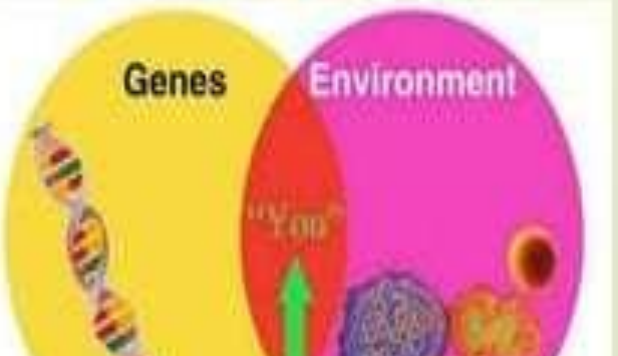
MULTIFACTORIAL DISORDERS

MULTIFACTORIAL INHERITANCE

"Inheritance and expression of a phenotype being determined by multiple genes at different loci and the effects of the genes are cumulative , with each gene contributing a small amount to the final expressed phenotype aided by certain environmental factors"

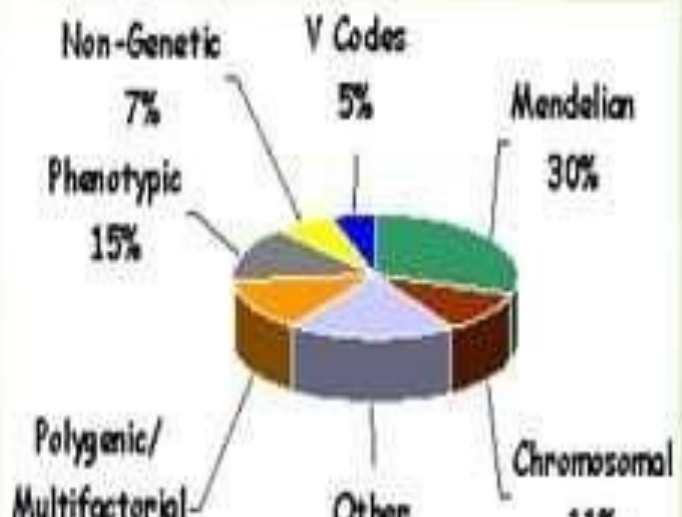
- None of the genes is dominant or recessive to another.



TYPES OF GENETIC DISEASES

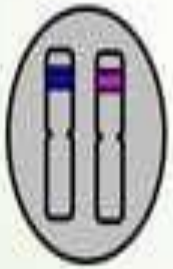
3 groups of genetic diseases:

- Disorders with multifactorial inheritance (polygenic)
- Monogenic (mendelian) disorders
- Chromosomal aberrations

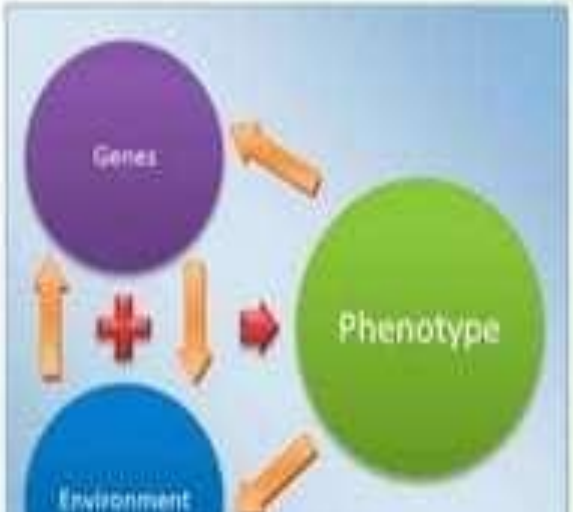


MULTIFACTORIAL DISORDERS

"Disorders caused by multiple genes along with additives such as environmental factors are called multifactorial or polygenic disorders"



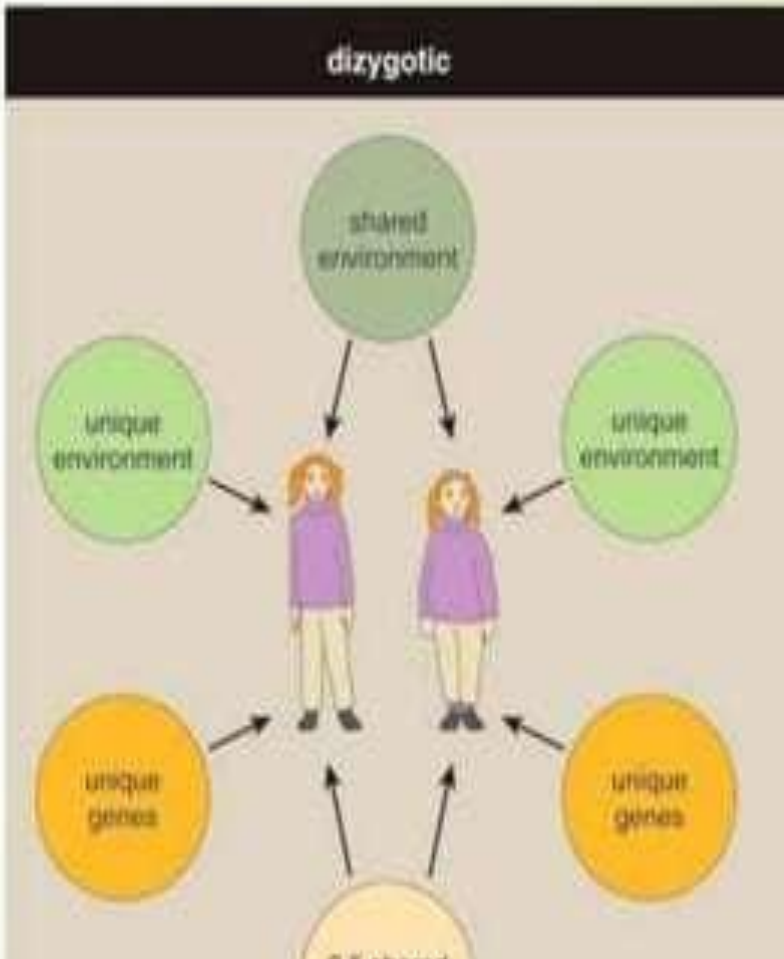
+ environment



- First-degree relatives share on average 50% of their genes.

- Often familial occurrence; probability of disease is:
  - In 1st degree relatives about 5-10%
  - In 2nd degree relatives about 0.5-1%

- One organ system affected



Risk factors for coronary artery disease

Uncontrollable (but identifiable)

Family history (genetics)

Age

Male sex

Potentially controllable or treatable

Fatty diet

Hypertension

Smoking

High serum cholesterol

Low serum HDL

High serum LDL

Stress

Insufficient exercise

Obesity

COMMON DISEASES

- Asthma
- Autoimmune disorders
- Alzheimer's Disease
- Cancers
- Cleft palate
- Cardiac diseases
- Diabetes mellitus
- Epilepsy
- Hypertension
- Intellectual disability
- Infertility
- Obesity

TREATMENT

- Genetic disorders are rarely treatable
- Gene therapy is being tested to treat genetic disorders
- Bone marrow transplants
- Medications
- Enzyme replacement therapy (ERT)

  Gaucher's disease is caused by a deficiency of enzyme glucocerebrosidase, which helps the body process the fatty substance glucocerebroside. Treatment for Gaucher's disease may involve enzyme replacement and other therapies.

- Controlling of environmental factors.

  For example, the effect of folic acid administration to pregnant mothers in reducing the incidence of myelomeningocele

INTELLECTUAL DISABILITY

Intellectual disability (ID) or general learning disability is a generalized disorder appearing before adulthood, characterized by significantly impaired cognitive functioning and deficits in two or more adaptive behaviors.

Symptoms

- Delays in oral language development
- Deficits in memory skills
- Difficulty learning social rules
- Difficulty with problem solving skills
- Delays in the development of adaptive behaviors such as self-help or self-care skills
- Lack of social inhibitors

Causes

- Genetic conditions

Abnormal genes (mutations) or abnormal no. of chromosomes

- Problems during pregnancy

Drugs or infection

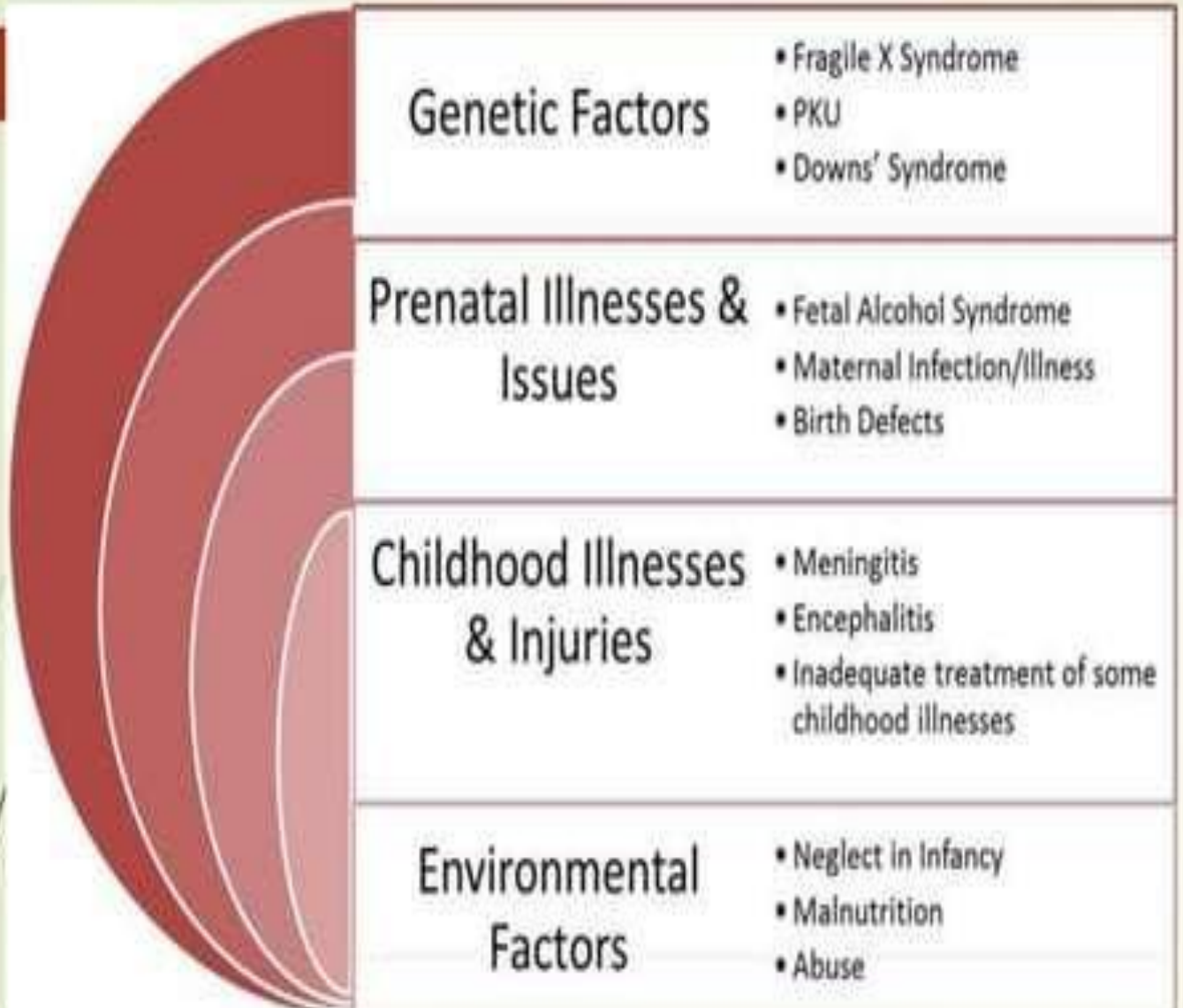
- Problems at birth.

Lack of oxygen

- Exposure to certain types of disease or toxins.
  - Whooping cough
  - Measles
  - Meningitis
  - Lead
  - Mercury
- Iodine deficiency

Goiter and Cretinism

- Malnutrition
- Absence of the Arcuate fasciculus


Genetic Factors
• Fragile X Syndrome
• PKU
• Downs' Syndrome
Prenatal Illnesses & Issues
• Fetal Alcohol Syndrome
• Maternal Infection/Illness
• Birth Defects
Childhood Illnesses & Injuries
• Meningitis
• Encephalitis
• Inadequate treatment of some childhood illnesses
Environmental Factors
• Neglect in Infancy
• Malnutrition
• Abuse

MOOD DISORDERS

Mood disorders refer to a category of mental health problems that include all types of depression and bipolar disorder.

- Mood disorders are sometimes called affective disorders

Types

- **Major depression:**

A two-week period of a depressed mood or a noticeable decrease in interest in usual activities.

- **Dysthymia (dysthymic disorder):**

A chronic, low-grade, depressed, or irritable mood for at least two years.

- **Manic depression (bipolar disorder):**

At least one episode of a depressed or irritable mood and at least one period of a manic (persistently elevated) mood.

- **Mood disorder due to a general medical condition:**

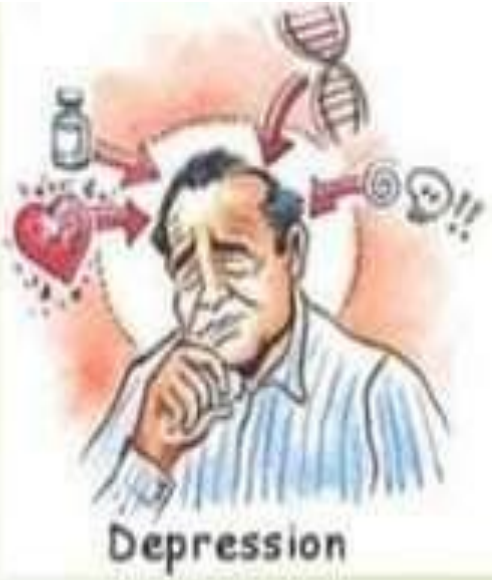
Many medical illnesses (including cancer, injuries, infections, and chronic medical illnesses) can trigger symptoms of depression.

- **Substance induced mood disorder:**

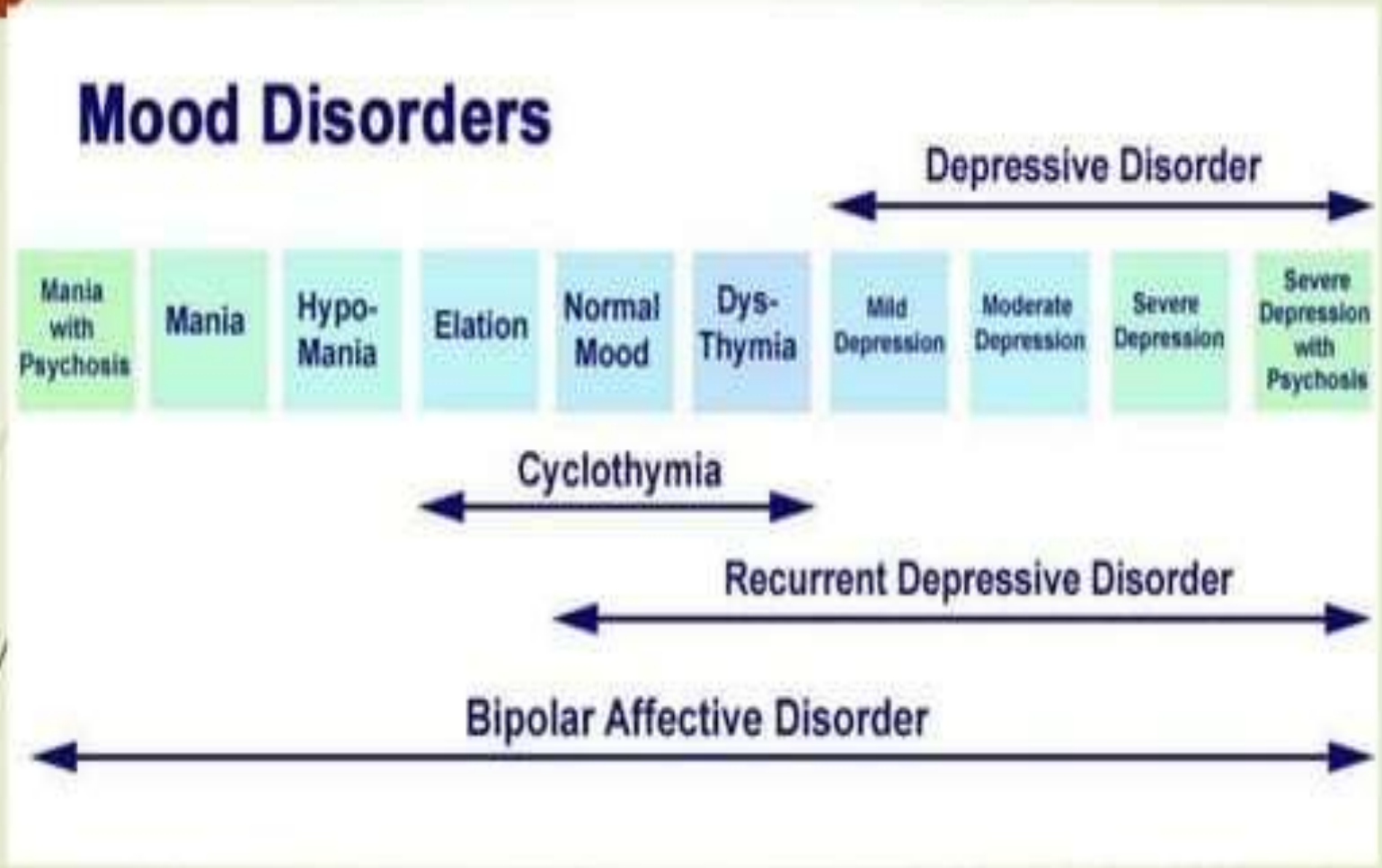
Symptoms of depression that are due to the effects of medication, drug abuse, exposure to toxins, or other forms of treatment.


Bipolar Disorder
MANIC
Yvonne
DEPRESSIVE
•ONSET BEFORE AGE 30
•MOOD:
ELEVATED
EXPANSIVE
IRRITABLE
•SPEECH:
LOUD-RAPID
PUNNING
RHYMING
CLANGING
VULGAR
•? WT. LOSS
GRANDIOSE
•DELUSIONS
•DISTRACTED
•HYPERACTIVE
•↓ NEED FOR SLEEP
•INAPPROPRIATE
•FLIGHT OF IDEAS
•BEGINS SUDDENLY
ESCALATES OVER
•PREVIOUS MANIC
EPISODES
•MOOD:
DYSPHORIC
DEPRESSIVE
DESPAIRING
•↓ INTEREST IN
PLEASURE
•NEGATIVE VIEWS
• FATIGUE
•↓ APPETITE
•CONSTIPATION
•INSOMNIA
•↓ LIBIDO
•SUICIDAL
PREOCCUPATION
•MAY BE AGITATED
OR HAVE MOVEMENT

Symptoms



- Persistent feelings of sadness
- Feeling hopeless or helpless
- Having low self-esteem and energy
- Feeling inadequate
- Excessive guilt
- Loss of interest in usual activities or activities once enjoyed (difficulty concentrating)
- Difficulty with relationships
- Sleep disturbances (for example, insomnia or hypersomnia)
- Changes in appetite or weight
- A decrease in the ability to make decisions
- Suicidal thoughts or attempts (running away)
- Frequent physical complaints (for example, headache, stomachache, or fatigue)
- Hypersensitivity to failure or rejection

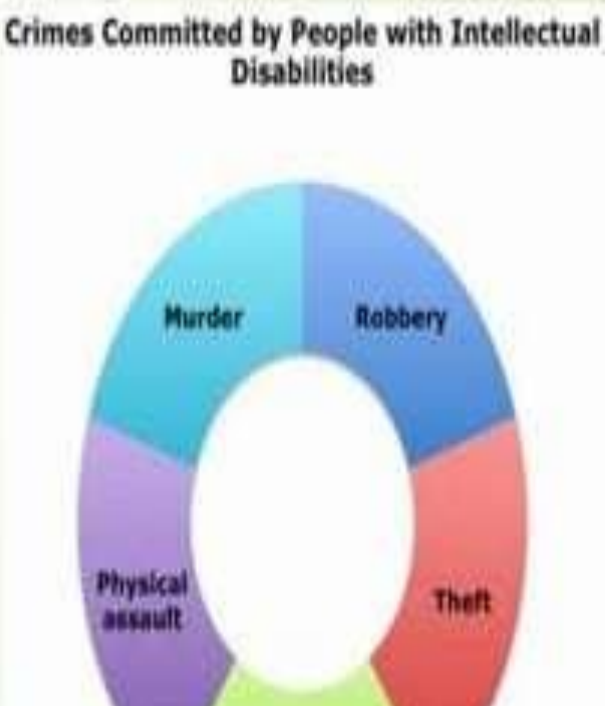

Mood Disorders
Depressive Disorder
Mania with Psychosis
Mania
Hypo-Mania
Elation
Normal Mood
Dys-Thymia
Mild Depression
Moderate Depression
Severe Depression
Severe Depression with Psychosis
Cyclothymia
Recurrent Depressive Disorder
Bipolar Affective Disorder

Causes

- Endorphins enhancing positive mood are regulated by neurotransmitters
- Abnormal quantity or structure of neurotransmitters as a result of genetic and environmental mutations cause mood disorders
- In Alzheimer's neurotransmitters are defective due to mutations in the 3 genes encoding for it:
  - Amyloid precursor protein (APP)
  - Presenilin 1
  - Presenilin 2

Prevention & Treatment

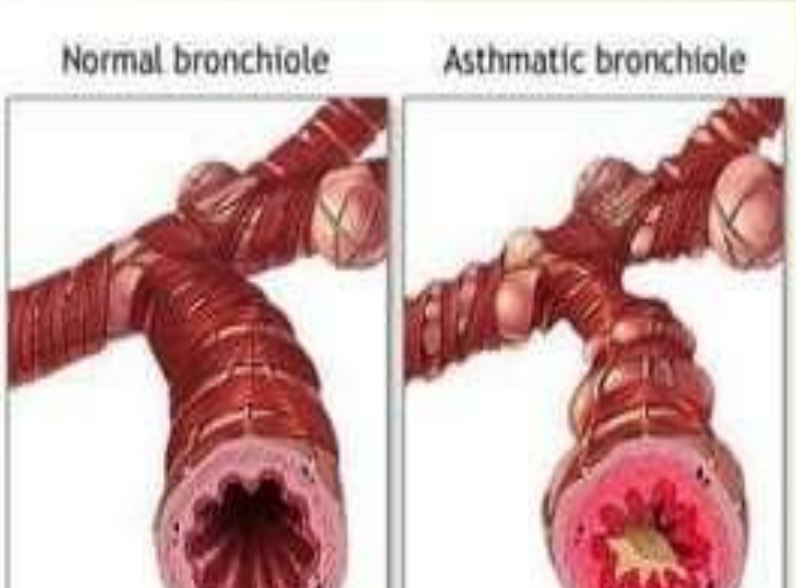
- Preventive measures to reduce the incidence of mood disorders are not known at this time.
- Early detection and intervention can:
  - Reduce the severity of symptoms
  - Enhance the individual's normal growth and development
  - Improve the quality of life



ASTHMA

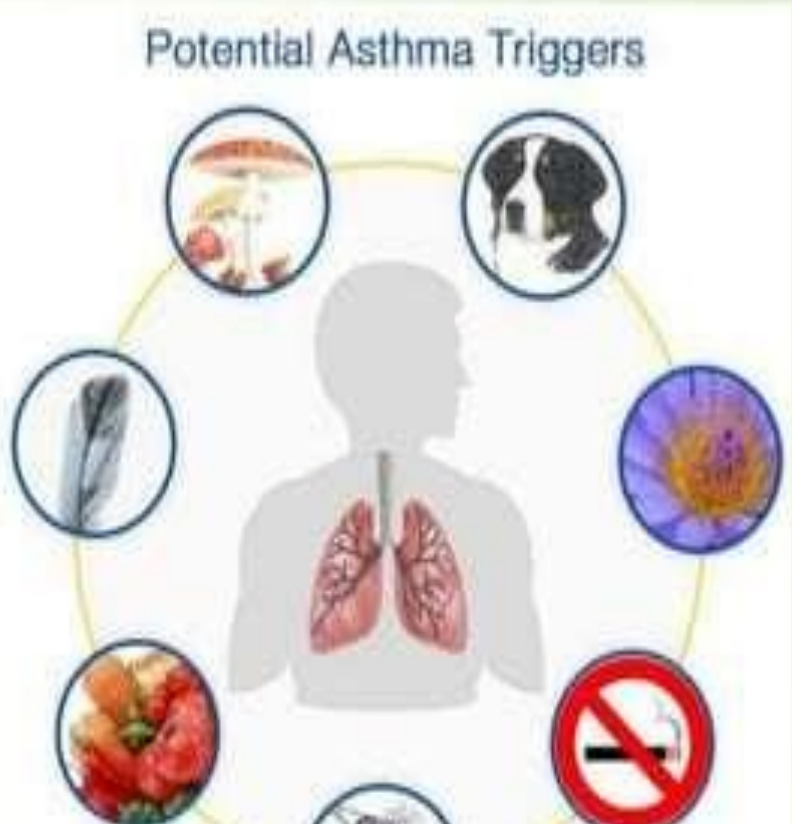
- **Asthma** (from the Greek word "panting") is a common chronic inflammatory disease of the airways characterized by variable and recurring symptoms, reversible airflow obstruction and bronchospasm.

- The inflammation of asthmatic airways



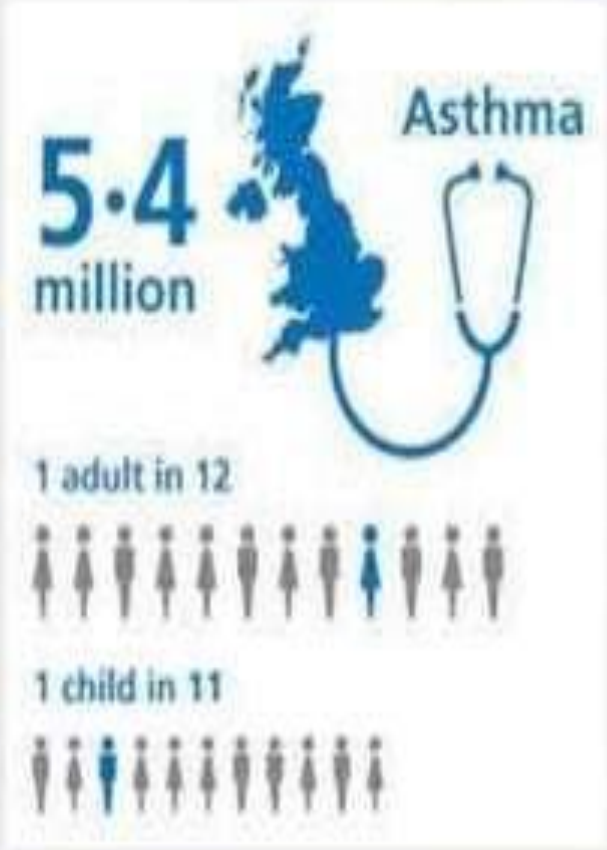
Multiple factors:

- Genetic
- Environmental
- Socioeconomic
- Life style



Symptoms of asthma:

- Coughing
- Wheezing
- Shortness of breath
- Chest pain, tightness or pressure
- Weakness during exercise
- Trouble during sleep
- Difficulty in talking
- Bluing of lips and finger nails



Treatment:

Medications:

- Antiflammatories
- Bronchodilators

Others:

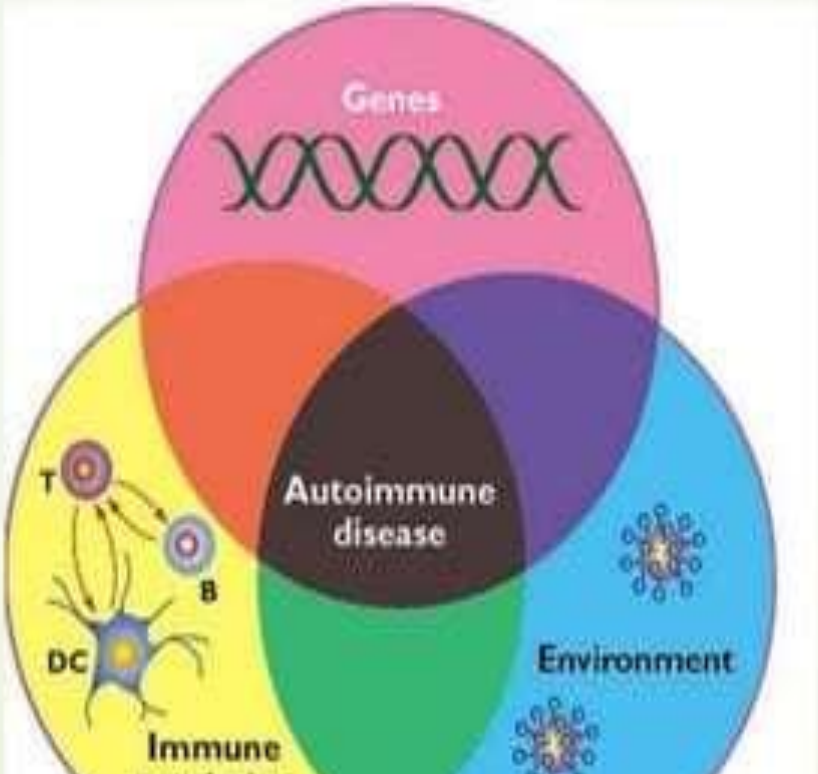
- Hygiene
- Avoid things that can worsen your asthma

Drugs for treatment:

- Inhaled corticosteroids
- Cromolyn
- Theophylline
- Leukotriene modifiers
- Anti IgE
- Beta 2 agonists


I CAN CONTROL MY ASTHMA
Check my peak flow meter.
Visit my asthma Doctor.
Take my inhalers
Take my meds

AUTOIMMUNE DISORDERS



Definition:

Autoimmune diseases arise from an abnormal immune response of the body against substances and tissues normally present in the body (autoimmunity)

- In patients with an autoimmune disorder, the immune system can't tell the difference between healthy body tissue and antigens.
- The result is an immune response that destroys normal body tissues.
- This response is a hypersensitivity reaction similar to the response in allergic conditions.

Types:

- Diabetes type 1
- Graves disease
- Inflammatory bowel disease
- Multiple sclerosis
- Psiorosis
- Rheumotoid arthritis
- Scleroderma
- Systemic lupus erthymetosus

Symptoms:

- Joint pain, muscle pain or weakness or a tremor
- Weight loss, insomnia, heat intolerance or rapid heartbeat
- Recurrent rashes or hives, sun-sensitivity, a butterfly-shaped rash across your nose and cheeks
- Difficulty concentrating or focusing
- Feeling tired or fatigued, weight gain or cold intolerance
- Hair loss or white patches on your skin or inside your mouth
- Abdominal pain, blood or mucus in your stool, diarrhea or mouth ulcers
- Dry eyes, mouth or skin
- Numbness or tingling in the hands or feet
- Multiple miscarriages or blood clots

Treatment:

Goal of treatment:

- Reduce symptoms
- Control the autoimmune process
- Maintain the body's ability to fight disease

- Which treatments are used depends on the specific disease and your symptoms.
- Some patients may need supplements to replace a hormone or vitamin that the body is lacking. Examples include thyroid supplements, vitamins such as B12, or insulin injections.
- If the autoimmune disorder affects the blood, you may need blood transfusions.
- People with autoimmune disorders that affect the bones, joints, or muscles may need help with movement or other functions.

Treatment:

Immuno supressive medicines:

Medicines are often prescribed to control or reduce the immune system's response. They are often called immunosuppressive medicines.

They include:

1. Corticosteroids
   - Prednisone
2. Nonsteroid drugs
   - Azathioprine
   - Cyclophosphamide
   - Mycophenolate
   - Sirolimus


EAT MORE FRUITS
EXERCISE
DRINK MORE WATER
READ SPIRATIONAL BOOKS
HEALTHY LIFESTYLE
PEACE OF MIND
MEDITATION
WALK
EAT WELL

DIABETES

A chronic disease in which the body cannot use or make insulin.

or

A metabolic disorder characterized by hyperglycemia due to an absolute or relative lack of insulin or to a cellular resistance to insulin

Statistics

- Pakistan ranked 7th in diabetes prevalance
- Effects 23 million people in Uk
  - Diagnosed 17.9 million people
  - Undiagnosed 5.7 million peole

Types

There are three main types:

- Type I diabetes (childhood) / juvenile diabetes / IDDM
- Type II diabetes (adult onset) / NIDDM
- Gestational diabetes

TYPE 1 VS TYPE 2 DIABETES

- Type 1 : destroys pancreatic cell that produce insulin
- Type 2 : body does not use insulin effectively

FACTORS AFFECTING DIABETES

- Environmental factors
- Dietary factors
- Race
- Geography
- High blood pressure
- Abnormal cholesterol level

Symptoms

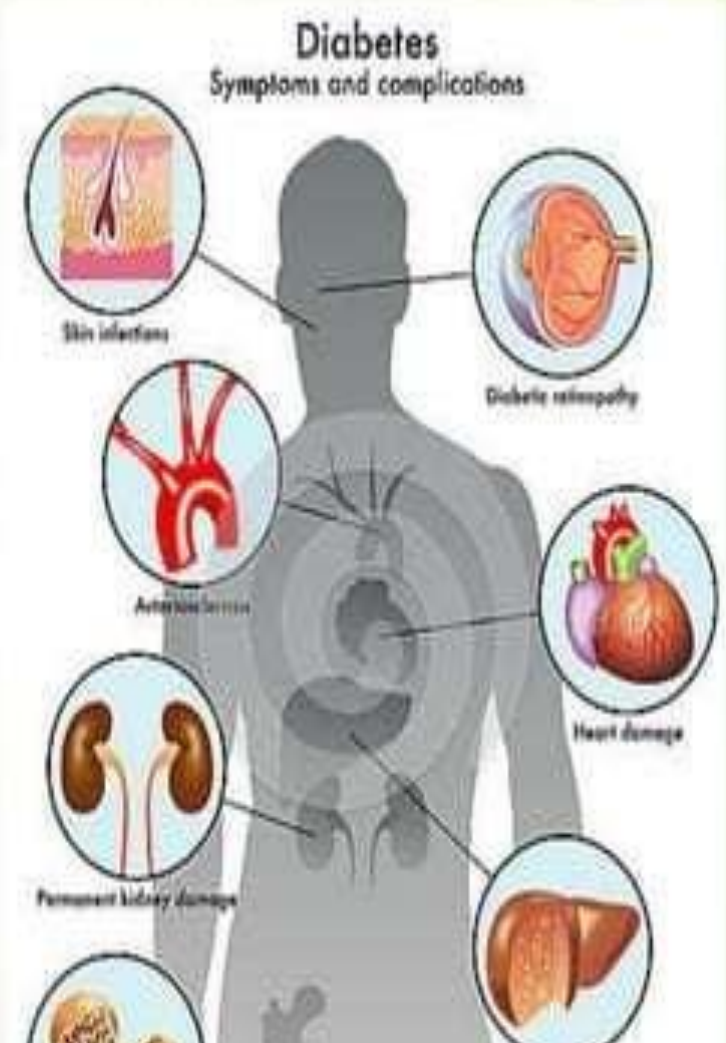
- polyuria
- polyphagia
- Poly dipsia
- Weight loss
- Fatigue
- Delayed wound healing
- Skin infections
- Sexual dyfunction
- Numbness in feet and hands

Treatment

- Insulin injections
- Exercise
- Diet
- Glucose monitoring
- Medicines

Complications associated

- Retinopathy
- Kidney damage
- Poor blood circulation
- Nerve damage
- Heart diseases and stroke
- Vision problem and blindness
- Nerve damage



Diagnostic tests

- **Blood glucose tests**

  Monitor your blood sugar or glucose level. This involves pricking your finger, putting a drop of blood onto a test strip, and putting the strip into a glucose meter. When your blood sugar stays near the normal range, you'll have more energy, fewer skin problems, and a reduced risk of heart disease and kidney damage.

Insulin shots

- People with type 1 diabetes must take insulin to help the body process blood sugar. Most patients take insulin as an injection and need multiple shots per day.

A1c blood test

- A1c blood test is held every three to six months. This test reveals how well your blood sugar has been controlled. If the results show poor blood sugar control, you may need to adjust your insulin therapy, meal planning, or physical activity

Pancreatic islet cell transplant

Surgeon transfers healthy insulin-producing cells from a donor into the pancreas of someone with type 1 diabetes.

Hypertension

Definition:

Hypertension, also referred to as high blood pressure, is a condition in which the arteries have persistently elevated blood pressure.

HYPERTENSION DANGER ZONE

Multiple factors

- Obesity
- High sodium consumption
- Low potassium intake
- Too much alcohol intake
- Stress
- NSAIDS
- Deficiency of vitamin D

Symptoms

It is some times called SILENT KILLER

- Headache
- Severe anxiety
- Nosebleeds
- Shortness of breath
- dizziness

Types

Mainly 3 types of hypertension:

- Malignant hypertension
- Secondary hypertension
- Renal hypertension

Diseases associated with hypertension

- Hypertension and heart disease
- Hypertension and kidney disease
- Hypertension and eye disease
- Hypertension and diabetes
- Hypertension and pregnancy

TREATMENT:

- By consuming healthy diet
- By loosing weight
- Lower intake of alcohol
- Exercise

Medications

- ACE inhibitors
- Calcium channel blockers
- Diuretics
- Beta blockers
- Alpha blockers

CLEFT PALATE

&

CANCER

Developmental process

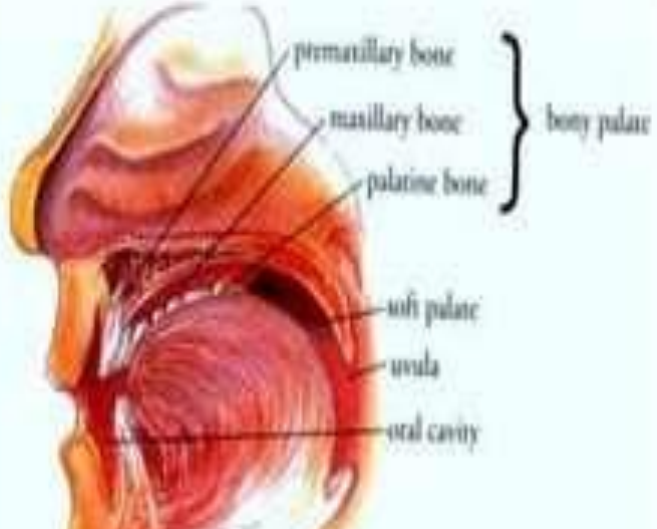
Development of the face

- Formed between the 5th and 8th weeks of gestation
- Results from the fusion of
  - Two mandibular processes
  - One frontonasal process
  - Two maxillary processes

Cleft palate

"Lack of fusion of the processes between the frontnasal masses and the maxillary processes is interrupted"

- Involves the vermilion border of the upper lip and may extend through the lip toward the nostril
- Affects the shape of the nose



Classification of Clefts

Clefts are classified as

1. Unilateral cleft of the lip and palate
2. Bilateral cleft of the lip and palate
3. Submucous cleft
4. Bifid uvula

1. Unilateral
   - Extends from the external portion of the upper lip, through the alveolar ridge, and through the hard and soft palates

2. Bilateral
   - The lip and the alveolar ridge is cleft under both nostrils and the central portion of the lip, alveolar ridge, and the premaxilla are positioned abnormally

3. Bifid Uvula

4. Submucous cleft
   - Muscular cleft of the soft palate
   - A bifid uvula sometimes accompanies this

Causes

1. Genetic disorders
   - Factor in over 400 different genetic syndromes
2. Chromosomal aberrations
3. Teratogenically induced disorders
   - Environmental teratogens are agents that interfere with or interrupt normal fetal development
4. Mechanically induced abnormalities

   Amniotic rupture, intrauterine crowding, uterine tumors, irregularly-shaped uterus

Surgical Management

Primary correction

- Lip surgery by 3 months
- Palatal cleft surgery by 6-18 months

Secondary correction

- Pharyngeal flap
  - ✓ 25% of cases
  - ✓ Improves velopharyngeal competence
  - ✓ Done between 6-12 years of age

Dental Management

Issues related to chewing and speech

- Orthodontists
- Prostodontists
  - obturators

Audiological Management

Middle ear disease

- Chronic otitis media
- Persistent conductive hearing loss

Psychosocial Management

- Facial differences
- Speech differences
- Self-esteem

Communication Problems Inherent with Clefts

80% of individuals born with clefts not associated with a syndrome who receive palatal repair by 18 months can expect reasonably good speech without intervention

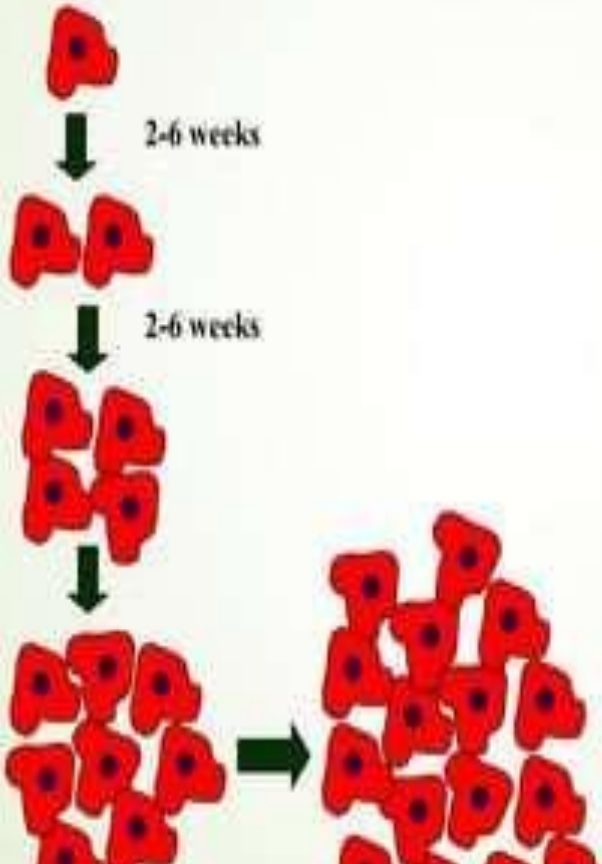
Cancer

Cancer is a large group of diseases (over 200) characterized by uncontrolled growth and spread of abnormal cells.

Normal Cells Vs. Cancer Cells

- Cancer cells:
  - Lose control over growth and multiplication
  - Do not self-destruct when they become worn out or damaged
  - Crowd out healthy cells

Growth of Cancer Cells

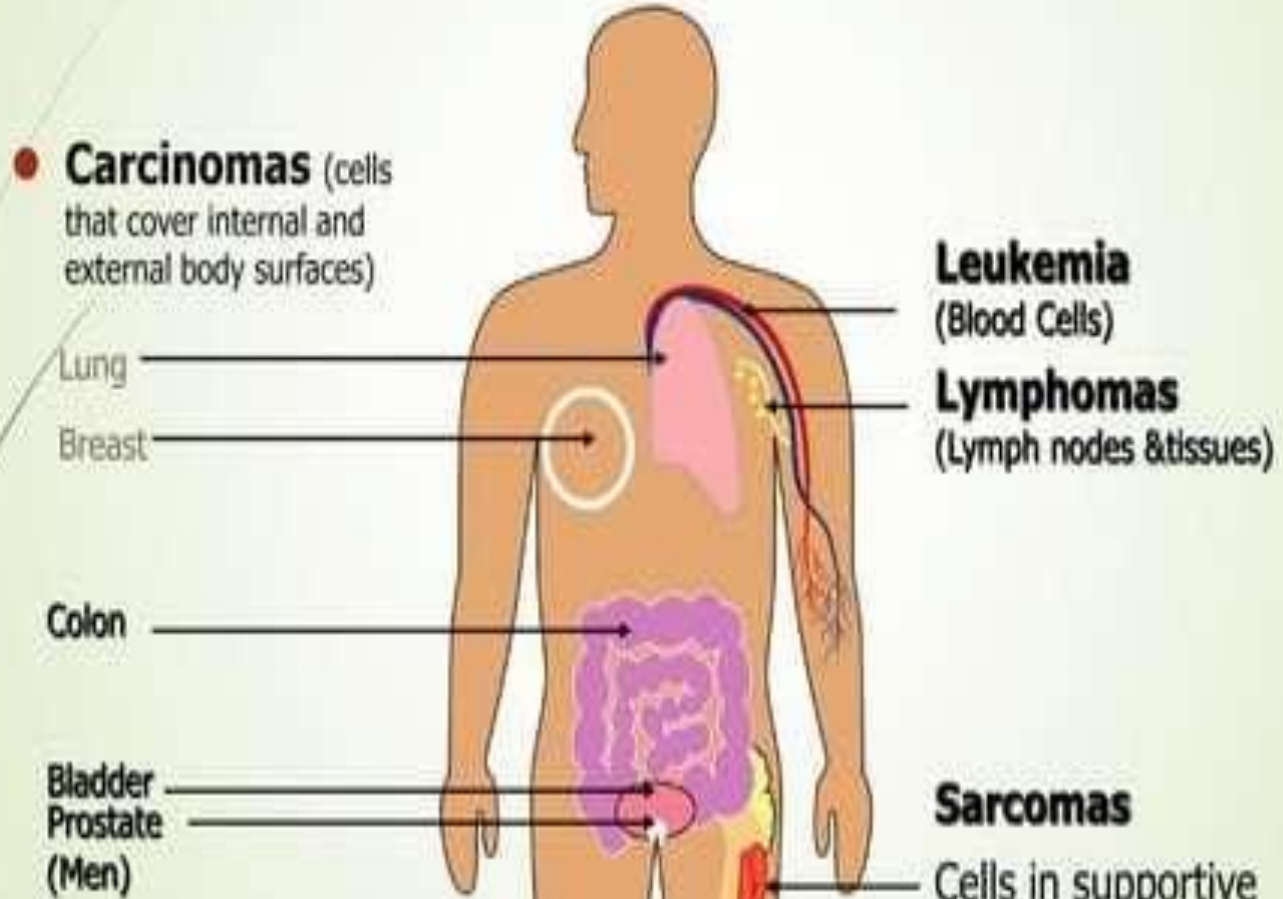


- Cancer cells reproduce every 2-6 weeks.
- Size of cancer cells:
  - One million cancer cells = head of a pin
  - One billion cancer cells = a small grape
  - $2^{30} = 1,073,741,824$
    $= 1$ billion cells

Symptoms of Cancer

- Change in bowel habits or bladder functions
- Sores that do not heal
- Unusual bleeding or discharge
- Lumps or thickening of breast or other parts of the body
- Indigestion or difficulty swallowing
- Recent change in wart or mole
- Persistent coughing or hoarseness

Types of Cancers



What Causes Cancer?

Lifestyle

Family History

Lifestyle Risks

- Smoking
- Diet high fat and low in fruits and vegetables
- Lack of exercise

- Unprotected exposure to the sun, (UV) rays

Environmental Risks

- Second hand smoke
- Air pollution
- Industrial pollution
- Chemical exposures

Inherited Risks

- Less than 15% of cancers are inherited
- Gene mutations are linked to some inherited cancers
- Cancers that may be caused by inherited gene mutations are:
  - Colon cancer
  - Breast cancer
  - Ovarian
  - Prostate cancer
  - Skin cancer

Screening Tests and Self-exams

Screening tests:

- Colon
- Breast
- Cervical
- Prostate

Self-exams:

- Testicular
- Skin

Why Screening Tests?

The treatment of cancer is most successful when the cancer is detected as early as possible, often before symptoms occur.

Fruits and Vegetables Decrease Cancer Risks

- Cancer rates could **decline** by up to **20%** if everyone consumed 5 fruits and vegetables a day!*
- Cancer fighting substances:
  - Antioxidants
  - Dietary fiber
  - Carotenoids
  - Flavenoids

Reduce Your Skin Exposure to the Sun

- Limit time outside, between 10 a.m. & 4 p.m.
- Wear protective clothing. Use wide-brimmed hats and sunglasses.
- Prevent sunburns, especially for children under 18. Use waterproof sunscreen of SPF 15 or higher. Reapply as directed.
- Avoid tanning beds.
- Exercise for 30 minutes or more at least 4 days a week.

OBESITY

&

CARDIAC DISEASES

Lack of Physical Activity and Unhealthy Food Choices =

OBESITY

Obesity is primarily driven by individual decisions, and the way society influences them

1) **Human biology** - genetics plays a part but does not pre-destine us to be obese

2) **Culture/Individual psychology** - it is difficult to break habituated unhealthy eating patterns, especially when common to those around us

3) **The food environment** - there has also been a huge increase in the quantity of quick convenience foods, which tend to be high in saturated fat, salt and sugar.

The Government's Food Standards Agency is responsible for putting out the message that balanced nutrition is instrumental in attaining and sustaining a healthy weight and life

Men and weight loss

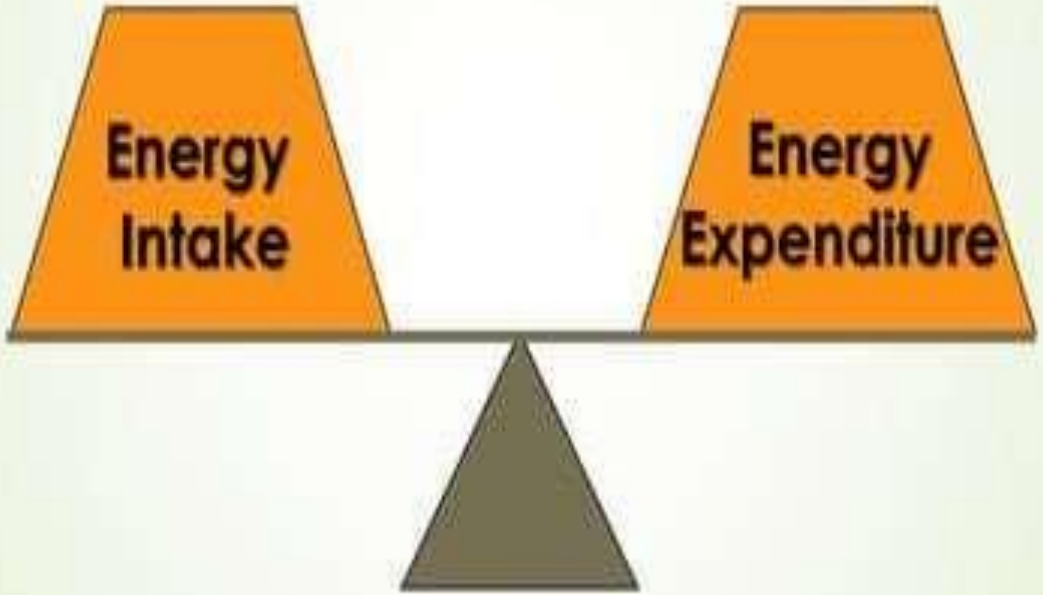
- Men are reluctant to seek medical advice to lose weight, until after they have developed a medical problem
- Less than one fifth GP or hospital obesity clinic patients are male
- Women are the driving force behind men's health

Cause of Obesity

Simple equation...when you eat more than you use,it is stored in your body as "fat"

- Causes
  - Global shift in how we eat
  - Western diet of processed food
  - Higher sugar, fat and calories in what we eat
  - Less nutrients
  - Reduced intake of vitamins and minerals

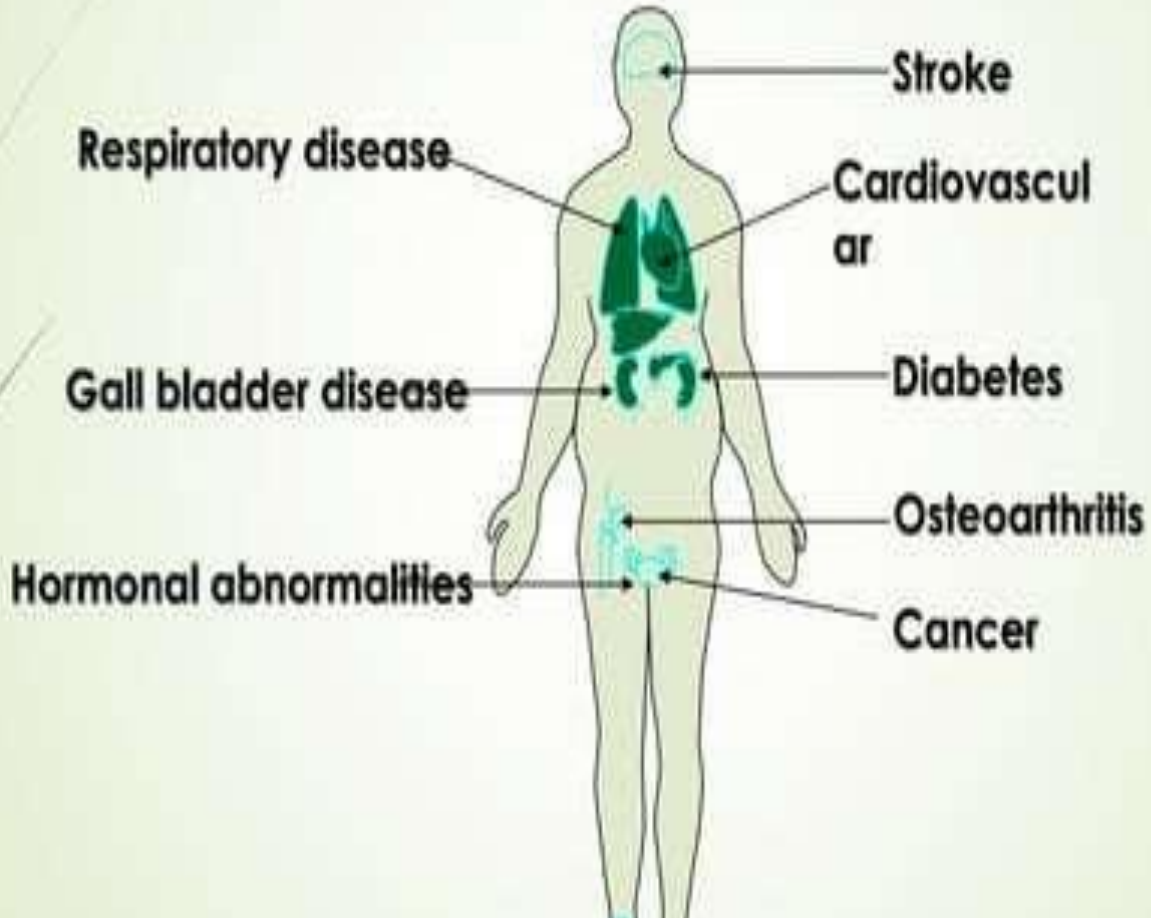
- Nutritional
- Activity levels
- Endocrinology
- Genetic
- Drugs



Effects

With more people gaining too much weight, there are health issues to consider:

- Cardiovascular disease
- Diabetes type 2
- Musculoskeletal disorders
- Cancers-endometrial, cervical and colon
- Infertility
- Gallstones
- Premature death and disability


Stroke
Respiratory disease
Cardiovascul
ar
Gall bladder disease
Diabetes
Osteoarthritis
Hormonal abnormalities
Cancer

Heart Disease- The Silent Killer

What is Heart Disease?

A general term that covers a number of diseases which affect the heart, including coronary artery disease, heart-failure and angina.

Causes

- Atherosclerosis-fatty deposits of cholesterol
- Hypertension

Coronary Artery Disease

Occurs when the coronary arteries that supply the heart muscle become blocked.

- Partially blocked it causes angina.
- Fully blocked it causes a myocardial infarction or a heart attack!

Myocardial Infarction or Heart Attack

- Symptoms: uncomfortable pressure, fullness, squeezing pain, pain spreading to the shoulders, neck and arms.
- Chest discomfort and light headedness
- Anxiety/nervousness
- Paleness or pallor
- Increased irregular heart rate

Congestive Heart Failure

- Fits under the description of heart disease.
- Does not mean the heart has failed, simply means the heart is not doing an efficient job.
- It results from an injury or a reduction of function of the heart muscles.

Cerebrovascular Accident or Stroke

Blood vessel in the brain becomes blocked by atherosclerosis- the tissue supplied by the artery dies.

Symptoms of Stroke

- Sudden numbness or weakness of the face, arm or leg, especially on one side of the body.
- Sudden confusion, trouble speaking, or understanding.
- Sudden trouble seeing in one or both eyes.
- Sudden trouble walking, dizziness, loss of balance or coordination.

Changeable Risk Factors

- Hypertension
- Serum cholesterol
- Obesity
- Diabetes Mellitus
- Physical Inactivity
- Cigarette Smoking
- Alcohol Intake

Treatment

- Cardiac Catherization
- Coronary artery bypass surgery
- Angioplasty

Treatment

- Coronary Artery Bypass Surgery (CABG)

  The most frequently performed major surgery in the United States. Surgery reroutes or bypasses blood around clogged arteries.

Treatment

- Angioplasty (PCTA)

  It involves creating a space in a blocker artery by inserting a small balloon and then inflating it. Now includes the placement of a mesh stent to improve effectiveness.

Epilepsy

EPILEPSY

- Neurologicol disorder
- Effects the nervous system
- Also known as seizure disorder
- Charecterized by seizures

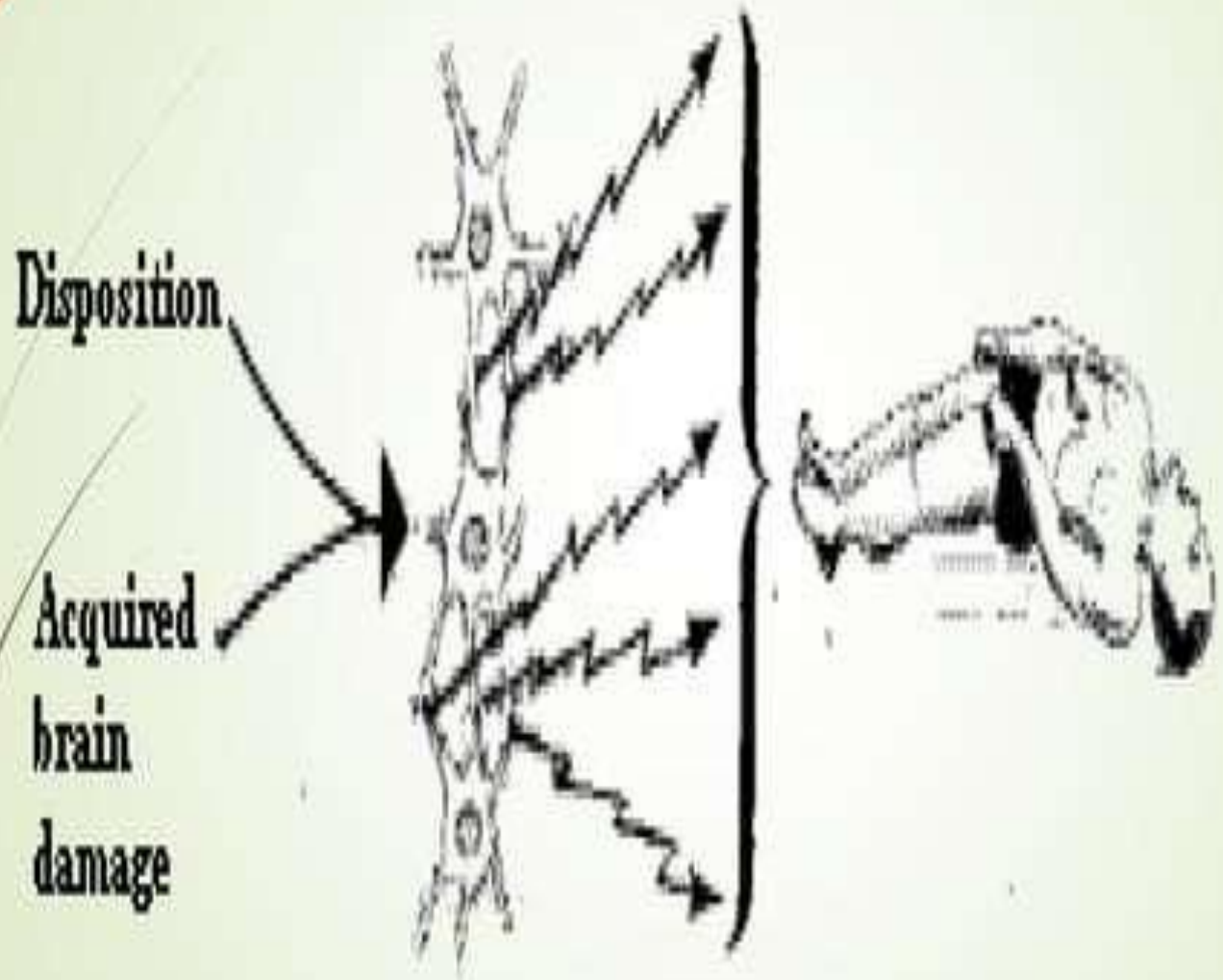
SEIZURES

- seizures (fit) are brief episodes of "abnormal excessive or synchronous neuronal activity in the brain".
- The outward effect can vary from wild thrashing movement (tonic-clonic seizure) to as mild as a brief loss of awareness (absence seizure).

CAUSES

- The underlying cause of epilepsy may be identified as genetic or as due to structural or metabolic problems,
- but in 60% of cases the cause is unknown.
- Genetic, congenital, and developmental conditions are more common among younger people,
- while brain tumors and strokes are more likely in older people

The Causes of Epilepsy



CAUSES

- Genetical
- Secondary
- syndromes

GENETICAL

- Genetics is believed to be involved in the majority of cases, either directly or indirectly.
- Some epilepsies are due to a single gene defect (1–2%).
- most are due to the interaction of multiple genes and environmental factors.
- Some of the genes involved affect ion channels, enzymes and G protein-coupled receptors.

SECONDARY

- Epilepsy may occur as a result of a number of other conditions including:
- tumors,
- strokes, head trauma,
- previous infections of the central nervous system,
- genetic abnormalities,
- as a result of brain damage around the time of birth

SYNDROMES

- There are a number of epilepsy syndromes which are typically grouped by age of onset into:
- neonatal period,
- childhood, adulthood,
- those with no strong age relationship.
- Additionally there are groups with specific constellations of symptoms, those due to specific metabolic or structural causes, and those of unknown cause

TREATMENT

- Epilepsy is usually treated with daily medication once a second seizure has occurred,
- but for those at high risk, medication may be started after the first seizure.
- In some cases, a special diet, the implantation of a neurostimulator, or neurosurgery may be required.

- The mainstay treatment of epilepsy is anticonvulsant medications, possibly for the person's entire life.
- The choice of anticonvulsant is based on :
- seizure type,
- epilepsy syndrome,
- other medications used, other health problems,
- the person's age and lifestyle