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REVIEW ARTICLE

Occupational Toxicology in Workplace Poisoning, Industrial Accidents, and Chemical Exposure Litigation: A Narrative Review

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ABSTRACT

Toxicology in a workplace setting deals with chemical exposures at work and has two central themes: the mechanisms of how to understand chemical exposures and how to evaluate chemical exposures in the legal environment. The purpose of this review is to discuss the problem of work poisoning, work-related accidents, and chemical exposure litigation in the context of occupational toxicology. Literature was synthesised using peer-reviewed published studies, occupational health guidelines, and sources of forensic toxicology. Some of the main toxicants from the occupation are benzene, lead and its compounds, solvents, pesticides, and industrial gases. Most cases of acute poisoning occur as a result of accidents, for example, a leak, a spill, or an explosion; whereas occupational poisoning results predominantly in chronic poisoning. Toxicants are associated with the respiratory system, central nervous system, liver, kidneys, skin, and reproductive system. The critical elements of risk assessment and legal causation are occupational exposure limits (OELs), biomonitoring, and dose–response assessment. Forensic toxicologists are useful in the history of exposure evaluation, biological evaluation, and causation in the evaluation of compensation cases, as well as chemical injury cases. Workplace toxicology is the scientific foundation of occupational safety, accident investigation, and the evidence-based litigation process in the event of chemical exposure.

KEYWORDS

• Occupational Toxicology • Workplace Poisoning • Industrial Accidents • Chemical Exposure • Forensic Toxicology • Etc

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INTRODUCTION

One of the major subdisciplines of toxicology, occupational toxicology, is the study of the toxicity of chemical, physical, and biological agents in the workplace. It highlights the dose-response relationship, route of exposure (inhalation, ingestion, dermal), and mechanism of toxicity (molecular, cellular, systemic) of hazardous substance exposure. Occupational toxicology is a sub-branch of toxicology that deals with exposures in the workplace that can be repetitive, chronic, and influenced by industrial processes and safety precautions.[1] An interdisciplinary science that incorporates elements of Industrial hygiene, epidemiology, and forensic science to assess and regulate occupational hazards.

The study of chemical exposure in the workplace is significant due to its implications for workers' health and for criminal investigation. Many industrial processes, such as pharmaceuticals, agriculture, mining, and manufacturing, have been associated with the use of synthetic chemicals, heavy metals, VOCs, and toxic gases due to industrialisation and advances in current technology. The workers in these environments are exposed to both acute toxic effects, such as poisoning, chemical burns, and respiratory distress, as well as chronic toxic effects such as carcinogenesis, neurotoxicity, reproduction problems, and organ damage.[2] These health effects may manifest themselves with long latency periods and be hard to detect and diagnose. An exposure history in the workplace is especially important in situations of unexplained illness, suspected occupational poisoning, or fatal industrial accidents where toxicological analysis is necessary to determine the cause of the accident and may also be useful in the reconstruction of an exposure history.

Moreover, occupational chemical exposures are one of the important components of legal and regulatory frameworks. A new branch of forensic toxicology has developed – chemical exposure litigation, a struggle over negligence and compensation for occupational diseases and injuries. The connection between exposure to a toxic chemical in the workplace and adverse health effects is often determined using toxicology evidence, exposure assessment data, and expert testimony. This includes the correct interpretation of toxicokinetic data, results from biomonitoring and environmental measurements, which are critical in carrying out scientifically rigorous forensic evaluations.[3]

Occupational toxicology is a broad field, and many areas are important. These include hazard identification, recognition, and characterisation of toxic substances in the workplace; exposure assessment, which involves measuring the level of exposure, including the intensity, frequency, duration of exposure, and risk assessment. In addition, biomonitoring and the use of biological markers to detect exposures in the body are also a part of the field, as are toxicokinetics and toxicodynamics to understand the uptake, distribution, metabolism, and elimination of chemicals in the human body. Occupational toxicology can be used in industrial accident investigations to assist in the reconstruction of the accident and to identify the cause of toxic chemicals released in the accident, such as in the cases of chemical spills or explosions. It is also important in developing occupational exposure limits and safety standards that are utilised by regulatory agencies.[4]

Prevention, assessment, and accountability are the main goals of occupational toxicology. First, it seeks to identify and assess hazardous agents found in the workplace and assess their potential health hazards. Second, it is designed to establish safe exposure limits and guidelines that will enable workers to not be exposed to acute or chronic toxicity effects. Third, it focuses on developing and implementing preventive controls, including engineering controls, personal protective equipment, and monitoring systems in the workplace. Moreover, occupational toxicology may also be involved in medico-legal investigations, providing scientific support for establishing a cause in cases of occupational poisoning or industrial accidents. The discipline is a general one that is intended to encourage the health of workers, minimise work-related hazards, and ensure that workers are treated fairly when exposed to chemicals and when their health is affected by industrial neglect.[5]

OCCUPATIONAL TOXICOLOGY: CONCEPT AND FRAMEWORK

Occupational toxicology is an area of toxicology that focuses on the harmful health consequences that occur after exposure to chemical, physical, and biological agents found in the workplace. The field aims to elucidate

the relationship of hazardous substances that are used, produced, and released as a consequence of work-related activities with the human body and the toxic effects that they cause.[6] Occupational toxicology is different from general toxicology, which deals with toxicity in any setting, because the exposure of an industrial worker may be different in route, different types of workers, and different industrial processes, all with their own health risks.[7]

The field has several purposes: to determine substances that are potentially dangerous in workplace situations; Calculate the levels of exposure and the risk of harm to the body; and develop strategies to prevent or minimise toxicity.[8] Occupational toxicologists work closely with industrial hygienists, occupational physicians, safety engineers, and various government agencies to make the workplace safe and healthy, and to help workers work efficiently and at their best.[7] Chemicals may be as toxic in a lab as they are hazardous on the job if they are not used correctly. However, a substance that has moderate toxicity might be hazardous to workers if it is inhaled or a worker works for long durations in the presence of the substance, or if workers are not suitably protected from the substance.[6]

The chemical hazards and risk assessment in the workplace have four elements of the strategy for industrial toxicology assessment: Hazard identification, dose assessment, risk assessment, and risk management.[9]

Hazard Identification

This consists of the determination of whether a chemical, physical, or biological substance poses an adverse and ill health effect to humans and the gathering of information from a variety of sources.[10] All possible adverse effects of substances in the workplace need to be considered when assessing hazards. Acute effects can be irritation, burns, and immediate poisoning, which occur shortly after exposure; chronic effects can be organ damage, cancer, and neurological disorders, which occur after months or years of exposure or repeated exposure.[6,11] Once hazards have been correctly identified, employers can then take the necessary steps to set up a suitable warning system, training, and protective measures.[10] Learners are informed about possible hazards that they may encounter and how to protect themselves.[8] Exposure limits and safety standards[12] need to be established by regulatory agencies and maintained by the authority to protect the workers.

Dose Assessment

It is defined as the amount of substance that is absorbed by the body and is present in specific tissues over a period of time.[11] This part centres around the concept of dose, an essential element of the toxicity of an exposure, whether harmful or harmless.[9] The frequency of exposure is also very important.[7] Chronic health effects may result from multiple exposures to low levels of a chemical over many months/years, while acute poisoning is the result of single exposures to high levels of a chemical.[6] The level of dose is also influenced by the working practices, as during work, dust, vapours, or fumes are generated that increase the dose level compared to the static dose.[8] Ventilation systems[12] lower the amount of contaminated air in a building. Personal protective equipment provides protection of the body. Several factors of individual biology, including genetic factors, age, health status, and pre-existing conditions, affect how a person will respond to a certain amount of a substance.[11]

Dose assessment is a very important element in forensic and legal contexts.[8] It is usually done during the industrial accident investigation and can be used to reconstruct the exposure scenario and to account for the severity of the effects of some workers compared to the lack of effect of others.[12] In chemical exposure litigation, proof of dose would help or hurt any arguments to the fact that exposure to the chemical caused a specific health issue because courts require proof of exposure levels that can cause the claimed issue to arise.[6]

Risk Assessment

Risk assessment is the scientific process of predicting a hazard that causes adverse health effects under realistic conditions in the workplace. It serves as a link between the identification of the hazard and the protection needed in the workplace. Hazard identification is a description of whether or not a substance is capable of causing harm, whilst risk assessment tells whether or not it will cause harm, given realistic exposure conditions.[6] Risk assessment is the process of relying on information collected to establish exposure limits such as occupational exposure limits

(OELs), permissible exposure limits (PELs), and recommended exposure limits (RELs) that are then used by regulators. These are suggested limits which are designed to protect workers' health.[10]

Risk Management

It is the practical application of the knowledge of occupational toxicology for the management and reduction of different hazards that exist in the workplace.[10] The first step in the risk management process is to assess the available control measures and then determine which ones are suitable for the particular hazard situation at the workplace.[12] Controls like modification in the work practices to minimise exposure, such as job rotation, reduced work hours, and training programs.[12]

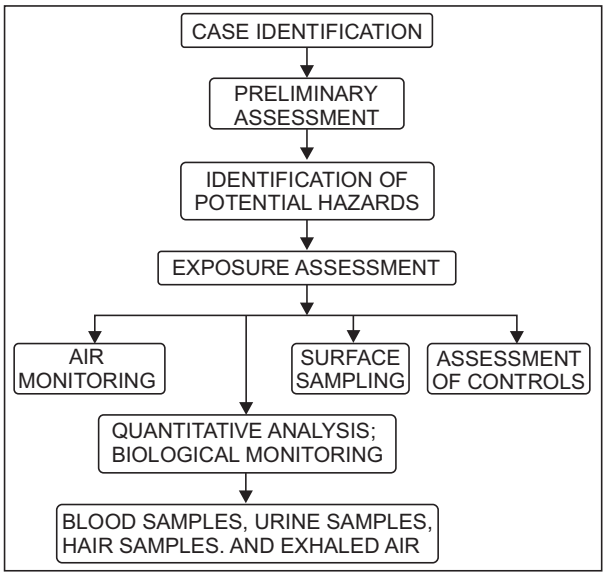


Figure 1: Flowchart representation of the investigation of occupational toxicology

In the cases of workplace poisoning, industrial accidents, and chemical exposure litigation, the role of risk management is significant and has a legal dimension.[8]Failure to take necessary controls can be considered as negligence, regulatory violation, or misconduct.[6] Strong risk management systems indicated that employers had taken reasonable steps to protect worker health, and thus reduced their potential liability and learned from these failures to prevent future accidents.[13] In addition, risk management has a preventive function, which goes beyond a particular case.[10] Hazard Risk Management Systems help to minimise the likelihood of poisonings or accidents in the workplace by setting best practices for hazard control. The protective function is beneficial for workers, employers, and society because it reduces the risk of injury and disease and lowers medical expenses, while also ensuring productive processes.[8]

MAJOR OCCUPATIONAL TOXICANTS AND HEALTH EFFECTS

Over 370,000 premature deaths are thought to be caused by occupational exposure to toxicants each year, making it one of the worst public health issues in the world.[14] The health consequences of workplace chemical exposure range from acute poisoning and immediate organ damage to chronic illnesses such as cancer, neurological disorders, and respiratory diseases that develop after prolonged low-level exposure. Chemical agents are the most common occupational hazard that causes disease, accounting for 41% of all occupational disorders resulting from work-related exposures.[15]

Based on epidemiological statistics and industrial toxicology research, the following sections classify significant occupational toxicants by category and describe their origins, exposure pathways, acute and chronic health consequences, and essential organs impacted.

Table 1: Heavy metals and their health effects

Toxicant	Main Source	Route of Exposure	Acute Effects	Chronic Effects	Key Organ Affected
Lead	Battery manufacturing, mining, smelting, welding, painting, ceramics, electronics[14]	Inhalation of dust/ fumes (95%) and dermal contact[15]	Abdominal pain ("lead colic"), headache, confusion, vomiting, muscle weakness, encephalopathy with seizures[16]	Neurotoxicity (cognitive impairment, peripheral neuropathy, memory loss), anaemia, reduced fertility, hypertension, carcinogenicity[14]	Nervous system, Bone marrow, kidneys, cardiovascular system[16]
Arsenic[15]	Semiconductor manufacturing, glass production, metal alloys, pesticides[14]	Inhalation of dust/fumes; dermal contact with arsenic compounds	Vomiting, abdominal pain, diarrhoea ("rice-water stools"), headache, confusion, seizures, and death.	Skin changes (hyperkeratosis, nail pigmentation), peripheral neuropathy, cardiovascular disease, skin/lung/bladder cancer, blackfoot disease	Skin, lungs, cardiovascular system, and peripheral nervous system

table Cont....

Toxicant	Main Source	Route of Exposure	Acute Effects	Chronic Effects	Key Organ Affected
Cadmium [15]	Battery production (Ni-Cd), metal plating, pigments, plastics stabilisers, soldering alloys	Inhalation of fumes/dust; minimal dermal absorption	Severe respiratory irritation, chemical pneumonitis, pulmonary oedema, respiratory failure, cough, chest pain, and dyspnea.	Irreversible lung damage (emphysema, COPD), renal toxicity, bone damage (osteoporosis, osteomalacia), and lung cancer	Lungs and kidneys
Mercury[15]	Dental amalgams, electrical equipment, thermometers, fluorescent lamps, chemical manufacturing, and gold extraction	Inhalation of elemental vapours; dermal (organic compounds) in pesticides/ chemicals	Respiratory tract irritation, chest pain, cough, chemical pneumonitis, pulmonary oedema; headache, confusion, tremors	Classic triad: erethism (anxiety, depression, memory loss, personality changes), tremors, gingivitis; renal damage, peripheral neuropathy.	Nervous system (brain), kidneys, and respiratory system.

Table 2: Organic solvents and their health effects

Toxicant	Main Source	Route of Exposure	Acute Effects	Chronic Effects	Key Organ Affected
Hexane[15]	Extraction processes, adhesives, cleaning agents, and rubber manufacturing[14]	Inhalation of vapours (high volatility); dermal contact with solvents	CNS effects: headache, dizziness, nausea, confusion, CNS depression, unconsciousness; respiratory irritation	Peripheral neuropathy; irreversible, may progress to muscle weakness/paralysis; liver and kidney damage	Peripheral nervous system (neuropathy), liver, and kidneys
Carbon Disulfide[15]	Cellulose production (cellophane), rubber manufacturing, solvents, pesticides[14]	Inhalation of vapours (high volatility); significant dermal absorption	CNS effects: headache, dizziness, confusion, nausea, vomiting, delirium, seizures, coma; respiratory irritation.	Neurological disorders; cardiovascular effects (hypertension, myocardial infarction risk), renal injury, reproductive toxicity[17]	Nervous system (brain, peripheral nerves), cardiovascular system, kidneys
Dimethyl-formamide (DMF)[15]	Pharmaceutical manufacturing, synthetic fibres, polymers, pesticides[14]	Inhalation of vapours; significant dermal absorption (penetrates intact skin)	CNS effects: headache, dizziness, nausea, abdominal pain; liver enzyme elevation, respiratory irritation	Hepatotoxicity; GI symptoms, skin irritation, reproductive toxicity	Liver (hepatotoxicity)
Dichloroethane	Solvents, metal cleaning, adhesives, chemical synthesis intermediates[14]	Inhalation of vapours (high volatility); dermal contact	CNS effects: headache, dizziness, confusion, nausea, CNS depression; respiratory irritation, liver damage, kidney injury	Hepatotoxicity, nephrotoxicity, peripheral neuropathy, and cognitive impairment	Liver, kidneys, nervous system
Benzene[15]	Shoemaking, leather products, luggage manufacturing, adhesives, and chemical manufacturing[14]	Inhalation of vapors (high volatility); dermal contact with solvents/ adhesives	CNS effects: headache, dizziness, confusion, nausea, vomiting, CNS depression, loss of consciousness; respiratory irritation; cardiac arrhythmias[18]	Bone marrow suppression; leukemia (acute myeloid); non-Hodgkin's lymphoma; multiple myeloma	Hemopoietic system, blood disorders and leukaemia

Table 3: Pesticides, Gases, and Other Toxicants

Toxicant	Main Source	Route of Exposure	Acute Effects	Chronic Effects	Key Organ Affected
Organophosphate Pesticides	Agriculture, pest control industries, insecticides, and pesticide manufacturing.	Inhalation of spray mist/dust; dermal contact, ingestion.	Cholinergic syndrome, excessive sweating, vomiting, bronchospasm, seizures, respiratory failure, and death.[19]	Persistent neurological effects, increased Parkinson's disease risk, and peripheral neuropathy.[20]	Nervous system, respiratory system, and musculoskeletal system.[21]

table Cont....

Toxicant	Main Source	Route of Exposure	Acute Effects	Chronic Effects	Key Organ Affected
Organochlorides	Agriculture, pest control industry, veterinary use, forestry, etc.[22]	Inhalation of vapours/dust and dermal contact.	Tremors, seizures, confusion, and respiratory distress.[20]	Alzheimer's disease, liver cancer, body fat persistence, and endocrine system disruption.[20]	Nervous system, liver, endocrine system.
Carbamates	Agriculture, veterinary, pest control, and household insecticides.	Inhalation, dermal contact, and sometimes ingestion.	Similar to organophosphates, cholinergic crisis, sweating, vomiting, bronchospasm, muscle weakness, etc.[20]	Neurobehavioral effects, memory loss, cognitive impairment, reproductive toxicity.[23]	Nervous system and respiratory system
Pyrethroids	Agriculture, pest control services, greenhouse sprayings, livestock treatment, etc.[22]	Inhalation, dermal contact, and sometimes ingestion.	Mild skin and eye irritation, tingling, nausea, and headache.	Skin sensitisation, respiratory sensitisation, and possible chronic neurotoxicity.[21,24]	Skin, nervous system, and respiratory system.

PREVENTION AND CONTROL STRATEGIES FOR OCCUPATIONAL TOXICANTS

Occupational toxicants prevention is organised across three complementary levels-primary, secondary, and tertiary-each targeting a distinctive stage in the chain from exposure to disease. Primary prevention aims to stop exposure before it occurs, while secondary prevention focuses on early detection and interruption of harm among exposed workers. Lastly, tertiary prevention addresses workers who have already developed adverse health effects. Together, these levels form an integrated program to minimise risk at the source and prevent recurrence. Effective occupational toxicant control requires layering these strategies, continuous risk assessment, and regulatory oversight to ensure that prevention is proactive, evidence-based, and sustained throughout a worker's lifespan.

Table 4: Prevention and Control Strategies for Occupational Toxicants

Level of Prevention	Strategies	Applications
Primary Prevention	- Elimination of hazardous substances - Substitution with less toxic alternatives - Engineering controls (ventilation, containment, automation) - Administrative controls (job rotation, reduced hours, training) - Personal protective equipment (PPE)	Prevent exposure before it occurs, provision of predominant means to reduce worker exposure, and substituting to safer alternatives as well as safer practices.
Secondary Prevention	- Environmental monitoring (air, water, surface concentrations) - Biological monitoring (blood, urine, tissue levels) - Pre-placement medical examinations - Regular health surveillance	Early exposure detection, continuous monitoring, and compliance with safety standards
Tertiary Prevention	- Medical treatment of affected workers - Compensation for occupational diseases - Rehabilitation programs - Return-to-work assessments	Minimize consequences of established disease; support affected workers.

FORENSIC TOXICOLOGY IN LITIGATION

The forensic toxicologist plays a very important role in the intersection of laboratory science and law, presents the medical results, and then interprets this evidence in a medico-legal context and during court proceedings.[25] A toxicologist is involved with the qualitative and quantitative analysis of drugs, poisons, metabolites, and more. Interpretatively, they analyse the type of exposure (therapeutic, fatal, and toxic), route of entry, post-exposure interval, and metabolism. Obviously, toxicologists help the court by providing the scientific facts to the court from a scientific and objective point of view. The forensic toxicologist can provide an explanation for the analytical reliability,

limitations in the specimen, expected toxic effects, dose responsiveness, the interpretation of the biomonitoring, and the importance of an occupational exposure standard in the case, but the law requires a more detailed analysis on what type of exposure was it, whether it was fatal, why it was exposed, whether it's detected in the workplace, in the specimen or in the environment, whether it matches the symptoms or more.[26]

This is why it is best to think of forensic toxicology in the context of occupational litigation as a science of correlation and explanation. It matches the biological evidence, exposure history and clinical outcome with specific contaminants and provides an understanding of the relationships in a manner that facilitates medico-legal decision making.[27]

ANALYSIS OF SPECIMENS AND EXHIBITS

Biological material like blood, urine, vitreous fluid, bile, gastric fluid, liver, kidney, hair, nails, in some cases, exhaled air or oral fluid, based on the time and type of exposure, is collected. Physical exhibits can consist of contaminated clothing, respiratory protection, workplace dust, chemical containers, liquids, powders, materials from machines, environmental swabs, food/beverages sampled during investigation, and pharmaceutical preparations. These exhibits are important in situations where poisoning is associated with a particular industrial activity, a spill, a mislabeled container, or a suspected contamination route.[25]

Typically, the analytical process consists of screening and confirmatory testing. Screening can be done with an immunoassay or with broad toxicological scanning, while confirmatory analysis is usually carried out through the use of chromatographic or mass spectrometric methods like Gas Chromatography-Mass spectrometry or Liquid Chromatography-Mass Spectrometry, which offer higher specificity and quantification. A crucial element in proper interpretation is that of specimen integrity, validated methods, and judicious chain of custody procedures, as specimen mislabeling, contamination, degradation, or delayed collection can severely compromise the evidentiary value of toxicological findings.[26]

Cases involving chemical exposure are rarely created by one toxicology result and multiple forms of evidence. Exposure history, such as job title, length of employment, tasks performed, chemical handling practices, personal protective equipment, accident descriptions, spill histories, and witness accounts, is a key source. Blood and urine are particularly useful for recent exposures, and hair or nails may be useful in the temporal pattern of exposure. Biomonitoring is more convincing when compared with the onset of symptoms, industrial hygiene data, occupational exposure limits (OELs), and other workplace standards.

Another important category is toxicokinetics, used to help explain why some specimens may be negative even if they have been exposed, why metabolites may be more informative than parent compounds, and why the timing of the specimen collection can be important in interpreting the concentration. It helps in the reconstruction of the magnitude and chronology of the exposure, mainly in acute industrial incidents.[26,28]

Last, but not least, medical records frequently offer the context for interpretation. The pattern of the disease may be visible in hospital records, occupational health assessments, symptom course, imaging, laboratory investigations, pathological findings, and treatment notes, and may indicate if the pattern was consistent with known toxic effects and if other causal factors have been ruled out. If the toxicology results are not correlated, then it may be impossible to prove causation in a litigated environment.[26,27]

CHALLENGES IN OCCUPATIONAL FORENSIC TOXICOLOGY

Determination of exposures may be a challenging process

Getting to the bottom of workplace poisoning and chemical injury cases is the most difficult part of these cases, and determining the worker's actual workplace exposure to a harmful substance, as opposed to elsewhere.

Difficulty in establishment of dose-response relationship

The dose and duration of exposure may only be effective at specific levels; in the majority of cases, workplace records may be incomplete, and it will be difficult to know the actual dose and duration of exposure.

Lack of specificity in common symptom

Nausea, weakness, and tiredness are the symptoms associated with headache, which can be attributed to several causes, and for which it is difficult to make a definite claim to one chemical.

Lack of biological evidence

Evidentiary value of biomonitoring results may be diminished due to delayed sampling, metabolism, rapid elimination, and/or contamination.

Difficulty in the coordination of science with litigation

A connection between exposure, toxic mechanism, clinical pattern, and outcome is expected by courts and is often hard to establish with certainty.

Subjective interpretation of the resulting data

The same facts can have different significance to toxicologists, clinicians, industrial hygienists and the legal community, especially when the exposure history and toxicological data are incomplete.

CONCLUSION

Occupational toxicology is a branch of science, medicine, and law, particularly when instances involving chemical exposure, workplace hazardous exposures, and industrial accidents take place and go beyond the level of the lab and into the courtroom. The review demonstrates that the approach encompasses more than just the detection of toxins, but also understanding how, when, and to what extent the workers are exposed, as well as how much of the exposure is causing the injury. The occupational toxicology process has four key components: hazard identification, dose assessment, risk assessment/risk management, and an algorithm for prevention of harm and medico-legal interpretation.

The major occupational toxicants included in this review—lead, benzene, mercury, arsenic, cadmium, industrial gases (hexane and carbon disulfide), and organophosphate pesticides—provide examples of the potential for acute toxicity and chronic, lifelong disease due to occupational exposure. The critical organs concerned with exposure to short or long-term exposure to workplace chemicals are the nervous system, bone marrow, kidneys, and the liver. The most significant toxicants are heavy metals and solvents because of their properties of accumulation in the body and long-term effects. The observations indicate that the risk of slow and low levels of exposure for a long time is much more hazardous than large accidental spills. Workers in small or medium-sized enterprises, with no safety standards and no understanding of the hazardous nature, are the most vulnerable.

Beyond detection, forensic toxicologists need to determine whether it was an occupational exposure; the chemical(s) involved, and the duration of the exposure; and whether the clinical picture is consistent with the chemical. Forensic toxicology plays a major role in determining who the culprit is. It goes beyond science to provide justice to those who suffer. Exposure history, biomonitoring, OEL, toxicokinetics, and medical history – need to be presented in a coherent story that can withstand legal challenge. In this sense, expert testimony can be very helpful in determining causality, responsibility, and injury, as well as in resolving some of these challenging scientific issues. Combination chemical exposures, divergent expert opinions, a strict burden of proof, non-specific symptoms, and exposure delays are some of the difficulties faced in some cases. The challenges demonstrate the crucial point that occupational toxicology is a preventative and investigative science. As a result, the field is essential for improving workplace safety as well as producing just and scientific outcomes in court. Occupational toxicology can be used to protect workers who have been exposed or poisoned by the chemical in the workplace, as well as to punish and fire employers who have failed to uphold their duty to ensure the safety of their employees. This can be done with scientific objectivity and ethical integrity in the workplace.

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