

Role of the Occupational Hygienist in establishing Work Relatedness of Occupational Disease

Sonia Lal – MSc., CRSP, RPIH

Occupational Hygienist/Health and Safety Specialist
Occupational Health Clinics for Ontario Workers
Toronto, Ontario, Canada

Occupational Hygiene?

Occupational hygiene :

the art and science

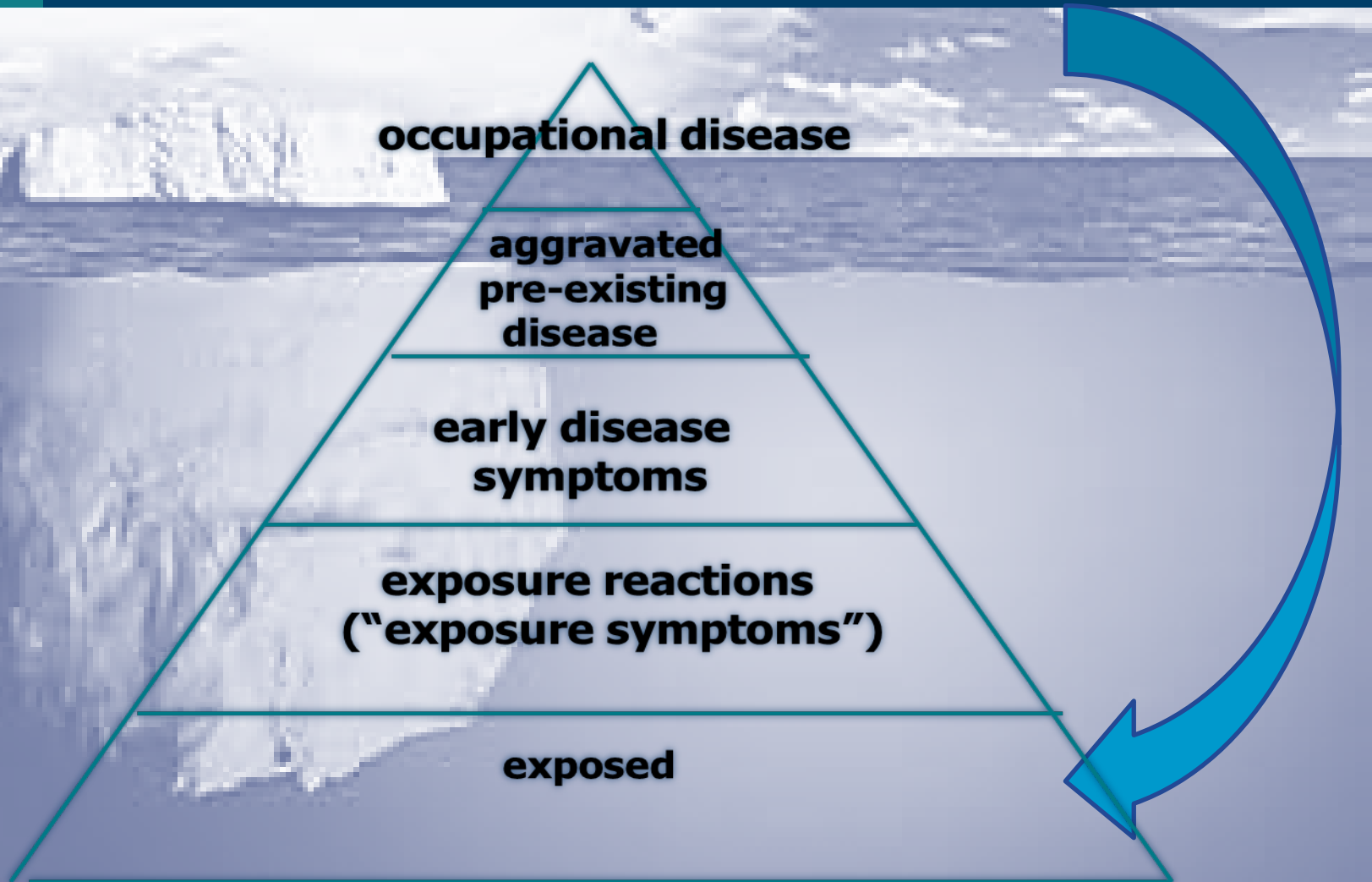
dedicated to the
anticipation,
recognition,
evaluation,
communication,
and control

of environmental stressors in,
or arising from, the work place
that may result in injury,
illness, impairment, or affect
the well being of workers and
members of the community.

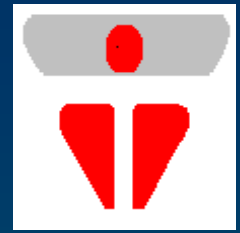


Homeostasis

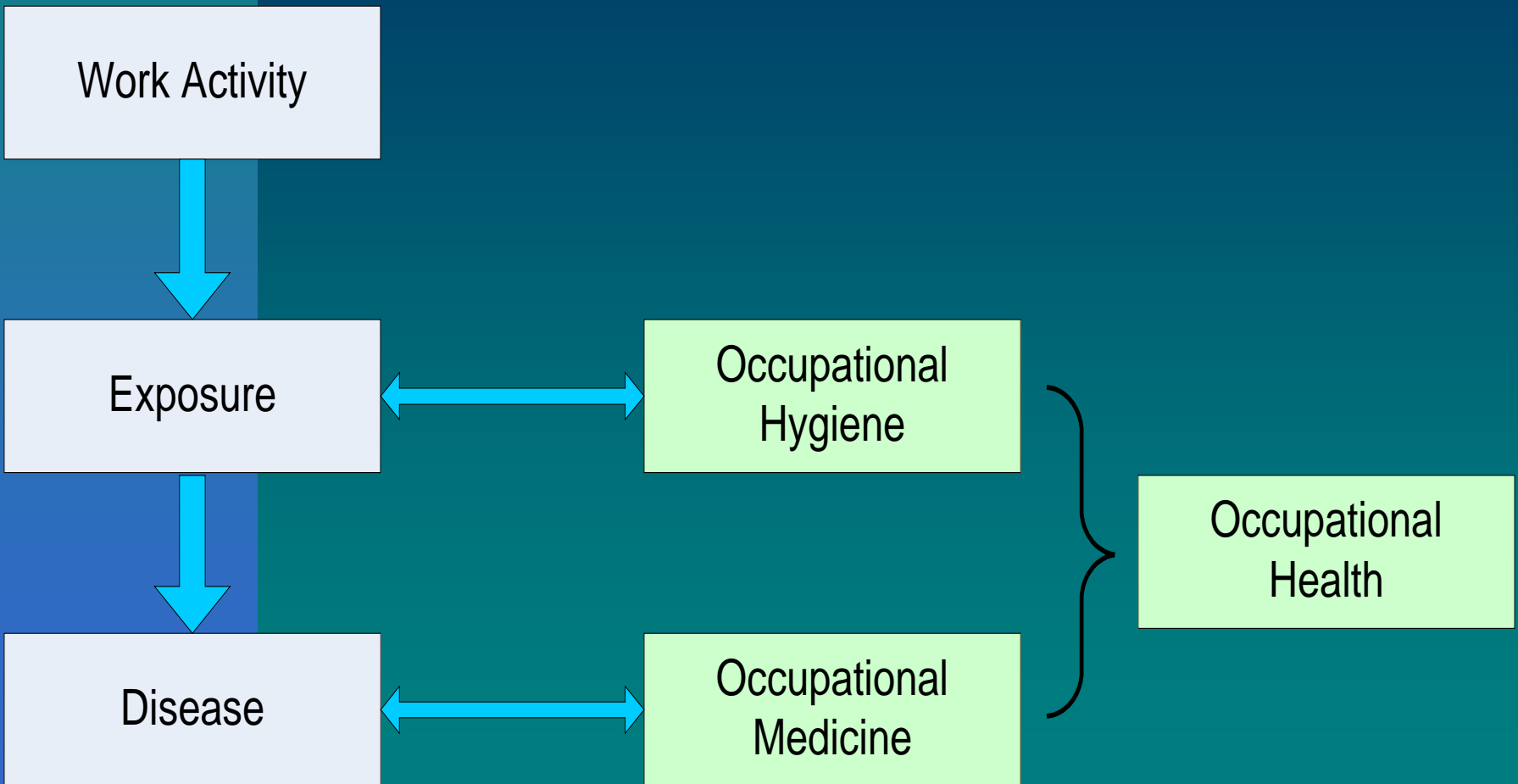
Occupational Disease Iceberg:



PREVENTION/ MONITORING AND CONTROL



Overview of Clinical Work





Overview of Clinical Work

Exposure

- to what
- how much
- how long
- toxicology

Medical

- symptoms
- tests results
- physical exam
- diagnosis

Work Relatedness

Exposure Categorization/
Quantification

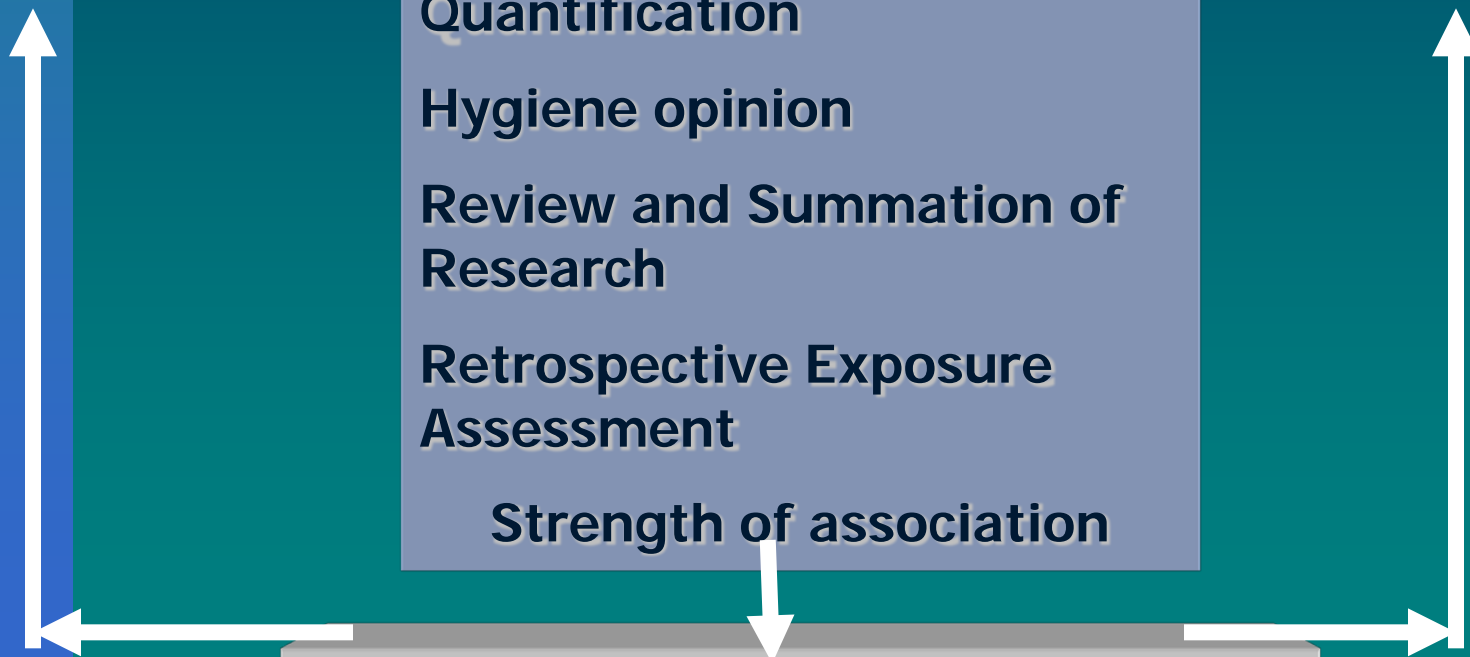
Hygiene opinion

Review and Summation of
Research

Retrospective Exposure
Assessment

Strength of association

Prevention/Compensation



Reconstruction of Exposures:

HOW IT'S DONE

Start our engines...

Data Collection:

A) Primary

- Interviews (Employee, Supervisor, Employer – anecdotal information etc)
- Documentation (Hygiene reports, MOL reports, MSDS, floor plans if available)
- Walkthroughs – **not likely**



Reconstruction of Exposures: Exposure Assessment

Data Collection:

B) **Secondary Sources**

Scientific Literature

- surrogates for
exposure

Reference Texts

Job Type - Databases



Exposure Assessment Framework

- 1. Characterize Exposure Setting
- 2. Identify Exposure Pathways
- 3. Quantify and Classify Exposure

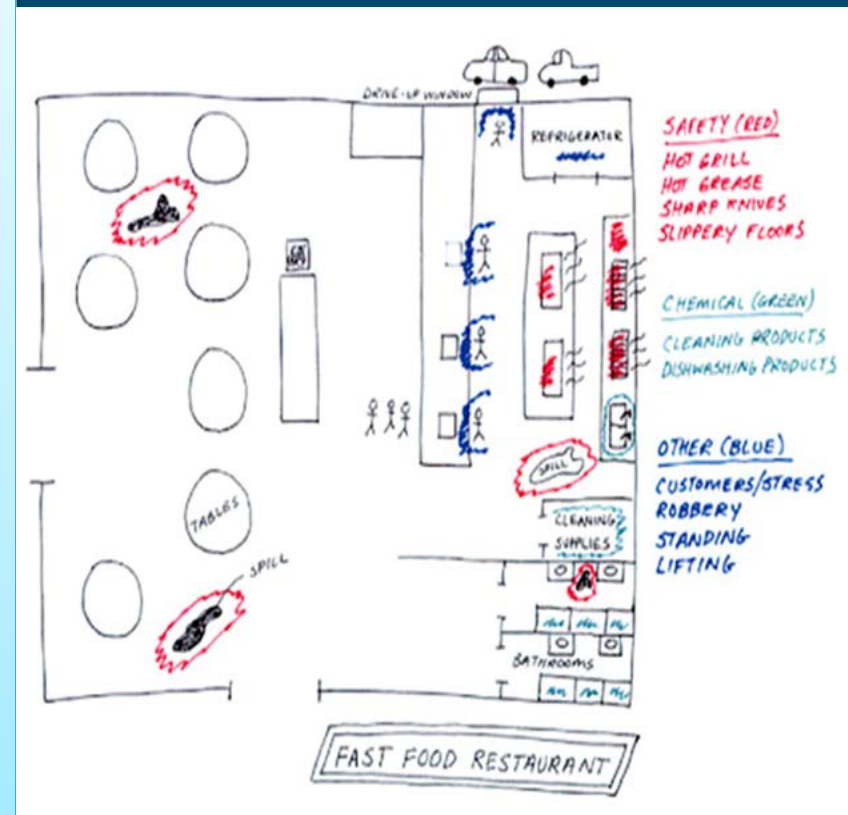
** characterization of exposures and understanding the work processes presents the Team with a more accurate reflection of the work and exposures realized by the workers as it is a comprehensive and participatory approach to retrospective exposure determination... (Ignacio et al., 2006)*

1. Characterize the Exposure Setting

2. Identify Exposure Pathways

Characterize Exposure Setting

- Systematic review of the
 - processes (chemical changes through processes)
 - materials (MSDS, chemical research, consult with suppliers, etc.)
 - ❖ chemical behaviour and properties
 - practices
 - ❖ consider housekeeping methods (dry versus wet)
 - ❖ consider **bystander** exposures
 - controls



Chemical Research, Analysis & Validation of Anecdotal Information

- International Chemical Safety Cards
- NIOSH Pocket Guide
- IARC Monographs
- CCOHS
- HAZ-MAP
- Environmental Protection Agency
- OSHA
- INCHEM
- NIHL
- Material Safety Data Sheets
- ATSDR –Agency for Toxic Substance Disease Research
- Literature Reviews
- Department of Health and Human Services
- Generic Material Safety Data Sheets with matching CAS #
- Field Visit Reports
- Management Correspondence
- Product Specification Sheets (With CAS #)
- Called Suppliers Directly
- Company Eng. Manuals

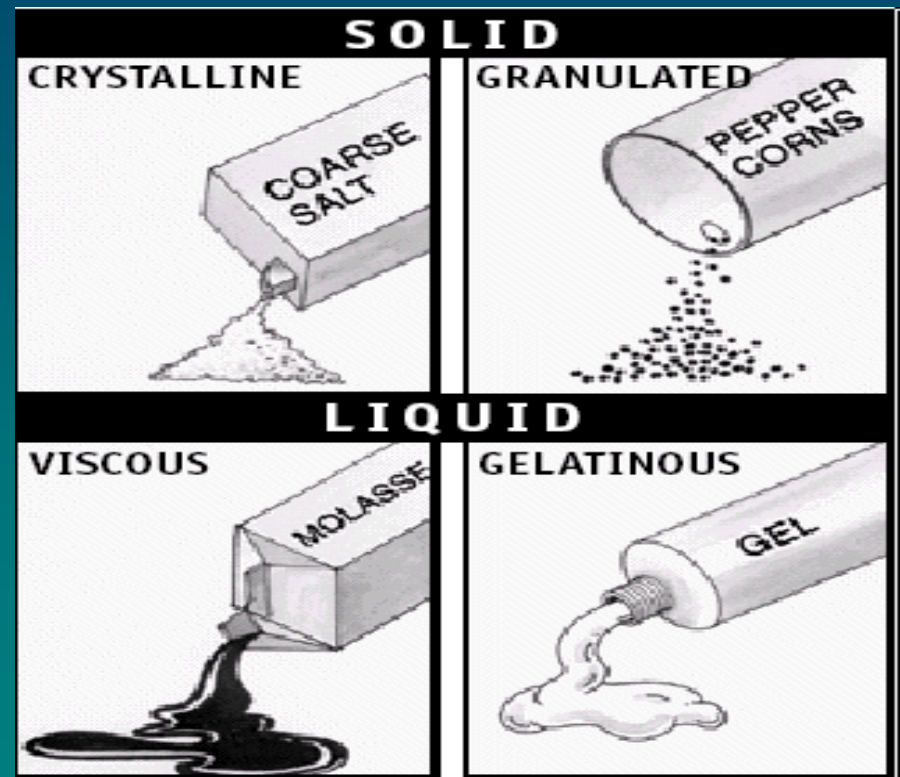
Exposure Assessment Framework:

- 2. Identify Exposure Pathways
 - a) Chemical behaviour/properties
 - b)
 - c)

2. Identify Exposure Pathways

a) Chemical Behaviour/Properties (refer to MSDS, Chemical Research)

- Physical State
- Odour Threshold
- Volatility
- Vapour Pressure
- Density
- Specific Gravity

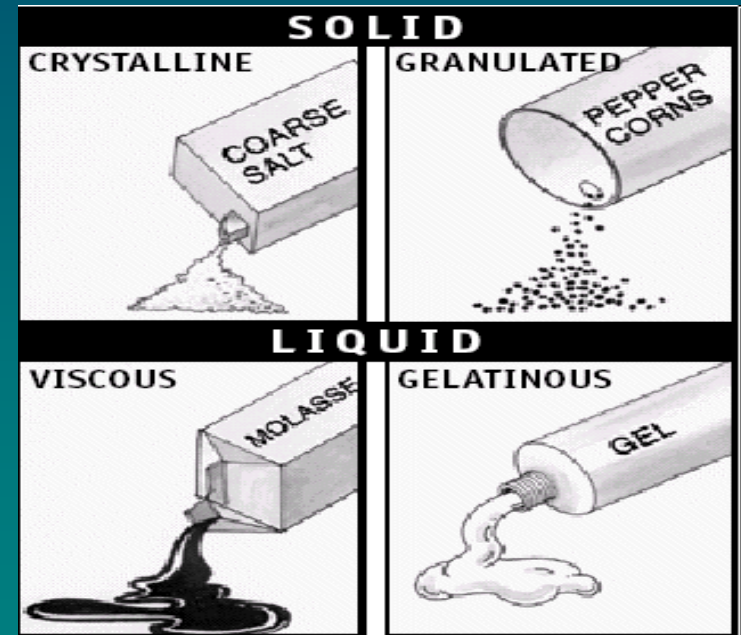


2. Identify Exposure Pathways

a) Chemical Behaviour/Properties (refer to MSDS, Chemical Research)

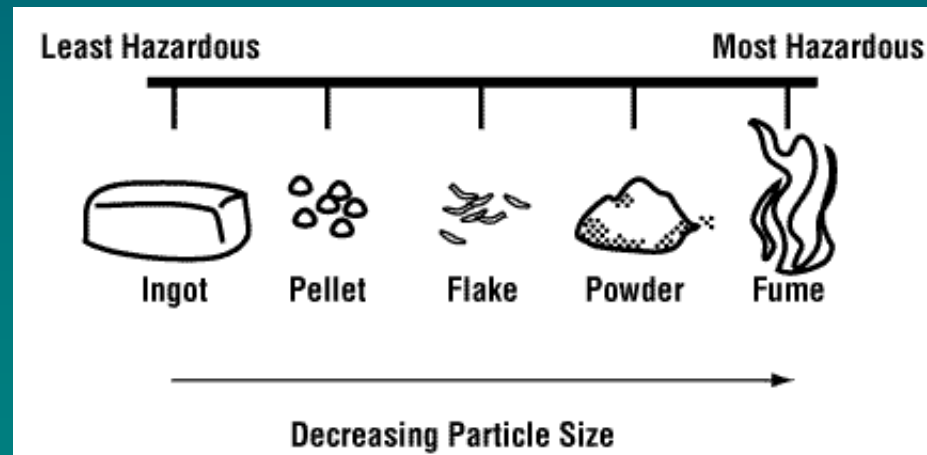
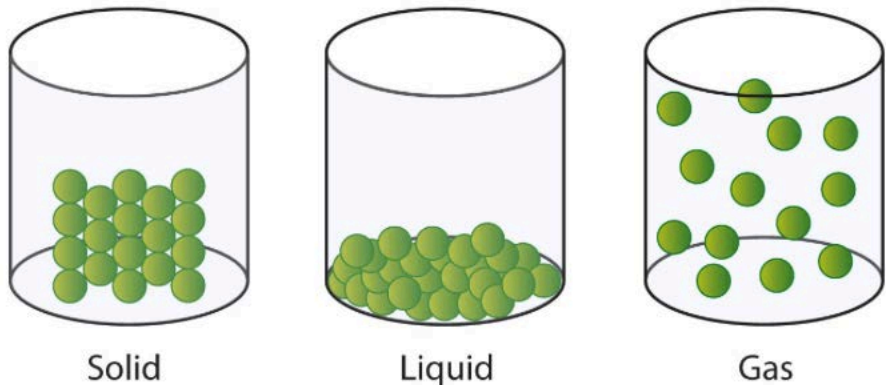
Avoid dust clouds when folding and disposing of empty bags

Roll bag downwards and away from yourself.



Exposure Assessment Framework :

- 2. Identify Exposure Pathways
 - a) Chemical behaviour/properties
 - b) Chemical changes (manipulations)
 - c) Routes of exposure



Chemical Changes: Hazardous Decomposition Products

2. Identify Exposure Pathways b) Chemical Changes

Isonel 51



Heat (Welding, Ovens)



Formaldehyde



Chemical Changes: Hazardous Decomposition Products

2. Identify Exposure Pathways b) Chemical Changes

Isonel 51



Heat (Welding, Ovens)



Formaldehyde

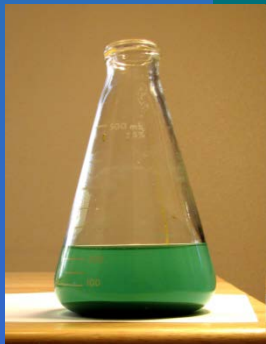
Trichloroethylene



Heat (Welding, Ovens)

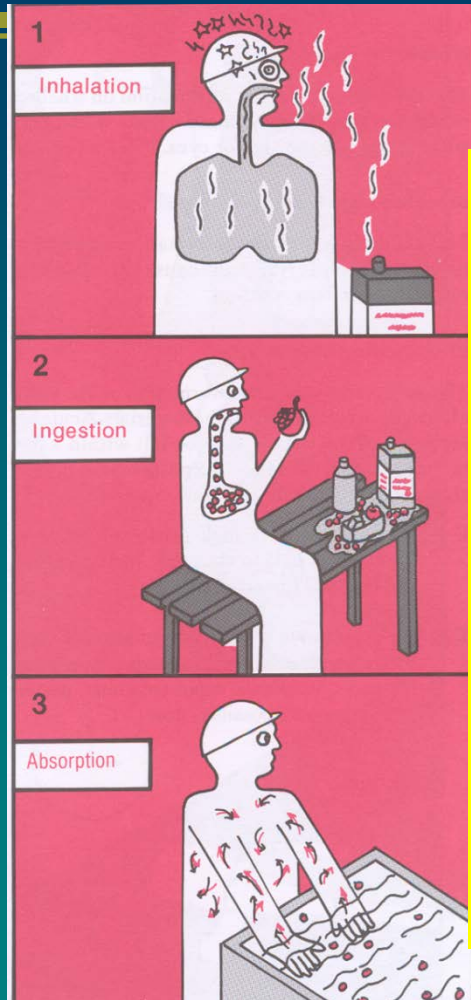
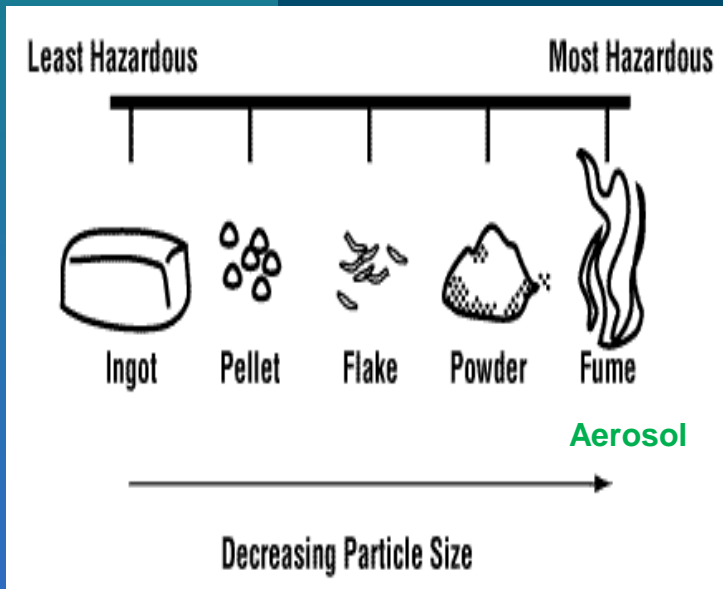


HCL

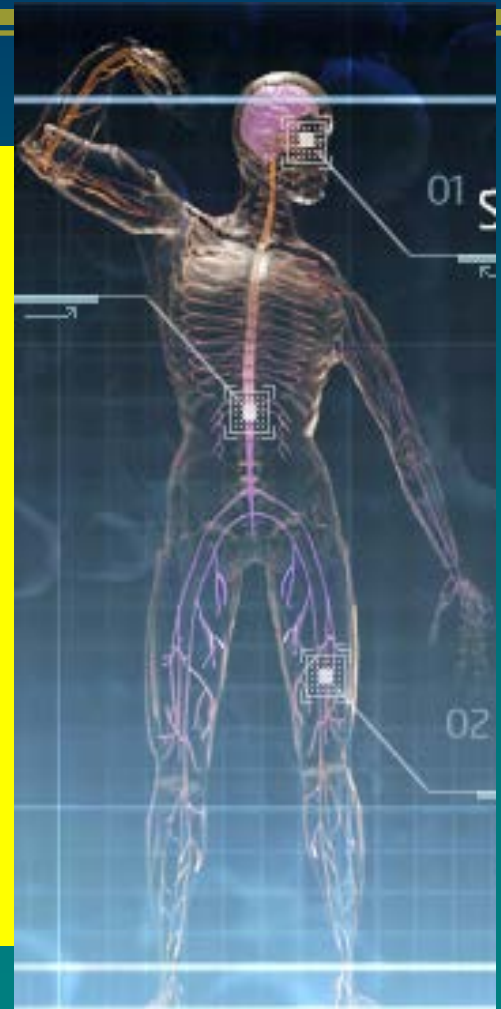


BisChloromethyl Ether - Lung Carcinogen

Exposure Assessment Framework:



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4. Injection

Exposure Assessment Framework: Take off!!!!

- **3. Quantify & Classify Exposure** (if possible)
 - ❖ Combines information for the previous 2 steps to quantify or classify the exposure exposure level or category (L, M,H) exposure frequency(Ra, Oc, Ro)

Expert opinion/Summary/Conclusion

- ❖ Develop a DEFENSIBLE estimate of the chemical source (s) that ultimately resulted in potential exposures

Forensic

Exposure Assessment Framework :

- If data available:
 - Extrapolate current data on the operation to assess past exposures
- If operations have ceased but data for similar sites are available
 - Extrapolate certain data
- If none of the above
 - SIMULATION studies
 - Similar Workplace studies

Exposure Assessment Framework:

- Occupational Hygienist:
 - Must rely on core scientific principles and publicly available data sources to define the environmental characteristics that affect chemical fate and transport in the work environment

Exposure Assessment Framework:

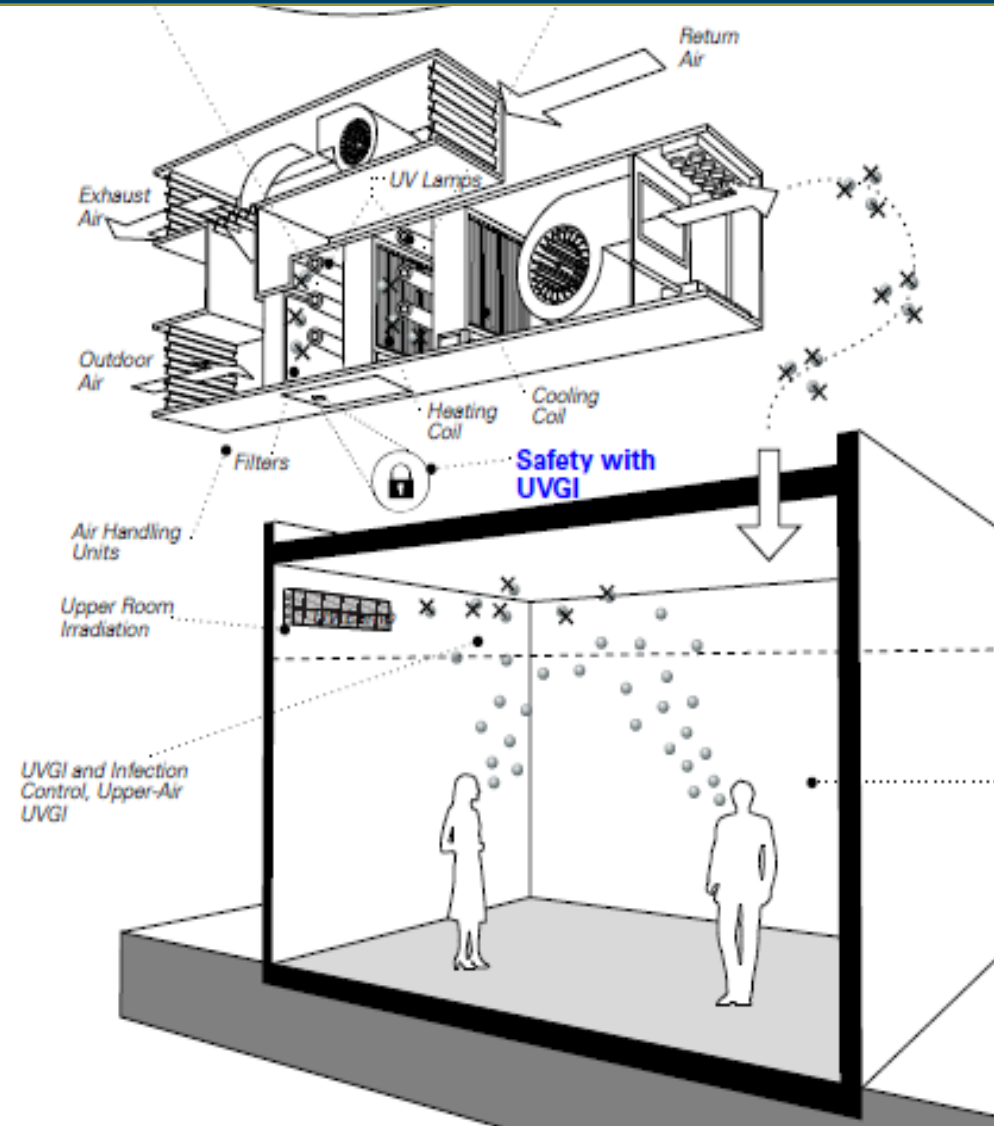
■ **Complexities:**

- You may not have authorization to enter the worksite in question
- The worksite may no longer exist
- Decades of work history need to be investigated – (obsolete and unique processes)
- Suppliers of chemicals – company owned
- Several uncertainties in building characteristics such as airflow rates
- Lack of **Hygiene** data
- Research – access to robust journals is limited
- Lack of documentation, work records
- List can go on.....

3 Patient Cases

Patient Case #1 – Toxic Encephalopathy

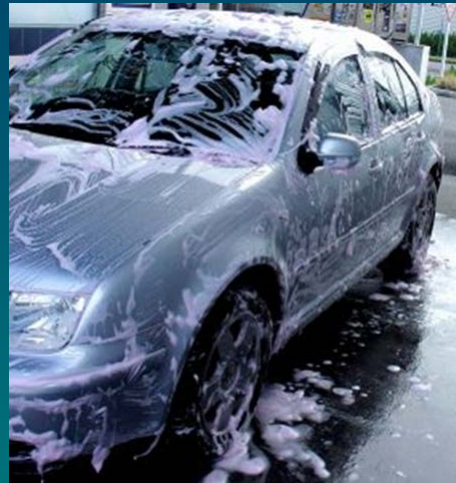
- P.Eng
- Office Work
- Adjacent to Paint Manufacturing Plant
- Irritable/Depressed/Lack of Concentration
 - Treatment – Depression
 - No attempt to seize exposure / just HR – Discipline
- Referred to OHCOW
 - Determined there was an Occupational Relationship***
 - Determined Cause of Disease
 - Won Compensation Case
 - Funds to manage rest of life
 - ❖ Lost job,
 - ❖ Wife and Kids
 - ❖ Home in the meantime



Patient Case #2

Manual Car Wash Operator

- Car Wash Operator and Blood Disease?
- Multiple myeloma is a cancer that starts in plasma cells, which are made in the bone marrow



<http://www.carnaubawax.org/helpful-articles/standards-for-dry-washing-and-pressure-washing.php>

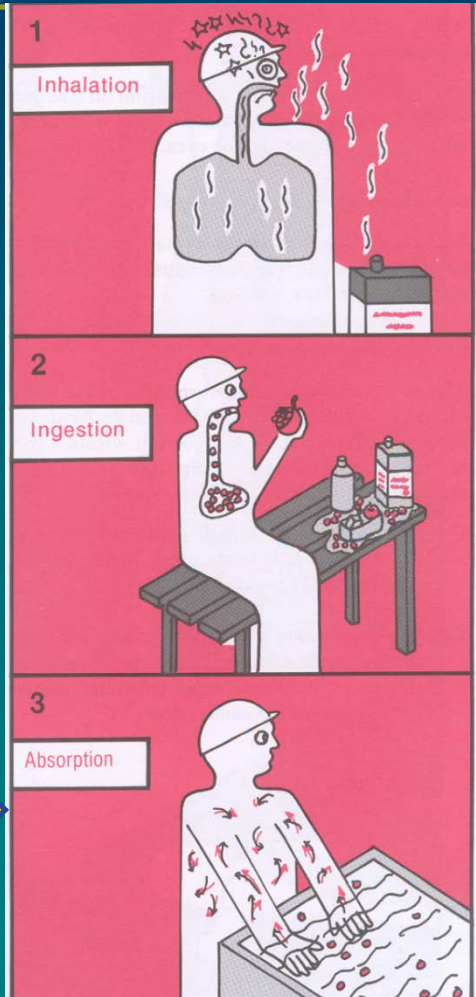
Patient Case #2

Manual Car Wash Operator

- Chronic Paronychia
- Called City – Sewer reports (negligence)
- Interviewed 2 co-workers
- (PPE, hours of work, chemicals used)



Exposure Assessment Framework: BENZENE



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Patient Case #3

Intake Clinic – Retrospective Exposure Profiling for a Manufacturing site



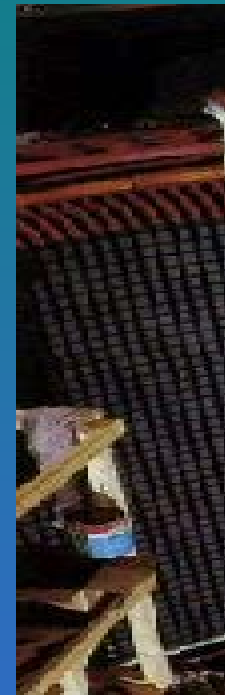
<http://wikitravel.org/upload/shared/c/c3/Ontario-map.png>



Adenocarcinoma of the Stomach in a Deceased Crane Operator



Patient Case #3





DATA COLLECTION: Applied Hygiene Questions

32

- **Key process specifications such as:**
 - Temperature of ovens
 - Vapour Pressure Impregnation temperatures
 - Solvents utilized
 - Engineering controls
 - Personal Protective Equipment
- **General Workplace Conditions**
- Housekeeping Practices/Eating at Workstation/Smoking
 - Washing hands, forearms, face with solvents,
 - MEK, Toluene
- Odours, Exposures (fumes were heavy, very dusty area)
- **Dimensions** of the equipment and machinery described
- **Engineering Manual** – Tonnes of solvents used for the VPI processes

CRITICAL CHEMICAL INVESTIGATION



33

67 chemicals were under investigation

- Who supplied the product?
- Year (s) product was used
- Called Product Manufacturer (historic)
- Processes? – textbook written by an ex-engineer who explained the unique processes
- Found company related patents for processes and products (some awarded some pending obsolete)

BODY ORGANS AFFECTED BY CHEMICAL EXPOSURE

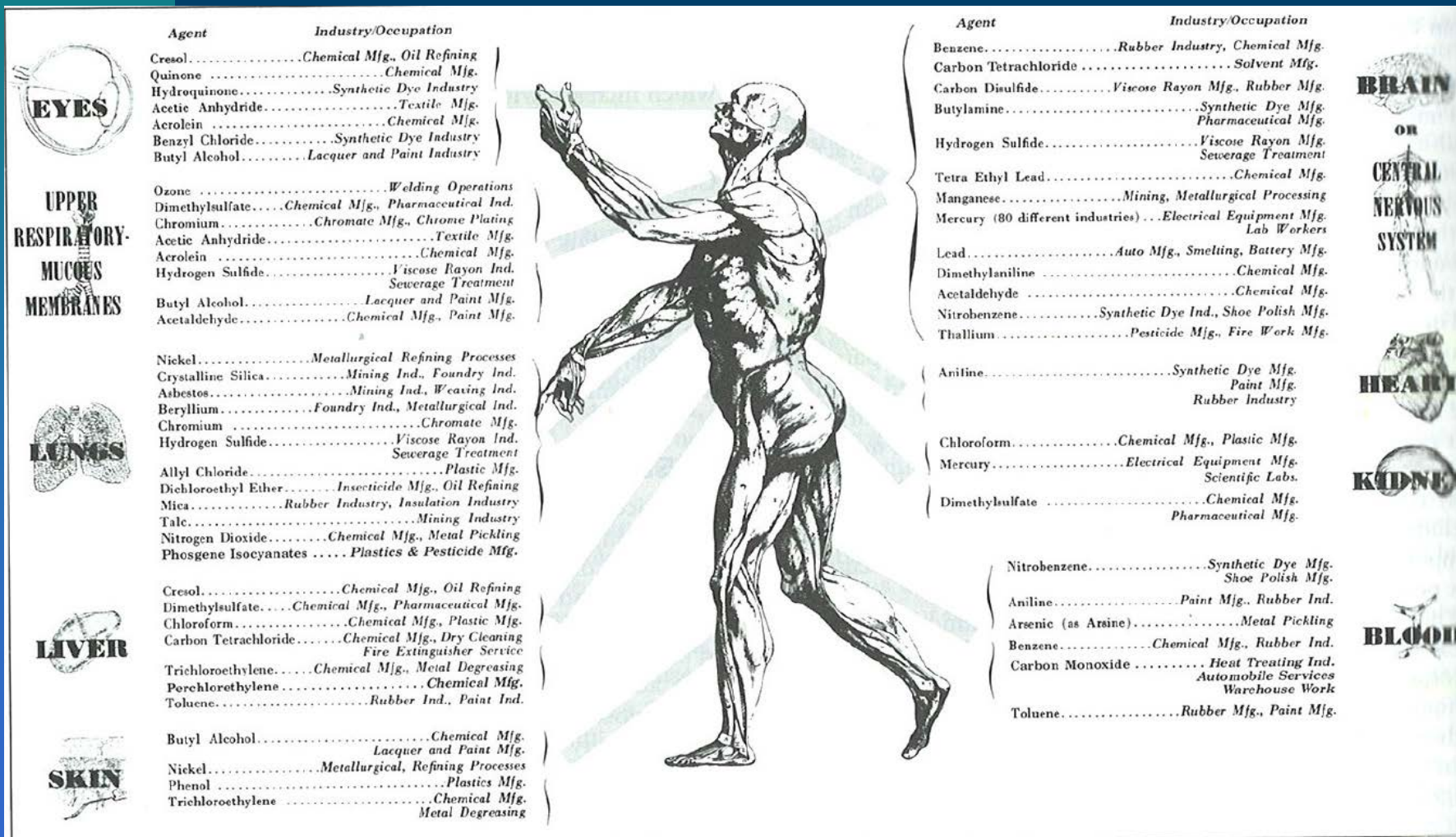


Figure 15-2. Body organs affected by exposure to some common industrial chemicals are illustrated (Courtesy Air Engineering Magazine)

Simulation Studies and Exposure Categorization



Surrogate Data

BULLOCK, 2006

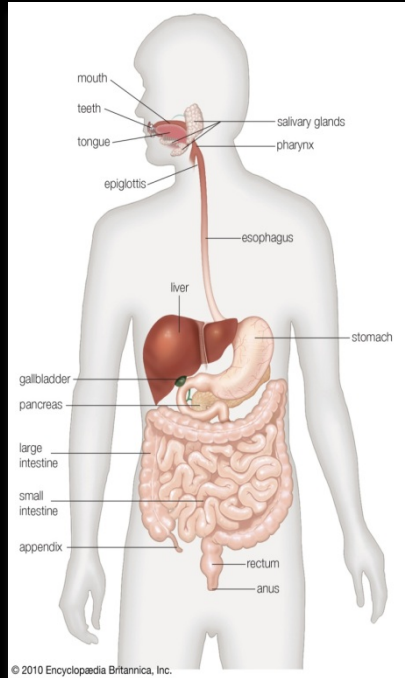
Exposure data from another agent: With caution, an industrial hygienist might be able to estimate exposure based on measured data for another agent used similarly in the workplace. Even if exposure conditions have changed, the monitoring data can provide some basis for estimating potential exposures to workers in SEGs. Adjustments based on professional judgment may be made using the following criteria:

- relative quantities of the environmental agent in use;
- frequency and duration of exposure;
- work practices;
- physical and chemical properties of the environmental agents; and
- operating conditions and control devices in use.

Surrogate data are sometimes used when estimating exposures associated with a mixture. The exposure estimate for a selected component (marker substance) may provide a basis for estimating exposures to other components of the mixture. This method, however, should only be used if the industrial hygienist has knowledge and experience regarding the behavior of the individual components in the mixture.

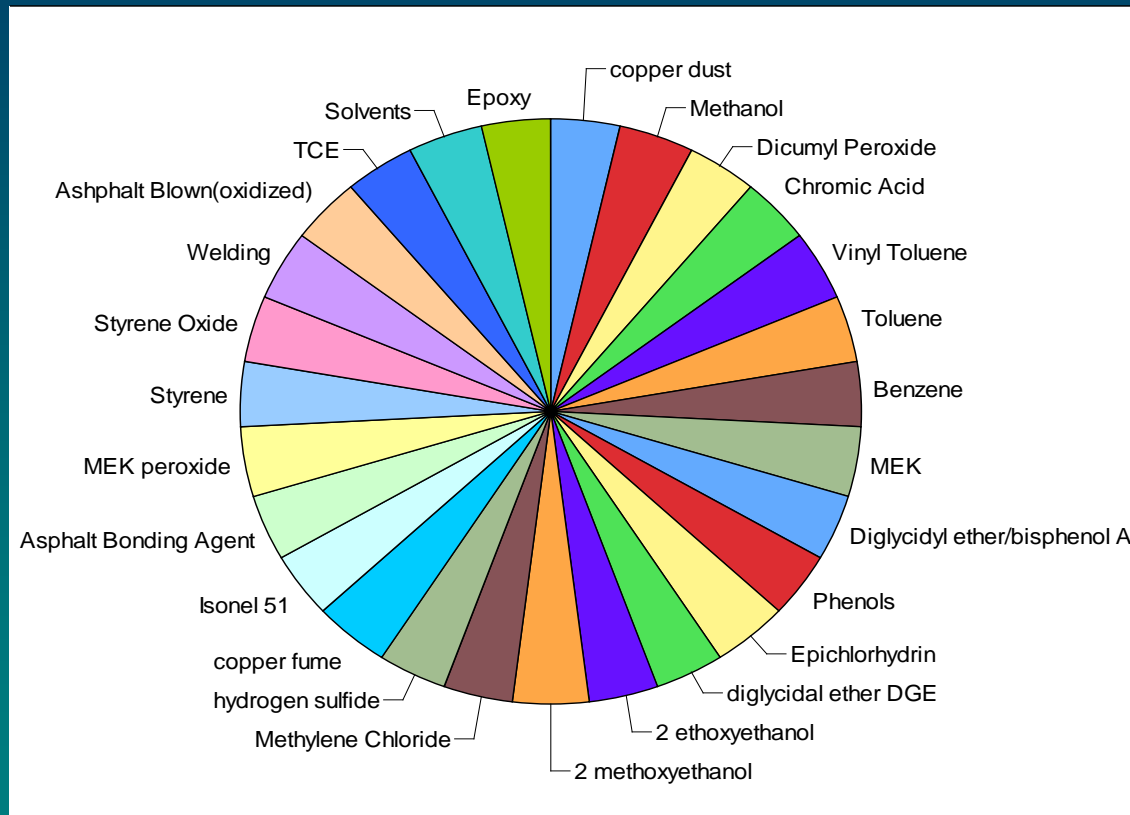
34 GASTROINTESTINAL SYSTEM TARGETS, 16 IARC CARCINOGENS

(CHEMICALS CAUSING EFFECTS ON GI SYSTEM/TARGET ORGANS)



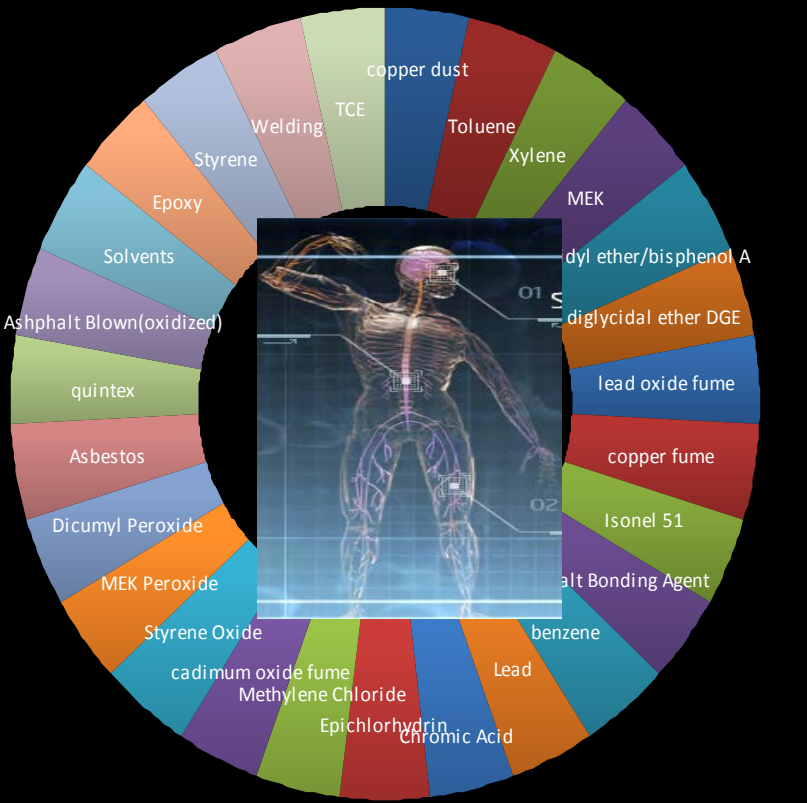
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**80 % Chemicals Whose Target is the GI System also affect the Skin

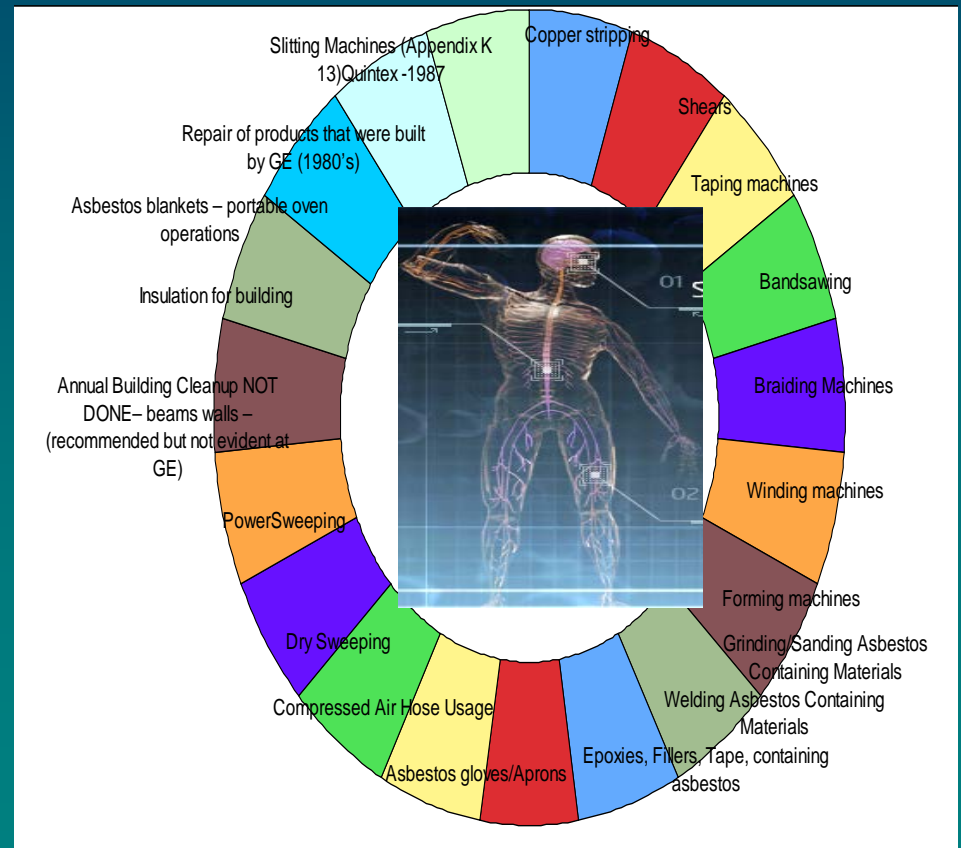


SUMMATION

CHEMICALS



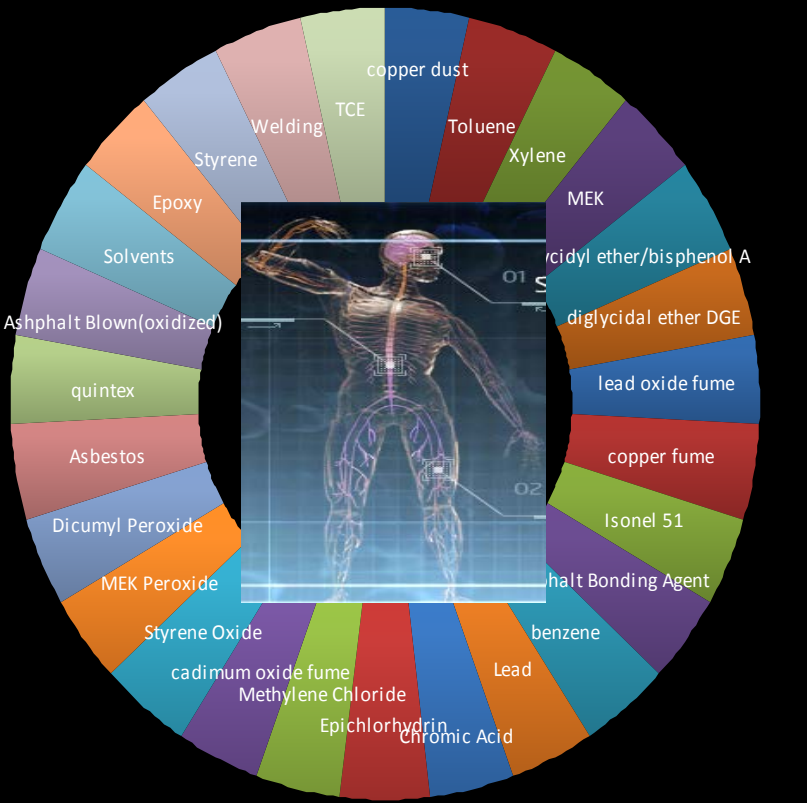
ASBESTOS- 19 processes



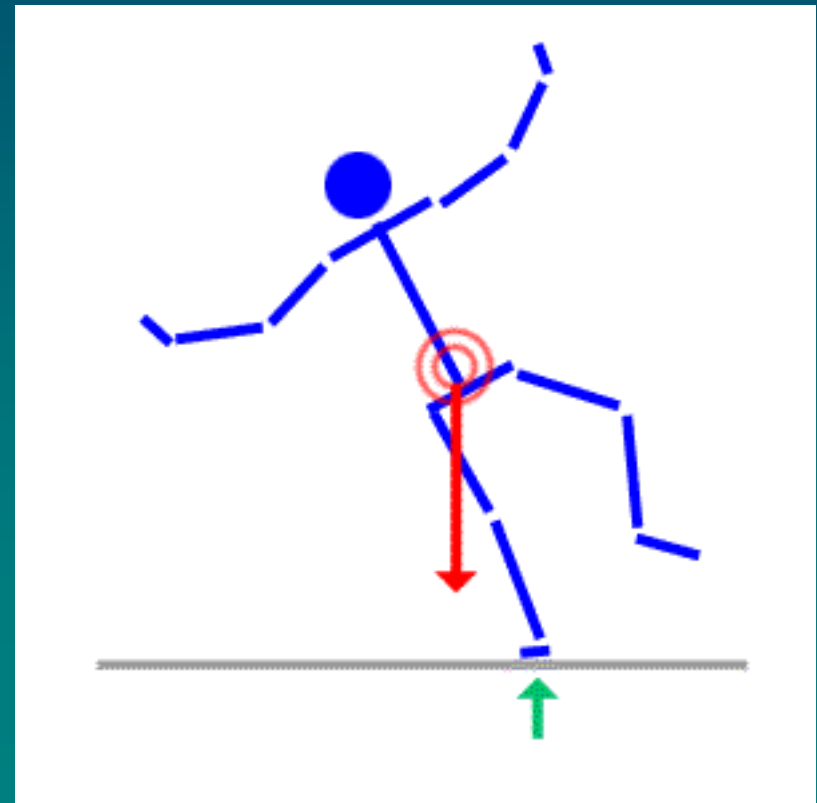
Plog, 1988

Bottom line...

Multiple Exposures

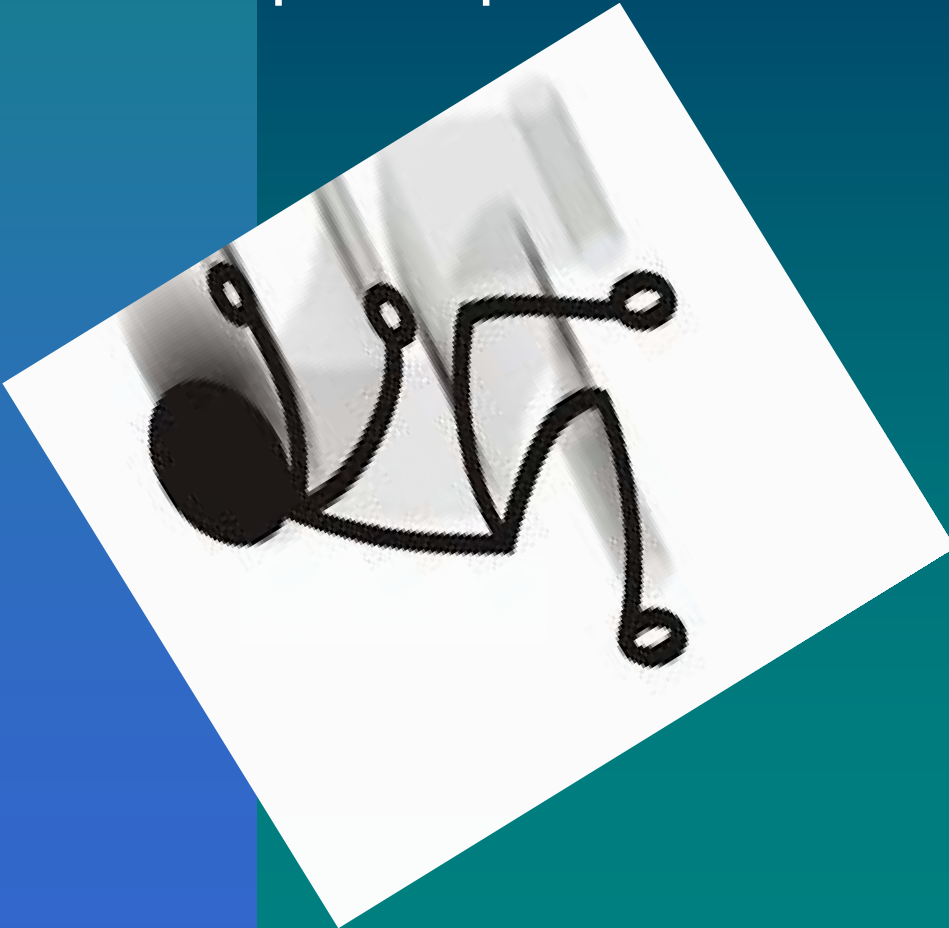


Outdated Policies – Single Exposures

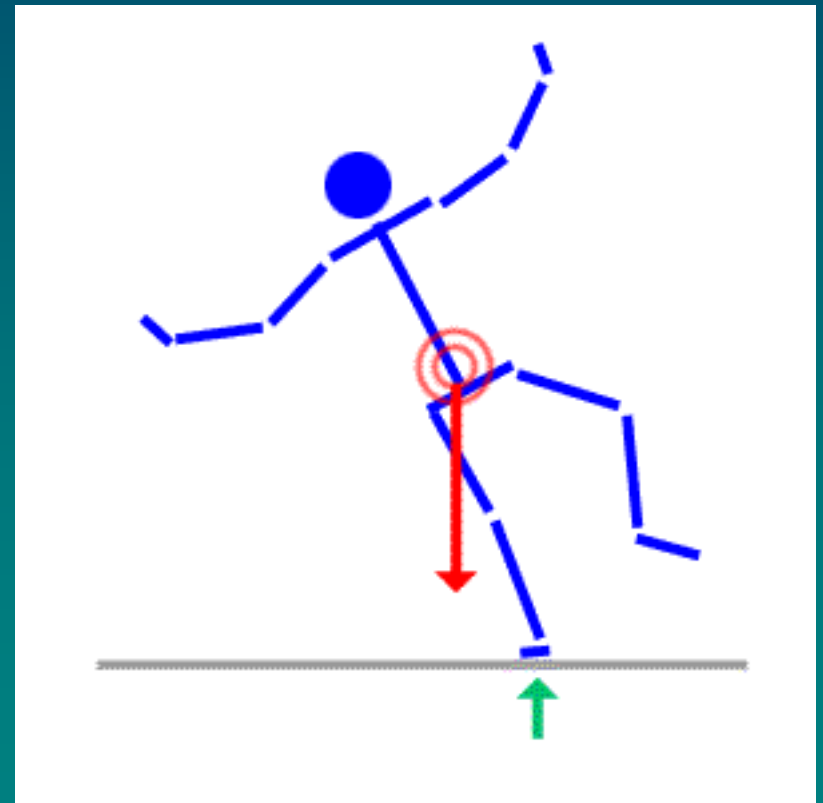


Bottom line...

- Multiple Exposures



- Outdated Policies – Single Exposures



Thank You



**KEEP
CALM
AND
Maintain
Homeostasis**



Occupational
Health Clinics
for Ontario
Workers

Centre de santé
des travailleurs
et travailleuses
de l'Ontario