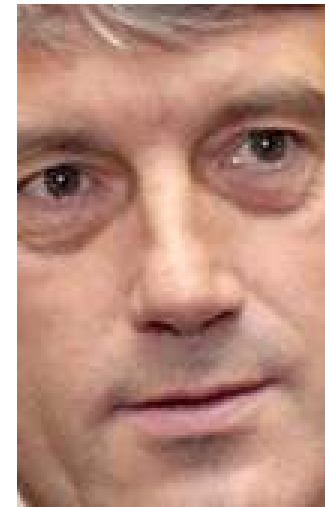
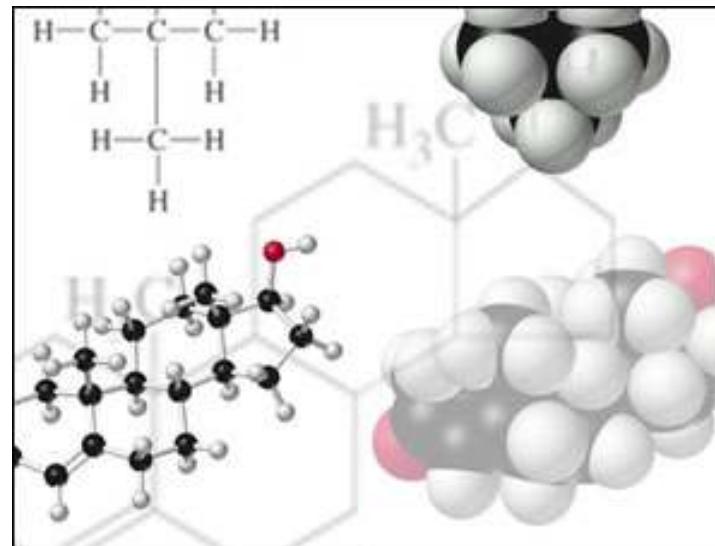


Occupational Health I. T



Dioxin poisoning, Viktor Yushchenko



SU Department of Public Health

Occupational health and safety in Hungary

- occupational medical service: **basic**
- centre of occupational medicine
- **secondary level:** occupational health consultations
- Hungarian Institute of Occupational Health

SUPERVISION: Hungarian Labour Inspectorate

National Public Health and Medical Officer Service:
gives license to the occupational medical services and supervises
the presence of minimum requirements.

Workload:

any effect that at least temporarily **disturbs that balance of the internal milieu**, thus changing the homeostasis of the body.

(originates for work capacity, accident risk...)

Strain:

the sum of reactions to workload.

(increased heart rates, core body temperature...)

In some jobs, the danger is obvious



International Hazard Datasheets on Occupations

In others, the danger may not be quite so obvious



International Hazard Datasheets on Occupations

Occupational disease: a disease contracted as a result of an exposure to risk factors arising from work activity.

Occupational accident: an occurrence arising out of, or in the course of work which results in:

- fatal occupational injury; or
- non-fatal occupational injury.

Occupational injury: death, any personal injury or disease resulting from an occupational accident.

Work-related diseases

Occupational diseases

Occur largely in the community

Occur mainly among working population

'Multifactorial' in origin

Cause is specific

Exposure to workplace may be a factor

Exposure to workplace is essential

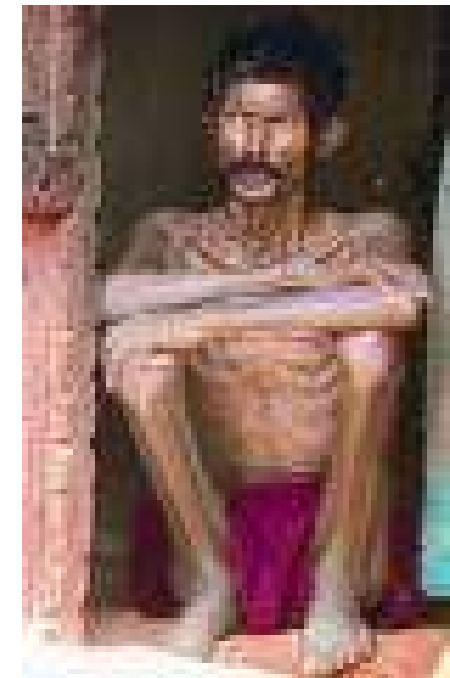
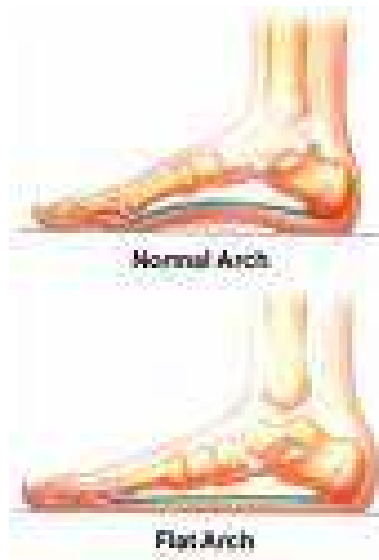
May be notifiable and compensatable

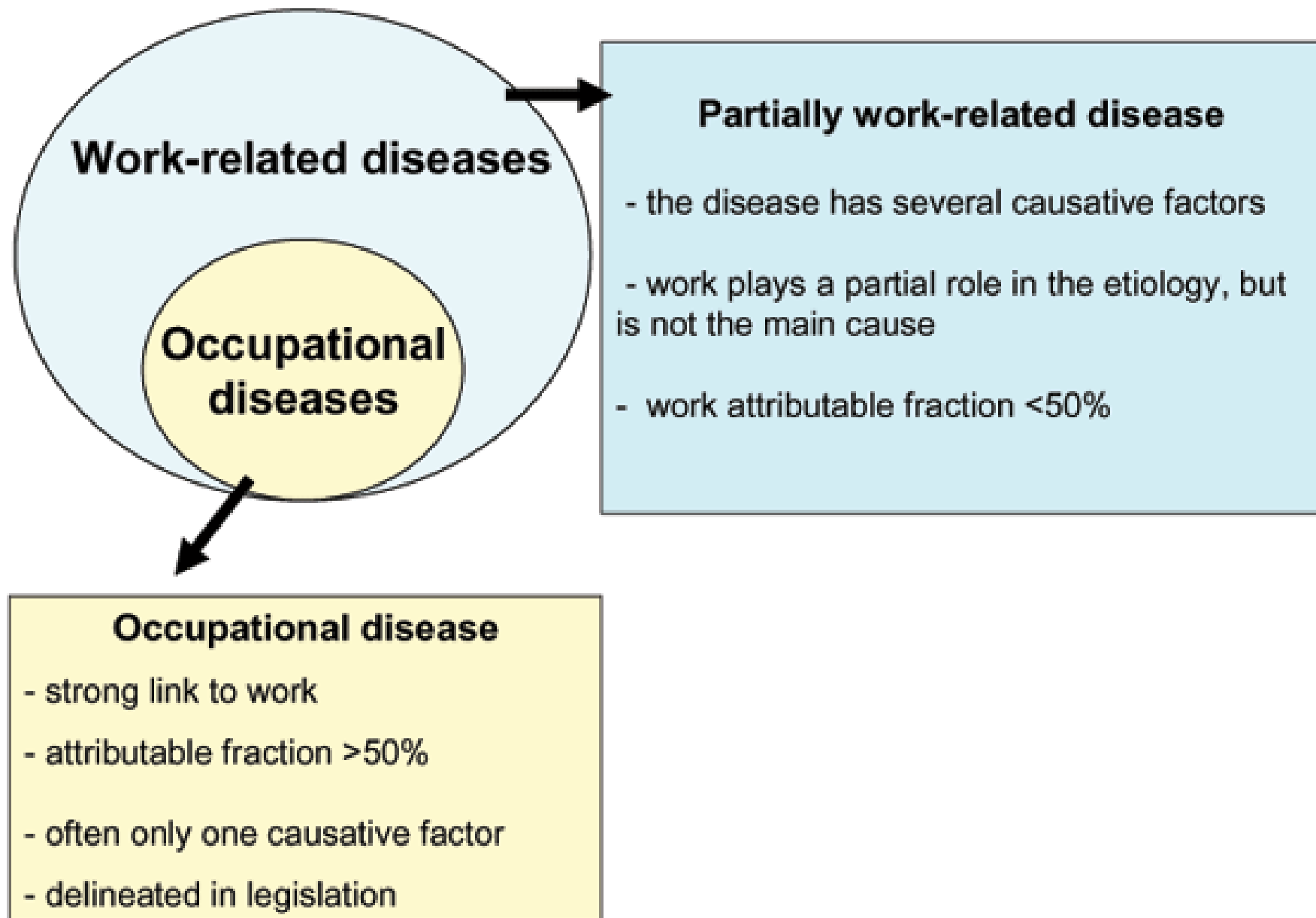
Notifiable and compensatable

Waiter's flat feet - work-related



Silicosis – occupational disease







Occupational hazards to human health

Type of hazard	Examples	Health effect
physical	noise local vibration	noise-induced hearing loss traumatic vasospastic diseases
chemical	various chemicals (e.g. solvents, heavy metals)	intoxications fibroses cancers allergies nervous system damage
biological	bacteria fungi viruses	infections allergies
ergonomic	repetitive work work-rest schedules	muskuloskeletal injuries mental stress lowered productivity and work quality
psychosocial	organizational stress conflicts	work dissatisfaction burnout depression

Occupational health vs. Environmental health

Occupational health	Environmental health
Hazards in workplace environment	Hazards in community environment
Hazards largely in air	Hazards in air, soil, water, and food
Hazards are physical, chemical, biological, and psychosocial	Hazards are physical, chemical, biological, and psychosocial
Route of exposure: inhalation and dermal	Route of exposure: ingestion, inhalation, and dermal
Exposure period: 8 h/day for working life	Exposure period: lifelong
Exposed population: adults, usually healthy	Exposed population: children, adults, elderly, and sick persons

Defining Risk

Hazard identification

Can the agent cause the adverse effect?

Dose–response assessment

What is the relationship between dose and incidence of adverse effects in humans or in animals?

Exposure assessment

What exposures are currently experienced or can be anticipated under various circumstances?

Risk characterization

What is the estimated incidence of the adverse effect in a given population or subpopulation?

What is the nature of the effect?

What is the strength of the evidence?

RISK:

expresses the **probability** that an adverse will appear in a person or a group.

HAZARD /occupational/:

potentially harmful effect caused by an inactive source.

RISK (R) mathematical formula:

$$R = W \times K$$

W = odds of occurrence /from 0 to 1/

K = severity of the event /from 0 to 1/

$$**POPULATION'S RISK** = N \times R$$

POPULATION'S RISK UNIT:

1 mikrorisk = at **1 millions person 1 death in lifetime** (70 years average)

Occupational health risk assessment

In HUNGARY for this is responsible the employer
(but it made by the occupational medical service)



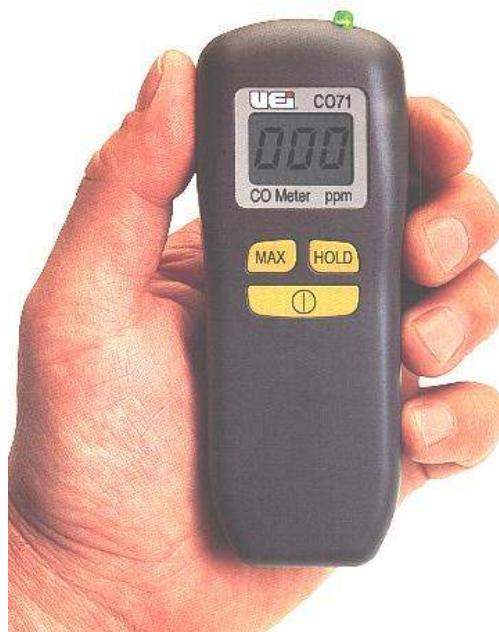
Environmental monitoring at the workplace

Chemical risk factors

Volatile Organic Compounds (VOC's) Monitor



For dust particuls



For CO measurement



PEL – permissible exposure limits

TLV – threshold limit value

REL – recommended exposure levels

MAC – maximum allowable concentration

(A quantity of exposure which the human body can tolerate **without any temporary or lasting damage, or health risks to descendants**. Applies to 8-hour working days or 40 working hours per week.)

Ceiling limits (C values)

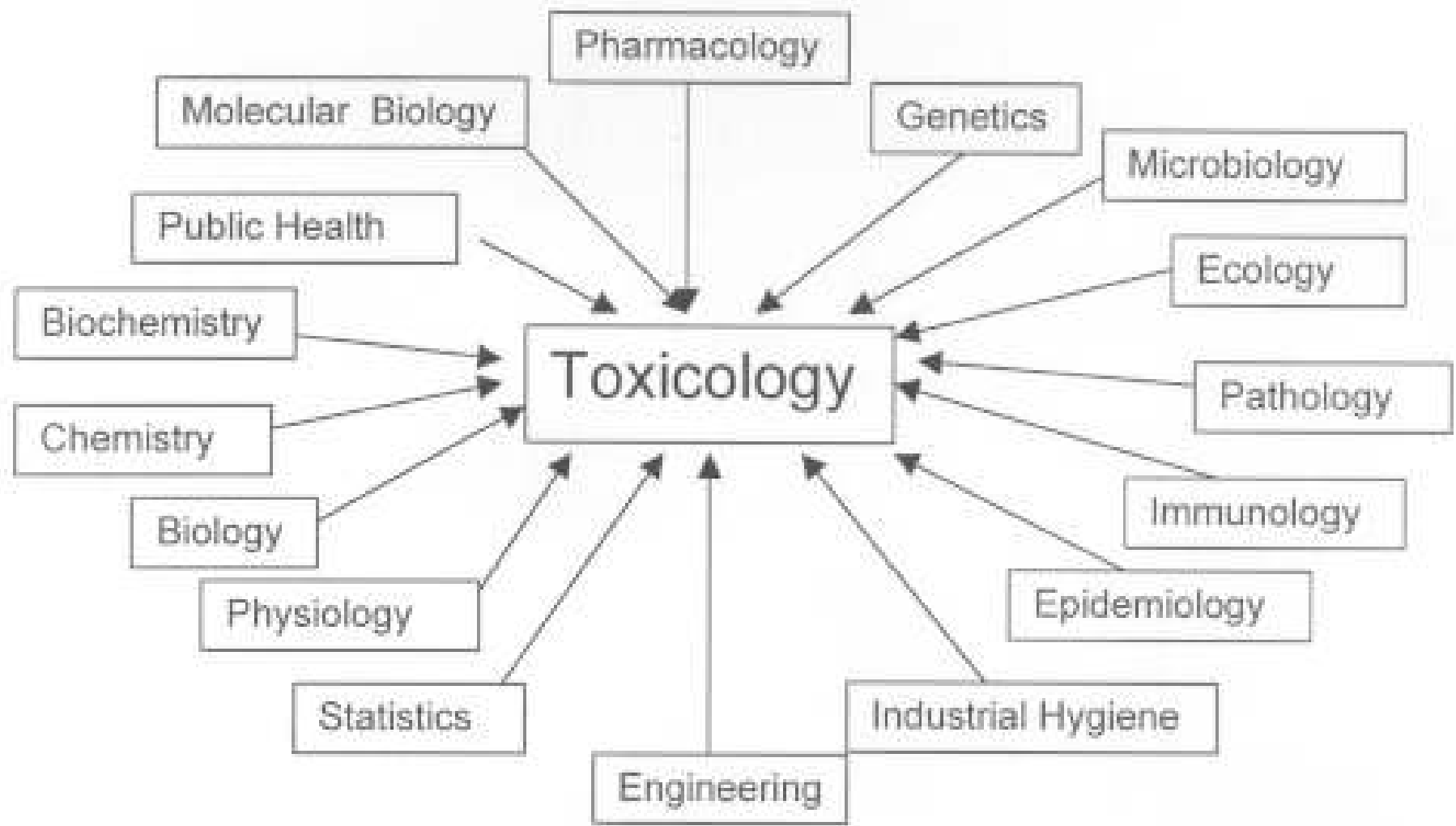
Time allowed: 15 minutes one-shift maximum.

Biological monitoring: measured as a **concentration of chemical substance that is present in body** or its metabolic byproducts or through the specific changes it induces.



Number of known (registered) chemical substances
about 13 million,
and 1 % (130 000) are currently available commercially.

The number of chemicals produced and used in large quantities
amount to a total of 4000.



Toxicogenomics

Aquatic toxicology

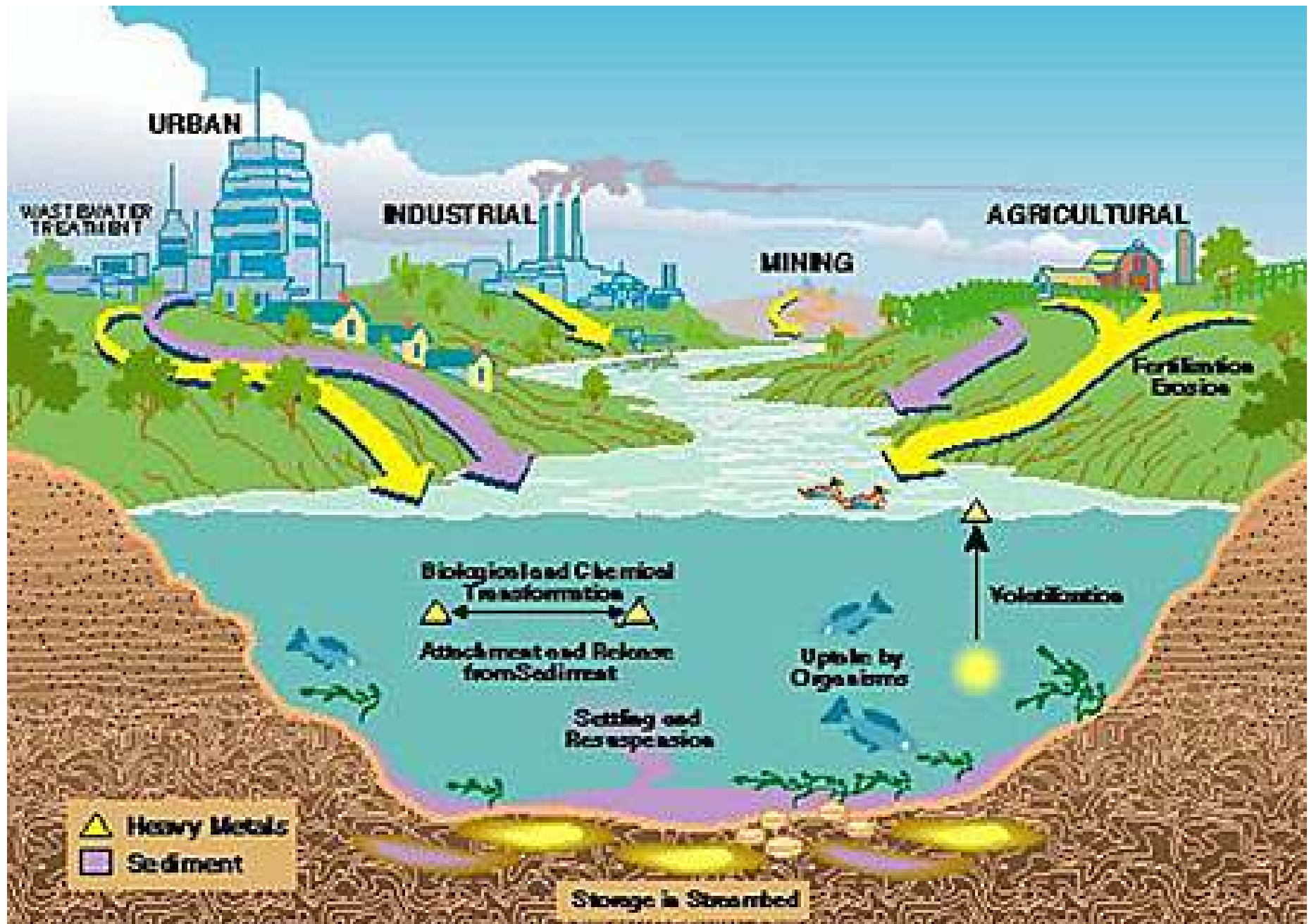
Chemical toxicology

Ecotoxicology

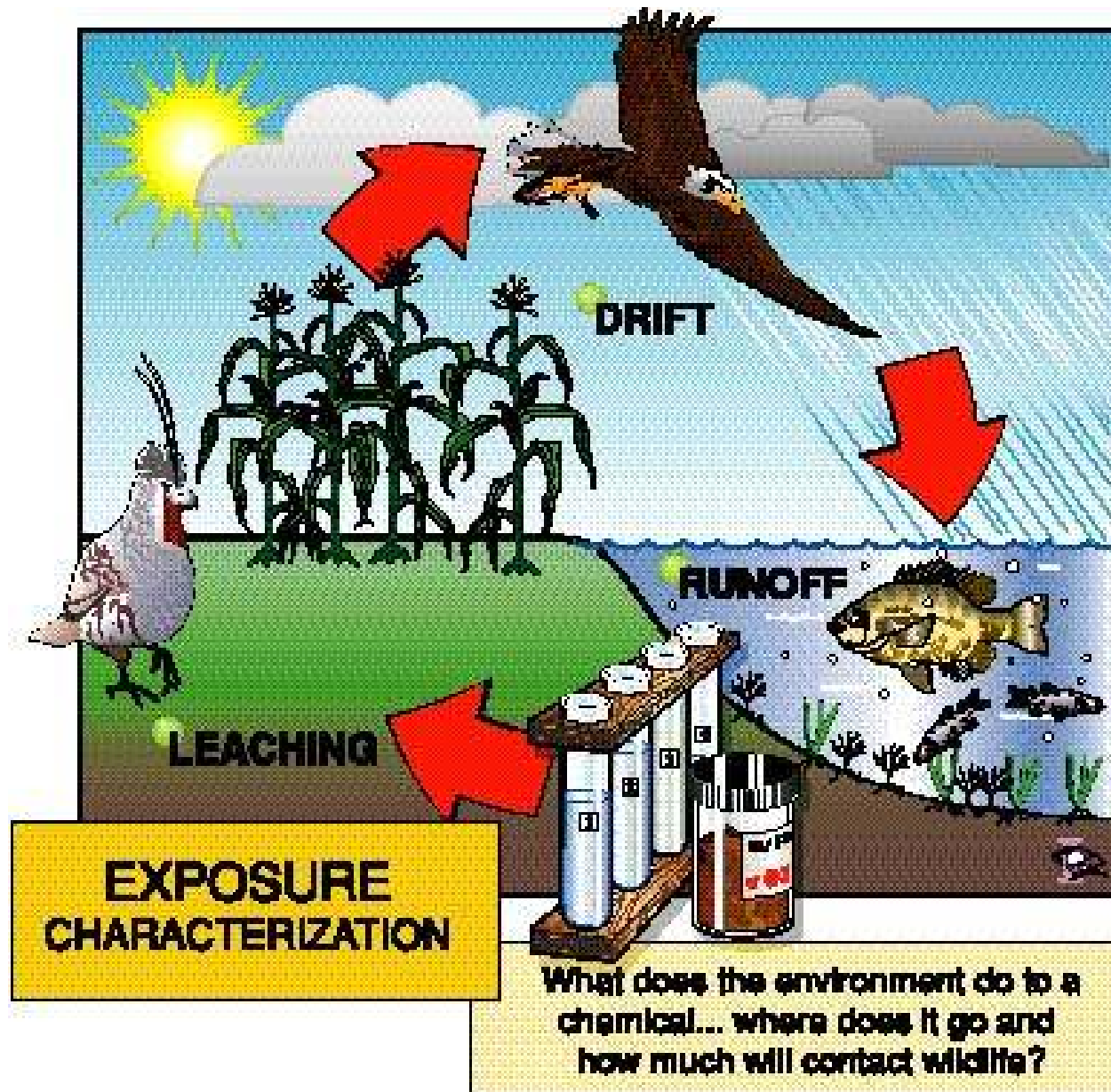
Environmental toxicology

Forensic toxicology

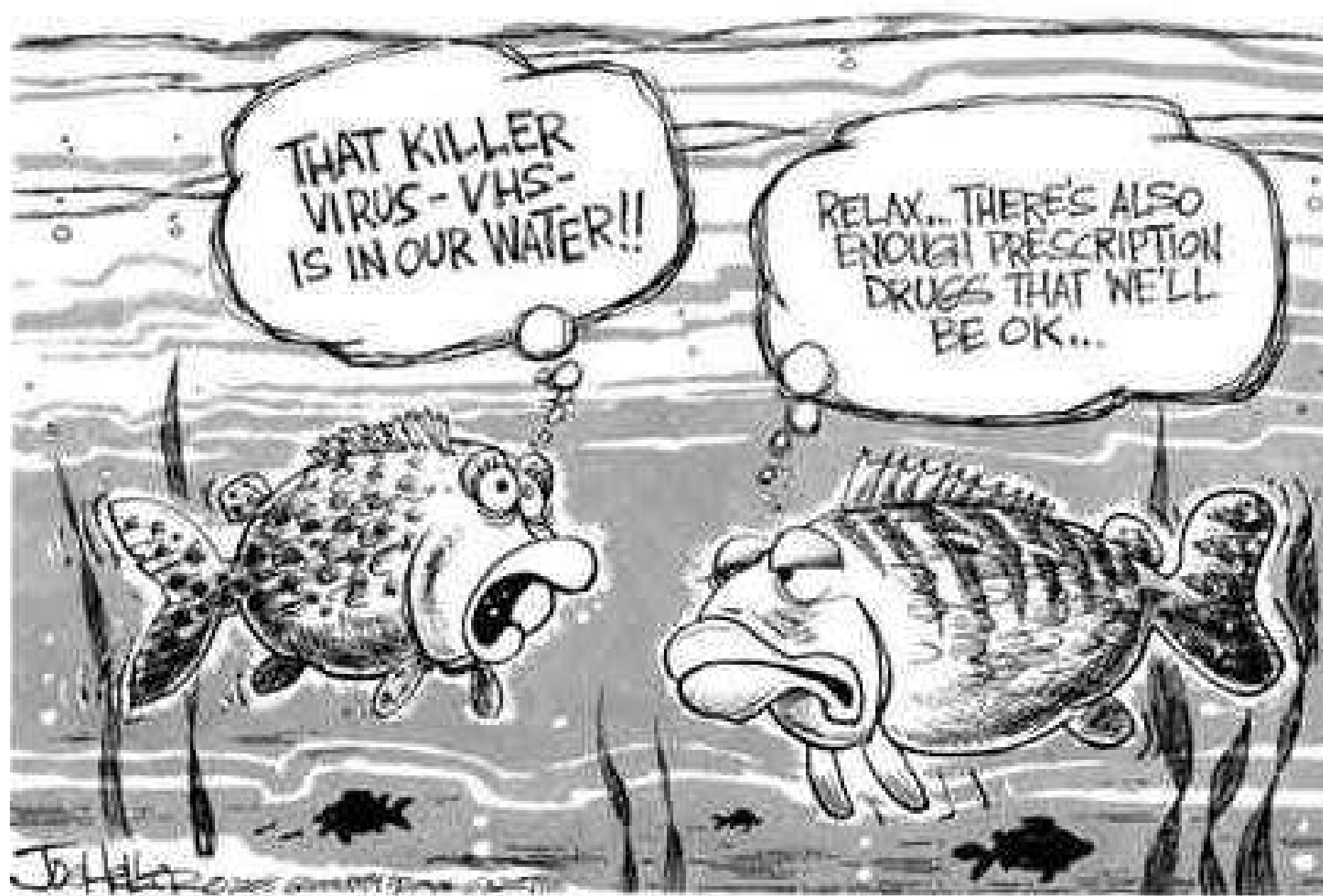
Medical toxicology



Environmental Heavy Metal Contamination



What does the environment do to a chemical... where does it go and how much will contact wildlife?



THAT KILLER
VIRUS - VHS -
IS IN OUR WATER!!

RELAX... THERE'S ALSO
ENOUGH PRESCRIPTION
DRUGS THAT WE'LL
BE OK...

JOHN HARRIS





Gannet (*Morus gassanus*) eggs monitored in Great Britain for mercury and PCB congeners

Epidemiologic and toxicologic problems in environmental health

(after Last)

Ambient level of toxic substances may be difficult to determine

Body burdens may be difficult to determine

Measurements seldom begin soon enough

Long latency or incubation time

Ill-defined clinical effects

Variable dose-response relationship

Low incidence of serious adverse effects

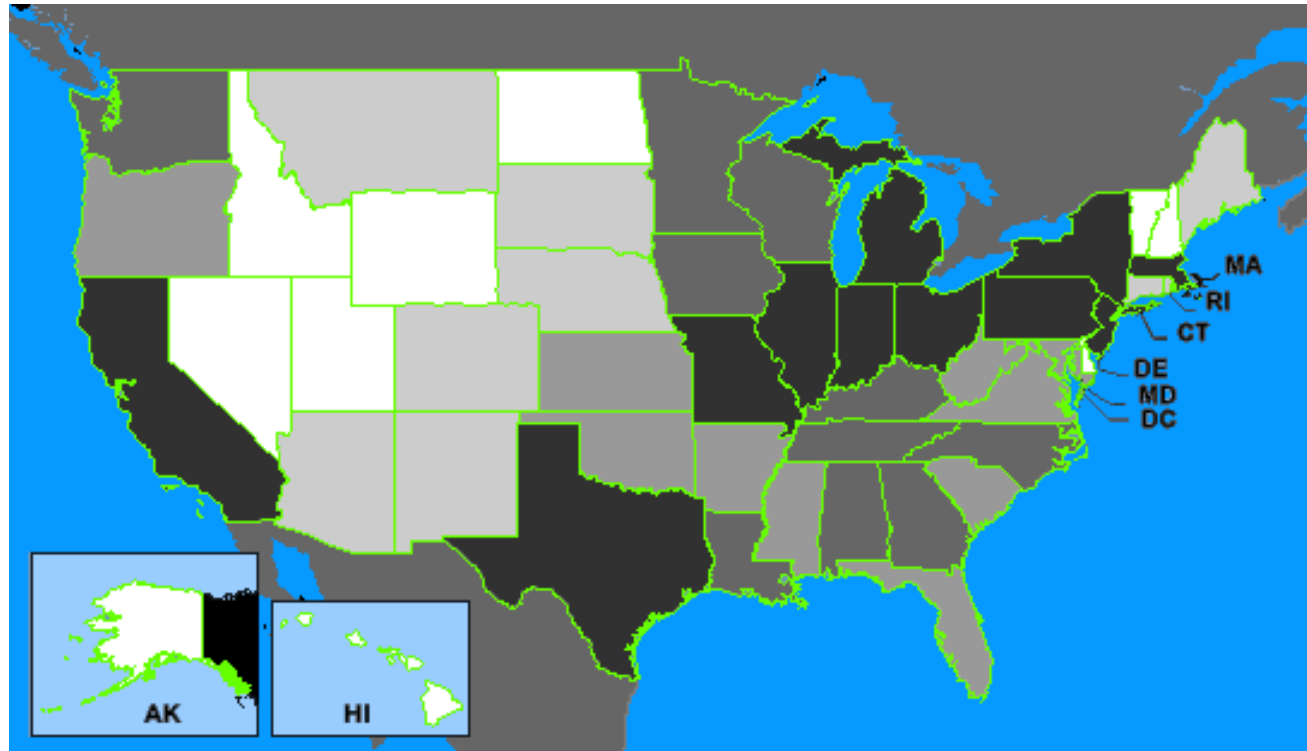
Confounding effects resulting from exposure to several toxic substances

Occupations and exposure change

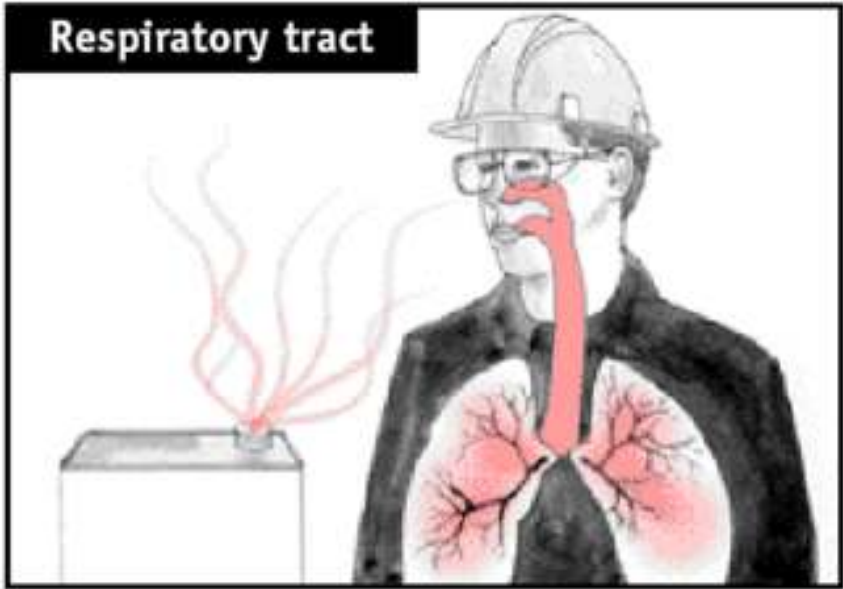
Workers may be migratory

Which denominator, which numerator should be used?

United States Housing Units with a High Risk of Lead Hazards



- highest 20% of states
- second highest 20% of states
- middle 20% of states
- second lowest 20% of states
- lowest 20% of states



Respiratory tract

90 – 100 m² (bronchiolar and alveolar surface)



Skin

1.5 – 2 m² (skin)



Digestive tract

200 m² (small intestine)

Properties of the chemical agent that are influencing the effect of poisons

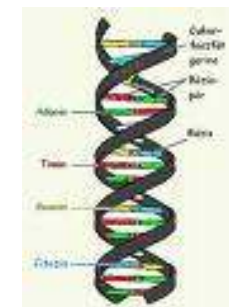
- quantity (dose)**
- concentration**
- chemical (technical) purity**
- lipoid solubility**
- size of molecule and gross**
- physical condition**
- steam pressure**
- size of particle**
- chemical structure**
- ionization**

Synergistic responses:

when **two or more hazardous material exposures occur the resulting effect can be greater than the effect of the individual exposures**. This is called a synergistic or potentiating effect. Example: exposure to both alcohol and chlorinated solvents.

Human factors that are influencing the effect of poisons

- species
- sex
- age
- pregnancy,
breastfeeding
- hormone status
- bodymass
- nutrition
- diseases
- genetic factors
- others



Time and frequency of exposure

- acute toxicity
 - involves harmful effects in an organism through a **single or short-term exposure**
- subacute toxicity
 - weeks
- chronic toxicity
 - the ability of a substance or mixture of substances to cause harmful effects **over an extended period, usually upon repeated or continuous exposure**, sometimes lasting for the entire life of the exposed organism



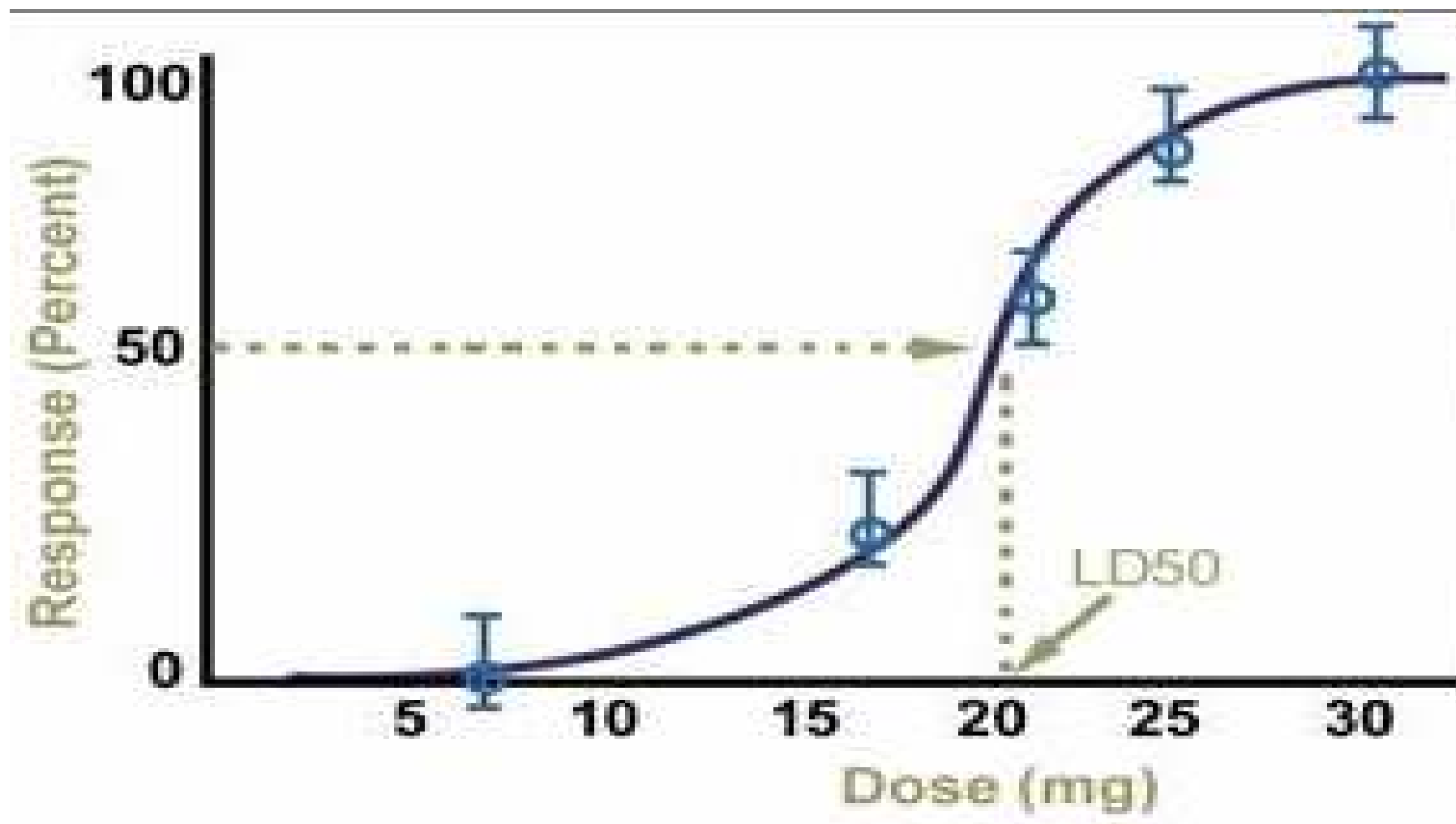
The Death of Socrates,
1787, Jacques-Louis David

Lethal Dose 50 (LD₅₀) is the **single dose** of a substance that, when administered **orally** is expected to cause the **death during 2 weeks of 50 per cent of a defined animal population.**



Lethal Concentration 50 (LC₅₀) is the **concentration** of a substance in the air that, when **given by inhalation over 4 hours,** is expected to cause the **death during 2 weeks in 50 per cent of a defined animal population.**

Lethal Dose 50 (LD₅₀)



Problems with the LD50 test

It is a very cruel test ("*a ritual mass execution of animals* „)."

LD50 for the same substance is often 10 times higher in one species than in another. Sometimes the differences are much greater.

For example, the LD50 for methylfluroactate was 0.15mg/kg in dogs and 11.00mg/kg in monkeys.

There can be large differences even between closely related species.

For example, the LD50 for paracetamol was 250-400mg/kg in mice and hamsters. Death was caused by liver damage.

However, in rats the LD50 was 1000mg/kg, and there was no sign of liver damage.

Toxicity rating

	Oral LD ₅₀ , rat, mg/kg	Dermal LD ₅₀ , rat or rabbit, mg/kg	LC ₅₀ , rat, mg/m ³ /4 hours
very toxic	≤ 25	≤ 50	≤ 0,25
toxic	25-200	50-400	0,25-1
slightly toxic	200-2000	400-2000	1-5

Longer term tests:

to find out if a chemical has long-term effects, **animals are fed smaller doses every day, often for 90 days**. Two species are usually tested, a rodent (rats or mice) and a non-rodent (often dogs).

Human cell cultures have several advantages in predicting toxicity:

- they are human and so **avoid species differences;**
- they **can be taken from the tissue a particular test chemical is most likely to affect,** for example the skin, or the liver;
- they allow researchers **to study how a substance causes damage to the cells, that is, why it is toxic;**
- they **avoid causing pain and death to animals.**

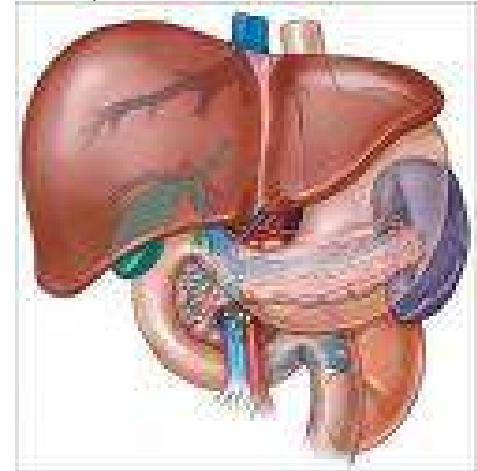
Human tissues for testing are becoming more available in the USA and Europe, although less so in Australia.

Absorption

Distribution (water soluble, fat soluble chemicals)

Biotransformation

Excretion



The liver needs to work efficiently to help break down toxins. All xenobiotics are potentially dangerous if the toxin is not dealt with by the liver.

The primary way the body deals with xenobiotics is to eliminate them via the urine or bile after processing by the liver, a process called **biotransformation detoxification**.

Phase I

oxidation
reduction
hydrolysis

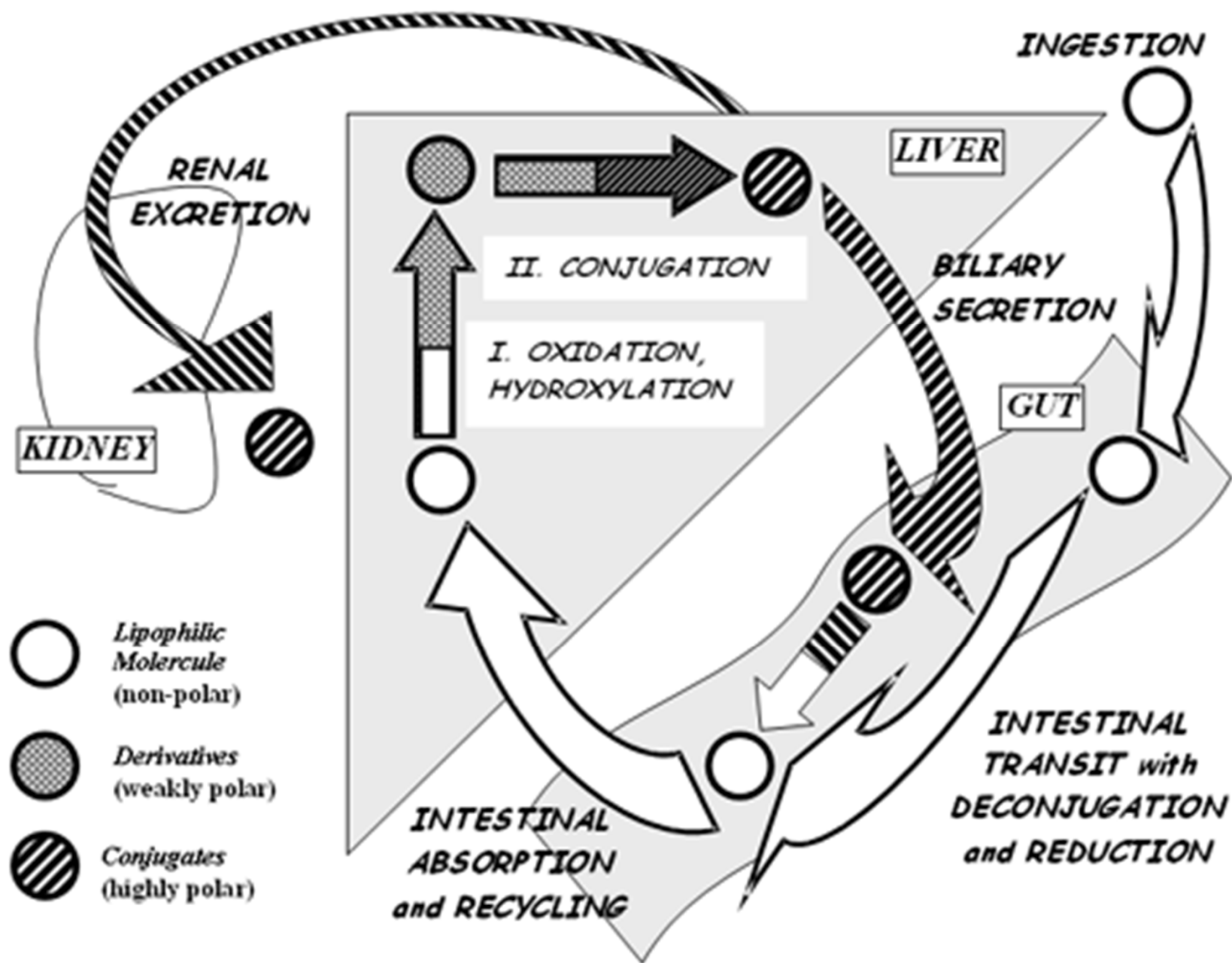


Phase II

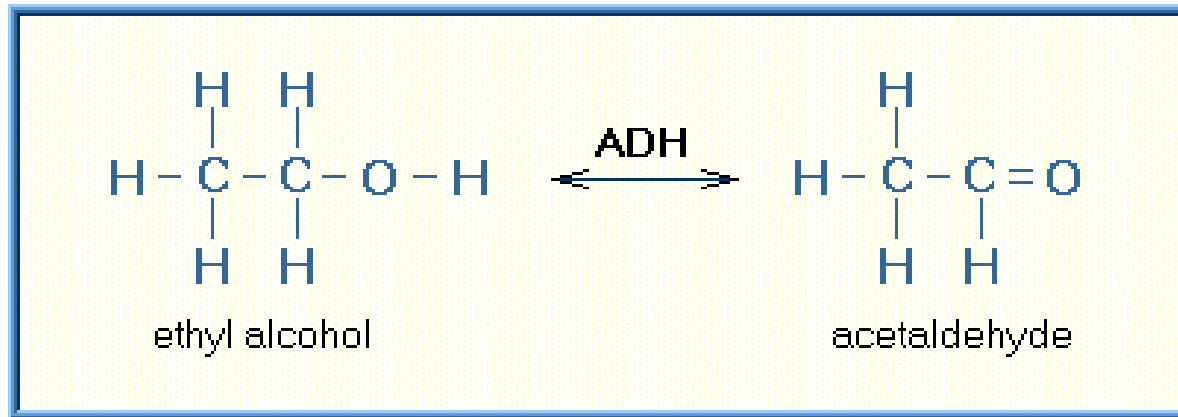
conjugation
synthesis

Elimination



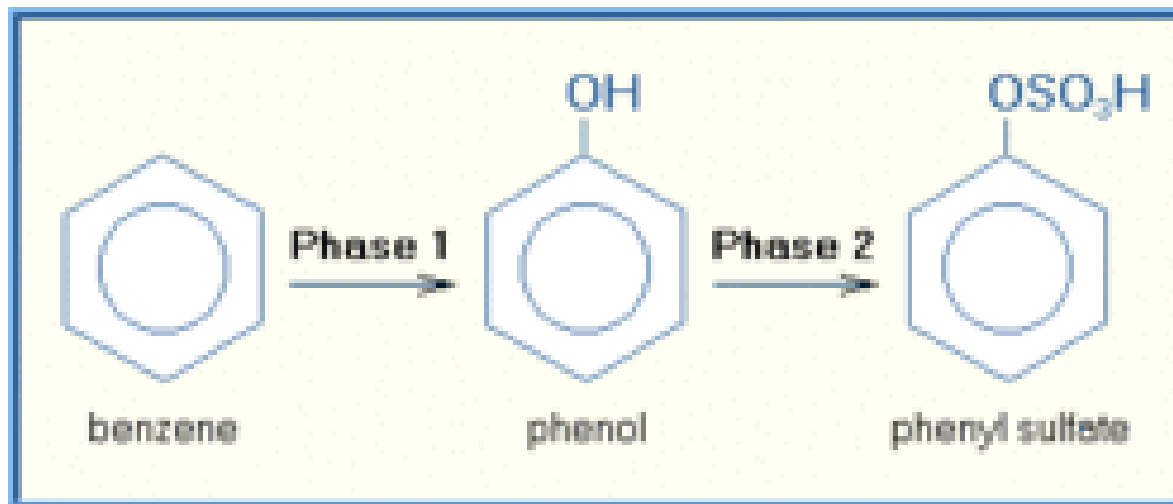


The biotransformation of ethyl alcohol to acetaldehyde:



ADH = alcohol dehydrogenase

The biotransformation of benzene (requires both Phase I and Phase II reactions):



The major transformation reactions for xenobiotics :

Phase I	Phase II
Oxidation	Sulfate conjugation
Reduction	Glucuronide conjugation
Hydrolysis	Glutathione conjugation
Acetylation	Amino acid conjugation

What is toxic detoxication?

An example:

First, methanol is slowly oxidized by alcohol dehydrogenase to yield formaldehyde.

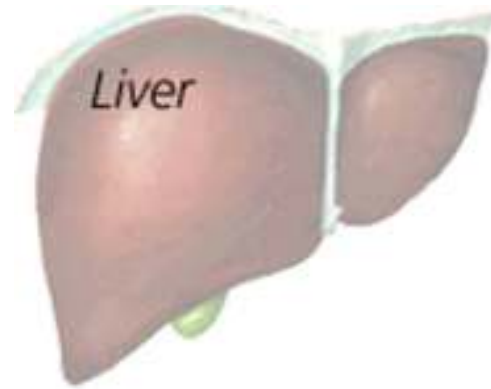
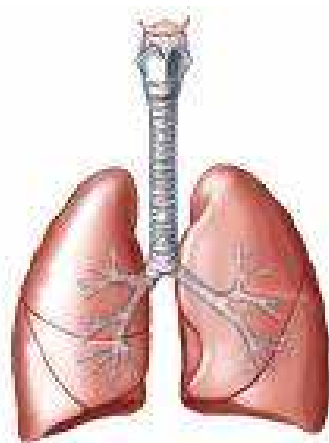
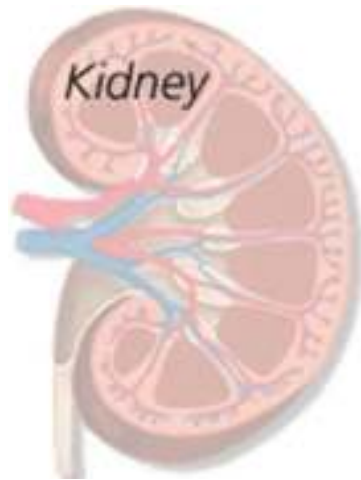
Next, formaldehyde is oxidized by formaldehyde dehydrogenase to yield formic acid (or formate, depending on the pH).

This oxidation occurs rapidly so that little formaldehyde accumulates in the serum.

Finally, formic acid is metabolized to carbon dioxide and water, which are excreted by the kidneys and lungs.

Formaldehyde and formic acid is more toxic than methanol.

Excretion



Sweat gland

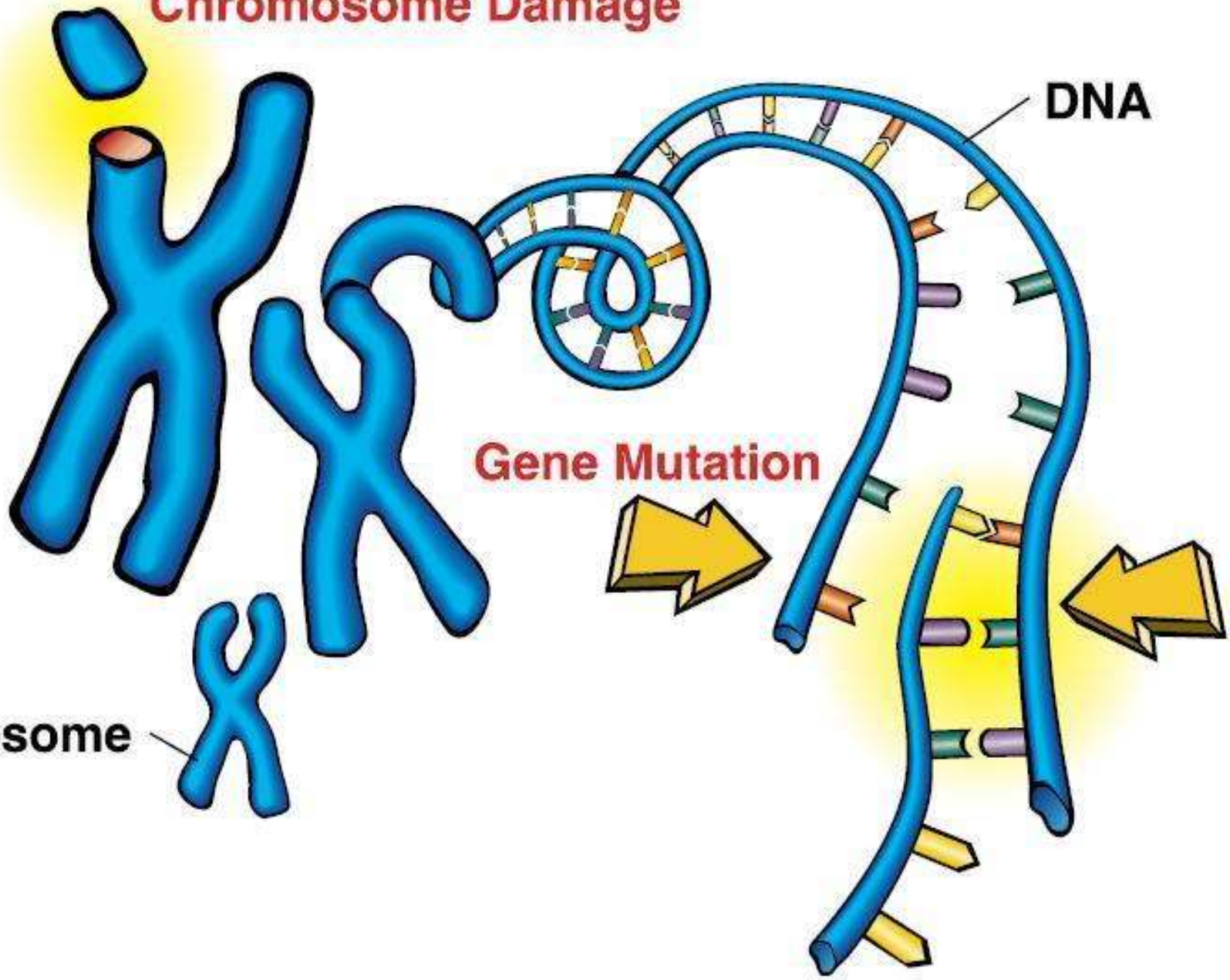


Chromosome Damage

DNA

Gene Mutation

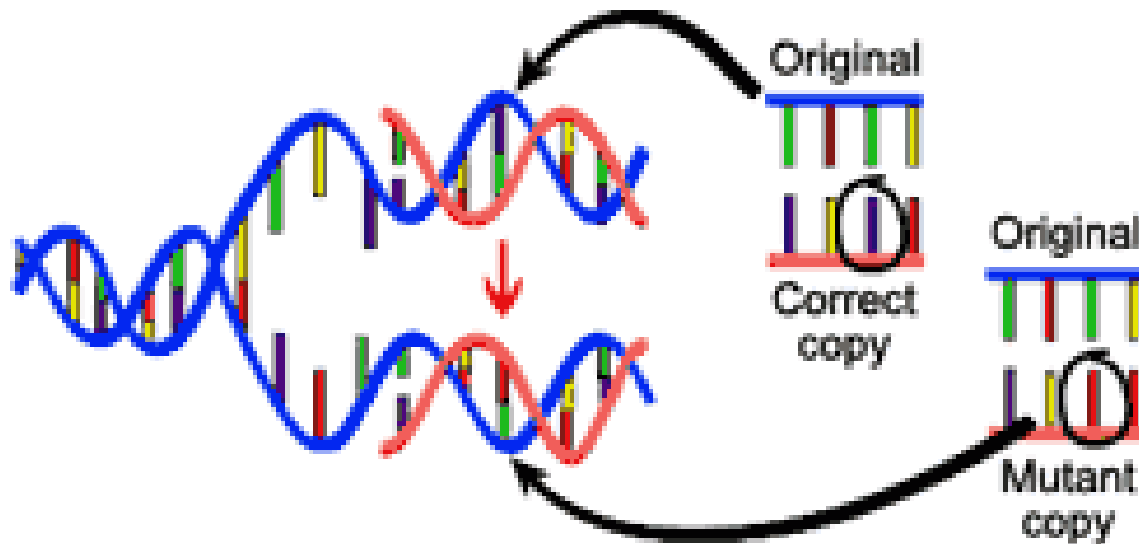
normal chromosome

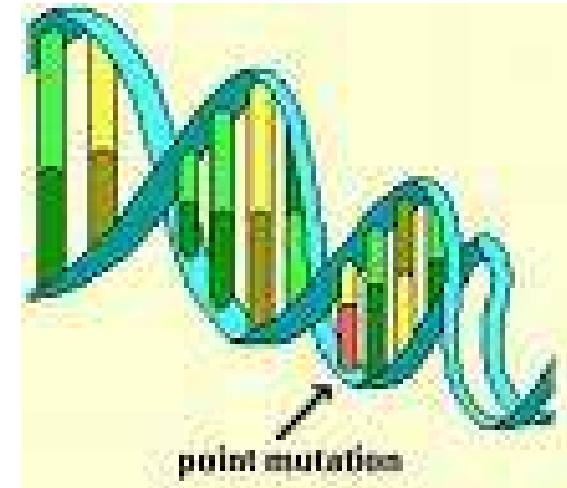
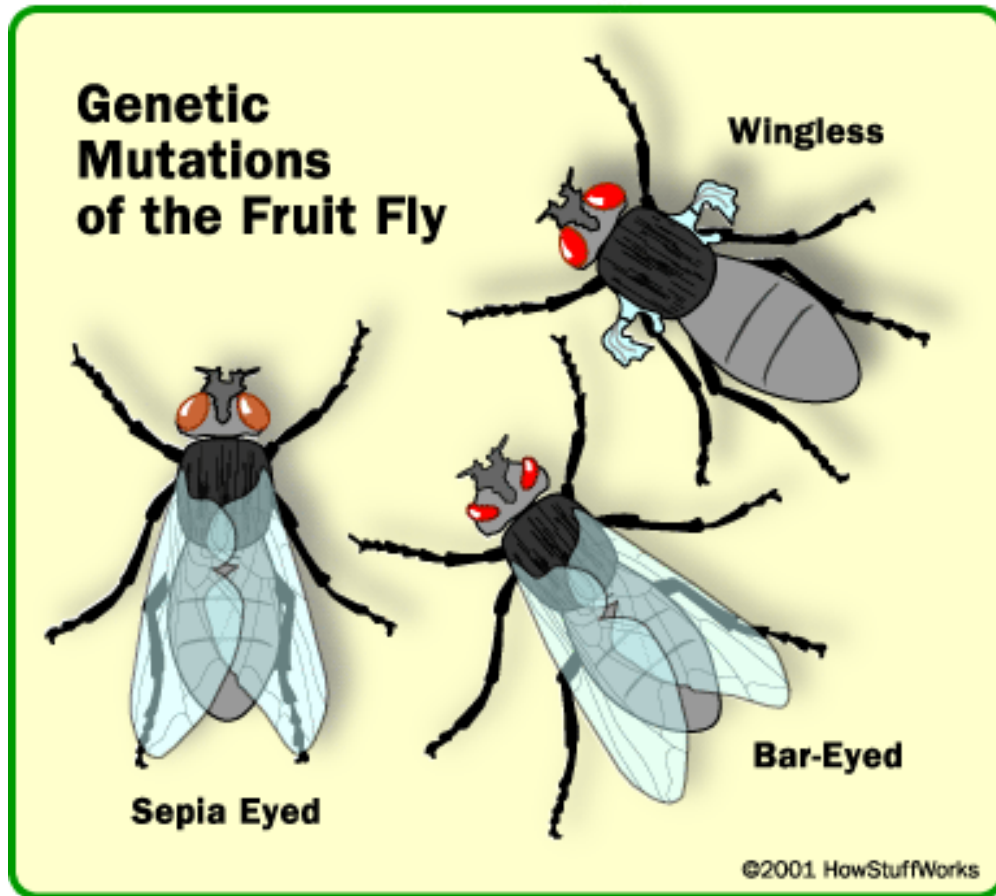




Brown was a Point mutation.
Depending on strain, this
mutation was due to radiation,
chemical induction, or
spontaneous mutation.

Fancier name: Chocolate





Hundreds of fruit flies in gelatin capsules was bombarded with **X-rays**. The irradiated flies were then bred to untreated ones.

In 10 days thousands of their offspring were buzzing around their banana-mash feed, and the researcher was looking upon an unprecedented outburst of man-made mutations. **There** were flies with bulging eyes, flat eyes, purple, yellow and brown eyes. Some had curly bristles, some no bristles...

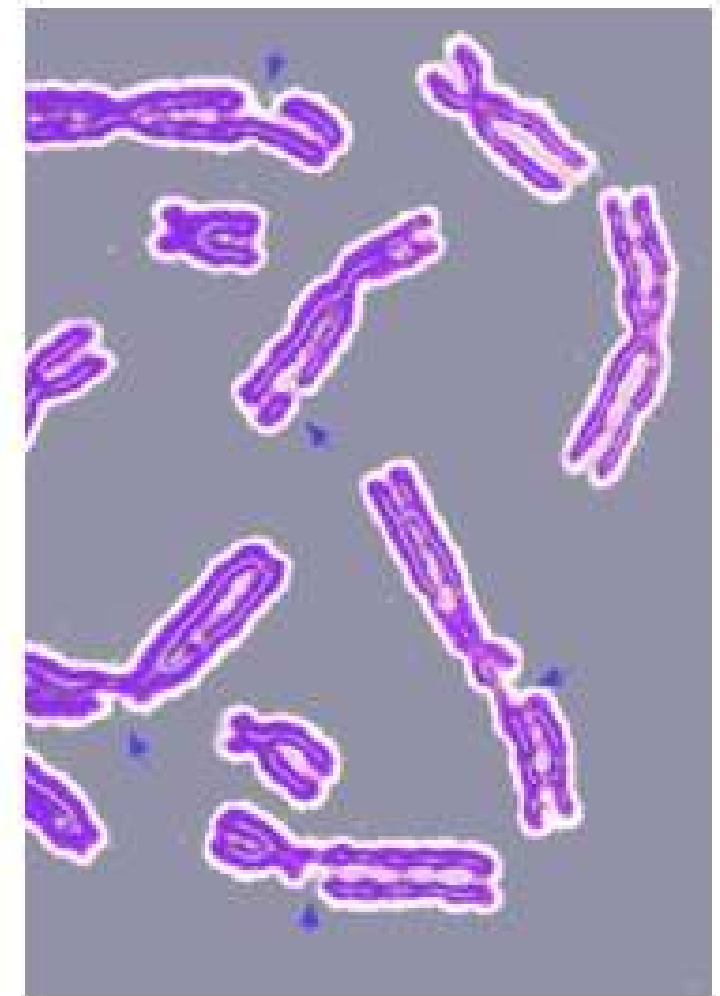
Genotoxicology monitoring system, genotoxicity tests

1. Chromosomal aberration (CA)

- genetic instability
- structural or numerical anomaly
- **Increased risk of cancer** in healthy individuals **with high levels of chromosomal aberrations** (CA) in peripheral blood lymphocytes

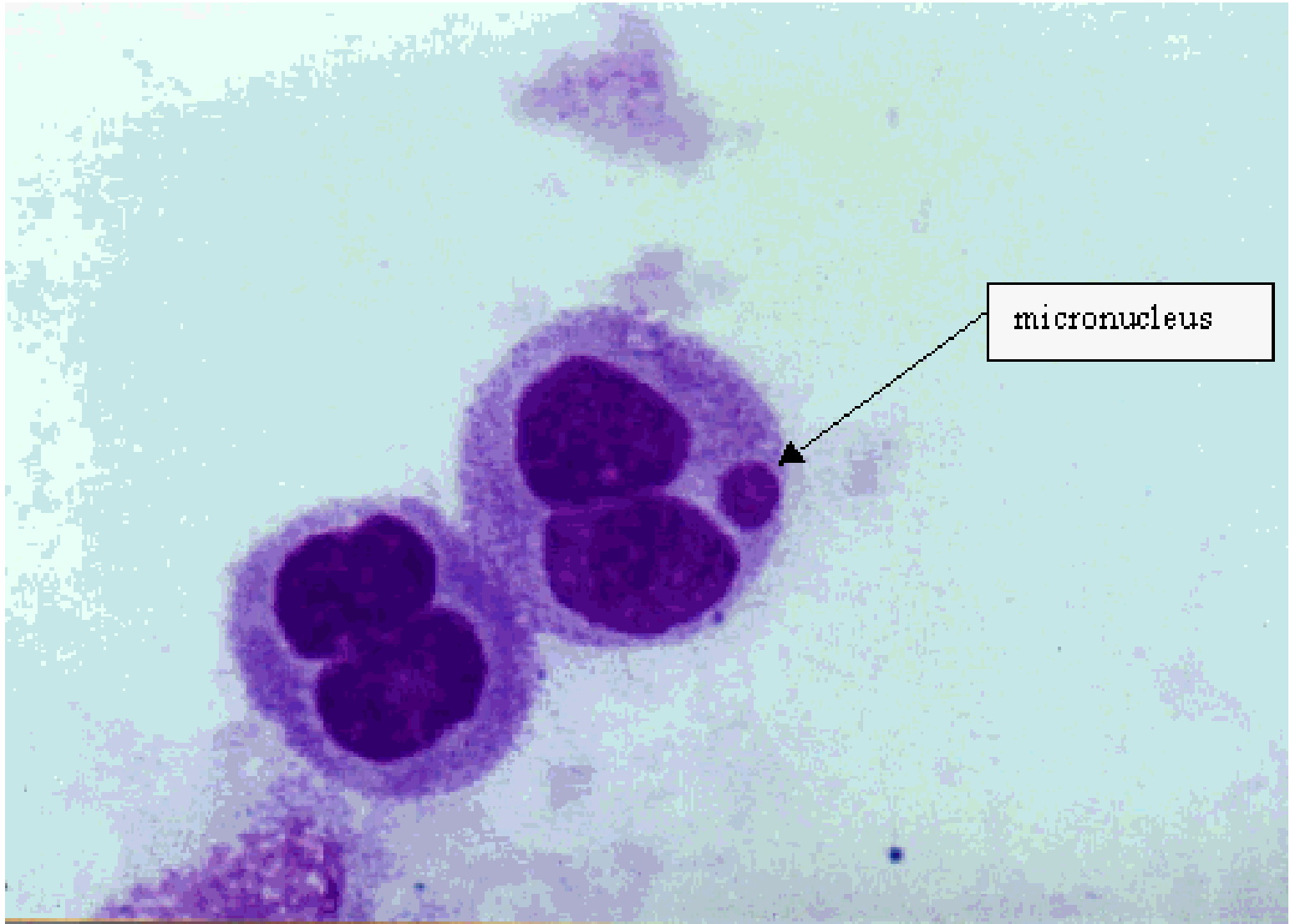
2. Sister-chromatid exchange test (SCE)

3. Micronucleus test



Sister-chromatid exchange (SCE)





micronucleus

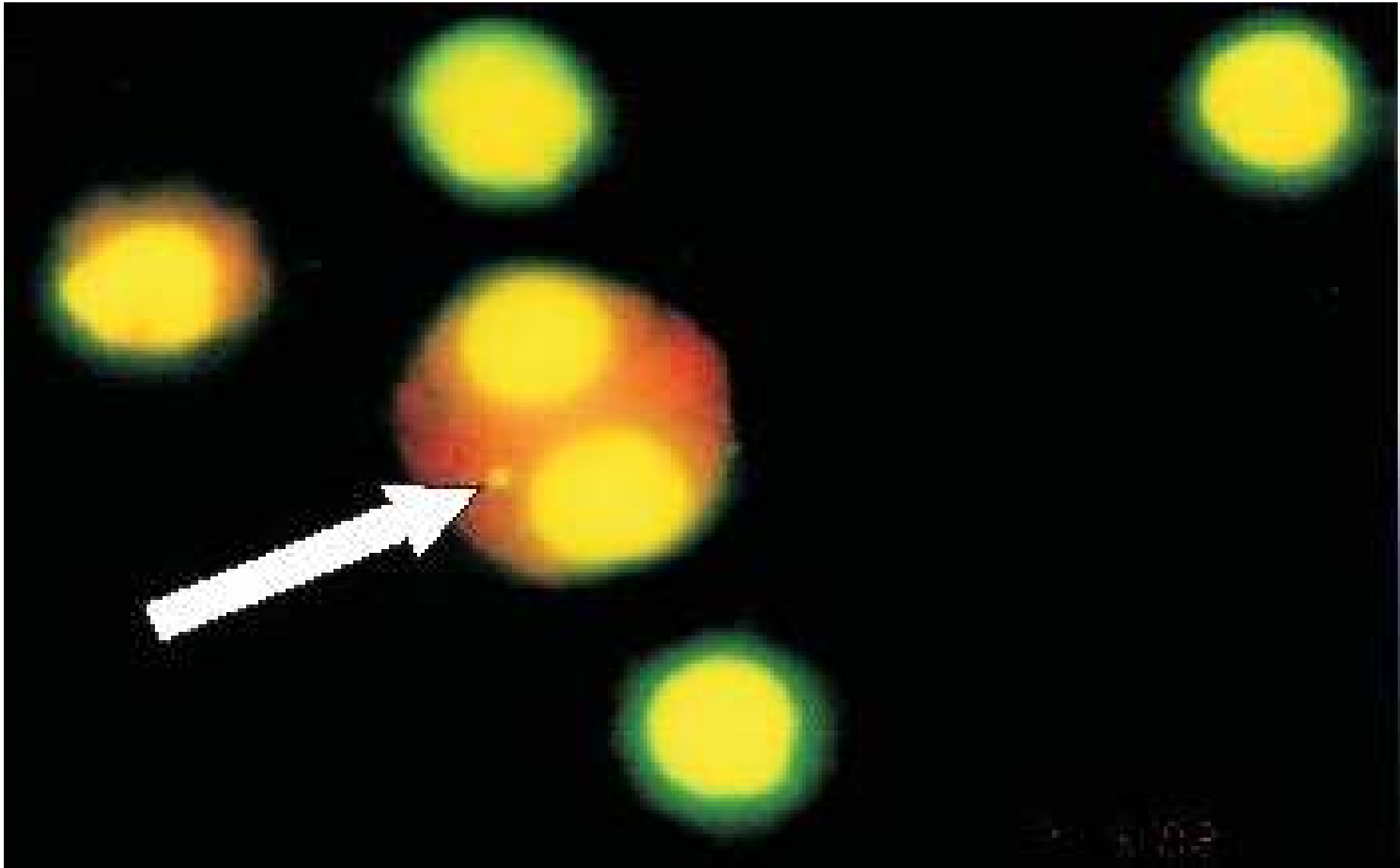
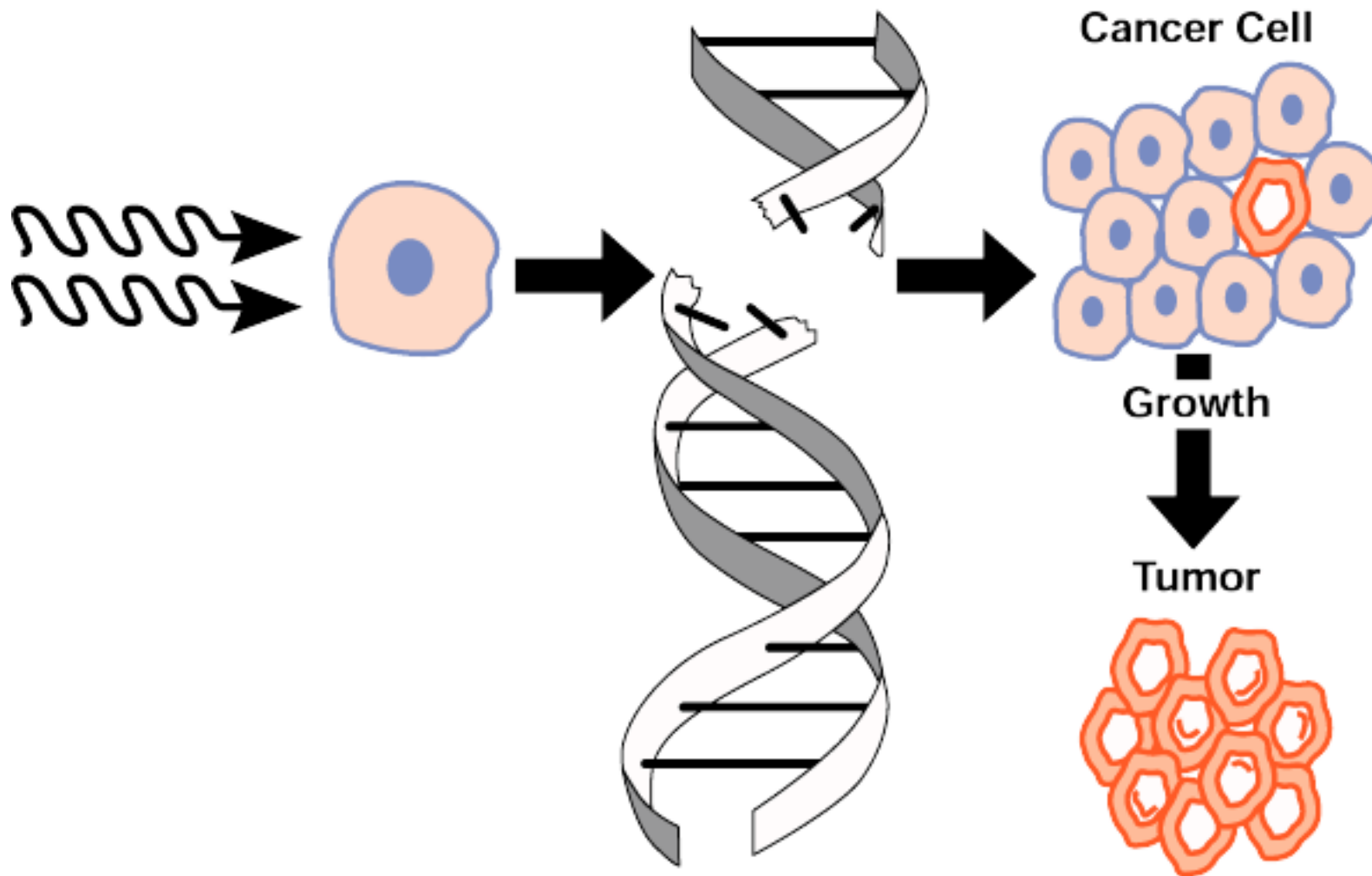


Illustration of a binuclear human lymphocyte containing a micronucleus (arrow). Nuclear material appears in yellow, cytoplasm in red. Acridin-Orange staining, fluorescence microscopy, enlargement 1000 fold.

Information in the genome exists in at least two forms, genetic and epigenetic.

The **genetic information** provides the blueprint for the **manufacture of all the proteins** necessary to create a living organism, whereas the **epigenetic information** provides additional instructions on **how, where, and when the genetic information will be used.**



Development of cancer from mutation: **1. Initiation** (initiated cell)
2. Promotion, **3. Progression**

The initiated cell must be exposed to the promoter to complete the second phase.

NEOPLASTIC CONVERSION

Chemical Carcinogen

↓
DNA Reaction
Epigenetic Effects

↓
DNA Alteration

Expression

NEOPLASTIC DEVELOPMENT

Neoplastic Cell

↓
Promotion

↓
Progression

↓
Neoplasm

Weisburger and Williams, The Distinction between Genotoxic and Epigenetic Carcinogens and Implication for Cancer Risk, *Toxicological Sciences* **57**, 4-5 (2000)

Genotoxic carcinogens:

that bind to DNA and cause mutation
by cell initiation

(for example: benzene, heavy metals).

Epigenetic carcinogens:

which are not able to cause mutation
and do not bind to the DNA but are able
to cause cancer through promotion

(for example: hormones, barbiturates).

Genotoxic carcinogens

- Chemical capable of producing cancer by directly altering the genetic material of target cells.

Direct carcinogens (no metabolic activation)

- Alkylating agents

Indirect carcinogens (metabolic activation)

- Polycyclic aromatic hydrocarbons
- Aromatic amines
- Nitrosamines
- Natural substances
 - Mycotoxins
- Inorganic carcinogens
 - Ni, Cr, Cd, As

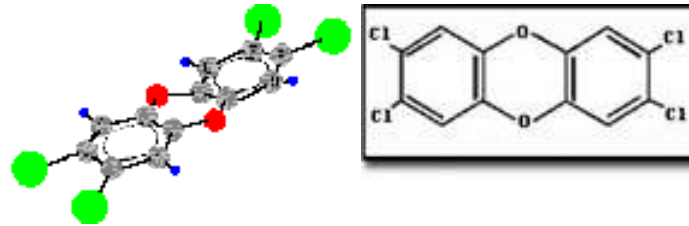
Epigenetic carcinogens

- **Cytotoxic carcinogens**

- Nitrotriacetate, BHA (Butylated Hydroxyanisole), BHT (Butylated hydroxitoluene)

- **Tumor promoters**

- DDT, Dioxin



- **Hormones**

- Estradiol, DES (diethylstilboestrol)

- **Immunosuppressants**

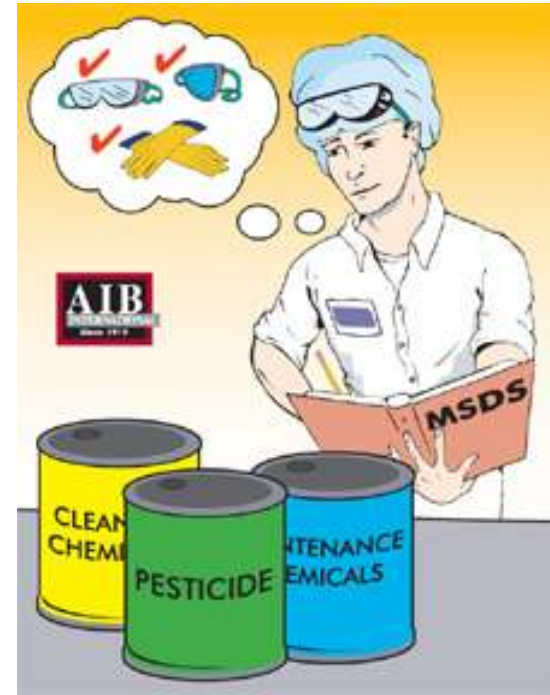
- Cyclosporin A

- **Particulates**

- Asbestos

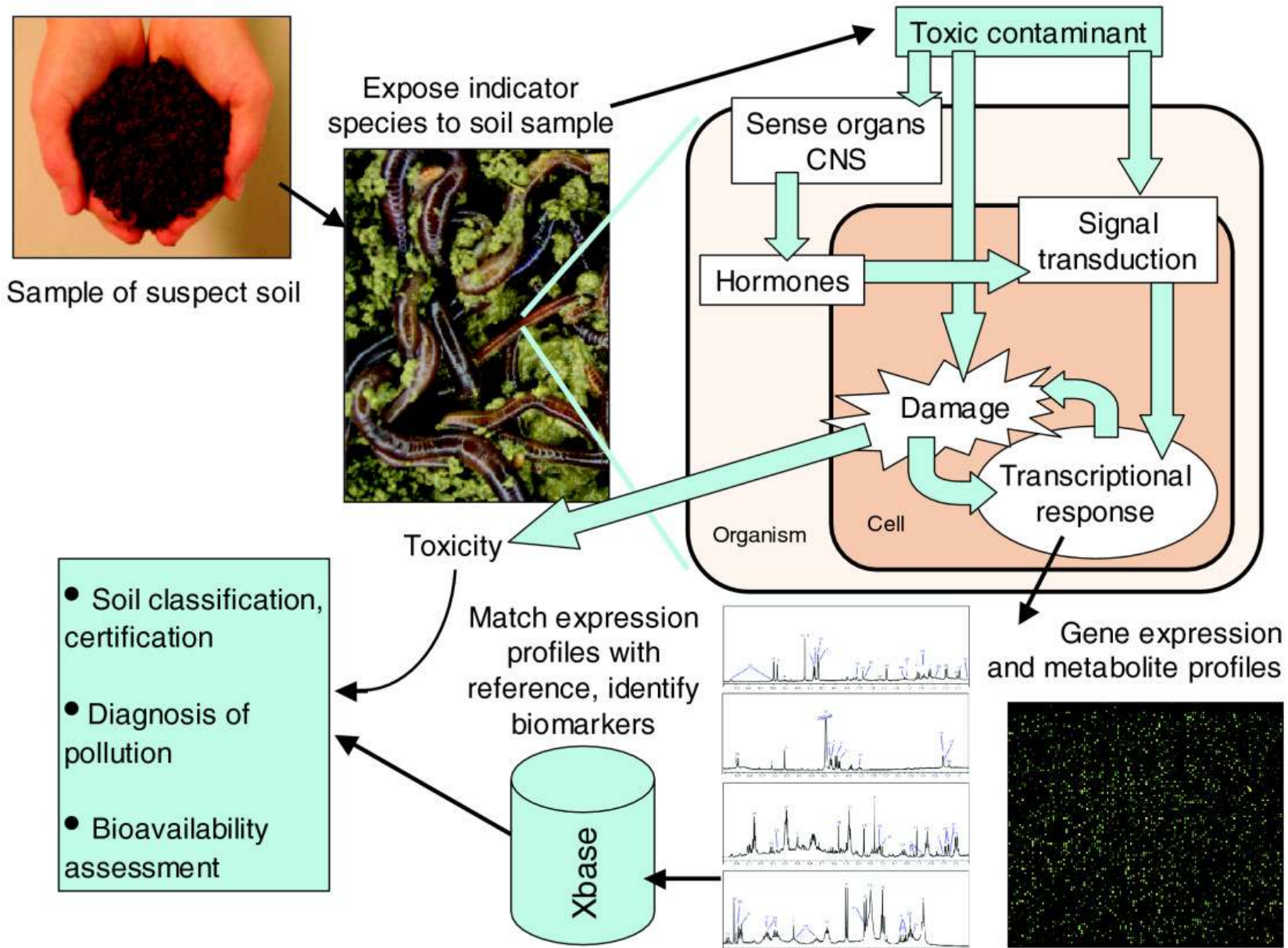
Toxicology II.

BERN. RAMAZZINI
 de Rebus, Morbis, Causis, Signis, Prognosi,
 &
 MORBIS
 ARTIFICUM
 DIATRIBA.
 AUCTORIS
 LUCA ANTONII SCOTII
 de Aliphanis Medici
 DE VITALI MEDICINA
 PRAELECTORIS,
 Pro sua salute
 DISSERTATIO LOGICA
 Editio Secunda.
 MDCCLXXVII.
 In aedibus
 Carol. GUILL. DEUM. vulgo M. DCCII.
 Societate Typographica. imp.



- The Dirty Dozen POPs**
- polychlorinated biphenyls (PCBs)
 - dioxins (PCDDs)
 - furans (PCDFs)
 - aldrin
 - dieldrin
 - DDT
 - endrin
 - chlordane
 - hexachlorobenzene
 - mirex
 - toxaphene
 - heptachlor

SU Department of Public Health



Arsenic

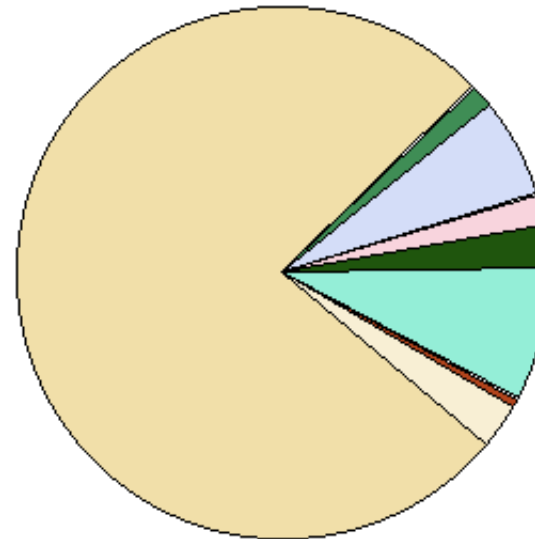
Exposure to lower levels of arsenic and chronic exposition can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and **can lead to progressive peripheral and central nervous changes, sensation of “pins and needles” in hands and feet, hyperpigmentation, hyperkeratosis, „black foot disease”.**

Arsenic and arsenic compounds are human carcinogens.



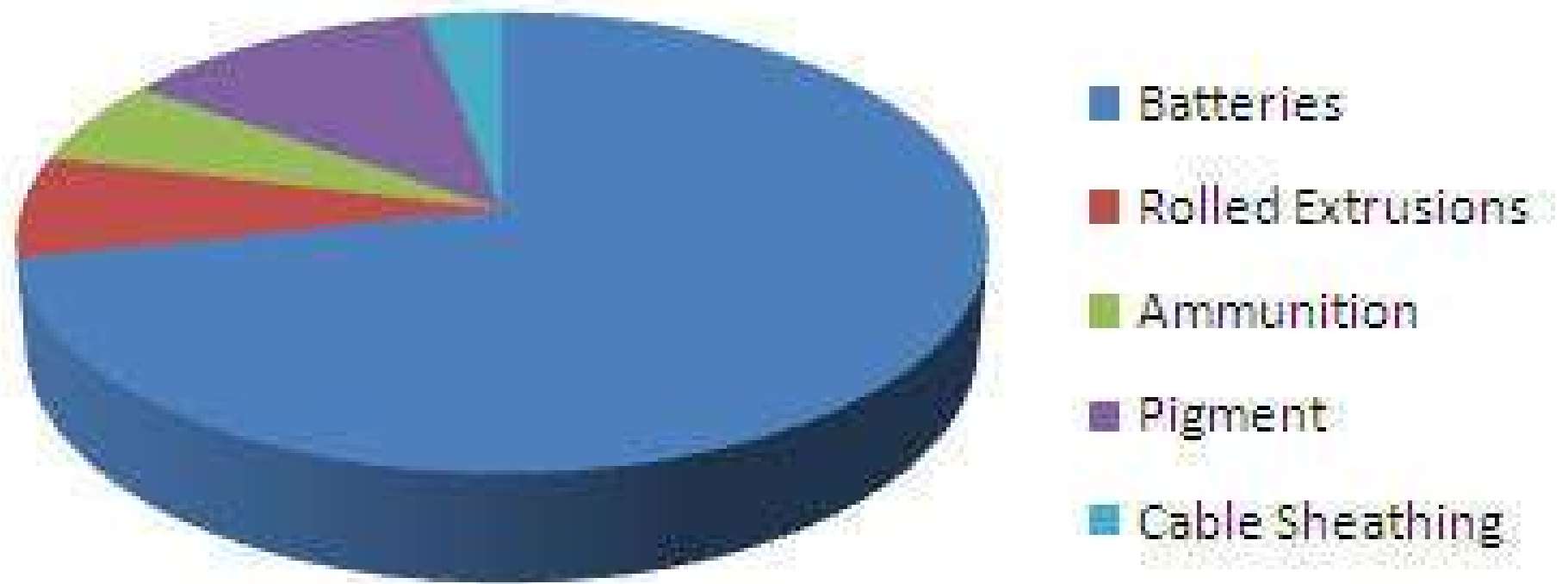


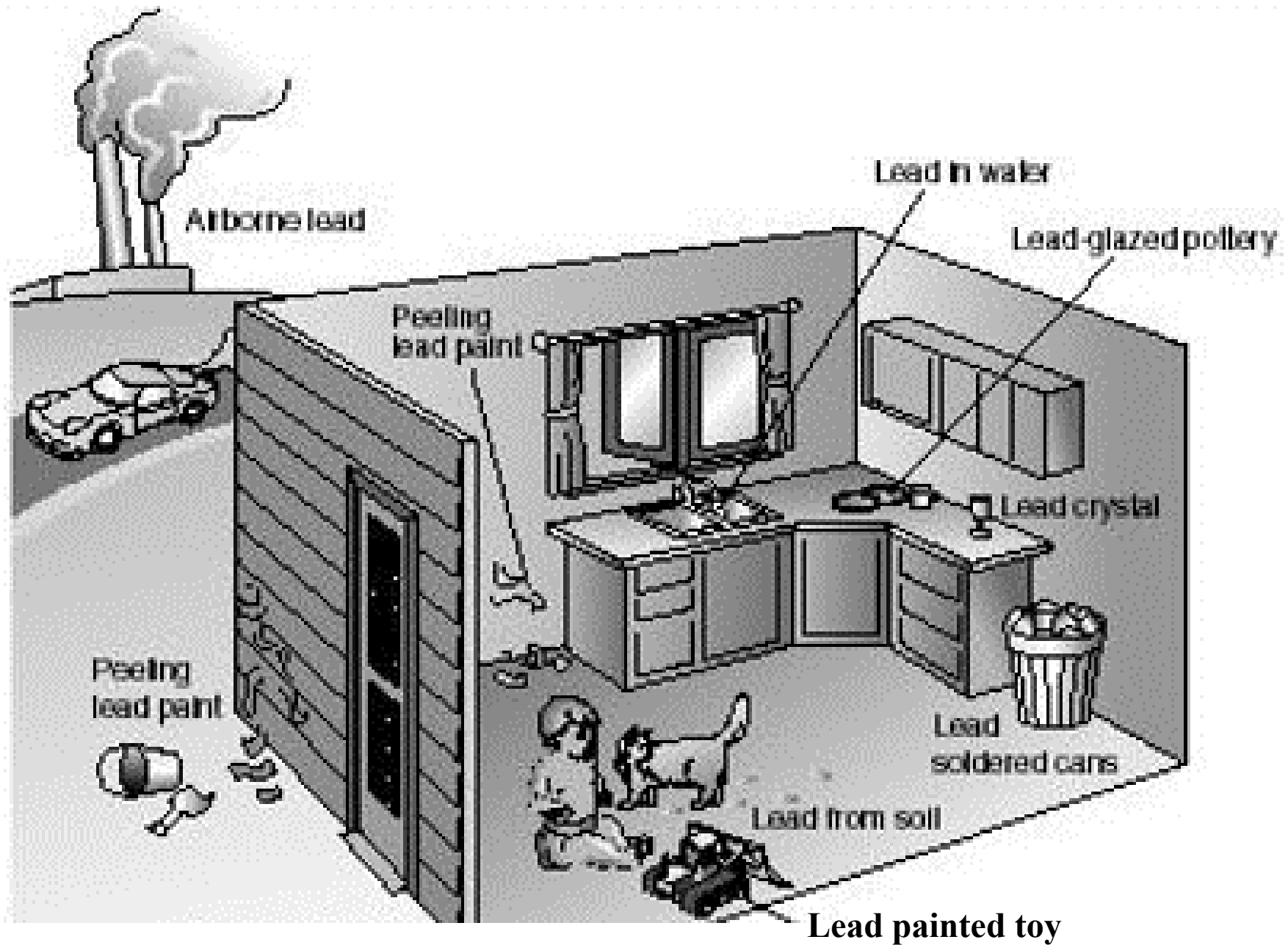
Johannes
GUTENBERG
(about 1400 -
1468)



- Batteries
- Cable Sheathing
- Rolled & Extruded
- Shot/Ammunition
- Alloys
- Pigments & Compounds
- Gasoline Additives
- Miscellaneous

End Uses of Lead



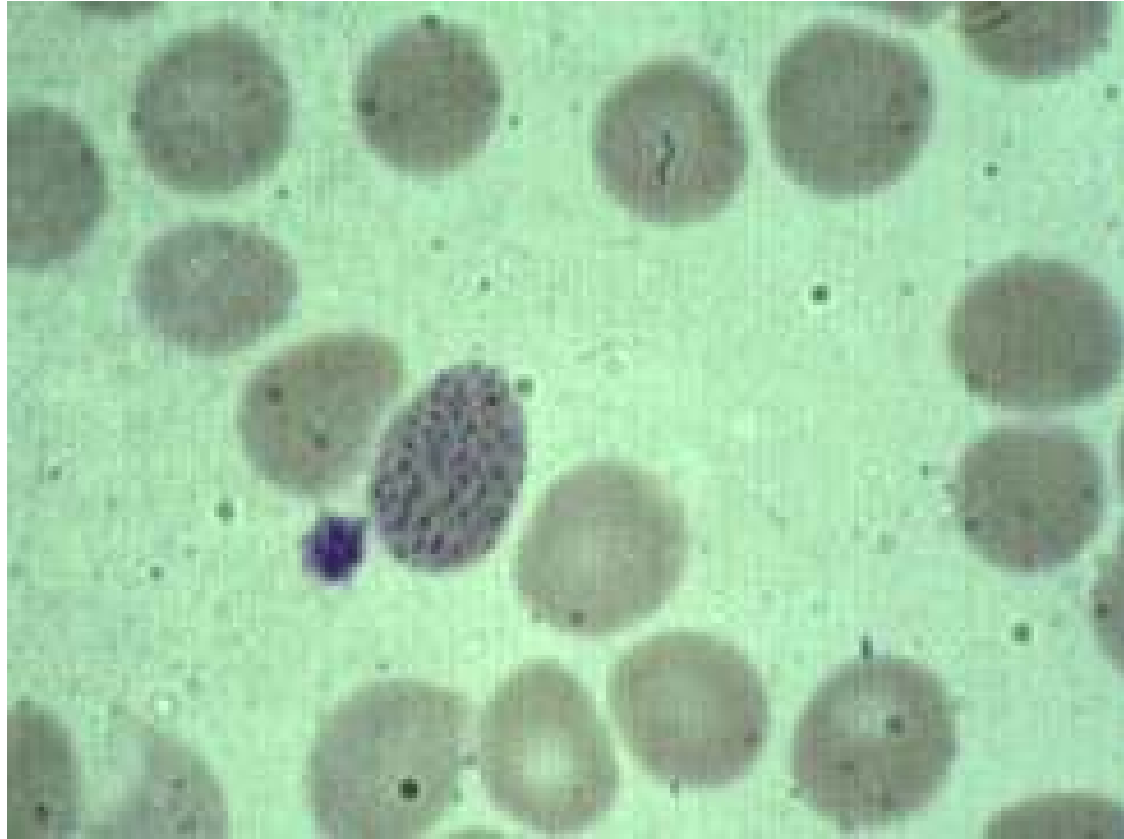


Lead

Lead can damage nervous connections and cause **blood and brain disorders**. Lead causes **ineffective heme synthesis** and subsequent microcytic anemia.

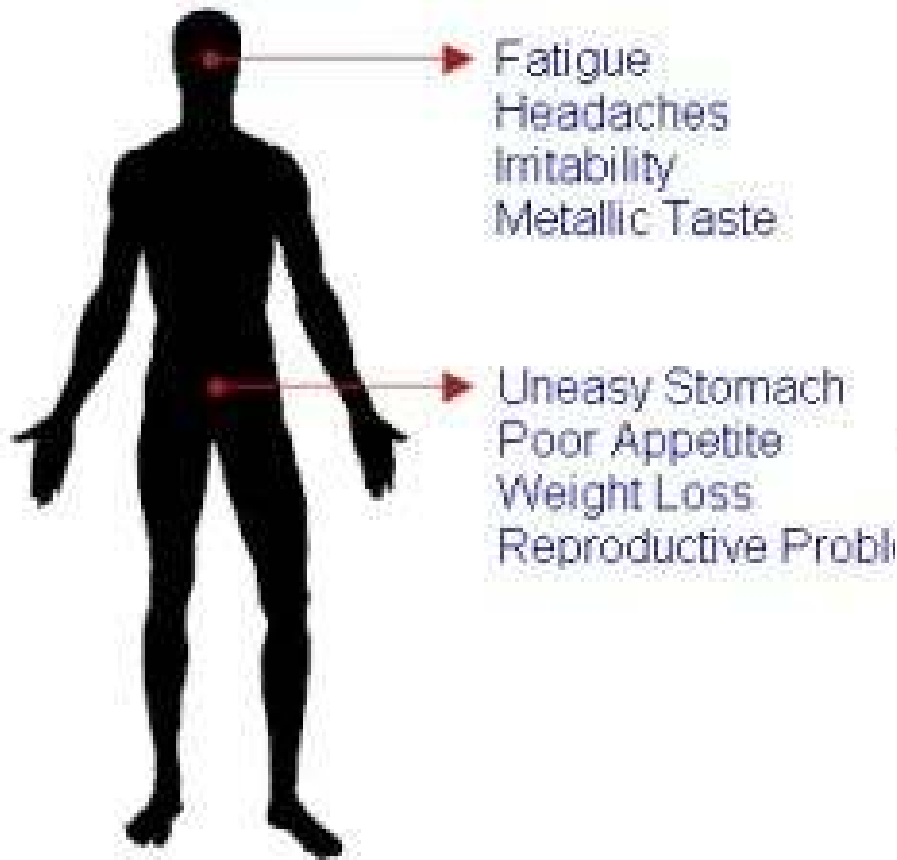
Long term exposure to lead or its salts (especially soluble salts or the strong oxidant PbO_2) can cause nephropathy, and colic-like abdominal pains.

Biological monitoring: measuring lead level in the blood.

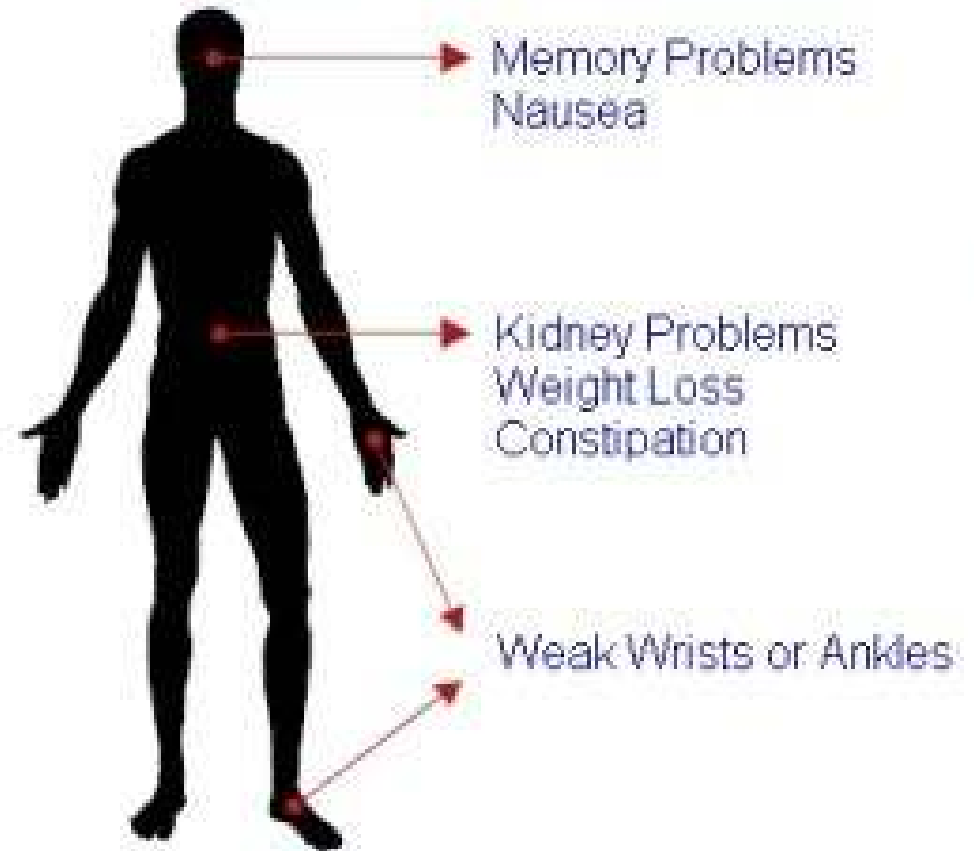


In blood lead is mostly associated with erythrocytes (red blood cells) – Above shows **basophilic stippling in red blood cells, resulting from the interference of lead with the sulphhydryl groups responsible for the proper function of the enzymes responsible for synthesising haemoglobin. Thus abnormal haemoglobin is produced - hence the basophil stippling, and anaemia.**

Early Symptoms of Lead Poisoning



Later Symptoms of Lead Poisoning



Dangers of lead and arsenic poisoning

Arsenic poisoning

Nerve damage

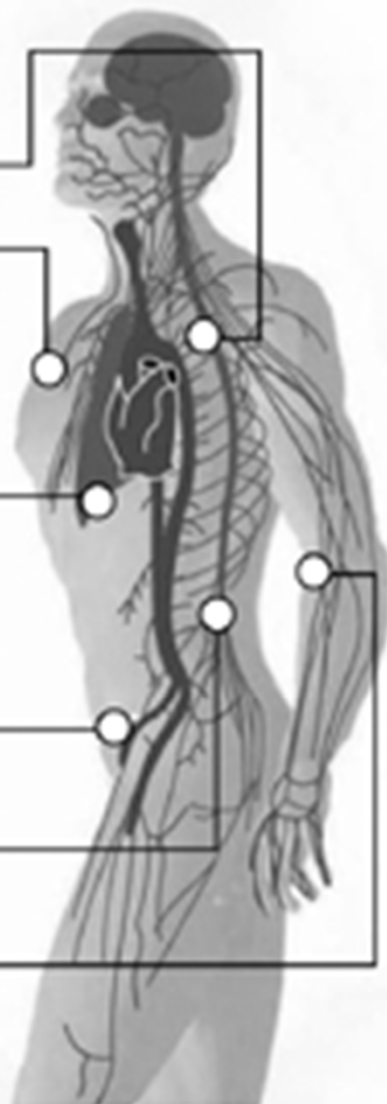
Skin damage:

- Hyperkeratosis (scaling skin)
- Pigment changes

Increased cancer risk:

- Lung
- Bladder
- Kidney and liver cancers

Circulatory problems in skin



Lead poisoning

High levels of lead

- Mental retardation, coma, convulsions and death

Low levels of lead

- Reduced IQ and attention span, impaired growth, reading and learning disabilities, hearing loss and a range of other health and behavioral effects.

Arsenic Poisoning

Easy to diagnose and treat -- if you think of it.

Sources of arsenic:

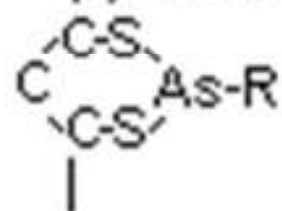
Well water (some countries)

Mining, industry

Pesticides

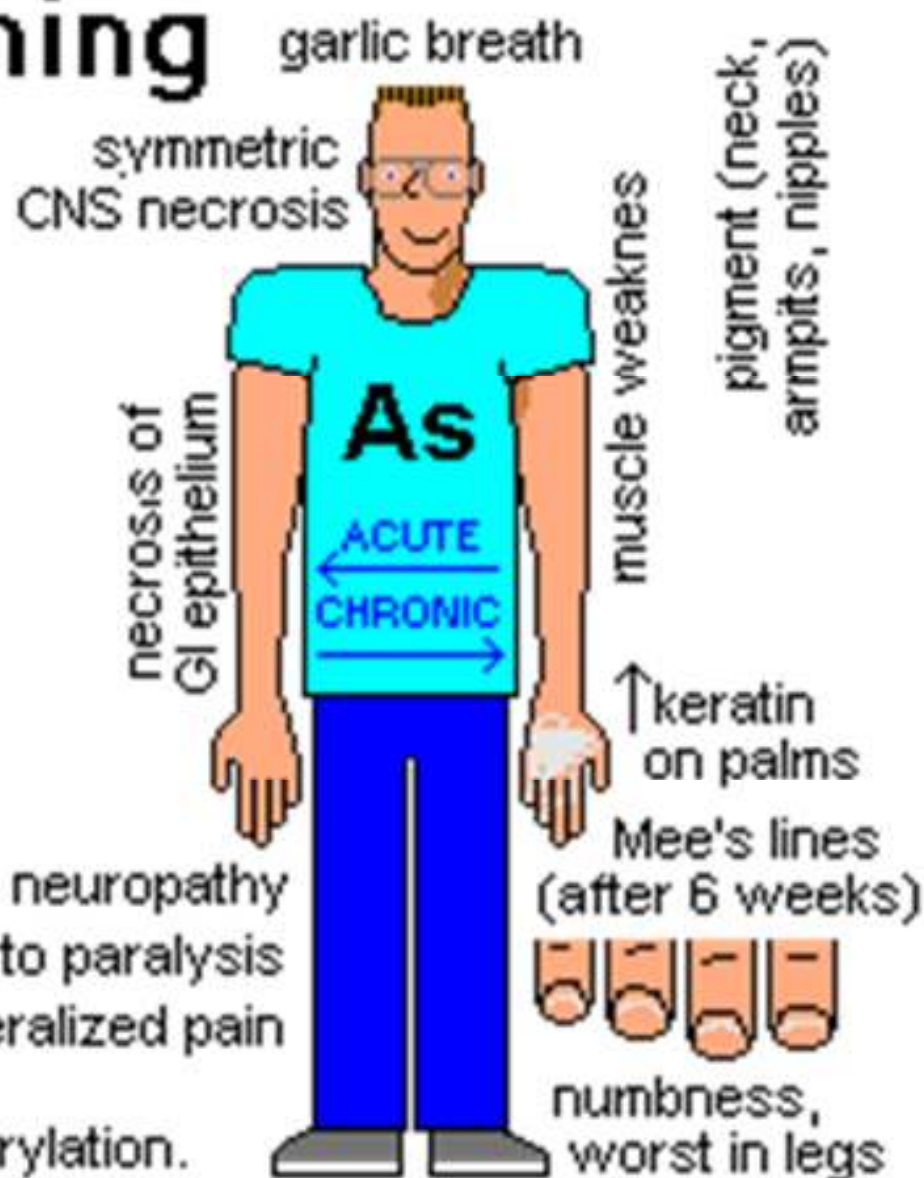
Homicide / Suicide

As^{+3} binds to lipoic acid in pyruvate dehydrogenase.



stocking and glove neuropathy with progression to paralysis and severe generalized pain

As^{+5} uncouples oxidative phosphorylation.





Nagyréve

NYUGAT

SZERKESZTIK:

MÓRICZ ZSIGMOND és BABITS MIHÁLY

XXIII. évfolyam 3. sz.

1930. február 1.

BABITS MIHÁLY:

A Nyugat és az akadémizmus

FENYŐ MIKSA:

Az Ignotus-estet

ERDÉLYI JÓZSEF:

A bárány (Román népballada után)

RÉVÉSZ BÉLA:

Osvát

DÉRY TIBOR:

Két vers

MÓRICZ ZSIGMOND:

Tiszazugi méregkeverők

KOMJÁTHY ALADÁR:

Vers

PAP KÁROLY:

Beszéd Magdala határában (Novella)

EMÖDI NAGY LAJOS:

A vonat (Novella)

JUHÁSZ GÉZA

Vers

HARASZTI SÁNDOR:

A vajdasági magyar irodalom tíz éve

TURÓK SOPHIE:

Vers

MÓRICZ ZSIGMOND: *A nagy fejedelem (Regény, III.)*

IRODALMI FIGYELŐ: Sárközi György: *Hajnali madár* — Komlós Aladár: *Marika, énekelj!* — Pénz a láthatáron — Kodolányi János: *Hortobágy* — Schöpflin Aladár: *Az őrsdiák* — Illés Endre: *A gyár* — Almódók, lázadók — Nyolc hold föld — Turóczi József: *Lenau magyarul* — Schöpflin Aladár: *Az ördög sarkantyúja* — Laziczius Gyula, Török Sophie: *Északi írók* — Halász Gyula: *Három cserkész Afrikában* — Komjáthy Aladár: *Az anyag korpuszkuális elmélete* — Barfa János: *A filozófia nagy rendszerei* — Apró bírálatok — Angol irodalom: Schöpflin Aladár: *David Garnett két regénye* — Rosti Magdolna: *Virginia Woolf* — Lytton Strachey

SZÍNHÁZI FIGYELŐ: Schöpflin Aladár: *A sirály*

ZENEI FIGYELŐ: Tóth Aladár: *A Greguss-díj*

KEPZOMUVÉSZETI FIGYELŐ: Farkas Zoltán: *A KUT kiállítás*
A Műcsarnok kibővítése

Előfizetési ára
negyedévre 10 P
65 Ke, 300 lei, 100 dinár



Egyes szám ára
2 pengő
12.50 Ke, 60 lei, 20 dinár

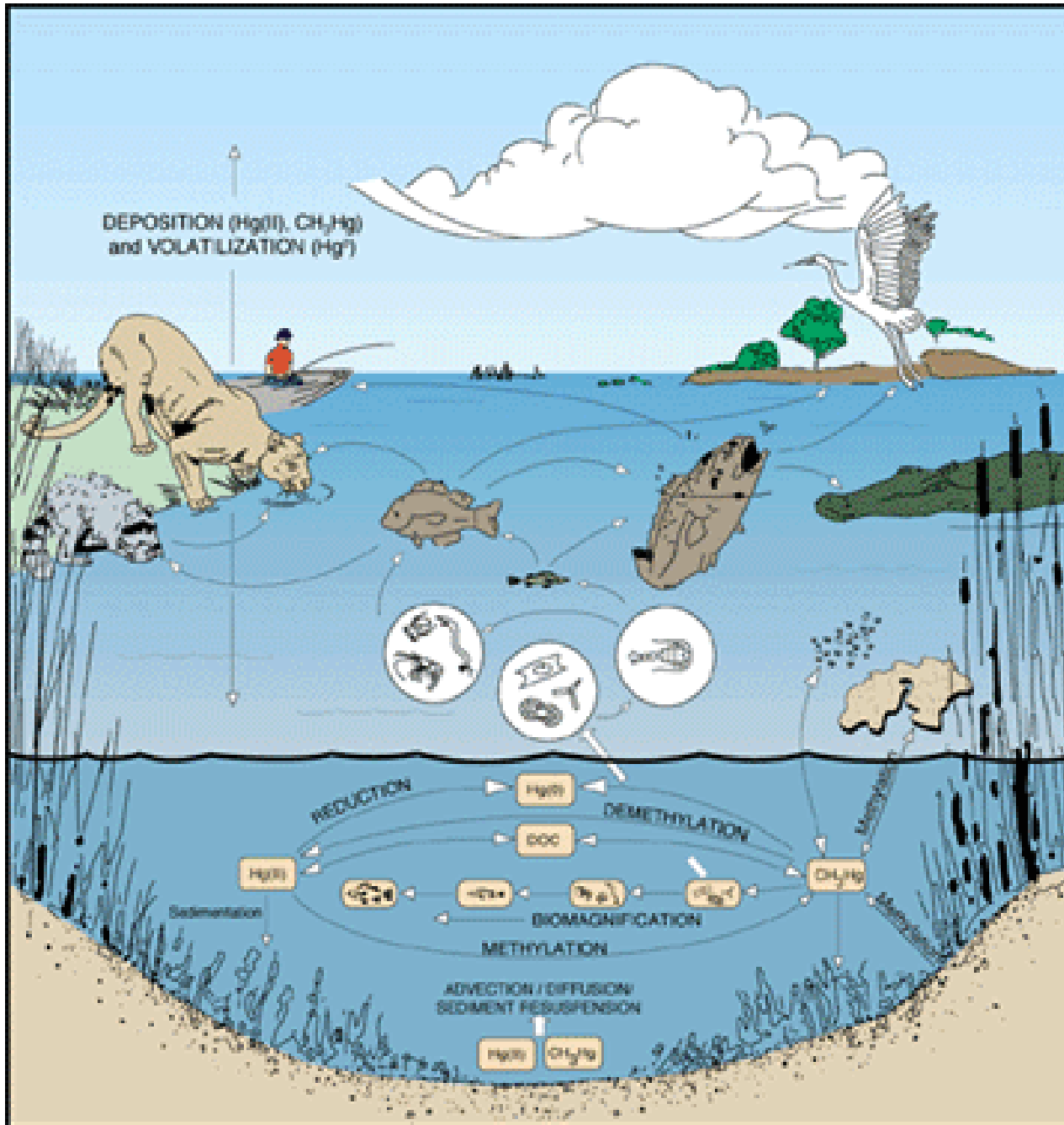
Mercury

Chronic exposure may result in tremors, impaired cognitive skills, and sleep disturbance in workers with chronic exposure to mercury vapour even at low concentrations. It affects the human **brain, spinal cord, eyes, and kidneys.**



„As mad as a hatter.” The "mad hatters" of the 19th century suffered from **mercury poisoning** which caused personality changes, nervousness, trembling, and even dementia. The hatters were exposed to mercury in the felting process, where mercury was rubbed onto cloth to preserve it.

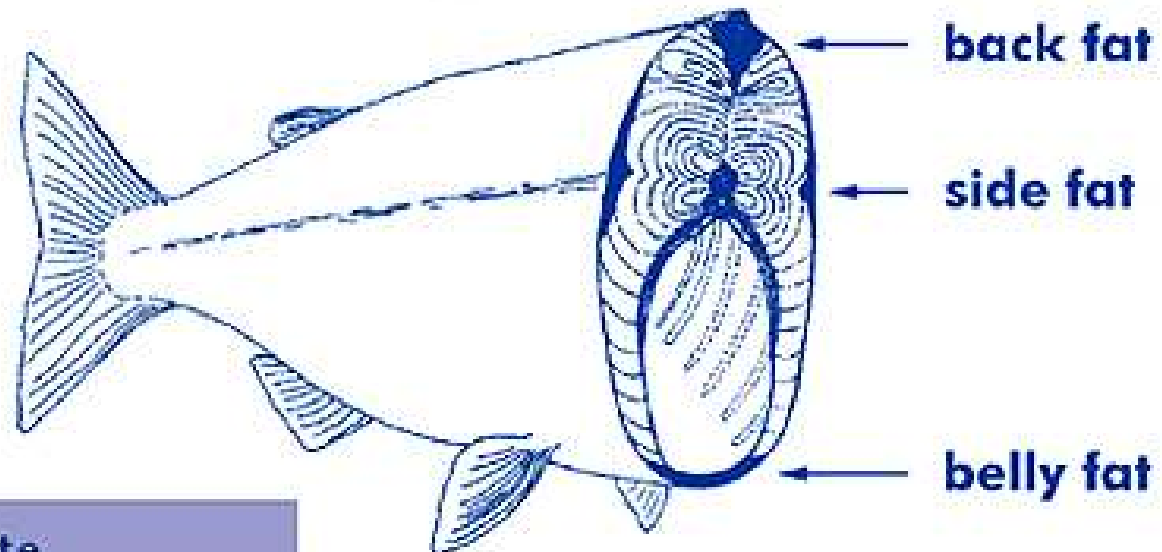




Mercury Methylation Cycle

- **Methylmercury** —a chemical made up of **mercury** combined with **carbon**; mainly produced by microscopic organisms in the water and soil.

Trim away the skin and fatty tissue before cooking to reduce the level of some pollutants in the fish you eat.



Health Note

Mercury is found throughout the tissue in fish, so these cleaning and cooking techniques will not reduce the amount of mercury in a meal of fish.

What is Minamata-disease?



Children with Congenital Minamata Disease due to intrauterine methylmercury poisoning (Harada 1986).

Mercury - methylmercury

The **methylmercury bioaccumulated within the food chain, from plankton and other microorganisms up to fish and shellfish.** Obtained much of their protein from Minamata Bay seafood, in the early 1950s, Minamata Bay residents began to exhibit **symptoms of neurological illness**, such as **uncontrollable trembling, loss of motor control, and partial paralysis.**



Amalgam fillings - is it harmful or not?

What to do if you have a mercury spill?



Do

- Leave the area if you are not involved in the cleanup.
- **Open windows and doors to ventilate** the area.
- **Collect very small amounts** of mercury with adhesive tape or an eyedropper. **Store it in a sealed plastic container for transport to a household hazardous waste collection.**

Do Not

- **Use a vacuum cleaner to clean up mercury.**
A vacuum cleaner will spread mercury vapors and tiny droplets and increase the area of contamination.

Cadmium

Cadmium is associated with industrial processes such as metal plating and the production of **nickel-cadmium batteries, pigments, plastics, and other synthetics.**

Chronic exposure can result in chronic obstructive lung disease, renal disease and fragile bones.



What is Itai-itai disease?



The **cadmium** was released into rivers by mining companies in the mountains. It principally consists of a painful skeletal condition resulting from **weak and deformed bones**.

Spinal and leg bone pain, and an increasingly waddling gait due to bone deformities.

Cadmium is readily taken up by rice and other plants time.

<http://www.kanazawa-med.ac.jp/~pubhealt/cadmium2/itaiitai-e/itai01.html>

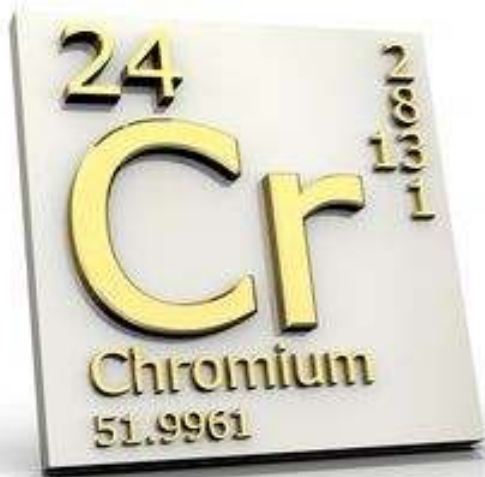
Chromium

Cr^{III} , Cr^{VI} (the latter much more dangerous)

Cr^{III} is an essential trace mineral (glucose tolerance factor)

acute poisoning (renal tubular necrosis, severe liver damage)

chronic poisoning (dermatitis, skin ulcers ('chrome holes'), ulceration of nasacal mucosa (perforation of nasal septum), airway irritation, chronic bronchitis, Cr^{VI} - lung cancer





Hexavalent **chromium** enters the human body mainly through inhalation in the form of dust, fume or mist.

They are mainly exposed to hexavalent chromium in any of the following ways:

- During the **production of chemicals like chromate pigments**, chromic acid.
- Working in the close proximity of **chrome electroplating**.
- While **welding of stainless steel, chrome coated metals** or **chrome alloys**.
- At the time of **application or removal of paints with chromate** content.



After effects of chromium, a carcinogenic commonly used in the tanning

Nickel

Chronic exposition may lead to **chronic rhinitis, sinusitis, perforation of nasal septum, asthma, cancers** of the nasal cavities.

Biological monitoring: Ni-measurement in the urine



Nickel necklace -
could cause allergic skin
dermatitis.



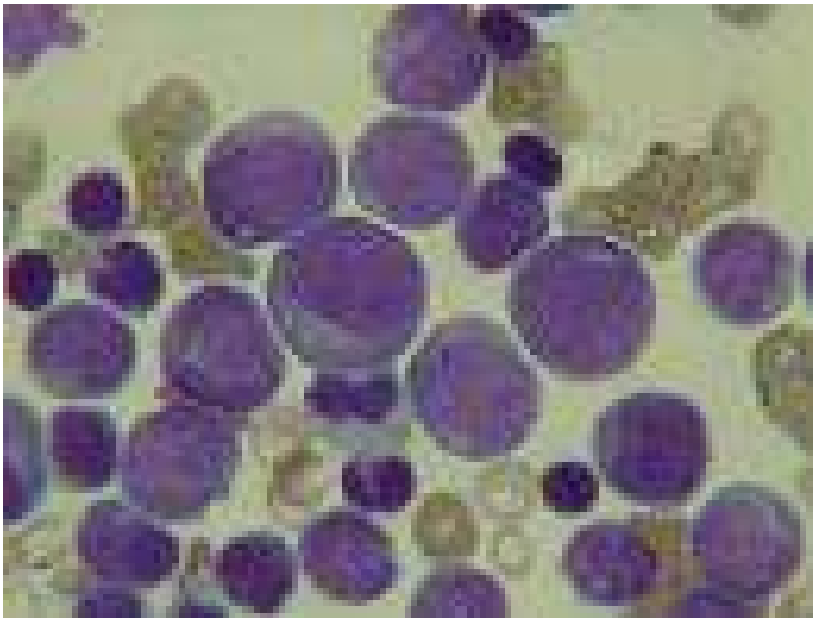


Allergy of the skin to nickel - a case of nickel eczema (dermatitis).

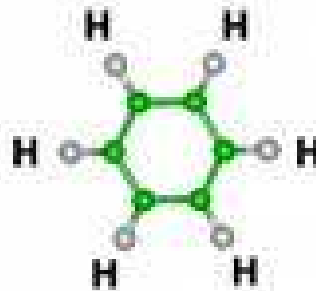
Benzene

It is an important industrial solvent and precursor in the production of drugs, plastics, synthetic rubber, and dyes.

Chronic exposure: **damages the bone marrow** and can cause a decrease in red blood cells, leading to anemia. It can also cause excessive bleeding and **depress the immune system**, increasing the chance of infection. Benzene causes **leukemia**. Benzene targets **liver, kidney, lung, heart and the brain**.



Acute myeloid leukemia



Carbon Monoxide = CO

Properties

- Gas

- Colorless
- Odorless
- Tasteless
- Non-corrosive

"Undetectable by Humans"

- Density = 1.25 g/L
- Specific Gravity = 0.967
(compared with Air)

- Shaped like 2 atoms of oxygen



Methane

CO

Air

CO₂

rises

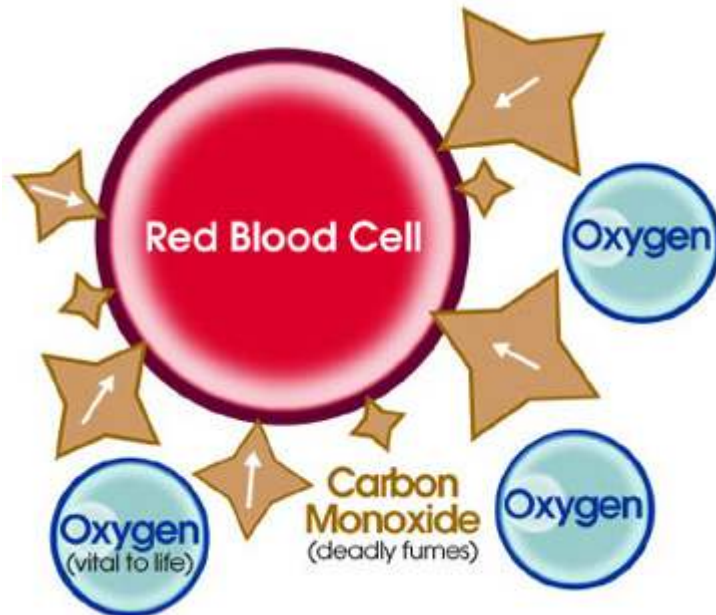
moves like air

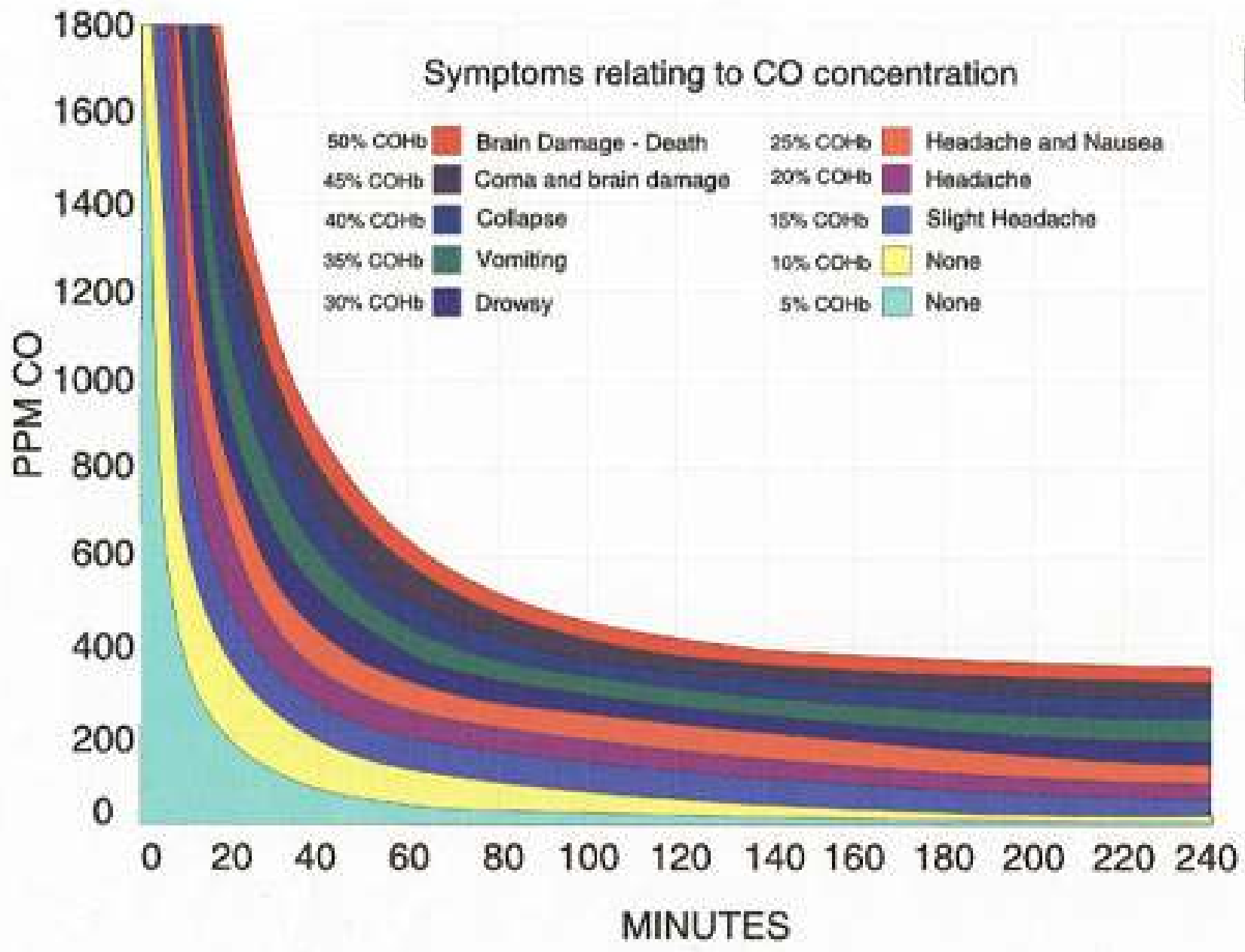
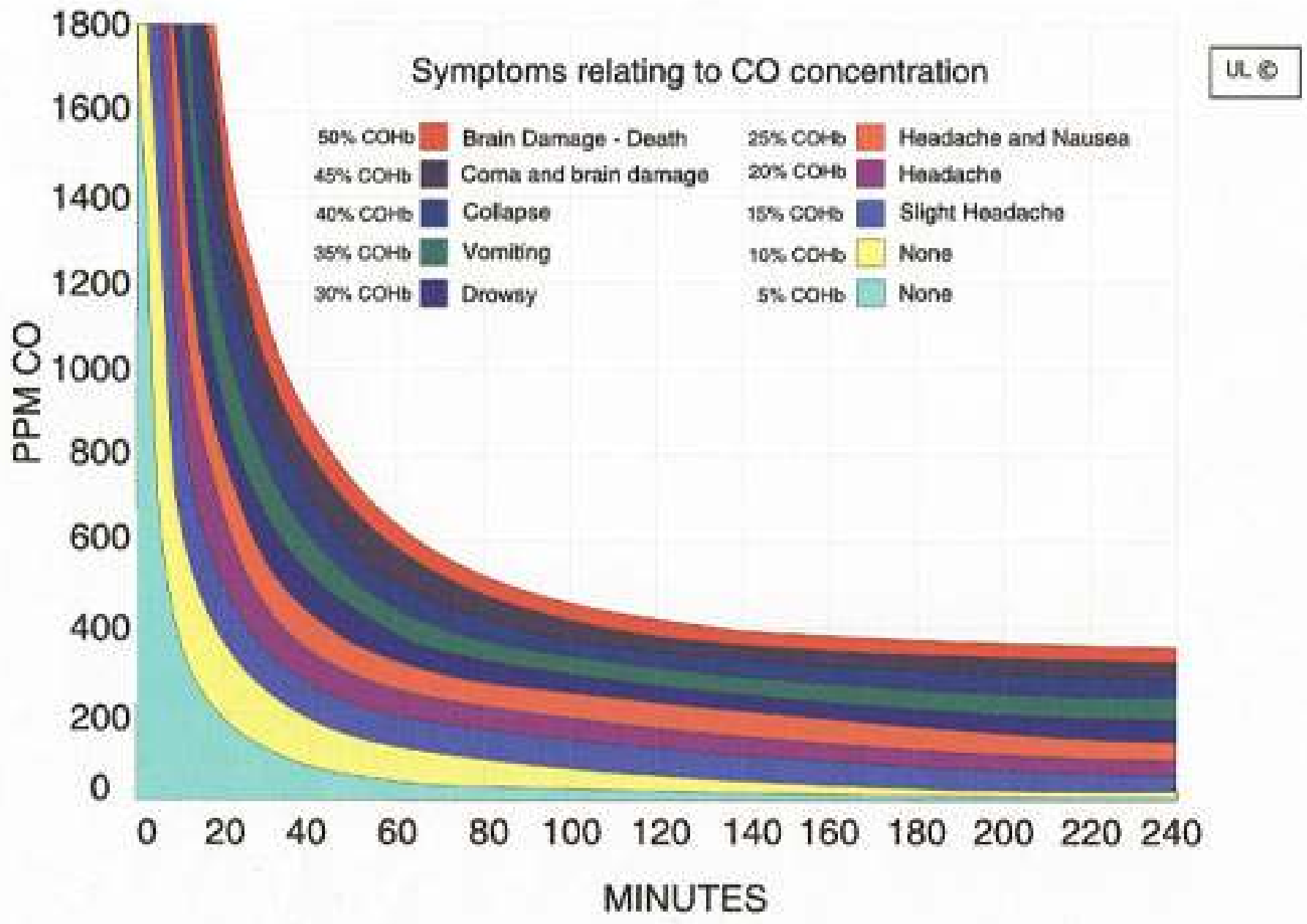
falls

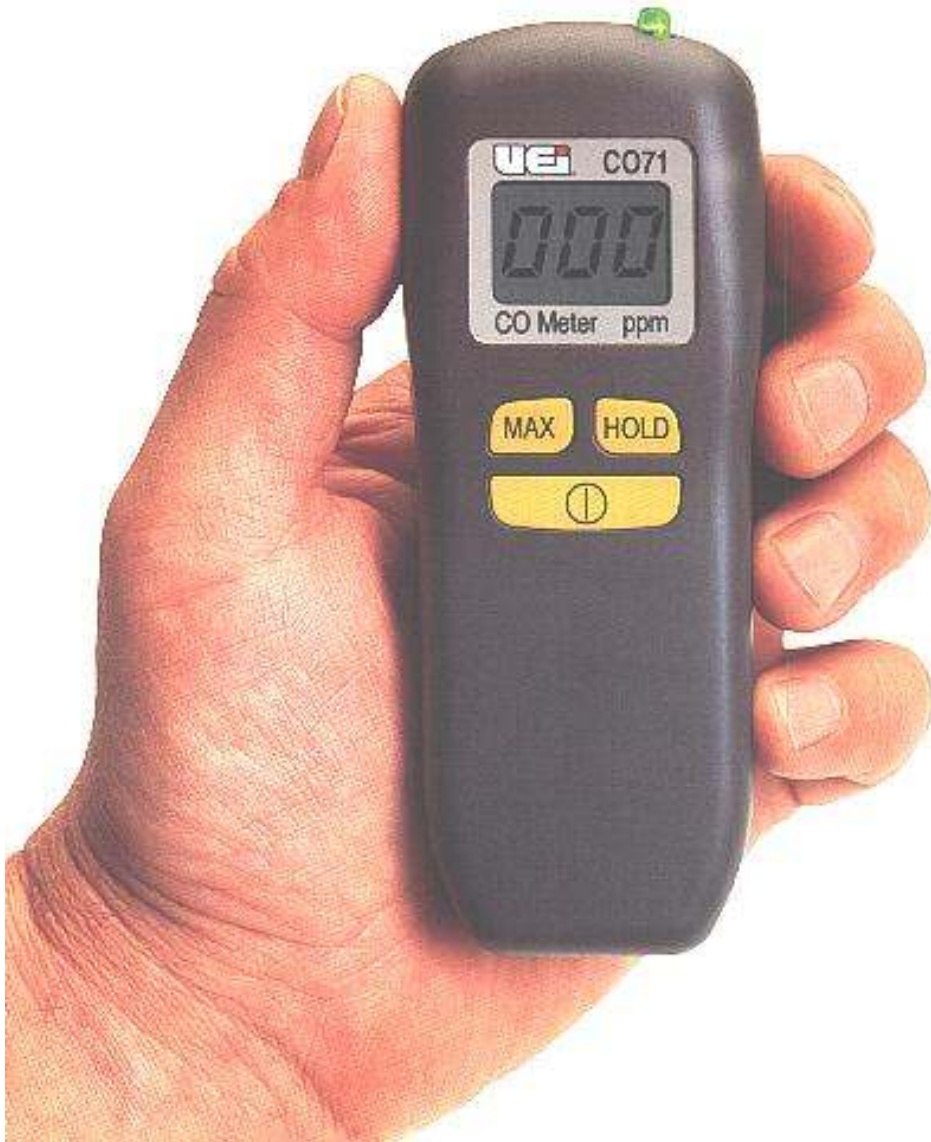
Carbon monoxide

Early symptoms of carbon monoxide poisoning include drowsiness and headache, followed by unconsciousness, respiratory failure, and death.

Carbon monoxide binds to hemoglobin three hundred times more strongly than oxygen.







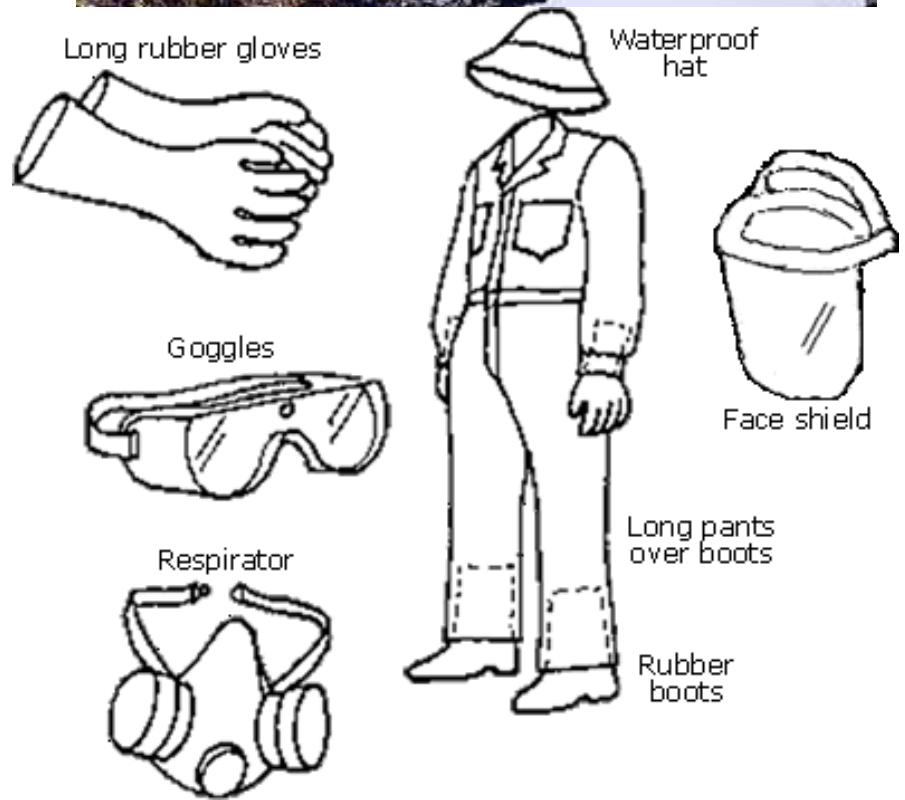
Carbon monoxide detector

Green LED: 2-9 ppm

Yellow LED: 10-34 ppm

Red LED: >35 ppm

**Audible alarm at >35ppm
increasing frequency with
concentration**



The „Dirty Dozen“:

- 1. Aldrin**
- 2. Chlordane**
- 3. DDT** (dichloro-diphenyl-trichloroethane)
- 4. Dieldrin**
- 5. Endrin**
- 6. Heptachlor**
- 7. HBC** (hexachlorobenzene)
- 8. Mirex**
- 9. Toxaphene**
- 10. PCBs** (polychlorinated biphenyls)
- 11. Dioxins** (polychlorinated-dibento-p-dioxins)
- 12. Furans** (polychlorinated-dibenzofurans)

DDT concentration:
increase of
10 million times



DDT in
fish-eating birds
25 ppm

DDT in
large fish
2 ppm



DDT in
small fish
0.5 ppm



DDT in
zooplankton
0.04 ppm



DDT in water
0.000003 ppm



UNEP Adds to „Dirty Dozen” List:

- 1. Pentabromodiphenyl ether**
- 2. Octabromodiphenyl ether**
- 3. Chlordecone**
- 4. Lindane**
- 5. Alpha-hexachlorocyclohexane**
- 6. Beta-hexachlorocyclohexane**
- 7. PFOS**
- 8. Hexabromobiphenyl**
- 9. Pentachlorobenzene**



CAUTION



**HIGHLY TOXIC
CHEMICAL**

Use by Authorized
Personnel Only

Chemical exposure I.

Classification



Explosive (E)



Oxidising (O)



Flammable (F, F+)



Toxic (T, T+)



Corrosive (C)



Harmful (Xn), Irritant (Xi)



Dangerous for the environment (N)

Chemical exposure II.

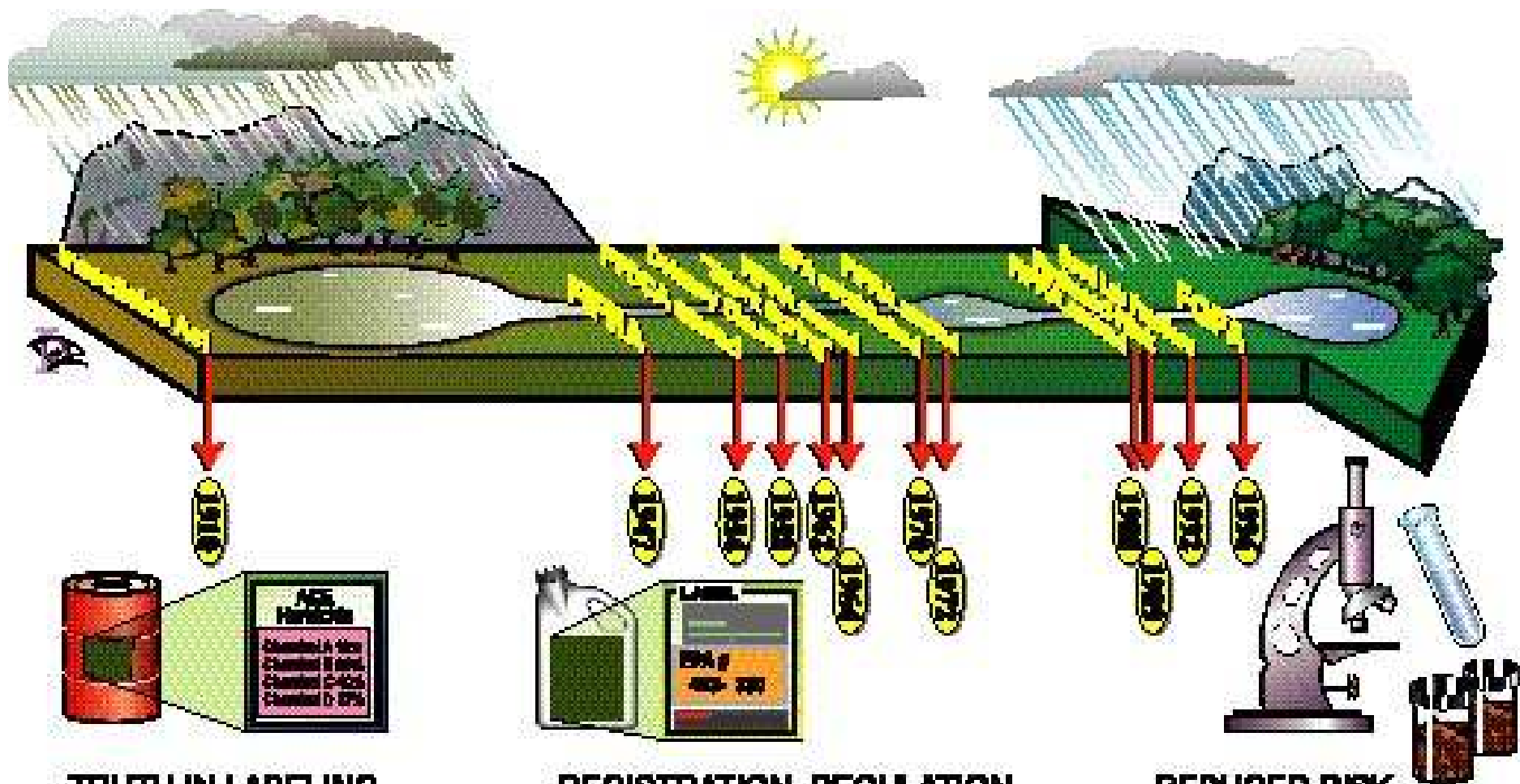
VINYL CHLORIDE		0082 April 2000
CAS No: 75-01-4 RTECS No: KU9625000 UN No: 1086 (stabilized) EC No: 602-023-00-7	Chloroethene Chloroethylene VCM (cylinder) C ₂ H ₃ Cl / H ₂ C=CHCl Molecular mass: 62.5	International chemical safety cards (ICSC) <i>Available: www.ilo.org</i>
Physical State; Appearance COLOURLESS COMPRESSED LIQUEFIED GAS, WITH CHARACTERISTIC ODOUR. Physical dangers The gas is heavier than air, and may travel along the ground; distant ignition possible. Vinyl chloride monomer vapours are uninhibited and may form polymers in vents or flame arresters of storage tanks, resulting in blockage of vents. Chemical dangers The substance can under specific circumstances form peroxides, initiating explosive polymerization. The substance will polymerize readily due to heating and under the influence of air, light, and on contact with a catalyst, strong oxidizing agents and metals such as copper and aluminium, with fire or explosion hazard. The substance decomposes on burning producing toxic and corrosive fumes (hydrogen chloride, phosgene). Attacks iron and steel in the presence of moisture. Occupational exposure limits TLV: 1 ppm; A1 (ACGIH 1999).	Routes of exposure The substance can be absorbed into the body by inhalation. Inhalation risk A harmful concentration of this gas in the air will be reached very quickly on loss of containment. Effects of short-term exposure The substance irritates the eyes. The liquid may cause frostbite. The substance may cause effects on the central nervous system. Exposure could cause lowering of consciousness. Medical observation is indicated. Effects of long-term or repeated exposure The substance may have effects on the liver, spleen, blood and peripheral blood vessels, and tissue and bones of the fingers. This substance is carcinogenic to humans.	

WARNING



PESTICIDE USE

FOR INFORMATION
CONTACT
CALL COLLEGE
DATE POSTED
DATE SPRAYED



TRUTH IN LABELING

**REGISTRATION, REGULATION,
ENFORCEMENT**

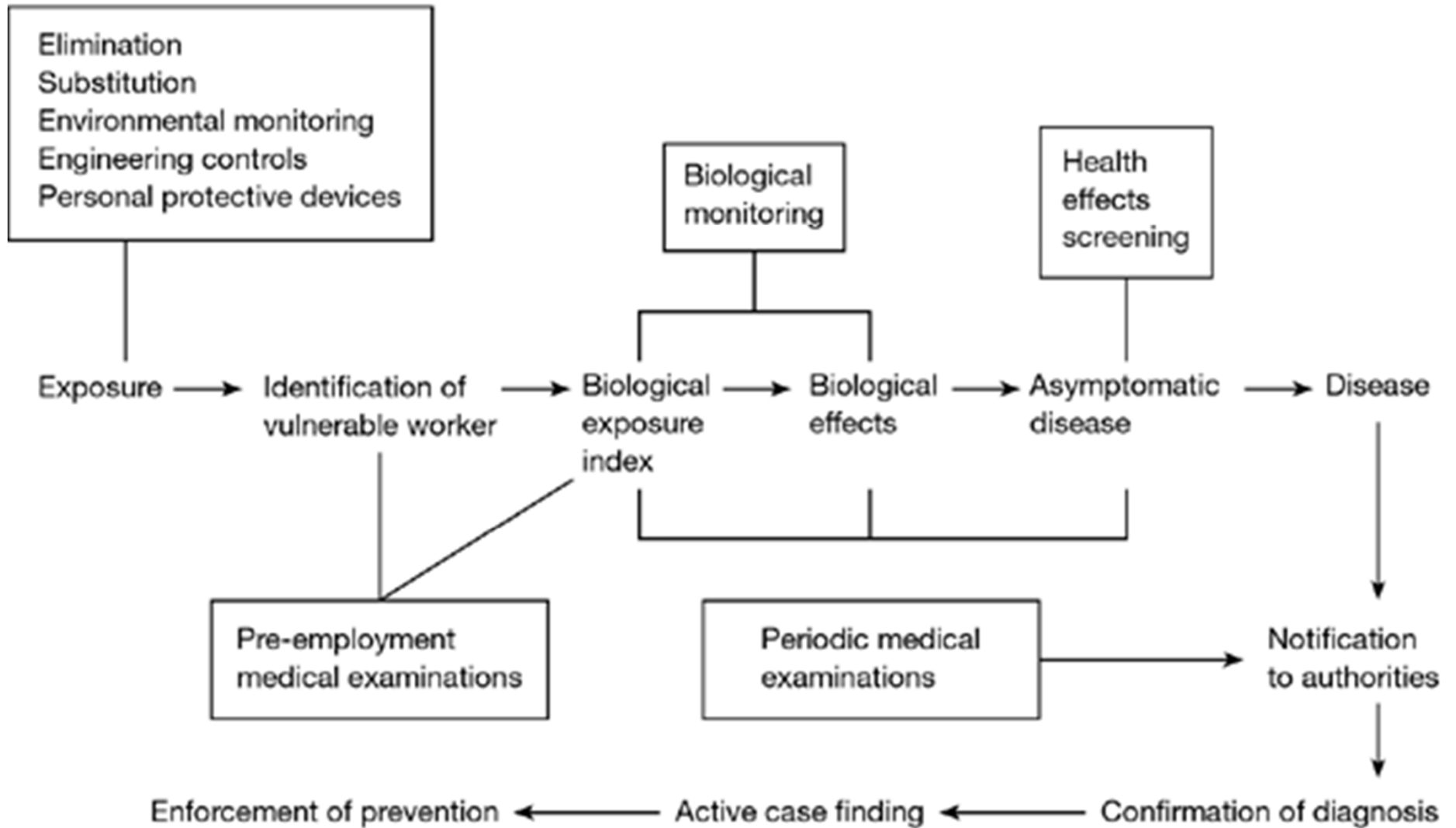
REDUCED RISK

The Stockholm Convention is an international agreement that mandates the participating countries to actively reduce, and ideally eliminate the release of the treaty-designated POPs into the environment, and therefore prevent their spread around the world.

The Convention on Persistent Organic Pollutants was adopted May 2001.

PRIMARY PREVENTION

SECONDARY PREVENTION

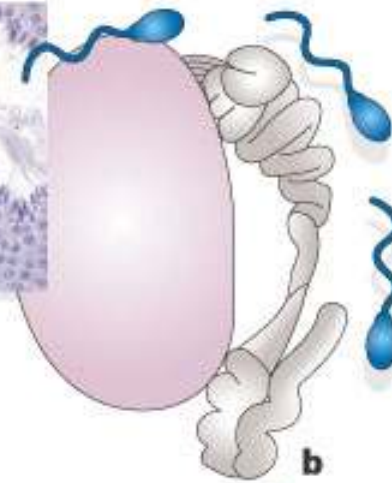


Source: Deters R et.al. (eds.). Oxford Textbook of Public Health. Oxford University Press, 2002.

e
During pregnancy, xenobiotics can disrupt differentiation of the fetal gonads



a
Germ-cell formation and sperm release



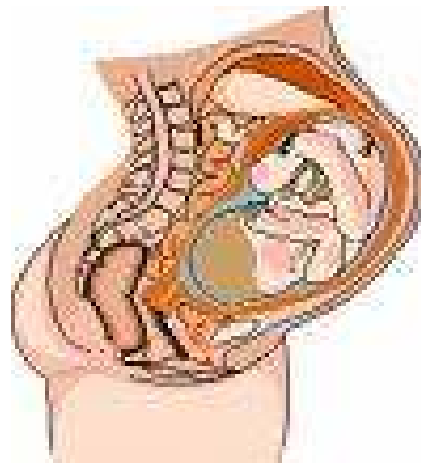
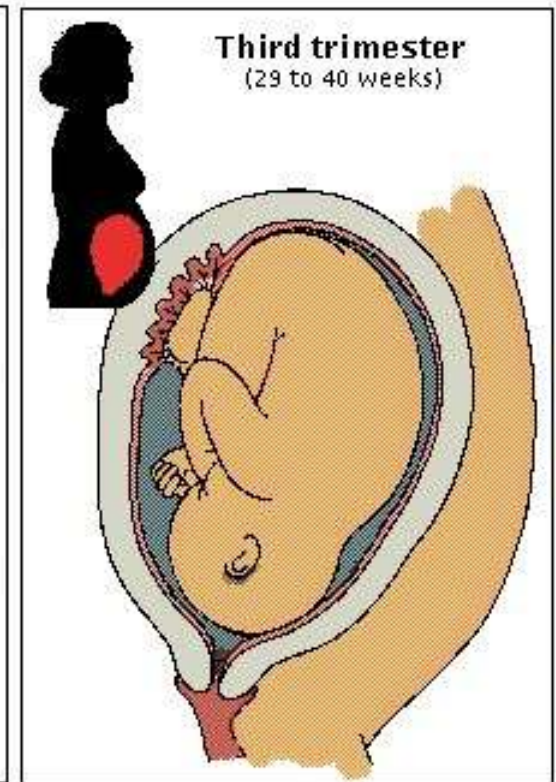
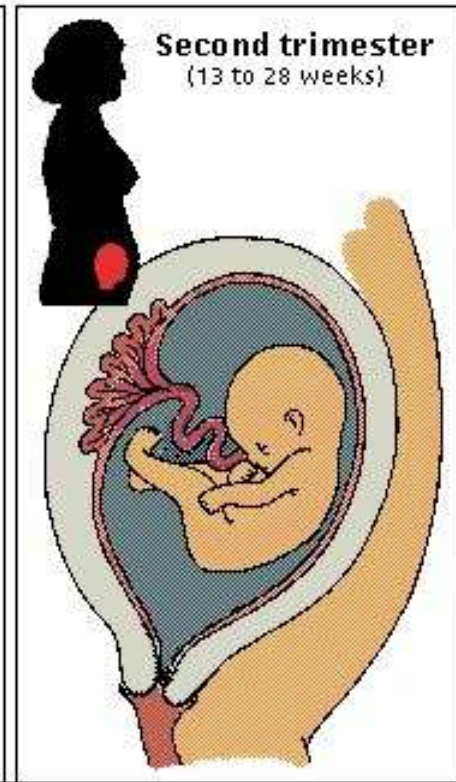
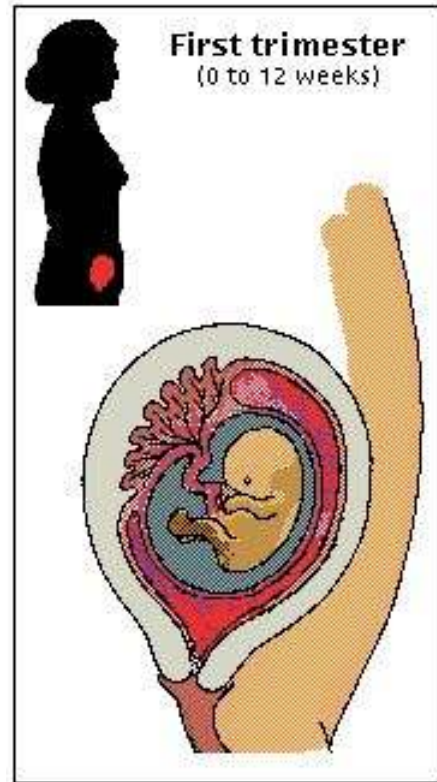
b
Sperm spend about a week maturing in the epididymis

d
Fertilization with DNA-damaged sperm may lead to fetal mutations



c
Sperm spend up to six days in the female tract before fertilization





It is very important to take out the gravid woman from the harmful exposition at once as the pregnancy is known!



**How to choose for the worker
the suitable personal protection device?**



Program from an USA state:
residents, farms, or business firms may bring unwanted pesticides to the Hazardous Waste Depot for disposal at no charge!
This program is available while funding lasts.



A puzzle for Hungarian boys and girls

Further info to be found:

www.ilo.org

www.cdc.gov/niosh

www.who.int

www.who.dk

www.osha.gov

www.epa.gov