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CELEBRATING 50 YEARS

ENVIRONMENTAL STUDIES & LIFE SCIENCES

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ENVIRONMENTAL STUDIES & LIFE SCIENCES

Disease Management

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The condition of being sound in body, mind or spirit, especially freedom from physical disease or pain- **Health**

Factors influencing health:

1. **Genetic disorders**- deficiencies a child born with & deficiencies/ defect child inherit
2. **Infections**
3. **Life style-** food & water, rest & exercise, habits

Disease Management

Any condition which interferes with normal functioning of the body and impairs the health- Disease

Types of Diseases:

I. Congenital Disease- inborn disease & genetically inherited

II. Acquired Disease- after birth & non- inheritable

Congenital Disease:

1. Disease due to gene mutation. Eg.- Haemophilia, Color blindness
2. Disease due to chromosomal mutation Eg.- Down's syndrome, Klinefelter's syndrome

Acquired Disease:

1. Communicable or infectious diseases- air, water, food, physical contact or vectors (Bacteria, Virus, Protozoa, Helminth, Fungus etc.)
2. Non- communicable or non- infectious diseases- Deficiency disease (Diabetes), Degenerative (Arthritis), Cancerous & Allergic diseases (Asthma)

Disease Management

- **Disease management** is a system of coordinated heath care interventions and communications for defined patient populations with conditions where self-care efforts can be implemented.

- **Disease management** empowers individuals, working with other health care providers to **manage** their **disease** and prevent complications.

Improvements in quality of care and patient outcomes should be the primary indicator of successful **disease management**.

Infectious diseases can be caused by:

- **Bacteria.** These one-cell organisms are responsible for illnesses such as strep throat, urinary tract infections and tuberculosis.
- **Viruses**. Even smaller than bacteria, viruses cause a multitude of diseases ranging from the common cold to AIDS.
- **Fungi.**
- **Parasites.**

Common Infectious Diseases

- Chickenpox.
- Common cold
- Diphtheria.
- Giardiasis.
- HIV/AIDS.
- Influenza (flu)

Disease Management

Lifestyle diseases are ailments that are primarily based on the day to day habits of people.

Lifestyle diseases include

- atherosclerosis
- heart disease
- stroke
- obesity
- type 2 diabetes
- hypertension
- diseases associated with smoking and alcohol and drug abuse
- colon cancer, and
- premature mortality

Disease Management

A **chronic disease affects** every aspect of a person's life.

This can include physical and mental health, family, social life, finances, and employment.

Chronic diseases can also shorten a person's life.

Conditions such as asthma and diabetes require regular monitoring to prevent the disorders from progressing to life-threatening levels.

Chronic disease management, therefore, is **essential** to both improving health outcomes of poor individuals and containing costs in health care system.

Disease Management

Diseases can be grouped as:

1. Food & water borne diseases
2. Air borne diseases
3. Vector borne diseases

Food & water borne diseases:

- Proper personal hygiene include keeping the body clean; consumption of clean drinking water, food, vegetables, fruits, etc.
- Proper public hygiene which includes proper disposal of waste and excreta; periodic cleaning and disinfection of water reservoirs, pools, cesspools and tanks and observing standard practices of hygiene in public catering.
- Eg.- Typhoid (*Salmonella typhii*), Amoebiasis (*Amoeba*) and Ascariasis (*Ascaris*)

Air borne diseases:

- Close contact with infected person & their belongings should be avoided
- Personal hygiene is also very important to prevent diseases
- Eg.- Pneumonia and Common cold

Vector borne diseases:

- Controlling or eliminating the vectors and their breeding places.
- Avoiding stagnation of water in and around residential areas, regular
  cleaning of household coolers, use of mosquito nets
- Introducing fishes like *Gambusia* in ponds that feed on mosquito larvae, spraying of insecticides in ditches, drainage areas and swamps, etc.
- Doors and windows- wire mesh to prevent the entry of mosquitoes.
- *Aedes & Culex* mosquitoes, Houseflies
- Malaria, Filariasis, Dengue and Chikungunya

Prevention or control of Diseases

- Infectious diseases can be prevented through maintenance of personal and public hygiene

10 steps for coping with a chronic condition

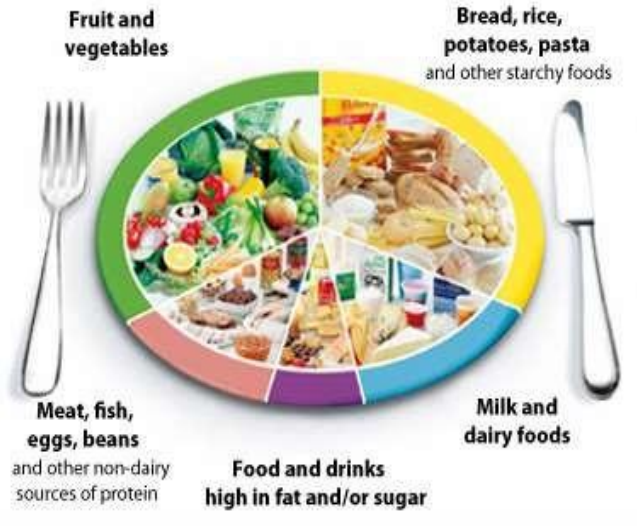
- Get a prescription for information.
- Make your doctor a partner in care.
- Build a team.
- Coordinate your care.
- Make a healthy investment in yourself.
- Make it a family affair.
- Manage your medications.
- Beware of depression.

Prevent Chronic Diseases----contd….

- **Eat Healthy.** Eating healthy helps prevent, delay, and manage heart disease, type 2 diabetes, and other chronic diseases.
- **Get Regular Physical Activity**. Regular physical activity can help you prevent, delay, or manage chronic diseases.
- **Avoid Alcohol.**
- **Get Screened.**
- **Get Enough Sleep.**

Disease Management

Disease Management



https://nutrivity.in/blog/super-nutrition-secrets

Prevent Chronic Diseases---contd….

Vaccines and immunisation

- Diseases can be now prevented- vaccines and immunisation
- A **vaccine** is a biological preparation that provides active acquired immunity to a particular infectious disease.
- **Vaccines** - eradicate smallpox, polio, diphtheria, pneumonia and tetanus
- Through Biotechnology we can make available newer and safer vaccines.
- Discovery of antibiotics and various other drugs has also enabled us to effectively treat infectious diseases

Immunity

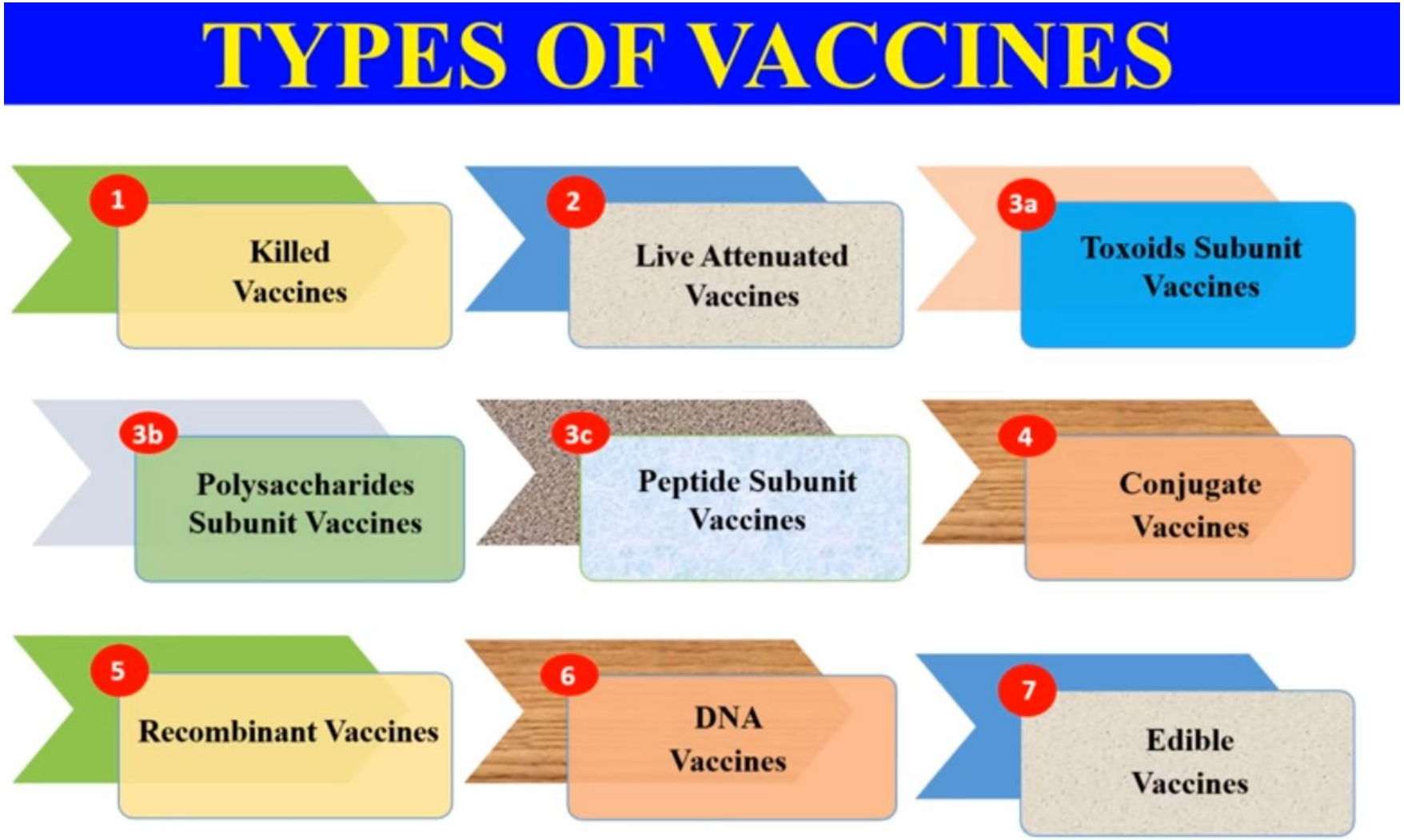
- The foreign agents could be pathogens or any foreign substance that could cause disease in host
- The overall ability of host to fight against disease causing organism-**Immunity**

Types of Immunity

1. **Innate Immunity**
2. **Acquired Immunity**

- **Innate Immunity-** which is present from the time of birth & is not pathogen specific
- **Acquired Immunity-** not from time of birth & is pathogen specific; Immunity is conferred based on memory that immune system have for that pathogen

Disease Management



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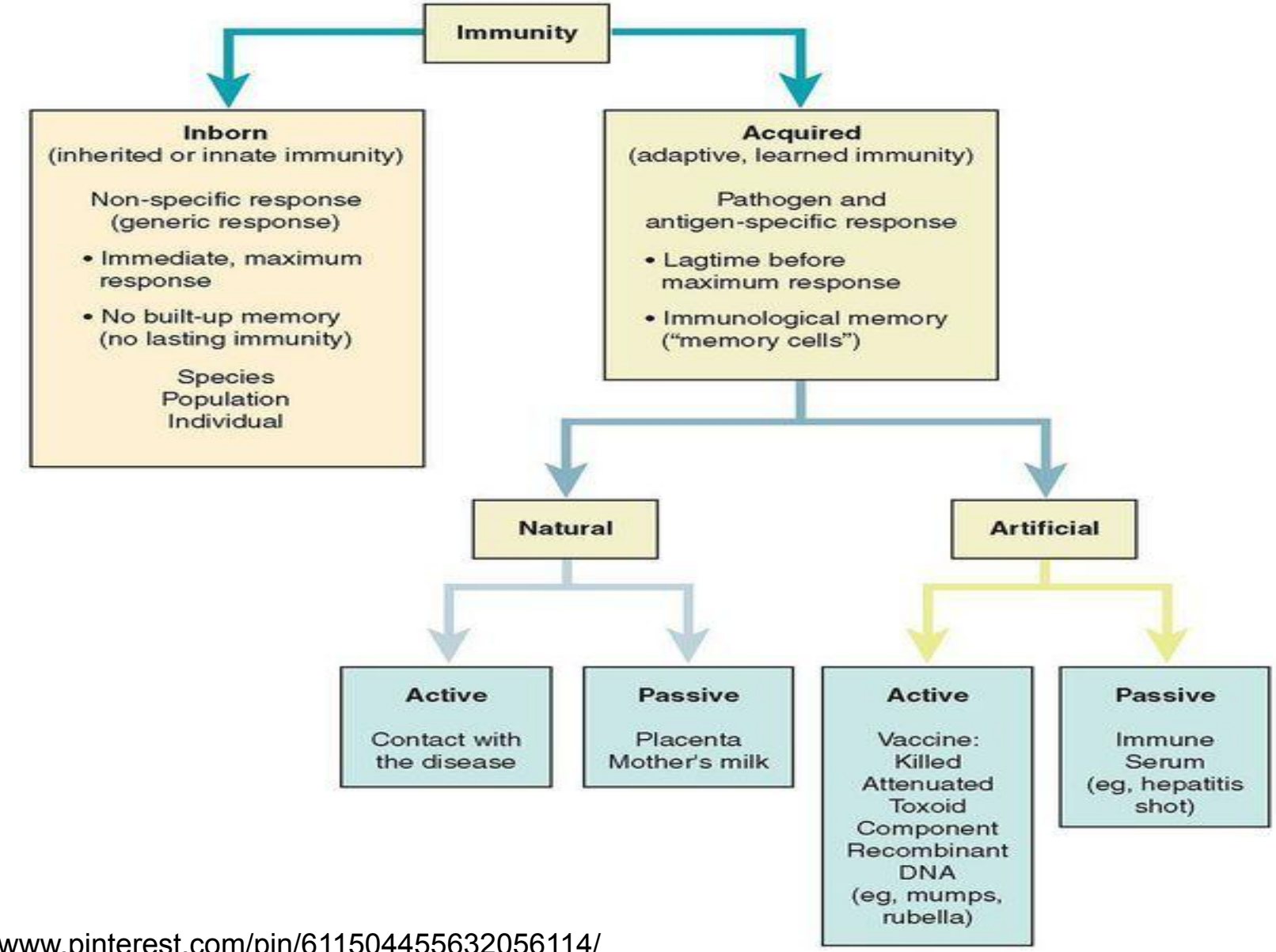
Disease Management



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Principle- "property of 'memory' of the immune system"

Vaccination

- **Antigenic proteins** of pathogen or **activated/weakened pathogen** (vaccine) are introduced into the body.
- The antibodies produced in the body against these antigens would neutralise the pathogenic agents during actual infection.
- The vaccines also generate memory – B and T-cells that recognize the pathogen quickly on subsequent exposure and overwhelm the invaders with a massive production of antibodies.
- Recombinant DNA technology- antigenic polypeptides of pathogen are produced in bacteria or yeast.
- Vaccines produced using this approach allow large scale production and hence greater availability for immunisation, e.g., hepatitis B vaccine produced from yeast

Disease Management

- Immunization is the process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine. Vaccines stimulate the body's own immune system to protect the person against subsequent infection or disease.
- Two Types:

1. **Active Immunisation-** Slow immune response- infected from mild dosage of dead / pretreated live microbe. Eg.- Measles, Mumps, Rubella etc.
2. **Passive Immunisation-** Quick immune response

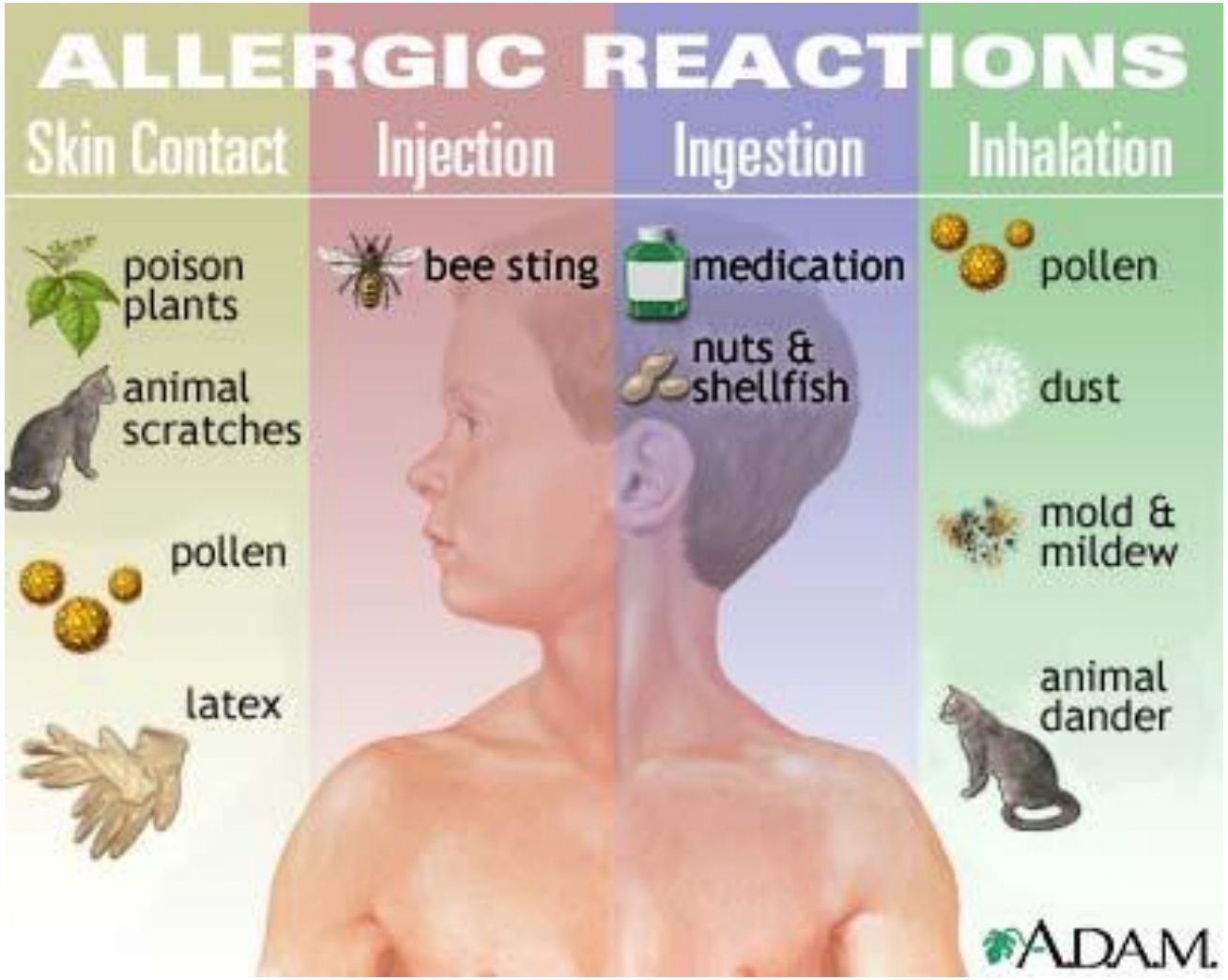
- Direct injection of preformed antibodies (Eg. Tetanus), or antitoxin- a preparation containing antibodies to the toxin (Eg. Snakebites)
- Snakebites, the injection which is given to the patients, contain preformed antibodies against the snake venom- Passive Immunisation

Disease Management

Allergy: Is hypersensitivity disorder of immune system in which exaggerated response of the immune takes place to certain antigens present in the environment

- Substance which induce allergy- **Allergen** (mites in dust, pollens, animal dander)
- Antibodies produced- IgE type etc.
- Symptoms: Sneezing, watery eyes, running nose and difficulty in breathing.
- Reason: Release of chemicals like **histamine** and **serotonin** from the mast cells
- Diagnosis: Injecting small dosage of possible allergens & reactions are observed
- Drugs **anti-histamine, adrenalin and steroids-** quickly reduce the symptoms of allergy
- Protected environment- lowered immunity thus more & more people are now sensitive to allergens

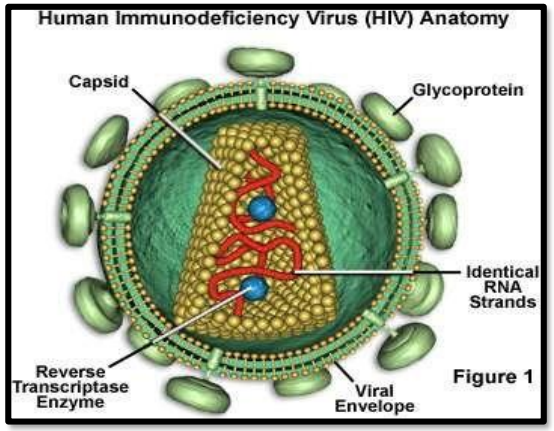
Disease Management



http://umr.adam.com/content.aspx?productid=117&pid=1&gid=000812

Acquired Immuno Deficiency Syndrome

- **Acquired Immuno Deficiency Syndrome-** disease caused due to deficiency of immune system
- Disease/ syndrome- acquired during the lifetime of an individual indicating that it is not a congenital disease
- First reported in 1981 & last twenty-five years- 25 million persons were killed



Causative organism:-

- **Human Immuno deficiency Virus (HIV)- retrovirus**, i.e RNA virus having RNA genome enclosed by protein coat

Modes of Transmission of HIV infection:

(a)sexual contact with infected person

(b)by transfusion of contaminated blood and blood products

(c)by sharing infected needles as in the case of intravenous drug abusers

(d)from infected mother to her child through placenta

- Individuals with multiple sexual partners, drug addicts who take drugs intravenously, individuals who require repeated blood transfusions and children born to an HIV infected mother- high chance of AIDS

It takes few months to few years (5- 10 years)- between infection & appearance of AIDS symptoms

Disease Management

Symptoms:

- HIV attacks Helper T lymphocyte- reduction of Helper T lymphocyte which cause severe **Cellular immuno- deficiency**
- Bouts of fever, Diarrhoea & Weight loss
- Highly susceptible to *Mycobacterium,* viruses, fungi, parasites like *Toxoplasma*
- Infected person becomes opportunistic to infections

Diagnosis & Treatment:

- Diagnostic test for AIDS- **enzyme linked immuno-sorbent assay**(ELISA)
- Treatment of AIDS with **anti-retroviral drugs-** partially effective
- Drugs can only prolong the life of the patient but cannot prevent death, which is inevitable.

Prevention of AIDS:

- Educating people to generate awareness among them
- National AIDS Control Organization (NACO) and
- other non-governmental organization (NGOs)
- WHO has started a number of programs to prevent the spreading of HIV infection which includes- Making blood (from blood banks) safe from HIV, ensuring the use of only disposable needles and syringes in public and private hospitals and clinics, free distribution of condoms, controlling drug abuse, advocating safe sex and promoting regular check-ups for HIV in susceptible populations
- Infection with HIV or having AIDS is something that should not be hidden – since then, the infection may spread to many more people

Cancer

- Cancer also known as a malignant tumor, is a group of diseases involving abnormal **cell growth** with the potential to invade or spread to other parts of the body

- Considered as one major cause of death all over world
- Due to its severity process of Oncogenic transformation of cells, its treatment and control requires most intense areas of research in biology and medicine

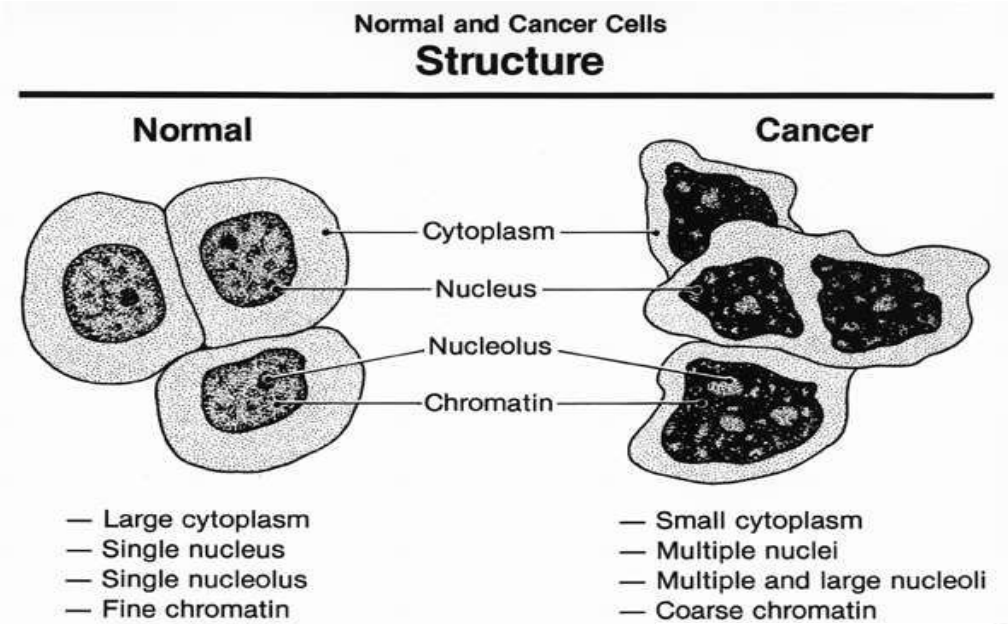
- Cancer can be induced by external factors- **Carcinogens**

Causes of Cancer:

Normal cells transformed into cancerous neoplastic cells by physical, chemical and biological agents. These agents are called **carcinogen.**

- **Physical agents:** ionizing radiation like X-rays, gamma rays non- ionizing radiations like UV-rays.
- **Chemical agents:** Tobacco smoke, sodium azaide, Methyl ethane sulphonate.
- **Biological agents:**
  - Cancer causing viruses called **oncogenic viruses** have a gene called **viral oncogenes,** induce transformation of neoplastic cells.
  - **Cellular oncogenes** (c-onc) or **proto oncogenes** in normal cells, when activated lead to oncogenic transformation of the normal cells

Disease Management



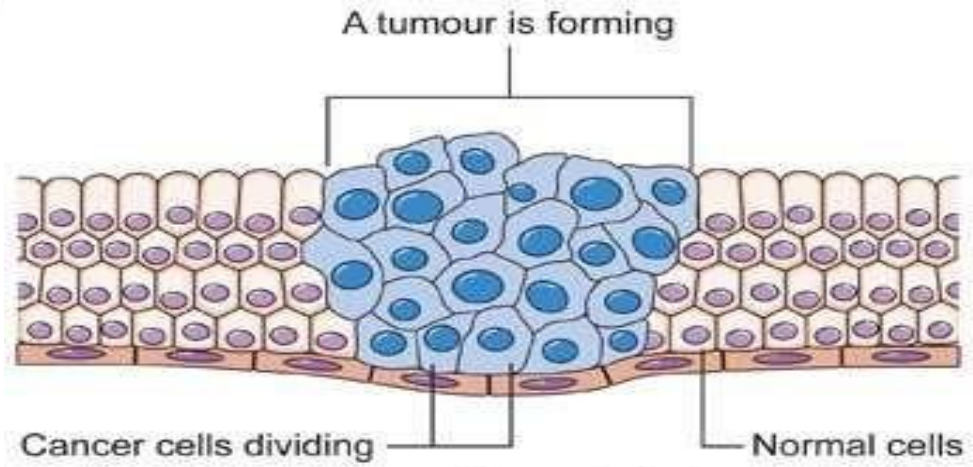


Diagram showing how cancer cells keep on reproducing to form a tumour

Mechanism to transformation to cancerous cell:

- Cell growth and differentiation is highly controlled and regulated which is lacked in cancerous cell
- Normal cell show a property- **Contact inhibition-** inhibits uncontrolled growth
- Cancer cells appears to have lost this property. As a result of this, cancerous cells just continue to divide giving rise to masses of cells called **tumors**.

TYPES OF TUMOR

Benign tumors:

- Normally remain confined to their original location
- Do not spread to other location.
- Cause little damage

- **Malignant tumors:**
  - Mass of proliferating cells called **neoplastic** or tumor cells.
  - These cells grow very rapidly.
  - Invade and damage surrounding tissues.
  - These cells actively divide and grow; they also starve the normal cells.
  - Cancerous cells escape from the site of origin and moves to distant place by blood, wherever they get lodged make the normal cell cancerous. This property is called **metastasis.**

https://www.medicalnewstoday.com/articles/322551

Four main types of cancer are:

Carcinomas. A **carcinoma** begins in the skin or the tissue that covers the surface of internal organs and glands.

Sarcomas. A **sarcoma** begins in the tissues that support and connect the body.

Leukemias. **Leukemia** is a cancer of the blood.

Lymphomas and **Myelomas,** Cancer of immune system

Disease Management

Detection of Cancer:

Biopsy and histopathological study-

a)tissue and blood and bone marrow tests for increased cell counts (leukemias);

b)Biopsy of a piece of the suspected tissue cut into thin sections is stained and examined under microscope (histopathological studies) by a pathologist

Radiography like X-rays, CT (computerized tomography)

a)used to detect cancers of the internal organs

b)Computed tomography uses X-rays to generate a three- dimensional image of the internals of an object

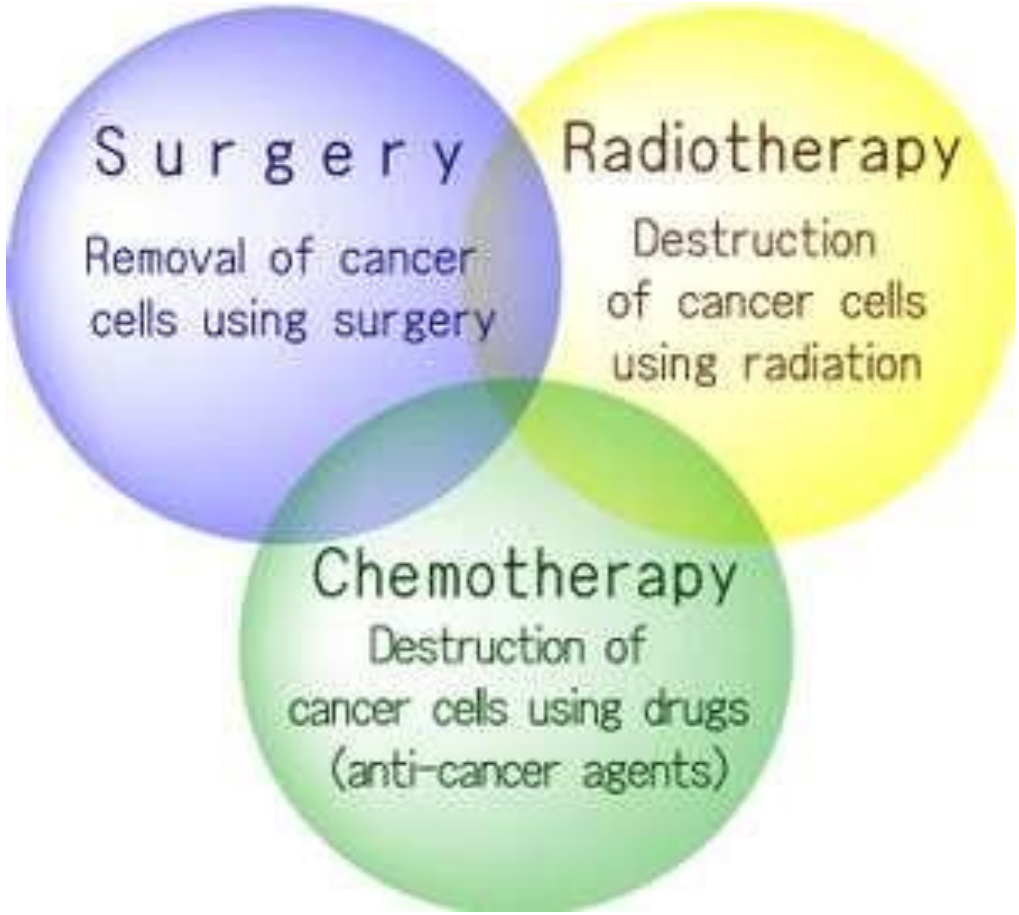
MRI (magnetic resonance Imaging):

a)uses strong magnetic fields and non-ionising radiations to accurately detect pathological and physiological changes in the living tissue

Antibodies against cancer-specific antigen:

a) Antibodies against cancer-specific antigens are used for detection of certain cancers genes- person is advised to prevent exposure

Treatment


Surgery
Removal of cancer cells using surgery
Radiotherapy
Destruction of cancer cells using radiation
Chemotherapy
Destruction of cancer cells using drugs (anti-cancer agents)

Disease Management

Pandemic Management Platform

THANK YOU

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