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MORE INDUSTRIES MORE CANCER

With Rapid industrialization, the concentration of chemical carcinogens in environment is increasing every day. Judicious planning to check and reduce such carcinogens could prevent threat to our health and well being



What is carcinogen?

A carcinogen is an agent or process which significantly increases the incidence of cancer in a population.

● Three main groups of carcinogens-

▣ VIRUSES

▣ RADIATION

▣ CHEMICALS

- In the past **2-3 decades**, there has been nearly an exponential increase in the amount and number of chemicals used by man.
- **Modernization of agriculture and industrialization** involved an over increasing use of chemicals & synthetic fertilizers, affecting our environment.
- Today advertently or inadvertently a large number of chemicals & physical agents have found their way into the environment.
- Beside sunlight , **alcoholic beverages, dietary component and medical treatments**, environmental factors that are the likely cause of cancers are synthetic industrial chemicals.

CHEMICALS AS CARCINOGENS

- Evaluation of carcinogenic chemicals is based on two main criteria
 - 1) Data related to testing in humans of experimental animals
 - 2) On evidence of human exposure
- Generally the potential of chemicals to cause cancer is evaluated by administering daily a maximum tolerated dose of the agent to animals for their lifetime.
- Some of the chemical carcinogens act directly at the site of exposure, whereas indirectly acting chemicals carcinogens are generally activated by **body metabolism**.
- Chemicals may be **transported by water or air** & enter man and other organism.
- Chemicals used as starting materials or intermediate in manufacture may end up as residues in air through vaporization, in surface & underground water through contact and leaching, by sewage effluents, or in soil through adsorption.

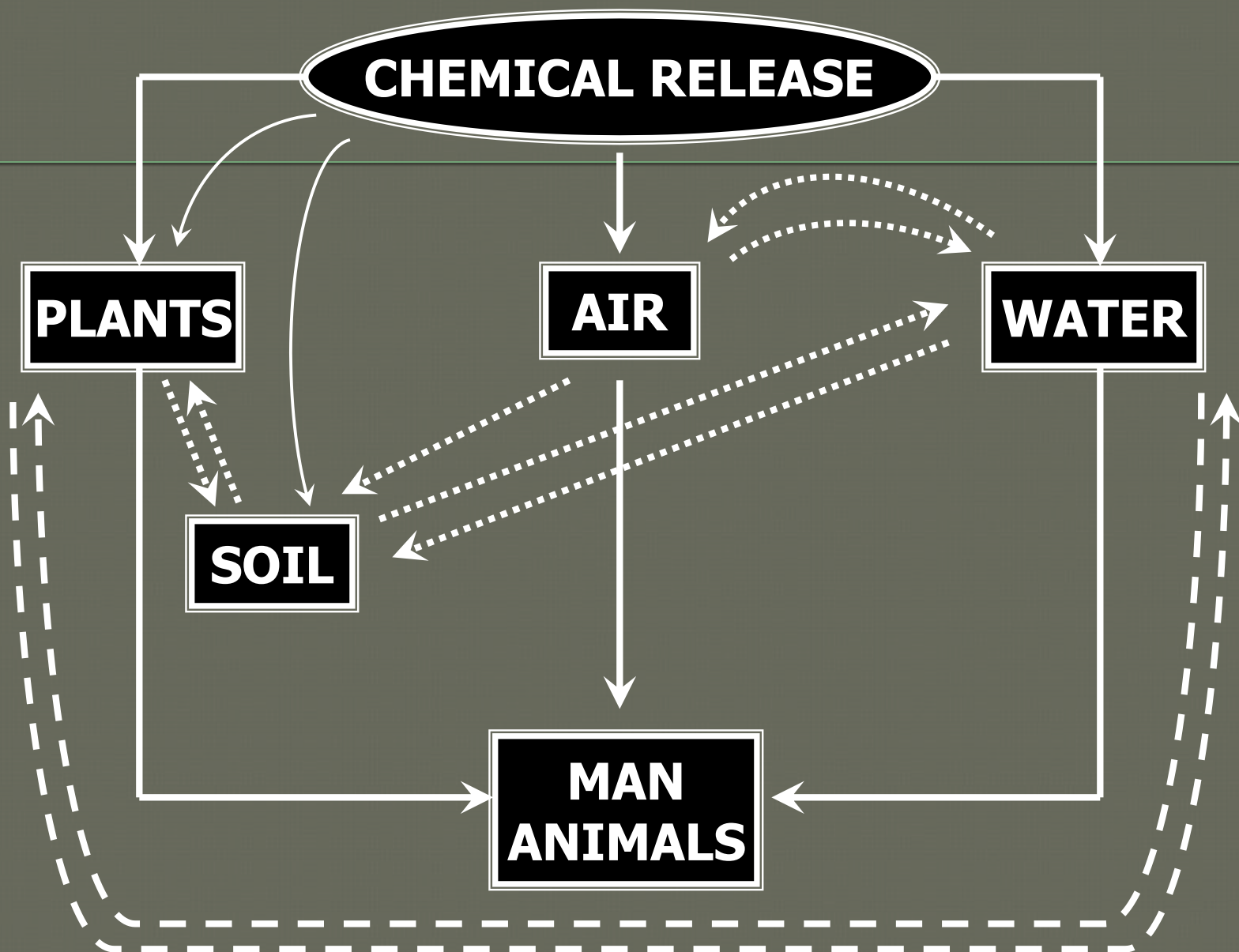


Figure- Man's exposure to chemical

CARCINOGENIC CHEMICALS IN INDUSTRIES

● **National Institute of Occupational Safety and Health, USA, (NIOSH)---**Registry of toxic effects of chemicals substances contain over **22000** substances, including over **1900** substances positive for carcinogenicity.

● Some commonly used chemicals substances in industries today which are probably responsible for much of the general cancer incidence are given---

- ✱ **Acetamide**
- ✱ **Acrylonitrile**
- ✱ **Aliphatic & Aromatic epoxides**
- ✱ **Aromatic amines**
- ✱ **Arsenic & its Compound**
- ✱ **Asbestos**
- ✱ **Benzene**
- ✱ **Beryllium & its Compound**
- ✱ **Chlorinated Hydrocarbons**
- ✱ **Chromium Compound**
- ✱ **Nickel & its Compounds**
- ✱ **Polychlorinated biphenyls**
- ✱ **Polycyclic aromatic hydrocarbons**

CARCINOGENIC CHEMICALS IN INDUSTRIES

*Acetamide

- * In Various forms they are used as plasticizers, leather, cloth and coatings, in explosive & cosmetics industries, in medicine and also in insecticides.
- * In human they seem to cause **aplastic anemia**, which later develops into **leukemia**.

*Acrylonitrile

- * Chemical used in fiber makers, fumigators, plastics products, resin markers and textile industries, pipe fitting, automotive component, telephones, electrical and electronic equipment.
- * In human it causes **colon and lung cancers**.

*Aliphatic & Aromatic epoxides

- * It causes **cancer of the skin, lung and blood in human**. These are found in food, cosmetics, agricultural, textile and petroleum industries.
- * Exposure can occur during industrial processing and production of plastic & polymers, rubber, ointment, cosmetic cream, lipsticks etc.

*Aromatic amines

- * Composed of unsaturated **cyclic hydrocarbons** rings.
- * Industrially important are benzidine, phenepidine, β naphthylamine, biphenyl amine.
- * Industrial to workers in rubber production, pharmaceutical cosmetics and butter manufacturer.
- * Many of them are **carcinogenic in human** bladder, intestine, lung, liver and ureter

CARCINOGENIC CHEMICALS IN INDUSTRIES

* Arsenic & its Compound

- * A large number of workers of various industries who are exposed to As compound include farmers, insecticide makers & users, book binders, glass workers, dyers, glue wax & ink manufacturer, paper makers and printers, photographers & tannery workers & textile printers.
- * It causes **cancer of lung, skin and liver in human**.

* Asbestos

- * Massive exposure can occur to the Asbestos workers, electrical appliances and wire workers, rubber, shingle, tile and building materials manufacturer, cement makers and shipyard workers.
- * In human it is absorbed via inhalation or orally.
- * **Lung and gastrointestinal tract cancer** are prominent in the asbestos exposed member of population

* Benzene

- * Benzene is imminent threat to public health.
- * Exposure to it comes from production of rubber goods, petroleum processing, paint, adhesive, leather, resin, styrene, enamel, linoleum, plastics, explosive, pharmaceuticals, detergents and cosmetics.
- * Benzene generally entered the body via inhalation and also through skin, cause **acute leukemia** beside causing **skin, lung and blood cancer**.

* Beryllium & its Compound

- * Its exposure comes from its dust during the process of ore-mining, milling, production of alloys, manufacturer of surgical instruments, electronic and fluorescent light bulbs, dental cement, ceramics and cosmetics.
- * It causes **lung cancer via inhalation**.

CARCINOGENIC CHEMICALS IN INDUSTRIES

* Chlorinated Hydrocarbons

- * This group include commonly used chemicals like chloroform, **CCl₄, DDT, aldrin.**
- * The industrial and other working group at risk from exposure to these material include dry cleaners, rubber markers, drug and dye makers, mechanical, perfume, ink and resin makers.
- * A number of chlorinated HC are carcinogenic to human liver, lung, skin and **bone marrow.**

* Chromium Compound

- * Workers of industries are of high risk of exposure to Chromium, in one form are another is known to cause human **cancer of the lung and respiratory tract.**

* Nickel & its Compounds

- * It involved in various industrial procedure including Ni ore-mining, grinding, Nickel plating, battery production etc.
- * Exposure associated with workers of coin maker, electroplater, painter, electronic appliances & battery manufacturer.
- * **Prolonged exposure** are known to cause human **cancer of lung and nasal cavity.**

**List of some industrially used chemical substances
associated with cancer in humans**

Agent	Target Site
Acetamide	Blood
Acrylonitrile (Vinyl cyanide, etc.)	Colon, Lung
Aliphatic & Aromatic epoxides	Respiratory tract, blood & Gastrointestinal tract
Arsenic Compound	Skin, Lung, Liver
Asbestos	Respiratory tract, Gastrointestinal tract
Benzene	Bladder, Lung, Skin
Benzidine	Lung
Beryllium Compound	Bone, Lung

**List of some industrially used chemical substances
associated with cancer in humans**

Agent	Target Site
Chlorinated Hydrocarbons (Carbon tetrachloride, etc.)	Liver
Chloromethylethers	Bladder, Lung
Chromium Compound	Lung
Isopropano	Respiratory tract
Nickel Compounds	Respiratory tract
Polychlorinated biphenyls	Skin and Various sites
Polycyclic aromatic hydrocarbons	Skin, Lung, Bladder
Vinyl chloride	Liver, Brain

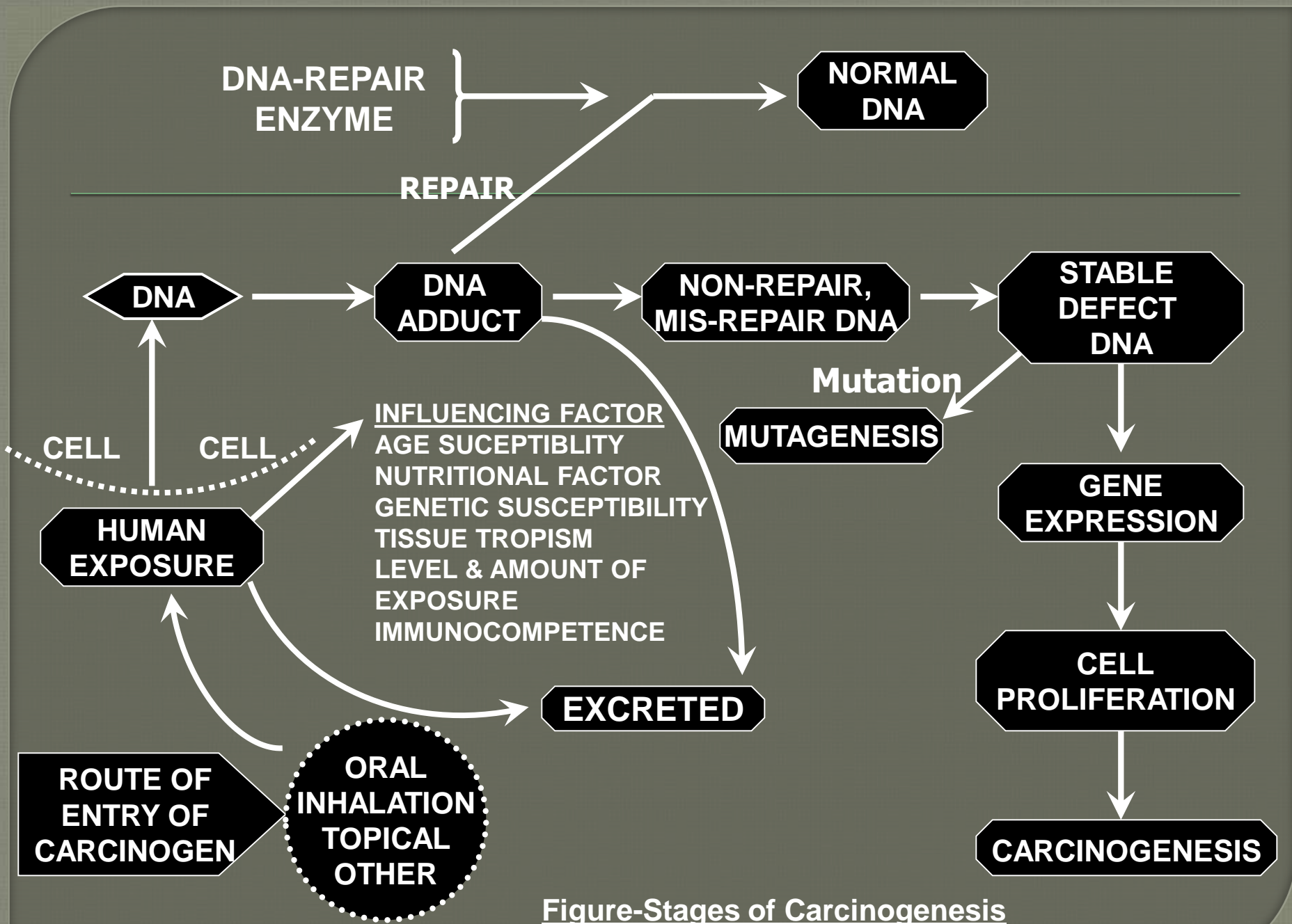


Figure-Stages of Carcinogenesis

PRECAUTIONS AND CONTROLS

- A **sound knowledge** of the potential hazards of chemicals use in industries will automatically make a person take maximum possible precaution to minimize the expose.
- Some of the essential control measure of an industry or plant process and equipment design, **exhaust, ventilation, enclosure and isolation** along with personal **hygiene respiratory protection, protective clothing** and of course proper maintenance of the whole area.
- Installation of plant and equipment should also **provide easy maintenance** and **repair equipment and piping** should be made of corrosions resistant material for easier cleaning.
- A **proper exhaust ventilation** at the working place is necessary.
- Full face shield are **face piece respirator, head covering** (Cap of Helmet), **impervious cloth**, glove and boots are the common safety precaution for protection.
- **Administrative control** are also equally necessary to reduce exposure.
- **Regular medical checkup** of worker could help minimize of chemical exposure.

CONCLUSION

- The most desirable and ideal precaution against carcinogenic chemicals would be total **prevention of exposure** to these substances .
- To accomplish this with certainly would definitely required **discontinuance of manufacture and use of all these chemicals.**
- Basically **humans are of creative nature** and industrialization is our creation as well as a necessity.
- Lack of common knowledge, negligence and carelessness are major factor responsible for chemical hazards to avoid cancer.
- Now the question arises that---
We stop using all these chemicals substances in our industries?
The plain and simple **answer is NO.**