact that the safety risk is not limited to the fine fog produced by a commercial aerosol can containing a propellant. A health risk may also be posed by manual pump sprays producing aerosol of a certain droplet size. In addition, there might be other factors determining the extent of lung damage from inhalation of such products. One could also speculate whether during polishing of the stone floor, respirable aerosols may again be produced and as a result, toxicologically relevant components may be present in the respiratory air. The processing step of final polishing is explicitly recommended in order to remove the moisture remaining after application of the stone sealer product. The processing instructions also recommend protecting adjacent coverings or objects by covering or taping. The respiratory protection required is not mentioned again at this point. Persons prone to allergic reactions and suffering from a hyperreactive bronchial system should also be aware of a possibly increased individual health risk when using impregnation sprays.

The above case report is intended to draw attention again to the possible inhalation health risk posed by chemical products for surface sealing. It is pointed out that on principle, increased safety precautions should be taken when using such impregnation products. It would be desirable for the safety warnings on the packages to be obvious enough so that careless handling of such products could be prevented.

Evaluation
Based on the information given on the temporal relationship between exposure and the occurrence of the manifestations observed, and in the absence of other causes, a causal relationship has been rated as probable.

2.5 Cases involving the eyes

2.5.1 Battery acid

Exploding car battery
When a car battery was being disconnected from a charger it exploded and splinters of glass and acid hit the right eye of the 49-year-old patient. He suffered a severe perforating corneal injury and presented to an ophthalmological university hospital as an emergency case.

Manifestations/course
At the eye hospital, it was impossible to determine the visual acuity and intraocular pressure (IOP) of the right eye in the acute stage. On admission, the visual acuity of the intact left eye was 0.6 sc, the intraocular pressure was not measured. Initial inpatient treatment included primary wound care and tetanus vaccination. After primary wound care encompassing corneal suture and iris repositioning, the patient developed a lens swelling. A secondary lens implantation was considered. However, it could not be carried out due to unclear conditions in the capsular bag. During a second operation performed under endotracheal anaesthesia, numerous synechiae were broken and a small glass splinter was removed. There were no more complications during the further postoperative course. On discharge, the visual acuity of the right eye was a mere 0.4 cc (+ 11.0 sph)/IOP 12 mmHg. When the patient was discharged, he was given eye drops containing neomycin and dexamethasone and in addition, amoxicillin/clavulanic acid as an oral antibiotic.

About four months after the accident, the last corneal sutures were removed under local anaesthesia. At that time, the patient had a right visual acuity of 0.7 cc (+ 13.0 sph)/IOP 13 mmHg. He was discharged and referred to outpatient treatment with a minor conjunctival injection, some residual suture material, smooth cornea and deep anterior chamber with no signs of irritation, centrally adhering retina, however, with a misshapen pupil and a missing lens (aphakia). Owing to comprehensive contact lens adaptation to correct the absence of the lens, the patient's right visual acuity had become largely restored (0.9/IOP 14 mmHg [left eye: 16 mmHg]) five months after the accident. After a period of reintegration, the patient had regained complete fitness for work six months after the accident.

Notes
Car batteries (lead-acid storage batteries) contain sulfuric acid (32 %), which may cause accident-related caustic burns of the skin and mucosae, mainly of the eye. In industry, sulfuric acid is used for example for the production of fertilizers, dyes, plasticizers and surfactants, as a drying agent (e.g. for gases), a deresinating agent (e.g. for mineral salts) and a cleaning agent (e.g. for milking machines). In general, sulfuric acid is hardly found in households, unless it is needed for DIY activities such as filling or maintenance of car batteries. When charging car batteries, explosions may occur due to ignition of a hydrogen-oxygen mixture (oxygen-hydrogen reaction) Particularly during the charging process, hydrogen may accumulate underneath the battery cover. The ignition spark needed to trigger an explosion may be generated when the charger cable clamps are disconnected or during the starting process. When charging a car battery, it is important to pay attention to the order of connecting/disconnecting the contacts and to a sufficient fluid level. If possible, maintenance-free batteries should be used because these have a strongly reduced gas production and water consumption due to low antimony content in the lead alloy. In addition, compatibility of charging conditions and battery type is important to avoid accidents.

In cases of chemical burns of the eye, the latter should be rinsed intensively for at least 10 minutes, ideally under running water. During this procedure, the required ectropionization is often difficult because of possible injury to the eyelids and the severe pain resulting from chemical burns. Application of 2 % lidocaine solution to the eyelid margins may be helpful. Ophthalmologists recommend a special amphoteric chelating agent for eye rinsing, which is to stop penetration of the caustic agent into the tissue and/or may remove the latter from the tissue. However, this preparation is very expensive and not in stock everywhere. Its administration should therefore be limited to cases where it is strictly indicated. Lose foreign bodies may be removed carefully. After first aid measures, patients should present to an ophthalmologist for further treatment. In the case described above, the severity of the injury was primarily due to the explosion and the impact on the eye of foreign bodies under pressure. As a result, the lens was torn out of the opened eye ball. Patients suffering from aphakia will see only gross contours. If the retina has remained intact, aphakia resulting for example from accidents may be corrected by insertion of a new, artificial lens.

As a rule, the predominant risk in the event of an exploding car battery will be that of chemical burns due to the ca. 30 % sulfuric acid. The issue of chemical burns was discussed in detail in the Cases of Poisoning Reported by Physicians 2005 annual report. In 2009, BfR received a total of 55 reports on accidents affecting the eyes which were associated with car batteries. Of these, seven were associated with an explosion.

Fig. 17: Exploding car battery

Evaluation of the case described
Based on the information received on the temporal relationship between exposure and manifestations, a causal relationship has been rated as confirmed in the above case.

2.5.2 Welding

Explosion-like deflagration during welding operations
When performing welding operations on a sewage pipe, a 50-year-old patient had suffered severe injuries of his face and both eyes as a result of an explosion-like deflagration. He was transported by helicopter to the burns care centre of a university hospital where he received surgical treatment and was put under intensive medical care.

Manifestations/course
On admission, the patient had spontaneous respiration and was in a stable pulmonary condition. He was capable of temporal and local orientation. His entire facial skin was massively encrusted with dirt and soot. Findings also included massive oedema of the eyelids. As a result of the explosion-like deflagration, multiple foreign bodies had penetrated deeply into the tissues of the facial region including the eyes. First measures included analgo-sedation and gross cleaning of the wounds in the bathroom for patients with severe burns. There were no burns found, but instead, diffuse high-pressure injections of dirt particles. Therefore, a comprehensive epidermal cleaning of the wounds was

performed in the operating theatre. The lesion was covered surgically and healed without irritation. During the same surgical session, the patient was also examined by an ophthalmologist, and foreign bodies were thoroughly removed from the cornea and conjunctiva by mircrosurgery. The corneas of both eyes were scraped off, and a rupture of the conjunctiva of the left eye was adapted. After termination of surgery, the patient required artificial respiration for another 24 hours. After extubation, the patient's respiratory and cardiopulmonary condition remained stable. A second operation was performed for another ophthalmological cleaning of the wounds.

After surgery and a total of two months of inpatient treatment, the visual acuity of the right eye improved to 0.5 sc/0.7 cc, and that of the left eye , to 0.25 sc/0.5 cc. At that time, the intraocular pressure of the right eye was 10 mmHg and that of the left eye, 9 mmHg. After about two and a half months, the patient was able to work again.

Notes

Welding is a process to permanently join workpieces under the effect of heat or pressure, with or without adding other materials. For fusion welding, the basic materials are heated until they become liquefied. In the case described, a pipe was welded either by electric arc or welding gas flame. Welding of pipes or tanks that have not been emptied before involves a high risk: Combustible components (liquids, dust, gases) may explode, and also non-combustible liquids (e.g. water) may cause a vehement deflagration in the sense of a steam explosion, entraining metal parts and contaminant particles. On principle, welding operations involve high-current loads, explosive gases, toxic exhaust gases, UV radiation, high temperatures and infrared radiation, posing numerous additional risks. It is important to wear appropriate protective clothing including protective glasses/mask, flame retardant clothing and ear protection. Fine dust particles should be removed by suction through mobile or stationary welding fume filters. Insufficiently ventilated environments require the use of respirators. The environment has to be protected by partition walls or special curtains. The risk involved has to be assessed for each welding workplace. All operators performing welding work have to be given appropriate technical training and instruction. In all companies performing welding works, responsibility is borne by a welding inspector to be appointed in addition to the certified welders, or by the owner of the establishment. From class B upwards, welding operations should be performed by trained specialists only.

In 2009, BfR received a total of 32 reports on accidents associated with welding operations. Of these, 24 accidents affected the eyes, six accidents resulted in injuries of the skin, and five accidents were associated with inhalation exposure.

Evaluation of the case described

Based on the information received on the temporal relationship between exposure and manifestations, a causal relationship has been rated as confirmed in the above case.

Fig. 18: Welding operation

2.6 Mercury poisoning

Severe damage to the nervous system in a teenage boy after exposure to mercury from industrial wasteland

In November 2008, a 13-year-old boy had found a vessel filled with metallic mercury on an abandoned factory site. He took it home and played with it over a period of several months. In mid-December, he began to complain of back pain that intensified at night. In addition, he was reported to have exhibited a markedly reduced physical resilience and a loss of appetite during this period. Other manifestations that became obvious included increasing tingling paraesthesia and muscular weakness. When he took the mercury to school to play with, a teacher noticed the source of risk and therefore contacted a poisons centre.

Manifestations/course

In mid-January 2009, the boy was admitted to a paediatric hospital to establish the causes of his manifestations. In spite of comprehensive diagnostic work-up, no clear cause could be found initially that would have explained the symptomatology. Only later on, during the period of inpatient treatment, the boy's father reported about the mercury found on the factory site so that an association could be assumed to exist between the health impairment and mercury exposure. As a consequence, examinations were performed that revealed elevated mercury (Hg) levels in the sense of poisoning that had affected the central and peripheral nervous systems. The boy was therefore transferred to a specialized hospital and stayed there for a period of four weeks to undergo further treatment of the mercury poisoning with the antidote, DMPS (dimercaptopropane sulfonate). On admission to the hospital, the boy was found in a stable general condition. His developmental stage was appropriate to his age, and his organ status was normal. However, the neurological examination revealed the following findings: The patient's gait was unsteady but to a minimal degree only, his muscle strength almost normal. Babinski reflexes were negative, Achilles tendon reflexes had become lost bilaterally, and patellar tendon reflexes were weak. The administration of the antidote was performed according to the recommendations by the manufacturer and the poisons centre consulted in this case, i.e. initially by the i.v. and subsequently, by the oral route. The patient was given vitamin, zinc and selenium supplementation. During therapy, the mercury levels became reduced from 351 to 5.6 µg/L in cumulative urine and from 11.2 to 7.2 µg/L in the blood. Nevertheless, the patient's clinical condition deteriorated further, and his blood pressure tended to increase. Sensorimotor polyneuropathy increased, as did the neuropathic pain.
The patient's muscle strength continued to decrease, and he was no longer able to walk. He required a wheelchair and was temporarily incontinent. The patient was discharged and referred to a rehabilitation facility under oral medication of the antidote. In early May, he had to be admitted to hospital again for two weeks because in the wake of a viral infection contracted in mid-April, he had developed anaemia requiring transfusion and progressive leukopenia associated with neutropenia, which required urgent clarification.

Findings made on admission included pronounced anaemia and leukopenia requiring a transfusion to be performed as a first measure. The patient's neurological status had not essentially improved as compared to that during his first stay at the hospital. He still required a wheelchair and was also unable to stand upright.

To exclude a diagnosis of leukaemia, a bone marrow biopsy was performed, which could not confirm this tentative diagnosis. However, it revealed fatty bone marrow containing few blood cells to none at all. Since an association of mercury poisoning with disturbances of haematopoiesis has not been described so far in literature, the cause of the bone marrow depression could not be elucidated conclusively. For precautionary reasons, both the antidote and the supplementation therapies were discontinued.

After consultation of specialists, an attempt was made to stimulate the tissue by means of a granulocyte stimulating factor because of persistent leukopenia associated with agranulocytosis. From the sixth day of treatment, a normalization of white blood cell counts was observed. Due to the existing risk of infection, the patient had to be isolated temporarily. A follow-up examination was performed for renal arterial stenosis that had been found in preliminary examinations and had obviously receded. On this occasion, renal sonography revealed bilateral nephropathy associated with a generalized alteration of the renal texture and diminished corticomedullary differentiation.

After stabilization of the haematological and immunological parameters, the patient was again admitted to a rehabilitation centre for further treatment.

Notes

Mercury, a heavy metal, and bromine, a halogen, are the only elements that are liquid at normal levels of temperature and atmospheric pressure. Because of its high surface tension, mercury has no wetting effect on the supporting material. Instead, it forms lens-shaped droplets due to its strong cohesion. In nature, it is found in pure form. It is the only liquid substance that is recognized as a mineral by the International Mineralogical Association (IMA). On principle, a distinction has to be made between poisoning with elemental, metallic mercury and such with inorganic or organic mercury compounds.

Elemental mercury mostly originates from broken thermometers. It is also contained in manometers, barometers, mercury vapour lamps, mercury switches and special batteries. In addition, it is used in dental amalgams. Therefore, mercury and its compounds may also originate from crematoriums (tooth fillings), industrial sources and households. Mercury found in the human environment is almost exclusively of anthropogenic origin.

Mercury will evaporate already at room temperature, albeit relatively slowly. At moderately higher temperatures, however, it will evaporate rather quickly. Since it is readily absorbed by the inhalation route (75–100 %), mild poisoning caused by leaking thermometers may occur in small and poorly ventilated rooms. Also, a severe poisoning accident has been described when a thermometer had become broken on a hot cooktop, and the mercury had evaporated quickly within a confined space. Absorption through the intact skin is possible owing to very fine dispersion. It regularly takes place after application of ointments containing mercury compounds. When absorbed through the gastrointestinal tract, metallic mercury is relatively harmless. Ingestion of small amounts such as the quantity contained in a clinical thermometer will not result in any relevant absorption (<0.01 %). The daily mercury intake levels for persons who are not occupationally exposed are 5 µg in the USA, 10 µg in Sweden, and 8–27 µg in Germany. Exposure takes place predominantly through the consumption of fish and fish products. Tooth fillings containing amalgam lead to an additional absorption of 2.5–10 (–17.5) µg Hg/day.

According to environmental studies, average mercury levels detected in the German population are 0.5 µg/L in blood, 0.25 µg/L in urine, or 0.34 µg/g creatinine. The tolerable maximum levels in terms of occupational medicine (Biologische Arbeitsstoff-Toleranzwerte – BAT levels) have been fixed at 50 µg/L in blood and 200 µg/L in urine. It has been discussed, however, whether these limits are too high and whether signs of micromercurialism may be developed by predisposed persons already at these levels.

The toxic effect of mercury is based on its ability to denature protein (local effect) and cause a blocking of active SH groups of enzymes. It will predominantly act as a chronic and accumulating poison, due to its slow excretion. The half-life of elemental mercury is 58 days.
In children, chronic poisoning will result in Feer's disease (also referred to as Selter-Swift-Feer disease, Swift-Feer disease, Selter's disease, acrodynia, pink disease). Manifestations will include cerebral, vegetative and dermal symptoms. These include pronounced muscular hypotension, later followed by refusal to walk, stand and sit, listlessness, grumpy and whiny behaviour, apathy of motor origin, muscle and limb pain, loss of appetite, weight loss, sleep disorders, profuse sweating, photophobia, pronounced itch, symmetrical reddening of the skin on nose, hands and feet (predominantly distal), and coarse scaling on hands and feet, increase of blood pressure and tachycardia. Obviously, a child's body is more sensitive to relatively low quantities of mercury. In individual cases, infants and young children are known to have developed severe manifestations of disease at urine concentrations markedly lower than 50 µg/L, particularly after inhalation of mercury vapours.

Adults will develop similar manifestations. These include hearing disturbance, tremor (typical shaky handwriting), persistent depressive mood, disturbance of memory, decrease in vitality and sleep disorder. Patients will become highly irritable and distrustful. This makes them difficult to deal with, and they may erroneously be diagnosed with a primarily psychiatric condition or vegetative syndrome. As a result, a targeted and clarifying diagnostic work-up is omitted and no causal treatment is initiated. Acute inhalation of large amounts or high concentrations of mercury vapour will typically be followed by pulmonary complaints such as cough, dyspnoea with signs of airway obstruction, interstitial pneumonia, necrotizing bronchiolitis, or acute pulmonary oedema. Subsequently, patients may develop lung fibrosis. Central nervous manifestations described include headache, dizziness, tremor, ataxia, visual disturbances with restrictions of the visual field and mental changes.

Treatment will depend on the clinical manifestations, the patient's age and the mercury levels detected. After inhalation of elemental mercury vapour, persons exposed should be removed from the danger area. Subsequently, oxygen should be given and topical glucocorticoids administered by inhalation. In cases showing signs of airway obstruction, administration of beta-2 sympathomimetics by inhalation is recommended, and severe cough should be treated by administration of antitussive agents. The treatment of toxic pulmonary oedema should include i.v. administration of glucocorticoids, intubation and artificial respiration. An antidote is available, namely DMPS (dimercaptopropane sulfonate), a chelating agent. It is mainly administered in cases of severe acute poisoning, by e.g. mercury salts. In rare cases of chronic poisoning, however, DMPS has to be administered over an extended period of time. No established regimens exist for treatment of such cases so that the therapeutic plan should be developed in cooperation with experienced toxicologists or poisons centres.

The risk posed by abandoned industrial sites was discussed by the Joint Poison Information

Centre in the city of Erfurt on its homepage, also including an explicit warning because of a risk of mercury poisoning. In 2009 alone, the Erfurt PC received information on three incidents of mercury poisoning involving several persons. In all three cases, children had found vessels containing metallic mercury on industrial wasteland in the new federal Länder. They had taken these vessels home and played with the mercury for extended periods of time. Due to the resulting chronic inhalation of mercury vapours, the children and also some other members of their families and other persons in the vicinity had developed mild to severe manifestations of poisoning, which required extensive medical treatment and evacuation and rehabilitation of the homes. The case described above was one of these three incidents, which affected four persons. The Joint Poison Information Centre in Erfurt informed BfR on these and another ten cases involved in the second incident, as well as on 12 persons exposed during the third incident of this kind. Altogether, BfR was informed about 32 cases of poisoning due to mercury in 2009, of which as many as 26 originated from industrial wasteland.

Considerations and assessments of the case
The patient was treated in several medical institutions until September 2009. Owing to the antidote therapy with DMPS performed over several months, the mercury levels dropped to normal. Nevertheless, the severity of the neurological findings remained almost unchanged. In the course of the disease, the patient developed manifestations of nephropathy and temporary manifestations of bone marrow depression. Neither of these complexes of manifestations could be specifically clarified as to their causes. After a review of literature and discussion with experts, they could not be considered as compatible with the picture of poisoning with only moderately elevated mercury levels.

The elucidation of the course of disease and the exposure to mercury in the home also included all other members of the family (single father with three sons). The 11-year-old brother developed only mild symptoms including headache, paleness, vertigo and nausea associated with mercury levels of 327 µg/L in the urine and 29 µg/L in the blood. The 15-year-old brother was completely asymptomatic but exhibited elevated mercury levels of 270 µg/L in the urine and 26 µg/L in the blood. The father developed mild symptoms including vertigo, nausea and paraesthesia associated with mercury levels of 174 µg/L in the urine and 25 µg/L in the blood, being within the upper normal range.

As compared to both his brothers and the father, the 13-year-old boy developed a considerably more pronounced symptomatology that could not be explained. It included neurological, haematological and nephrogenic damage at elevated initial mercury levels of 351 µg/L in the urine and 11.2 µg/L in the blood. Due to the severe clinical picture observed in the 13-year-old boy, all members of the family were administered a consistent DMPS antidote therapy, which resulted in a reduction of the mercury levels in all members of the family.

When comparing the above case report on the 13-year-old boy with other cases reported to BfR in the context of compulsory reporting of cases of poisoning by physicians, the course of the disease cannot be explained by mercury poisoning and possible enzyme polymorphism in the patient. Comparable cases were reported to BfR. A case report referring to health impairment in three siblings may serve as a particularly suitable basis for comparison.

Three mentally disabled children had found a bottle containing about 300 mL of mercury on an abandoned factory site. They took the bottle home and spread the mercury over the floors of their two rooms. About four to six weeks after the first contact, the children developed an unexplained muscular tremor over a period of two to three weeks. Only after intensive differential

diagnostic work-up of these symptoms, the diagnosis of mercury poisoning could be established 18 days later on the basis of the results of blood analyses. In all children, mercury levels of up to ca. 1500 µg/L in the blood and of up to ca. 2700 µg/L in the urine were detected, which were not found to be directly correlated with the degree of severity of the symptomatology observed. The children were administered four courses of treatment with DMPS (oral route). After about six weeks of hospitalization, the children could be discharged and referred to outpatient care. By this time, mercury levels in their blood had become reduced to ca. 60 µg/L, but urinary concentrations had remained considerably elevated (up to ca. 2000 µg/L). No late sequelae were reported.

Evaluation of the case described
Given the high degree of severity seen in the case of the 13-year-old boy, the assessment has raised questions that should definitely be elucidated by specialists. Based on the history, the (partial) symptomatology and the mercury levels found in the patient's blood/urine, mercury poisoning could not be excluded or may be considered as possible.

3 Results of reports by physicians

3.1 Evaluation of reports

During the period from 1 August 1990, i.e. the beginning of the compulsory reporting, to 31 December 2009, altogether 60 501 reports on cases of health impairment, poisoning or suspected cases of poisoning were received by BfR. In 2009, the reporting year considered, 3 493 reports were received (Fig. 19).

According to an agreement with the Berufsgenossenschaften made in the middle of 2000, all cases of acute health impairment after contact with chemicals or chemical products are directly reported to BfR. A great number of reports were received by BfR for the first time in 2001. Since that year, however, a continuous decrease has been observed in the number of reports by the Berufsgenossenschaften. According to the BG-Institute for Occupational Safety and Health (Berufsgenossenschaftliches Institut für Arbeitsschutz – BIA), this decrease can be attributed to an actual reduction in the number of accidents, and not to changes in the reporting behaviour. This is caused by prophylactic campaigns informing about circumstances and prevention of accidents, an improved occupational safety and accident prevention due to more effective safety measures and changes in operational processes (in part also automation).

The share of reports submitted by hospitals and medical practitioners has remained low. Owing to intensive information activities, however, this share of reports has slowly increased again. Evaluations by the poisons centres have shown that the share of health impairments after absorption of or contact with chemical products, household chemicals, plant protection and pest control products and all other reportable product groups has remained high and does not correspond to the number of reports received by BfR.

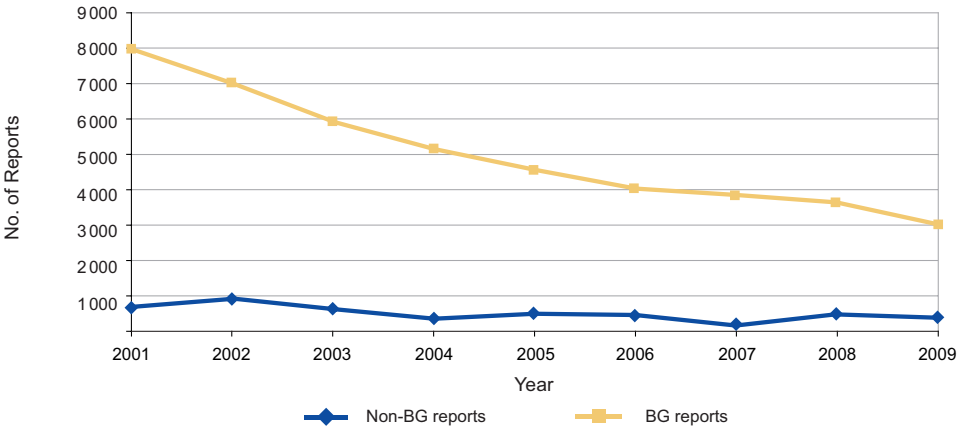


Fig. 19: Cases reported (BG reports 100 % = 3 071; non-BG reports 100 % = 422)

3.2 Cases of poisoning in 2009

3.2.1 Origin

In 2009, 3071 cases (88 %) were reported by the Berufsgenossenschaften. The remaining 422 reports (12 %) were essentially submitted by hospitals, medical practitioners and poisons centres.

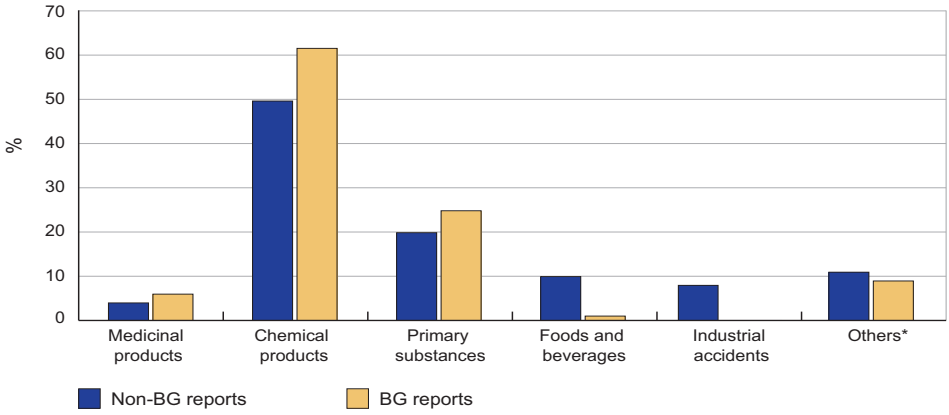
3.2.2 Spectrum of cases reported

Again, reports related to chemical products ranked first in the reporting year (Fig. 20). At a clear distance, the next group in ranking is that of primary substances. Only with regard to health impairments due to foods and beverages, the number of cases reported by the Berufsgenossenschaften was clearly different from that reported by hospitals and medical practitioners. The number of such cases reported to BfR by hospitals and medical practitioners was markedly higher. Next in the ranking are health impairments caused by medicinal products that were reported although these are not subject to compulsory reporting.

Both among the cases reported by the Berufsgenossenschaften and among the non-BG case reports, the share of male casualties involved in accidents associated with chemical products, primary substances and pesticides was strikingly higher. Among the casualties reported by the Berufsgenossenschaften, the share of females is considerably higher for cases associated with medicinal products.

For a detailed list in tabular form of toxicants reported to BfR since the beginning of compulsory reporting in 1990, see Annex (Chapter 4.1). In this table, the cases have been classified by product application groups (assignment of toxicants according to their intended use).

In order to enable a harmonized evaluation of cases recorded by the German poisons centres, the Society of Clinical Toxicology (Gesellschaft für Klinische Toxikologie e.V.) developed a categorization system which, similar to the BfR system of application groups, this based on the intended use of the products. Therefore, the cases reported to BfR in 2009 were evaluated also according to this categorization system. The respective list is given in Annex 4.1.2.



* *Others: Pesticides, cosmetics, plants, mushrooms, animals, veterinary medicines, agrochemicals, narcotic drugs, warfare/anti-riot agents, miscellaneous*

Fig. 20: Spectrum of cases reported (BG reports 100 % = 3071; non-BG reports 100 % = 422)

Product group	BG reports (3071 cases)			Non-BG reports (422 cases)		
	Male	Female	Total*	Male	Female	Total*
Chemical products	974	666	1897	100	79	207
Primary substances	483	186	761	51	21	84
Medicinal products	30	171	203	7	8	19
Pesticides	54	21	75	5	3	9
Cosmetics/ personal hygiene products	12	25	40	4	7	14
Foods and beverages	8	12	25	17	22	45
Agrochemicals	8	1	12	0	0	0
Industrial accidents	0	0	0	13	2	34
Veterinary medicines	3	3	6	0	0	0
Warfare/anti-riot agents	2	7	9	0	0	0
Plants	0	2	2	6	7	15
Animals	0	0	0	1	1	2
Narcotic drugs	0	0	0	1	0	1
Mushrooms	1	1	2	1	0	1
Miscellaneous	79	43	144	2	1	4

** The total number also includes cases where no data on the sex of patients were available.*

Table 4: Spectrum of reports – synoptic view (repeat listing of toxicants per case possible)

3.2.3 Circumstances of poisoning

About 99 % of reports by the Berufsgenossenschaften referred to exposure to poisons in the context of occupational accidents. The remaining 1 % of cases referred to cases of exposure that had occurred during the proper use of a product

Among the reports submitted by hospitals and medical practitioners, cases of accidental poisoning predominated (76 %), followed by exposure during proper use (13 %). Exposure due to mistaking chemicals for other substances was the cause in 3 %, and suicidal actions were reported in another 3 % of cases. 2 % of cases were associated with abuse of substances. In the remaining cases, the circumstances of exposure remained unknown.

3.2.4 Age structure and sex distribution

In 2009, 94 % of all cases reported referred to adults.

About 0.7 % of reports by the Berufsgenossenschaften referred to children. These cases were attributed to accidents in kindergartens or schools. 99.3 % of cases reported by BGs referred to adults.

Also among the reports received from hospitals and medical practitioners, the share of cases in adults predominated (55 %), while that of children was 37 %. In 7 % of cases, the age was not stated.

Sex	BG reports (100 % = 3071 reports)	Non-BG reports (100 % = 422 reports)
Male	52 % (1593 cases)	48 % (202 cases)
Female	36 % (1102 cases)	35 % (148 cases)
Unknown	12 % (376 cases)	17 % (72 cases)

Table 5: Distribution by sex – synoptic view

3.2.5 Degree of severity of health impairment

Also in 2009, the majority of cases reported referred to minor health impairment only, both among the cases reported by the Berufsgenossenschaften and among those reported by hospitals and medical practitioners. Cases of severe health impairment were more often reported by medical practitioners or physicians working in hospitals (see Table 6).

The product groups involved most frequently with regard to the degree of severity of health effects have been listed in Table 7 for the cases reported by the Berufsgenossenschaften, and in Table 8 for the cases reported by hospitals and medical practitioners. The spectrum of toxicants reported differs for example because of differences in the availability of toxicants in the private sphere and at the workplace.

The relatively high share of BG reports on cleaning agents has to be attributed mainly to cases involving industrial and milking machine cleaners. As expected, BG reports were dominated by occupation-specific risk factors. Moderate and severe cases of health impairment mainly referred to males (see Table 7). Strikingly, the non-BG reports showed a relatively high share of accidents caused by waste gases, particularly among males (see Table 8).

Degree of severity	BG reports (100 % = 3071 reports)	Non-BG reports (100 % = 422 reports)
None	4.7 % (143 cases)	28.0 % (118 cases)
Minor	85.1 % (2613 cases)	55.0 % (232 cases)
Moderate	4.9 % (149 cases)	4.0 % (17 cases)
Severe	0.1 % (4 cases)	8.1 % (34 cases)
Cannot be assessed	5.2 % (162 cases)	5.0 % (21 cases)

Table 6: Degree of severity of health impairment – synoptic view

Product group	Health impairment**								
	Minor (2613 cases)			Moderate (149 cases)			Severe (4 cases)		
	Male	Female	Total*	Male	Female	Total*	Male	Female	Total*
Primary substances	369	167	616	43	6	55	1		1
Cleaning agents, total	296	193	575	21	8	40			
Drain cleaners	7		9		1	1			
All-purpose cleaners	14	26	42	1	1	3			
Oven and grill cleaners	11	4	15	1	1	2			
Dishwasher detergents	9	6	15		1	1			
Industrial cleaners	45	8	66	4		6			
Milking machine cleaners	21	19	41		1	1			
Lavatory cleansers	2	25	29						
Disinfectants/sterilizers	51	246	329		5	8			
Medicinal products	26	147	175		3	3			
Paints and related materials	67	14	99	3	1	4			
Waste gases	56	31	88	4	1	5	1		1
Building materials	53	10	65	9	1	11			
Pesticides	47	13	60		1	1			
Accumulators	38	4	51				1		1
Paint thinners	28	4	39						
Glues	21	12	36	2		2			
Welding fumes							1		1

** The total number also includes cases where no data on the sex of patients were available.*
*** In 305 cases, no symptoms were observed or the degree of severity could not be assessed due to a lack of data.*

Table 7: Product groups involved most frequently, by degree of severity of health impairment (BG reports) (repeat listing of toxicants per case possible)

Product group	Health impairment**								
	Minor (232 cases)			Moderate (17 cases)			Severe (34 cases)		
	Male	Female	Total*	Male	Female	Total*	Male	Female	Total*
Primary substances	33	13	49	1		1	1	1	3
Cleaning agents, total	15	17	42	4	1	5	1	1	3
Drain cleaners	1	2	3	1	1	2		1	1
All-purpose cleaners	2	3	5	1		1		1	1
Oven and grill cleaners			3	1		1			
Dishwasher detergents	2	1	3						
Lavatory cleansers	1		2						
Detergents, auxiliary products								1	2
Medicinal products		4	5	2		2			
Waste gases	15	7	22	3	1	4	10	7	17
Paints and related materials	3		3				1		1
Foods and beverages	13	21	39	1		1	2	1	4
Industrial accidents	13	1	33		1	1			
Powders (cosmetic)								1	1

* *The total number also includes cases where no data on the sex of patients were available.*
** *In 139 cases, no symptoms were observed or the degree of severity could not be assessed due to a lack of data.*

Table 8: Product groups involved most frequently, by degree of severity of health impairment (non-BG reports) (repeat listing of toxicants per case possible)

Outcome of cases	BG reports (100 % = 3071 reports)	Non-BG reports (100 % = 422 reports)
Complete recovery	97.1 % (2980 cases)	85.3 % (360 cases)
Partial recovery (confirmed or probable)	0.2 % (7 cases)	2.8 % (12 cases)
Death	0 % (0 cases)	3.8 % (16 cases)
Unknown	2.7 % (84 cases)	8.1 % (34 cases)

Table 9: Outcome of cases – synoptic view

3.2.6 Outcome of cases

Altogether, sixteen deaths were reported to BfR (by BGs, hospitals and medical practitioners) in 2009. A summary is provided below:

- In ten cases, the use of charcoal grills in indoor environments resulted in fatal carbon monoxide poisoning. This issue was discussed in detail in the previous annual report (Cases of Poisoning Reported by Physicians in 2008, http://www.bfr.bund.de/cm/255/cases_of_poisoning_reported_by_physicians_2008.pdf)
- Two fatal cases were due to poisoning with meadow saffron. One of these patients had mistaken meadow saffron leaves for those of an edible plant and collected them for a meal of wild plants (see Chapter 2.1). Both patients died in spite of intensive medical care.
- Two adolescents had consumed alcoholic beverages contaminated with methanol during a holiday stay. One of these patients developed optic atrophy associated with generalized cerebral oedema and subsequent acute renal failure. The other patient also developed generalized cerebral oedema associated with optic atrophy and consecutive encephalopathy. Both patients died in spite of intensive medical care.
- An adult died from hydrocyanic acid and carbon monoxide poisoning after exposure to flue gas from an apartment fire, presenting the leading clinical picture of pulmonary oedema.
- Last but not least, BfR was also informed about a fatal case of poisoning with cherry laurel in a goat.

3.3 The product information system, PRINS

In order to protect consumers from health risks posed by chemicals and chemical products, the reports by physicians in cases of poisoning legally required under the Chemicals Act (§ 16 e para 2) are regularly evaluated in the sense of toxicological monitoring. Since 1994, the reporting physicians, the responsible ministries and the scientific community have been informed by annual reports on analyses of these reports and the corresponding results. In the context of these reports, the term, poisoning, is used to designate any health impairment associated with chemicals. Hence, this includes not only severe or life-threatening health disturbances but also undesirable health effects of products such as allergic symptoms and allergies.

Since 1998, manufacturers and distributors of chemical products such as household chemicals and DIY products, cosmetics, plant protection and pest control products and products for commercial use have been informed about selected and defined cases of health impairment associated with their products that have become known to BfR through case reports by physicians. For this purpose, a formal product information system (PRINS) was established. In the event of reported severe health impairment, rapid communications are provided for in these cases, depending on the urgency of measures to be taken. By such approach, industry is enabled to immediately fulfil their obligations with regard to product safety. All other reports are summarized and sent to the recipients mentioned above at annual intervals.

3.3.1 Rapid communications

If reports on severe health risks are received by BfR or a preparation is suspected of possibly involving a risk, BfR will provide for information of the competent industrial association/federal trade association, in addition to the manufacturer/distributor of the chemical product involved. In addition, an immediate report is submitted to the three competent ministries, i.e. the Federal Ministry of Food, Agriculture and Consumer Protection (BMELV), the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), and the Federal Ministry of Health (BMG). Suicides, abuse and improper use are excluded from rapid communications.

Criteria for a rapid communication include
- severe symptomatology,
- no suicide or abuse,
- no improper use.

Between 1 January 1998 and 31 December 2009, 29 rapid communications were prepared. A synoptic view of the last five years is given in Table 10.

In the reporting year of 2009, one rapid communication was distributed. A two-year-old girl lying on her back for diaper changing had grasped a closed powder bottle. Suddenly the cap had opened and a gush of powder had spilled onto her face. Subsequently, the child developed as-

Year	Produkt	Toxicologically relevant substance	Person exposed	Outcome	Proposal by BfR (P) and results (R)
2005	Detergents	Surfactant	Elderly male	Death	None
2005	Commercial dishwasher cleaner	Potassium hydroxide	Elderly female	Severe chemical burn	None
2005	Breadseed poppy	Morphine	Infant	Respiratory insufficiency	P: Guideline values/ maximum levels and their control, measures to reduce opiate levels R: Done
2006	Detergents	Surfactant	Elderly female	Death	None
2007	Impregnation spray for tents	Cannot be assessed	Adult female	Pulmonary oedema	P: Investigation
2008	Manual dishwashing detergent	Surfactants	Elderly female	Foam aspiration, death	P: Information
2008	Shoe impregnation spray	Cannot be assessed	Adult male	Pulmonary oedema	P: Investigation
2009	Baby powder (see case report 2.4.1)	Talc	Infant	Aspiration pneumonia, respiratory insufficiency	P: Information R: Distributed

Table 10: Rapid communications 1 January 2005 – 31 December 2009

piration pneumonia requiring artificial respiration and intensive medical care. She was discharged from hospital in an improved condition after a total of 10 days of inpatient treatment. This case has been described in detail in Chapter 2.4.1.

For explanations of individual cases up to 2008, reference is made to the previous annual reports.

3.3.2 Summary reports

Information on reports referring to cases of non-severe health impairment caused by chemical products in occupational or private environments is transmitted to the responsible manufacturers/distributors in a summarized form at the beginning of the year following the incidents. Since 2003, also suicides and attempted suicides have been included in the summary reports, irrespective of the degree of severity of poisoning. Rarely, also reports of severe cases are submitted to manufacturers in the form of a summary report if the data available were insufficient for a rapid communication.

Summary reports provide information in tabular form which, depending on the data available from the case reports, will include the following elements:

- Product name;
- Date of receipt by BfR of the report on the case of poisoning;
- Case number;
- Anonymized patient data such as sex and age group;
- Aetiology of the poisoning case (e.g. accidental or common use, abuse or mistake);
- Site of exposure (workplace or private sphere);
- Duration of exposure (acute or chronic); and
- Degree of severity of health impairment as assessed by BfR.

Cases reported to BfR will only result in a report being sent to the manufacturers if a causal relationship between the health impairment experienced and the product mentioned is considered at least as possible after evaluation by BfR. Information is also submitted on cases reported for which the degree of severity and/or the causal relationship cannot be assessed. Also in these cases, it is intended to draw the manufacturer's attention to risks that may arise from his product.

By means of the BfR summary reports, manufacturers and distributors are informed about possible risks associated with the handling of their products. In single cases, they will not be satisfied by such brief information. They will seek contact with BfR in writing or by telephone in order to obtain more detailed information on a specific case of poisoning.

After evaluation of the total of 3493 reports on cases of poisoning received by BfR in 2009, 374 summary reports were issued to the corresponding manufacturers according to the criteria mentioned above. In some cases, the report mentioned several products to be involved as toxicants. Therefore, the total number of products listed (see Table 11) is higher than that of the corresponding reports on cases of poisoning. These reports referred to a total of 384 products from 160 different manufacturers.

Table 11 provides a synoptic view of product application groups to which the summary reports on frequently listed products can be assigned.

First level Second level • Third level	No. of cases
Agrochemicals	**6**
Chemical products	**343**
Paints and related materials	6
• Primers	3
Fire lighting products	3
Building materials, auxiliary products	9
Building materials	4
Disinfectants/sterilizers	100
Glues	4
Solvents for technical use	3
Cleaning products	181
• Drain cleaners	5
• All-purpose cleaners	9
• Oven cleansers	3
• Dishwasher detergents	11
• Industrial cleaners	26
• Milking machine cleaners	27
• Lavatory cleansers	12
Water treatment products	4
Primary substances	**6**
Cosmetics/personal hygiene products	**4**
Pesticides	**25**
Fungicides	7
Herbicides	8
Insecticides	7

Table 11: Product groups frequently involved in 2009 summary reports (minimum three listings per product group)

As in the previous years, the majority of reports referred to accidents involving chemical products (total 343) with cleaning products stated most frequently (181). Also the numbers of reports referring to disinfectants (100) and those involving milking machine cleaners have remained high in this group (27).

The 374 cases leading to summary reports to manufacturers referred to health impairments characterized by the following degrees of severity (see Table 12):

Degree of severity of health impairment	No. of cases
Minor	330
Moderate	19
Severe	3
Cannot be assessed	22

Table 12: Degrees of severity of cases in 2009 summary reports

Table 13 shows the number of products in the individual product groups that were involved in moderate health impairments (19 products, repeat listing per case possible). It may be concluded that an involvement in cases of more serious health impairment was seen for ca. 6 % of the total of 384 products listed in summary reports to manufacturers.

First level Second level	No. of cases
Chemical products	**17**
Fire lighting products	1
Building materials	2
Dental material	1
Disinfectants/sterilizers	2
Glues	1
Cleaning products	10
Primary substances	**1**
Pesticides	**1**
Fungicides	1

Table 13: Cases of moderate health impairment associated with product groups involved in 2009 summary reports

As agreed, no rapid communications were issued to the responsible persons by BfR in spite of severe health impairments reported in three cases because there was obviously no need for action by the manufacturers involved. The manufacturers were informed about the accidents afterwards in summarized form. Two of these cases referred to attempted suicides. An adult had injected himself with a graffiti remover by the i.v. route. A female adolescent had ingested a chemical from an experimental kit. Both patients required intensive medical care. Another case referred to improper use of a stain protector for stone floors. The latter has been described in detail in Chapter 2.4.2.

In 22 of the total number of 374 cases of poisoning where summary reports had to be sent to manufacturers, the degree of severity of health impairment could not be assessed.

BfR also performs cumulative data analyses of case reports. If trends become apparent, the manufacturers of the products concerned are informed. In turn, manufacturers are requested by BfR to communicate comparable data and trends that may serve to improve product safety.

4 Annex

4.1 Spectrum of reported cases of poisoning

4.1.1 By BfR classification system for product application groups

Incriminated products/ applications	Reports, total numbers					Health impairment moderate/severe				
First level Second level • Third level	Total	Children	Adults	Home	Work	Total	Children	Adults	Home	Work
Agrochemicals	**232**	**6**	**226**	**6**	**217**	**32**		**32**	**1**	**30**
Fertilizers	120	6	114	6	107	12		12	1	11
Plant care products	4		4		3	2		2		1
Growth regulators	13		13		13	3		3		3
Medicinal products	**3016**	**750**	**2246**	**710**	**1299**	**485**	**118**	**364**	**227**	**45**
Medical devices	474	2	472	6	466	10	1	9	1	8
Chemical products	**32295**	**1769**	**30495**	**868**	**29549**	**2934**	**456**	**2467**	**314**	**2133**
Wastes, solid	299		299		299	32		32		32
Waste gases	2822	47	2773	119	2645	202	10	191	45	142
Sewage	133		133		133	10		10		10
Paints and related materials	2319	56	2261	86	2166	181	12	168	25	140
• Paint removers/ strippers	136		136	4	132	16		16	2	14
• Alkyd resin paints	3		3	1	1	2		2		1
• Emulsion paints	21		21		21	4		4		4
• Artist's painting materials	2	1	1		1					
• Glossy paints	478	2	476	16	460	39	1	38	3	35
• Parquetry sealers	33	4	29	21	8	3		3	1	2
• Pigments	8		8		8	2		2		2
• Primers	149		149	7	142	14		14	4	10
• Paint thinners/Paints and related materials	912	42	870	16	847	51	9	42	4	37
Fire lighting products	113	96	16	12	4	46	37	9	7	2

Incriminated products/ applications	Reports, total numbers					Health impairment moderate/severe				
First level Second level • Third level	Total	Children	Adults	Home	Work	Total	Children	Adults	Home	Work
Building materials, auxiliary products	365	8	357	9	348	38	2	36	5	31
Building materials	1711	3	1704	17	1686	229	1	226	1	225
Fuels, solid	2		2		2					
Fuels, solid; auxiliary products	7		7		7					
Fuels, liquid; auxiliary products	4		4		4					
Fuels, liquid	1177	752	419	29	382	367	317	49	21	27
• Petrol	242	16	226	3	221	18	3	15	1	13
• Ethanol for technical use	62	5	57	5	50	5		5	4	1
• Lamp oil	748	726	16	13	2	324	311	12	11	1
Fuels, gaseous	46	1	45	6	38	8		8	2	6
Office materials, chemical	187	5	182	2	176	41	1	40		40
Decoration materials	53	36	17	7	10	4	2	2	2	
Dental materials	142	1	141	21	118	21		21	9	11
Disinfectants/sterilizers	3543	17	3526	31	3492	165	1	164	15	149
Deodorants for technical use	105	71	34	5	29	5	3	2	1	1
Diagnostic agents	34	1	33		33					
Printing, auxiliary products	34		34		34	2		2		2
Insulating materials for electric equipment	2		1		1					
De-icing products	16	1	15	1	14	1		1		1
Fire extinguishing media	193	4	189	3	185	9		9		9
Flame retardants	4	1	3		3	1	1			
Galvanic cells	1060	12	1048	2	1044	52	1	51		51
• Accumulators	1011	1	1010	1	1007	50		50		50
• Batteries	39	2	37		37	2		2		2
• Button batteries	10	9	1	1		1	1			
Galvanizing agents, auxiliary products	31	1	30		30	9	1	8		8

Incriminated products/ applications	Reports, total numbers					Health impairment moderate/severe				
First level Second level • Third level	Total	Children	Adults	Home	Work	Total	Children	Adults	Home	Work
Galvanizing agents	27		27	1	25	4		4	1	2
Gases for technical use	23		23		23	2		2		2
Antifreezes	43	5	38	11	26	10		10	7	2
Foundry auxiliary products	1		1		1					
Glass-working, auxiliary products	5		5		5	2		2		2
Glass-making, auxiliary products	1		1		1					
Rubber production materials	21	1	20		20	1		1		1
Semiconductor production materials	6		6		6					
Household auxiliary products, chemical-technical	5	2	3	2	1	2	1	1	1	
Hydraulic fluids	358	3	354		354	13		13		13
Ceramics, auxiliary products	15	1	14	3	11	3		3	2	1
Ceramic materials	4		4		4					
Glues	1037	28	1009	28	979	81	7	74	7	67
Plastics, starting materials	233	38	195	3	192	25		25	2	23
Plastics, formulating materials	22		22		22	3		3		3
Refrigerants	73		73	1	72	7		7	1	6
Coolants	236	20	216	2	214	15		15	1	14
Leather processing products	9	1	8	3	5	4	1	3	2	1
Luminophors	15		15	2	13					
Solvents for technical use	917	7	910	39	867	90	1	89	10	78
Soldering and welding products	98	4	94		94	8	3	5		5
Metal repair auxiliary products	1		1		1					
Metallurgy, auxiliary products	213		213	2	211	26		26	2	24

Incriminated products/ applications	Reports, total numbers					Health impairment moderate/severe				
First level Second level • Third level	Total	Children	Adults	Home	Work	Total	Children	Adults	Home	Work
Measuring equipment, chemical-technical	30	9	20	8	11	1		1	1	
• Heating meters	15	6	8	7	1	1		1	1	
• Mercury thermometersr	6	3	3	1	2					
• Thermometer fluids	7		7		6					
Microbiological auxiliary products	1		1		1					
Dairy, auxiliary products	1	1								
Paper-making, auxiliary products	13		13		13	2		2		2
Photography, auxiliary products	96		96	2	94	1		1	1	
Radioisotopes, radionuclides	6		6		6					
Cleaning products	9776	447	9318	346	8948	905	50	849	123	718
• Drain cleaners	208	42	165	18	145	60	19	41	11	29
• All-purpose cleaners	658	37	620	21	596	43		42	11	31
• Oven cleansers	346	18	328	4	324	38	5	33	2	31
• Cleaners for electronic products	5	2	3		3	1		1		1
• Descaling products	313	25	286	21	265	20	1	18	5	13
• Front wall and stone cleaners	69		69	6	63	15		15	4	11
• Stain removers	35	17	18	1	17	3	1	2		2
• Floor polishes	63	6	57	6	51	5		5	1	4
• Washing-up detergents (manual use)	130	34	96	11	84	13	1	12	7	5
• Dishwasher detergents	214	44	170	6	163	19	3	16	2	14
• Dishwasher cleaners	87		87		87	8		8		8
• Glass cleaners	153	10	143	93	50	26	1	25	23	2
• Industrial cleaners	771	5	765	5	758	76	3	72	3	68
• Rinsing additive for dishwashers	82	11	71	1	70	4		4		4
• Plastic cleaners	29	4	25		25					

Incriminated products/ applications	Reports, total numbers					Health impairment moderate/severe				
First level Second level • Third level	Total	Children	Adults	Home	Work	Total	Children	Adults	Home	Work
• Glossy paint cleaners	6		6		6					
• Milking machine cleaners	559	10	549	1	548	64	5	59		59
• Metal cleaners	260	9	251	3	247	21	1	20	2	18
• Furniture polishes	25	19	6	4	2	3	2	1	1	
• Soot removers	8	3	5		5	2		2		2
• Lavatory cleansers	444	47	397	71	320	41	1	40	23	14
• Shoe and leather cleaners	45	6	38	36	1	16	1	15	15	
• Shampoos, technical use	1		1		1	1		1		1
• Carpet/upholstery cleansers	13	2	11	3	8	4	1	3	2	1
• Detergents, auxiliary products	47	19	27	8	18	7		6	2	4
• Detergents	149	28	121	10	111	13		13	5	8
Joke articles	4	3	1		1					
Lubricants	285	4	281	1	280	12		12	1	11
Welding fumes	355		355	3	350	35		35	1	32
Toys	16	10	6	3	3	4	3	1	1	
Dust-laying oils	2		2		2					
Textile, auxiliary products	34	3	31	11	20	12		12	7	5
Propellants/sprays	16		16		16	1		1		1
Washing-active raw materials	2		2		2					
Water treatment products	56	3	53		53	2		2		2
Pet shop products	8	2	6		6					
Narcotic drugs	**51**	**1**	**47**	**36**	**2**	**27**		**27**	**21**	
Primary substances	**17 138**	**348**	**16 658**	**381**	**16 154**	**2 096**	**57**	**2 037**	**136**	**1 866**
Cosmetics/personal hygiene	**872**	**116**	**749**	**211**	**535**	**102**	**11**	**91**	**65**	**26**
Hair care products	264	30	234	43	190	28	4	24	17	7
• Permanent wave products	52	4	48	1	47	3		3	1	2

Incriminated products/ applications	Reports, total numbers					Health impairment moderate/severe				
First level Second level • Third level	Total	Children	Adults	Home	Work	Total	Children	Adults	Home	Work
• Depilatory products	18	2	16	15	1	2		2	2	
• Hair conditioners	30	2	28	6	22	3		3	3	
• Hair dyes/colorants	120	6	114	12	101	14	3	11	8	3
• Hair tonics	2		2	2		1		1	1	
• Shampoos	30	15	15	4	11	2		2	1	1
Skin care products	461	66	390	109	281	49	6	43	27	16
• Bath oils/salts	39	11	28	10	18	8		8	6	2
• Tanning products	2		2	2						
• Creams/ointments	104	15	85	61	24	15		15	12	3
• Deodorants	21	3	18	2	16	2	1	1	1	
• Face tonics	1	1								
• Make-up products	8	2	6	2	4	1	1			
• Perfumes/after shaves	45	18	27	2	25	4	1	3	1	2
• Powders	4	2	2	1	1	1	1			
• Soaps	181	5	176	6	170	10		10	2	8
• Sun blockers	9	3	5	5		3	2	1	1	
• Oils	13	3	10	4	6	2		2	2	
Oral care/dental products	75	4	69	41	28	16		16	15	1
Nail care products	62	17	45	14	29	7	1	6	5	1
Pesticides	**2746**	**196**	**2543**	**648**	**1799**	**669**	**27**	**639**	**311**	**299**
Acaricides	5		5		5	1		1		1
Fungicides	179	6	171	11	156	40	1	39	4	33
Herbicides	394	11	383	26	347	63	1	62	12	46
Wood preservatives	311	26	285	178	101	133	8	125	85	35
Insecticides	1238	111	1123	410	643	355	15	338	207	114
• Carbamates	53	6	47	15	30	16	1	15	7	7
• Phosphoric esters	365	20	343	140	186	156	1	155	112	32
• Pyrethroids	412	49	363	128	234	90	3	87	49	37

Incriminated products/ applications	Reports, total numbers					Health impairment moderate/severe				
First level Second level • Third level	Total	Children	Adults	Home	Work	Total	Children	Adults	Home	Work
• Chlorinated hydrocarbons	253	28	223	125	51	79	10	67	39	24
Molluscicides	11	5	5		5	1				
Repellents	12	4	8	5	3	2		2	1	1
Rodenticides	95	34	61	20	39	12	2	10	10	
• Anticoagulants	35	19	16	7	7	4		4	4	
• Phosphates	33	5	28	10	18	8	2	6	6	
Seed dressings	22	2	20		19	5		5		5
Plants	**254**	**143**	**106**	**56**	**49**	**38**	**4**	**33**	**22**	**11**
Mushrooms	**77**	**26**	**50**	**40**	**10**	**30**	**5**	**25**	**24**	**1**
Miscellaneous	**1434**	**30**	**1399**	**113**	**1280**	**164**	**11**	**151**	**34**	**114**
Textiles	446	7	438	77	361	58	5	52	22	30
• Clothing	359	2	356	12	344	32	2	29	4	25
• Furnishing fabrics	71	5	66	60	6	24	3	21	18	3
Foods and beverages	**1071**	**161**	**878**	**510**	**340**	**220**	**24**	**192**	**151**	**27**
Alcoholic beverages	182	13	165	77	67	54	7	46	31	4
Food additives	38	2	36	1	35	5		5		5
Food supplements	203	10	187	184	3	44	3	39	39	
Tobacco and tobacco products	143	103	39	28	2	29	3	26	21	
Industrial accidents	**2126**	**238**	**1860**	**468**	**1289**	**224**	**10**	**214**	**47**	**163**
Veterinary medicinal products	**111**	**14**	**91**	**32**	**58**	**25**	**5**	**18**	**13**	**5**
Animals	**29**	**3**	**25**	**8**	**17**	**9**	**1**	**8**	**4**	**4**
Warfare/anti-riot agents	**109**	**16**	**92**	**10**	**81**	**6**	**2**	**4**		**4**
Pyrotechnic products	5	2	3		3	1		1		1
Tear gas	59	9	49	8	40	3	1	2		2

Table 14: This table summarizes 59 888 reports vs. degree of severity of health disturbances, classified by children and adults, except for cases classified as "no relationship" between symptomatology and exposure. The adult cases were in addition differentiated by exposure in the private sphere and the working environment. The evaluation covered the period from 1 January 1990 until 31 December 2009.

4.1.2 By sectors of the categorization system of the Society of Clinical Toxicology (Gesellschaft für Klinische Toxikologie e.V.)

Category	Number
Products	
Products of daily use	127
Objects of daily use (except cleaning and indoor air conditioning agents)	3
Cosmetics	54
Foods and food additives	69
Tobacco products	1
Products of daily use – unclassified	
Chemical/physicochemical agents	1450
Construction materials, sealants and adhesives	153
Paints, varnishes and dyes	116
Lamp fuels, lighting, odoriferous, decorative and related chemical agents	73
Cleaning and maintenance products	750
Chemicals for technical appliances, processes and products	230
Products for plants and animals	13
Chemical/physicochemical articles – unclassified	115
Drugs of abuse	1
Aphrodisiacs	
Centrally active sedatives	
Hallucinogens	1
Psychostimulants	
Drugs of abuse – unclassified	
Remedies	228
Medicinal products (for human use)	107
Medical devices	115
Veterinary medicines	6
Remedies – unclassified	
Products for protection against and control of microbes and pests	453
Biocidal material protection agents, hygiene products and disinfectants	374
Plant protection and pest control products	79
Products for protection against and control of microbes and pests – unclassified	
Weapons and pyrotechnic products	9
Pyrotechnic products – civil use	
Weapons and special products for military use	8
Weapons and pyrotechnic products – unclassified	1
Products – unclassified	
Primary substances	845
Natural environment	
Mushrooms	3
Microbes	
Plants	17
Animals	2
Natural environment – miscellaneous/unclassified	
Civilization-associated and inherited wastes	
Waste products, byproducts and incidental products	183
Civilization-associated and inherited wastes – unclassified	
Unclassified/unknown items	

Table 15: Spectrum of cases of poisoning reported in 2009, by sectors of the TDI categorization system of the Society of Clinical Toxicology (Translator's note: Translation of terms in Table 15 to be considered as a draft. Terminology should be harmonized and confirmed by experts of the responsible international panels.)

4.2 Reporting form for cases of poisoning

Bundesinstitut für Risikobewertung
Dokumentations- und Bewertungsstelle
für Vergiftungen
Postfach 3300 13

14191 Berlin

Stempel, Telefon-Nummer und Unterschrift der/des Ärztin/Arztes

Mitteilung bei Vergiftungen
nach § 16 e Abs. 2 des Chemikaliengesetzes
Telefon: 030 18412-3460, Fax: 030 18412-3929, E-Mail: giftdok@bfr.bund.de

1. Angaben zur/zum Patientin/en:

Alter: Jahre ☐ Monate (bei Kindern unter 3 Jahren) ☐

☐ männlich ☐ weiblich

Schwangerschaft (**freiwillig** auszufüllen) ☐ ja ☐ nein

2. Vergiftung ☐ **Verdacht** ☐

Unbedingt Handelsname der Zubereitung/des Biozid-Produktes oder Stoffname, aufgenommene Menge und Hersteller (Vertreiber); ggf. vermutete Ursache

a.

b.

c.

3. Exposition ☐ akut ☐ chronisch ☐ oral ☐ inhalativ ☐ Haut ☐ Auge sonstiges, welche ☐

Art der Vergiftung: ☐ akzidentell (Unfall) ☐ gewerblich ☐ Verwechslung ☐ suizidale Handlung ☐ Abusus ☐ Umwelt ☐ Sonstiges

Ort: ☐ Arbeitsplatz ☐ im Haus ☐ Schule ☐ Kindergarten ☐ im Freien ☐ Sonstiges

Labor-Nachweis: ☐ ja ☐ nein

Behandlung: ☐ keine ☐ ambulant ☐ stationär

Verlauf: ☐ nicht bekannt ☐ vollständige Heilung ☐ Defektheilung ☐ Tod ☐ Spätschäden (nicht auszuschließen)

(**freiwillig** auszufüllen)

4. Symptome, Verlauf – stichwortartig – (ggf. anonymisierte Befunde, Epikrise beilegen)

4.3 Reporting form for industrial accidents

BfR-Fragebogen zur Expositionsermittlung bei Stör- und Transportunfällen

Pers. Nummer ☐

weiblich ☐ männlich ☐ Erwachsene(r) ☐ Kind ☐

Bereich I

Unmittelbar Betroffene(r)

(Bitte Eintrag in die Landkarte)

Direkt am Unfallort ☐

Nahe Unfallort ☐

☐ m

Arbeiter(in) ☐

Feuerwehr ☐

Polizei/Rettungsdienst ☐

Privatperson ☐

Sonstige(r) ☐

Erstexposition Uhrzeit ☐ Datum ☐

Dauer ständig ☐ nicht ständig Stunden/Tage ☐

Schutzmaßnahmen ja ☐ nein ☐

Symptome ja ☐ nein ☐

(Wenn ja, bitte Dokumentation auf dem Meldebogen)

Bereich II

Nicht unmittelbar Betroffene(r)

(Bitte Eintrag in die Landkarte)

Entfernung vom Unfallort

☐ m

☐ km

Anwohner ☐

Beschäftigte(r)/Arbeitnehmer(in) ☐

Sonstige(r) ☐ ☐

Erstexposition Uhrzeit ☐ Datum ☐

Dauer ständig ☐ nicht ständig Stunden/Tage ☐

Symptome ja ☐ nein ☐

(Wenn ja, bitte Dokumentation auf dem Meldebogen)

Biomonitoring **Stoff:** ☐

Blutentnahme ☐ Datum ☐ Zeitpunkt ☐ Konzentration ☐

Urinprobe ☐ Datum ☐ Zeitpunkt ☐ Konzentration ☐

Spontanurin ☐ 24h Sammelurin ☐ Kreatinin ☐

4.4 List of poisons centres in Germany (status as of October 2010)

Berlin	BBGes – Giftnotruf Berlin Institut für Toxikologie Klinische Toxikologie und Giftnotruf Berlin	Oranienburger Straße 285	13437 Berlin	Phone: +49 30 19240 Fax: +49 30 30686 799 mail@giftnotruf.de www.giftnotruf.de
Bonn	Informationszentrale gegen Vergiftungen Zentrum für Kinderheilkunde Universitätsklinikum Bonn	Adenauerallee 119	53113 Bonn	Phone: +49 228 19240 and +49 228 28733 211 Fax: +49 228 28733 278 or +49 228 28733 314 gizbn@ukb.uni-bonn.de www.giftzentrale-bonn.de
Erfurt	Gemeinsames Giftinformationszentrum der Länder Mecklenburg-Vorpommern, Sachsen, Sachsen-Anhalt und Thüringen	Nordhäuser Straße 74	99089 Erfurt	Phone: +49 361 73073 0 Fax: +49 361 73073 17 ggiz@ggiz-erfurt.de www.ggiz-erfurt.de
Freiburg	Zentrum für Kinder und Jugendmedizin Vergiftungs-Informations-Zentrale	Mathildenstraße 1	79106 Freiburg	Phone: +49 761 19240 Fax: +49 761 27044 57 giftinfo@uniklinik-freiburg.de www.giftberatung.de
Göttingen	Giftinformationszentrum-Nord der Länder Bremen, Hamburg, Niedersachsen und Schleswig-Holstein (GIZ-Nord) Universitätsmedizin Göttingen-Georg-August-Universität	Robert-Koch-Straße 40	37075 Göttingen	Phone: +49 551 19240 Fax: +49 551 38318 81 giznord@giz-nord.de www.Giz-Nord.de
Homburg	Informations- und Behandlungszentrum für Vergiftungen Klinik für Kinder- und Jugendmedizin Universitätsklinikum des Saarlandes, Geb. 9		66421 Homburg/ Saar	Phone: +49 6841 19240 (Emergency) +49 6841 16283 36 (Office) Fax: +49 6841 16211 09 giftberatung@ uniklinikum-saarland.de www.uniklinikum-saarland.de/ giftzentrale

Mainz	Giftinformationszentrum (GIZ) der Länder Rheinland-Pfalz und Hessen Klinische Toxikologie Universitätsklinikum	Langenbeck-straße 1	55131 Mainz	Phone: +49 6131 19240 +49 700-GIFTINFO Infoline: +49 6131 23246 6 Fax: +49 6131 23246 8 or +49 6131 28055 6 mail@giftinfo.uni-mainz.de www.giftinfo.uni-mainz.de
Munich	Giftnotruf München Toxikologische Abteilung der II. Med. Klinik und Poliklinik, rechts der Isar der Technischen Universität München	Ismaninger Straße 22	81675 München	Phone: +49 89 19240 tox@lrz.tu-muenchen.de www.toxinfo.org
Nuremberg	Giftnotrufzentrale Nürnberg Med. Klinik 1, Klinikum Nürnberg Lehrstuhl Innere Medizin-Gerontologie, Universität Erlangen-Nürnberg	Prof.-Ernst-Nathan-Straße 1	90419 Nürnberg	Phone: +49 911 39823 65 Giftnotruf: +49 911 39824 51 Fax: +49 911 39822 05 giftnotruf@klinikum-nuernberg.de

4.5 Press releases on toxicological problems issued by BfR in 2009

Health risks from fumigated ship containers
Results of an expert meeting at BfR
03/2009, 13 March 2009

Water pipes: Each puff carries a risk
High levels of carbon monoxide in water pipe smoke are harmful particularly for pregnant women and cardiovascular patients
05/2009, 23 April 2009

Tattoo inks become safer
The Tattooing Agents Ordinance enters into force on 1 May 2009
06/2009, 30 April 2009

Farm visit without stomach pains
BfR advice: Young children should not drink raw milk
11/2009, 29 May 2009

Protect children from poisoning
BfR brochure provides information on the poisoning risks for children and first aid measures
12/2009, 10 June 2009

Children are not small adults
Seventh BfR Consumer Protection Forum views children as consumers
15/2009, 06 July 2009

Cadmium: New challenge for food safety?
BfR status seminar on cadmium in the food chain
17/2009, 15 July 2009

Indoor grilling with charcoal is very dangerous
BfR warns about risk of carbon monoxide poisoning
18/2009, 17 July 2009

EFSA confirms BfR position on detection methods for algal toxins in shellfish
BfR recommends replacement of animal experiments with chemical-analytical methods
22/2009, 10 September 2009

Glow sticks are not for small children
BfR records increased number of accidents involving small children and glow sticks
25/2009, 21 October 2009

Hair dyeing without any risk – is that possible?
BfR symposium on the latest scientific findings about cancer and allergy risks from hair dyes
27/2009, 28 October 2009

Danger of suffocation for infants from nuts
BfR recommends consumer information on packaging
37/2009, 22 December 2009

4.6 Solution to the riddle

Fig. 21: Plants shown in the cover illustration

You were able to identify the plants? Congratulations.
If not, you will find the solution below:

Plant C is the tasty bear's garlic,
plant B is lily of the valley, and
plant A, the poisonous meadow saffron.

Please continue to support our activities by your cooperation in the prevention of poisonings.

4.7 Abbreviations

Abbreviation	Meaning
µg/g	Micrograms per gram
BAT	Biologischer Arbeitsstoff-Toleranzwert (tolerable maximum level in terms of occupational medicine)
BfR	Bundesinstitut für Risikobewertung (Federal Institute for Risk Assessment)
BG	Berufsgenossenschaft – Institution for statutory accident insurance and prevention for trade and industry in Germany
BIA	Berufsgenossenschaftliches Institut für Arbeitsschutz – BG-Institute for Occupational Safety and Health
ChemG	Chemikaliengesetz – Chemicals Act (Germany)
CLP Regulation	Regulation (EC) No. 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures
D-dimer	Fibrin degradation product
DMPS	Dimercaptopropane sulfonate
EAPCCT	European Association of Poisons Centres and Clinical Toxicologists
EG	European Community
EKG	Electrocardiography
FDA	Food and Drug Administration
FEU	Fibrinogen Equivalent Units
GGIZ	Gemeinsames Giftinformationszentrum – Joint Poison Information Centre of the federal Länder of Mecklenburg-Western Pomerania, Saxony, Saxony-Anhalt and Thuringia in the city of Erfurt
GIZ	Giftinformationszentrum – poison information centre (poisons centres in Germany)
GOT	Glutamate oxaloacetate transaminase
GPT	Glutamate pyruvate transaminase
Hg	Mercury (hydrargyrum, liquid silver)
IOP	Intraocular pressure
i.v.	Intravenous
IMA	International Mineralogical Association
IPCS	International Programme on Chemical Safety
mg	Milligrams
mg/kg	Milligrams per kilogram
mmHg	Millimetres of mercury
PC	Poisons centre
PDF	Portable Document Format
PRINS	Product information system
PSS	Poisoning Severity Score
SH Gruppe	Sulfhydryl group, also referred to as thiol group
sph	spherical

TDI	Toxikologischer Dokumentations- und Informationsverbund – Toxicological Documentation and Information Network
U/L	Units per litre
Visus c.c.	Visual acuity cum correctione (corrected visual acuity)
Visus s.c.	Visual acuity sine correctione (uncorrected visual acuity)
WRMG	Wasch- und Reinigungsmittelgesetz – Detergents and Cleaning Agents Act (Germany)

The Federal Institute for Risk Assessment

Do nanoparticles promote the development of allergies? Does apple juice contain harmful aluminium? The Federal Institute for Risk Assessment – in short BfR – is responsible for questions to do with the health assessment of food, consumer products and chemicals. In its work it makes an important contribution to rendering food, products and the use of chemicals safer in Germany.

BfR was established in November 2002 to strengthen consumer health protection. It is the scientific body of the Federal Republic of Germany that prepares expert reports and opinions on questions of food and feed safety and the safety of substances and products. In doing so, the Institute assumes an important task in improving consumer health protection and food safety. The activities of BfR are conducted under the responsibility of the Federal Ministry of Food, Agriculture and Consumer Protection. At the three BfR locations in Berlin, a staff of ca. 700, among them 250 scientists, is being employed to work in the field of consumer health protection. The scientific expertise needed for its assessment and research activities is provided on a non-partisan basis.

In our globalized world it is important for the institutions involved in consumer health protection to be part of international networks. BfR is the national Focal Point of the European Food Safety Agency (EFSA) and a partner of the European Chemicals Agency (ECHA). It cooperates with a number of national and international, governmental and non-governmental agencies.

BfR sees itself as the advocate of consumer health protection in a context in which many stakeholders make their voices heard. On the scientific basis of its risk assessments, it seeks to strengthen consumer health protection. To this end, the Institute offers policy advice, participates in national and international panels and disseminates consumer information. An important component in its risk assessment activities has consisted in risk communication and the various forms it can take. Risk communication has been provided by BfR by means of various projects and events.

Thanks to the high standard of its work, its scientific independence and its transparent assessments, the Institute has become a recognized player and important driver of consumer health protection on both the national and international stage. Consumers know they can trust its judgements.

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