Nutrition in physiological diseases and wellbeing

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What is a Physiological Disorder?

- It is an illness that interferes with the way that the functions of the body are carried out.
- As a result of the incorrect functioning, certain effects will be seen in the body.
- This could be down to several reasons.
- For example, there may be too little or too much of a substance in the body, deterioration of certain cell types or blockages of pathways.

Physiological disorders

The types of physiological disorders that affect body system functioning include:

- **Endocrine system disorders**, e.g. type 1 and type 2 diabetes
- **Nervous system disorders**, e.g. Parkinson's disease
- **Musculoskeletal system disorders**, e.g. rheumatoid arthritis
- **Respiratory system disorders**, e.g. asthma
- **Circulatory system disorders**, e.g. coronary heart disease
- **Digestive system disorders**, e.g. Crohn's disease
- **Cancer**, e.g. bowel, prostate

CAUSES

What causes of physiological diseases can you think of?

- **Inherited traits** – disorders caused by genetics run in the family
  e.g. sickle cell anaemia, downs syndrome

- **Lifestyle choices** – choices an individual makes about their life
  e.g. smoking cigarettes, drug misuse

- **Diet** – disorders caused by the consumption or lack of food.
  e.g. obesity, dietary deficiency

- **Environment**- disorders caused by external factors, often out of human control.
  e.g. housing conditions, air pollution

Causative factors in physiological disorders

Genetics and inherited traits

Chromosomes contain the genes inherited from the parents.

There are different forms of the same gene – called alleles, and some are more dominant than others. The different forms of genes are caused by mutations (changes) in the DNA code. For example, for the gene that determines eye colour, one may inherit a brown allele from mother and a blue allele from your father. Then the child having brown eyes because brown is the dominant allele.

The same is true for medical conditions. There may be a faulty version of a gene that results in a medical condition, and a normal version that may not cause health problems.

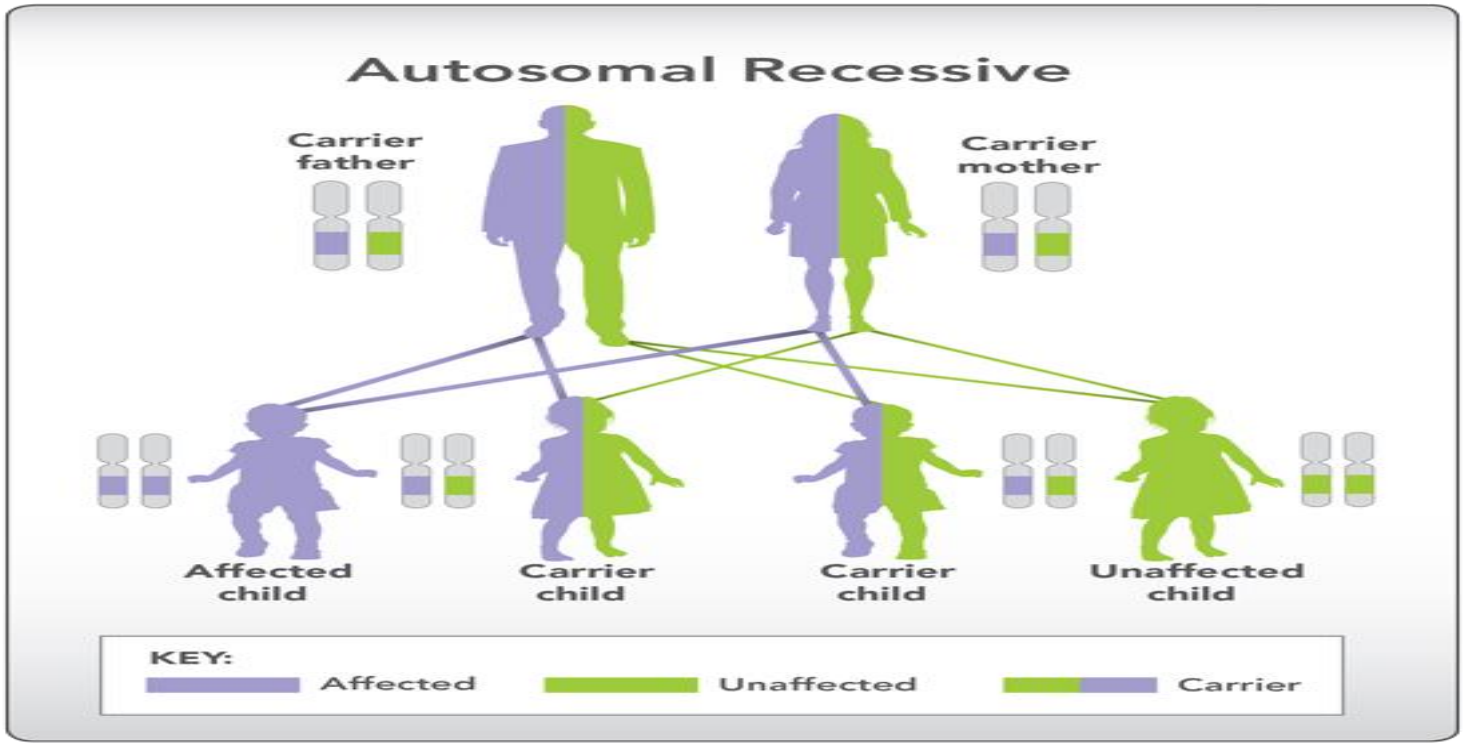
Examples of physiological conditions that can be caused by an inherited trait include:

- Cystic fibrosis
- Sickle cell anaemia
- Thalassaemia.

Genetic inheritance

- Dominant allele: Definitely get disease
- Recessive allele: Possibly get disease
- Faulty allele: Susceptible to disease

Inheritance of Cystic Fibrosis



Causative factors in physiological disorders

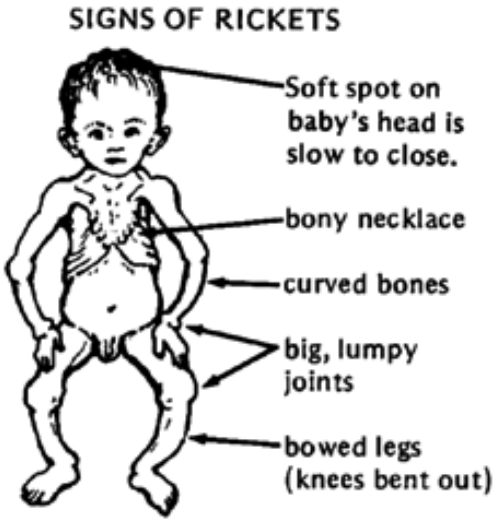
Lifestyle choices

Many physiological disorders can be caused or influenced by lifestyle choices. For example:

- Smoking cigarettes – associated with coronary heart disease (through ***atherosclerosis***), lung cancer, chronic obstructive pulmonary disease (COPD).
- Alcohol misuse - associated with coronary heart disease, liver disease, breast and bowel cancer.
- Unhealthy diet (excess fat, salt and sugar) - associated with type 2 diabetes, high blood pressure, and coronary heart disease.

Deficiency

- Rickets form as a result of vitamin D deficiency
- You need vitamin D to absorb calcium to make your bones strong



Deficiency

- Vitamin D comes from sunlight and food (fish, eggs and fortified breakfast cereal)
- It helps the body to absorb the calcium that we get from dairy products and green vegetables

1) Why do you think that children from Asian, African, Caribbean and Middle Eastern background are most likely to have this?
2) What impact could rickets have on your daily life?
3) How would you recommend that this is prevented or treated?

Causative factors in physiological disorders

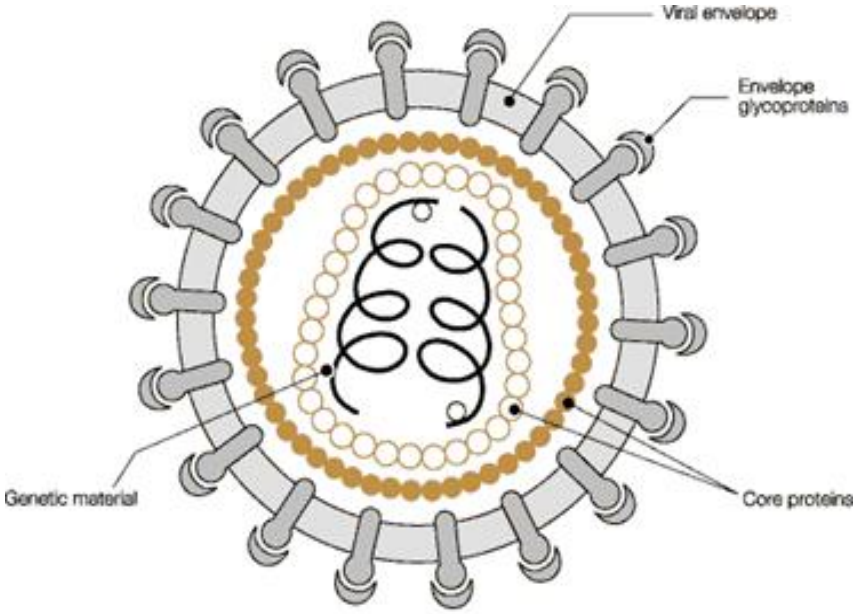
Environmental factors

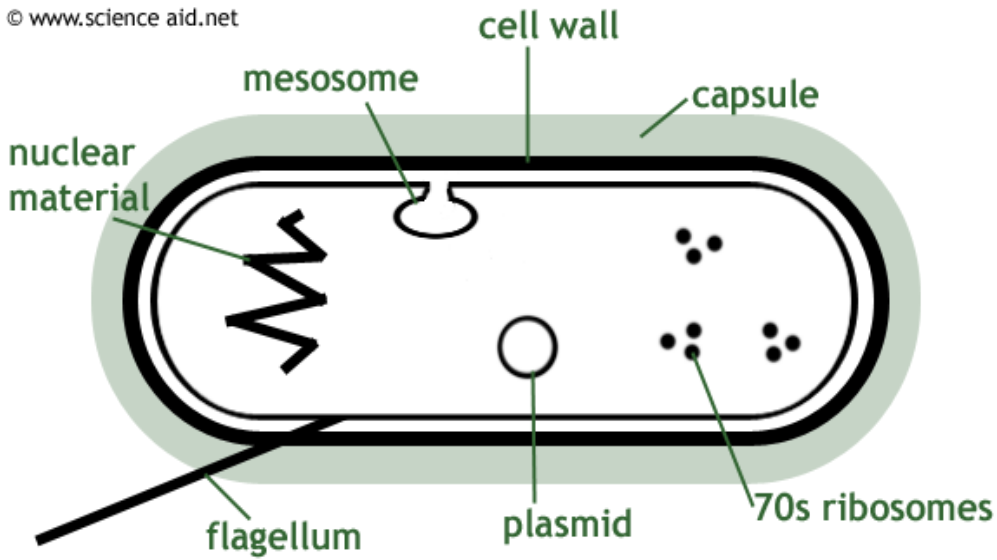
Many physiological disorders can be caused by or influenced by environmental factors. For example:

- Unprotected exposure to UV light (sunlight or sunbeds) – associated with melanoma (skin cancer).
- Overcrowded, cold or damp housing conditions – associated with respiratory conditions such as asthma.
- Working environment – associated with stress-related conditions, such as anxiety and depression.

Infection

- A pathogen that is communicable and uses other living organisms to survive





Lifestyle Diseases

- *They are diseases that are caused partly by unhealthy behaviors and partly by other factors.*

- *Causes: a person's*
  - *Habits*
  - *Behaviors*
  - *Practices*

Controllable Risk Factors

- *Your diet and body weight*
- *Your daily levels of physical activity*

- *Your level of sun exposure*
- *Smoking and alcohol abuse*

Uncontrollable factors

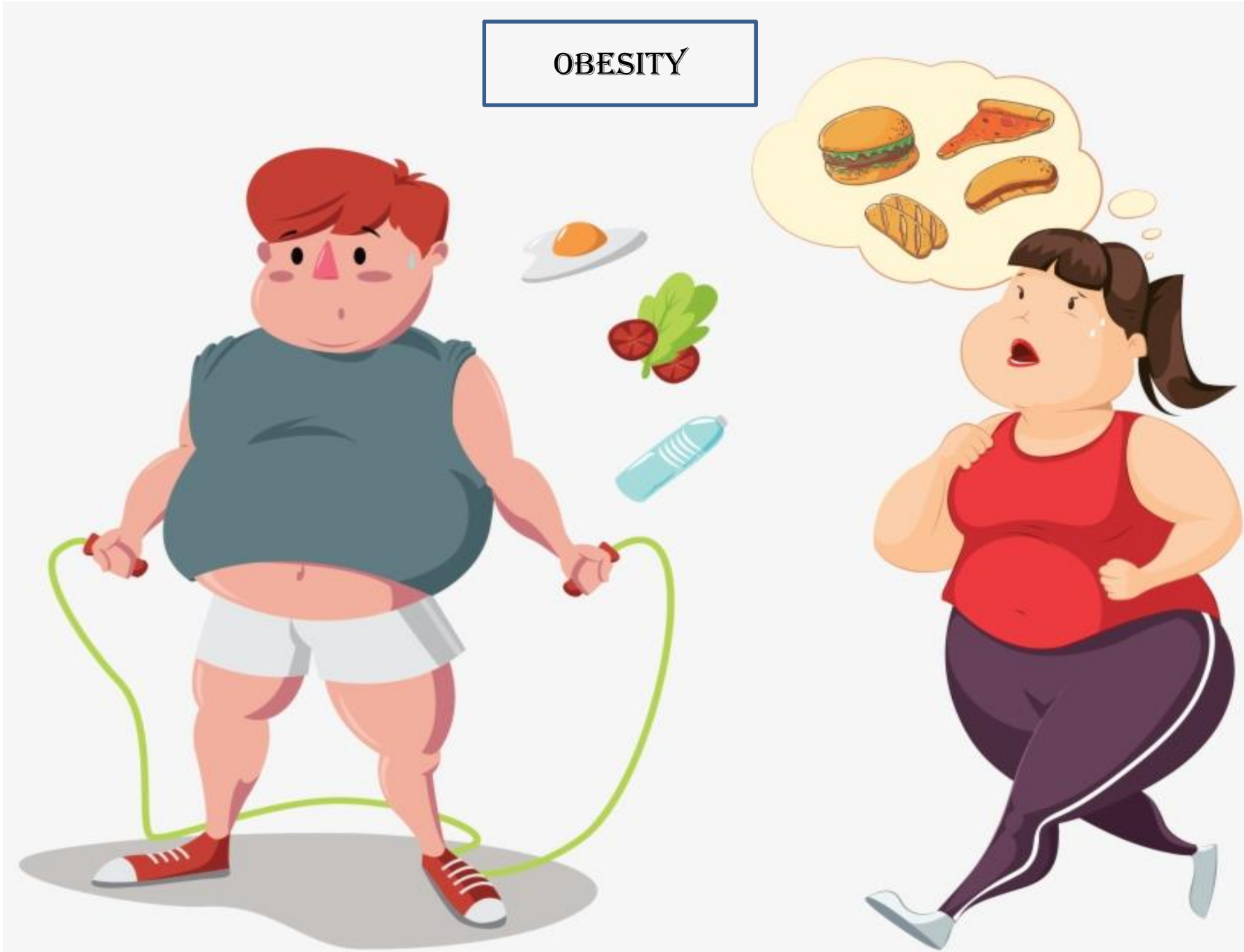
- *Age*

- *Race*

- *Gender*

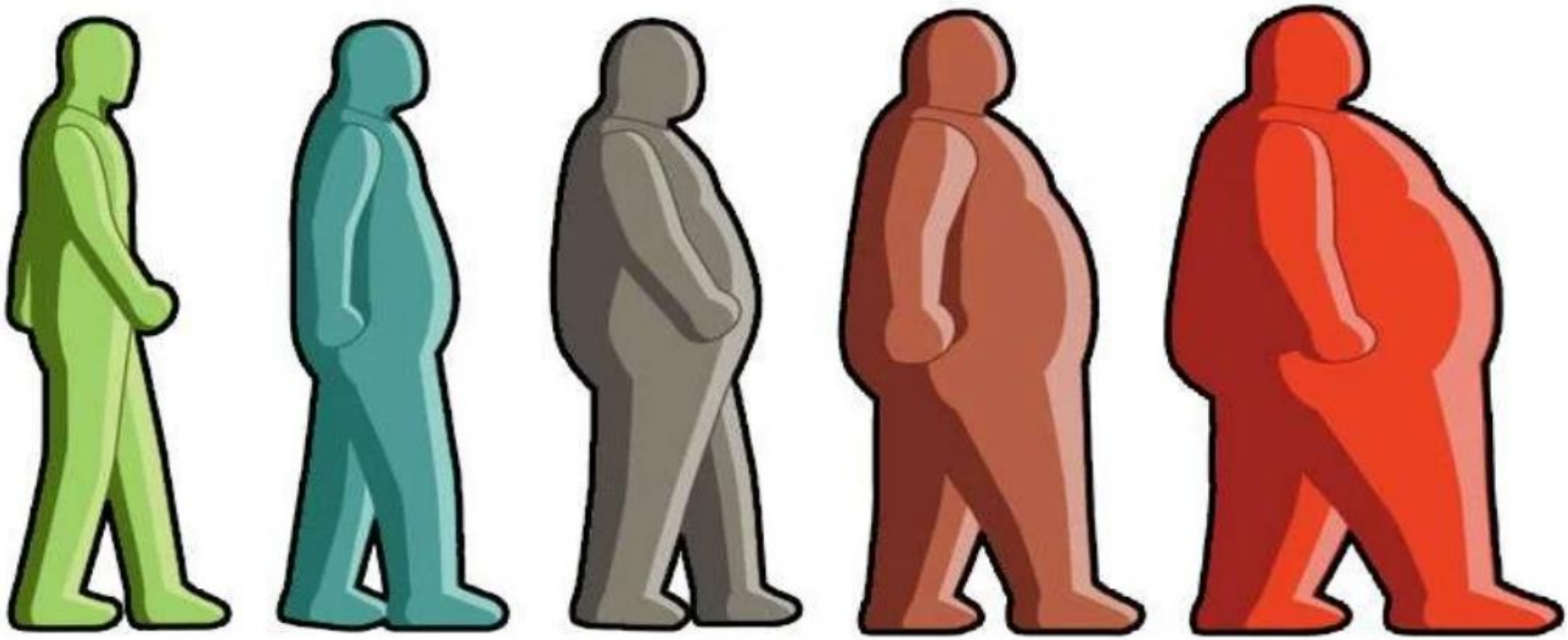
- *Heredity*

OBESITY



Definition

- Obesity is a medical condition in which excess body fat accumulates to the extent that it may have a negative effect on health, leading to reduced life expectancy and/or increased health problems
- Latin word "OBESUS" meaning fat.
- BMI ≥ 30



BMI
18.5-24.9
NORMAL
WEIGHT

BMI
25.0-29.9
OVER
WEIGHT

BMI
30.0-34.9
OBESITY
CLASS 1

BMI
135.0-39.9
OBESITY
CLASS 2

BMI
40.0-49.9
OBESITY
CLASS 3

Pathogenesis of obesity

Excessive lipid deposition

due to increased food intake, adipose cell hyperplasia or hyperlipogenesis.

Diminished lipid mobilization

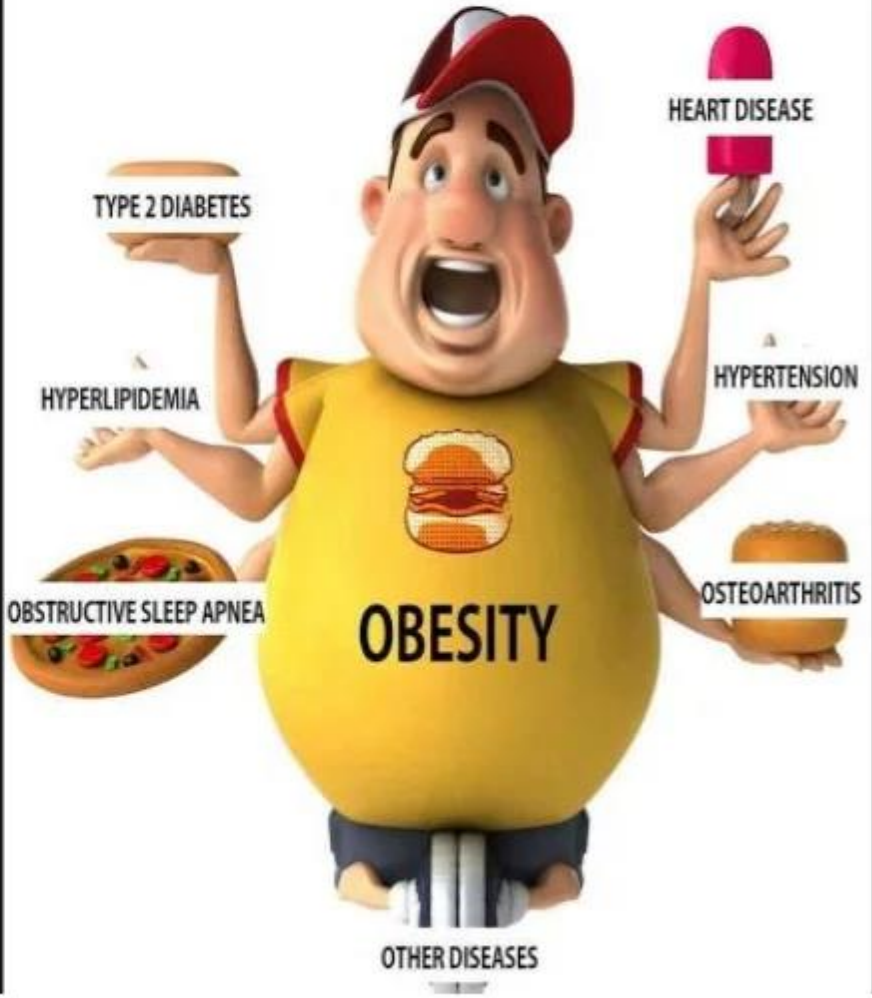
due to either decreased lipolytic hormones or defective adipose cells.

Diminished lipid utilization

due to defective lipid oxidation, defective thermo genesis or physical inactivity

SEQUELAE OF OBESITY

1. Hyperinsulinaemia
2. Type 2 diabetes mellitus
3. Hypertension
4. Hyperlipoproteinaemia
5. Atherosclerosis
6. Nonalcholic fatty liver disease
7. Cholelithiasis
8. Hypoventilation syndrome (Pickwickian syndrome)
9. Osteoarthritis
10. Cancer



TREATMENT

Nutrition and Diet:

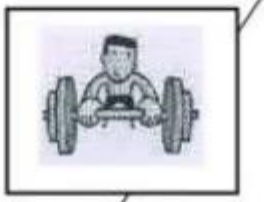
The total energy intake must be reduced in order for weight loss to occur. Moreover, once weight loss has occurred, the lower energy intake must be sustained to prevent weight regain.

- ✓ Low calorie intake
- ✓ Low in saturated fats
- ✓ Increased fibres in diet
- ✓ Low density food
- ✓ 1000 K cal deficit produces 1 kg wt loss per week


Select Less
OIL
Fats, Oils, Sugar & Salt
Use in small amounts
Meat & Alternatives
3 servings
(1/2 serving should come from dairy or other high calcium products)
Select More
Fruit & Vegetables
2 servings each
Oats
Brown Rice
Rice & Alternatives
5 - 7 servings
(2-3 servings should be whole-grain products)

TV, PC
game

<2 h/day



Stretching
Strength training

2-3 d/week

Aerobic exercise (more than 30 minutes)
Running, swimming, aerobics, skating, tennis,
skiing, volleyball, basketball etc.

3-5 d/week

Housework, walking (with the dog, parking the car farther away)
playing with children, walking upstairs instead of using lift
golf, bowling, using public transport

most days

***BEHAVIOURAL MODIFICATION*:**

Several behavioural strategies are commonly used:

- Self-monitoring of eating habits.
- Physical activity.
- Stress management to diffuse situations that lead to overeating.
- Stimulus control to avoid situations that lead to incidental eating
- And maintain proper diet such as to avoid sugar-sweetened beverages, refined grains, red meat like beef,pork,lamb and processed meat.

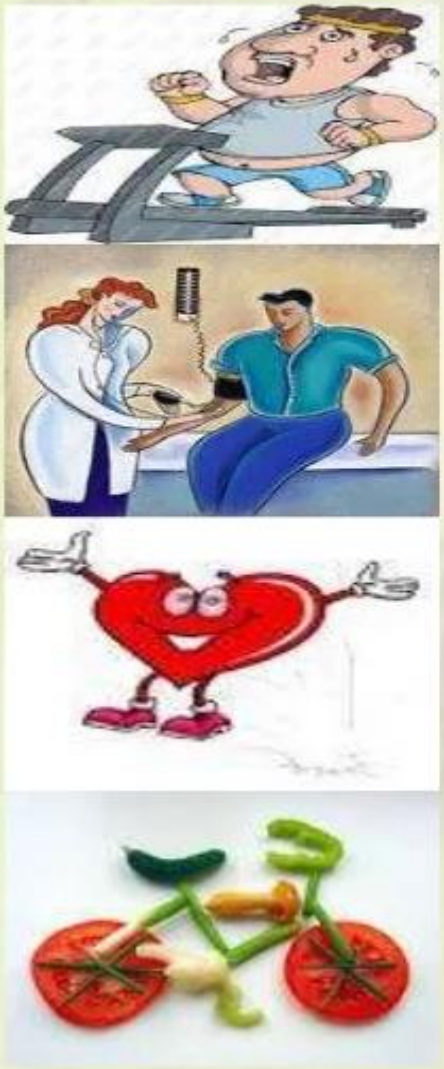
Cardiovascular Diseases

- *Cardiovascular diseases (CVD) are diseases or disorders that result from damage to the heart and blood vessels.*

Common Cardiovascular Diseases:-

- *High Blood Pressure*
- *Heart Attack*
- *Arteriosclerosis-fat deposition in blood vessels*

Prevention Of Cardiovascular Diseases



- Trim your fat intake, eat healthy
- Cut down on salt
- Keep your weight healthy
- Don't smoke
- Don't take alcohol
- Do exercise
- Monitor your blood pressure and cholesterol
- Relax & cut down on stress

Limit saturated fats and trans fat:

- Foods high in saturated fat include fatty meat, poultry skin, bacon, sausage, whole milk, cream , and butter.
- Trans fat are found in some fried foods, and backed foods made with hydrogenated oils.

Limit amount of cholesterol that you eat less than 200 mg per day:

- Food high in cholesterol include egg yolks ,fatty meat, whole milk ,cheese, shrimp, lobster, and crab.

Eat more omega-3 fats (heart healthy fats):

- Good choice include salmon, tuna, mackerel and sardines.
- Other foods with omega-3 fats include walnuts and canola and soybean oils.

Limit that total amount of fat that you eat including heart healthy fats to 25% to 35% of the calories that you eat

- **The recommended daily intake of dietary fiber for heart protection :**

(19 to 50)

- at least 25 grams for women and 38 grams for men .

(Older women and men)

- at least 21 and 30 grams of fiber, respectively

Different fiber types may have specific benefits:

- **Insoluble fiber (found in wheat bran, whole grains, seeds, nuts, legumes, and fruits and vegetables)** may help achieve weight loss. Consuming whole grains on a regular basis may lower the risk for heart disease and heart failure.
- **Soluble fiber (found in dried beans, oat bran, barley, apples, and citrus fruits)** may help achieve healthy cholesterol levels and possibly reduce blood pressure .

- **Antioxidant Vitamins.**

- Are a group of compounds that help to protect the body from the formation and elimination of free-radicals. Free-radicals are formed from exposure to sunlight and pollution and also as a byproduct of cell metabolism. Alcohol, cigarette smoke, stress and even diet also affect the level of free-radical development in the body.

Vitamin E : a fat soluble vitamin present in nuts, seeds, vegetable and fish oils, whole grains (esp. wheat germ), fortified cereals, and apricots.

Vitamin C : a water soluble vitamin present in citrus fruits and juices, green peppers, cabbage, spinach, broccoli, kale, cantaloupe, kiwi, and strawberries.

- *Potassium.* A potassium-rich diet can provide a small reduction in blood pressure. Potassium-rich foods include bananas, oranges, pears, prunes, cantaloupes, tomatoes, dried peas and beans, nuts, potatoes, and avocados. Potassium supplements should not be taken by patients without checking with your doctor first.

- **For those using potassium-sparing diuretics (such as spironolactone), or have chronic kidney problems, potassium supplements may be very dangerous.**

- *Magnesium.* Some studies suggest that magnesium supplements may cause small but significant reductions in blood pressure. The recommended daily allowance of magnesium is 320 mg.

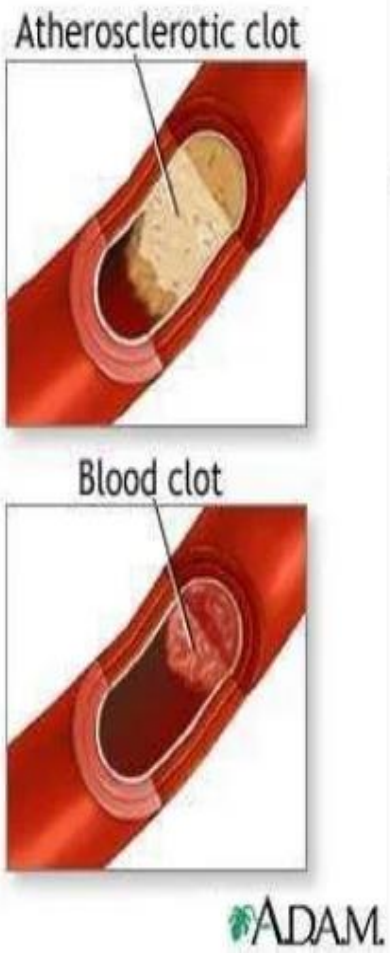
- *Calcium* regulates the tone of the smooth muscles lining blood vessels. Studies have found that people who consume enough dietary calcium on a daily basis have lower blood pressure than those who do not.

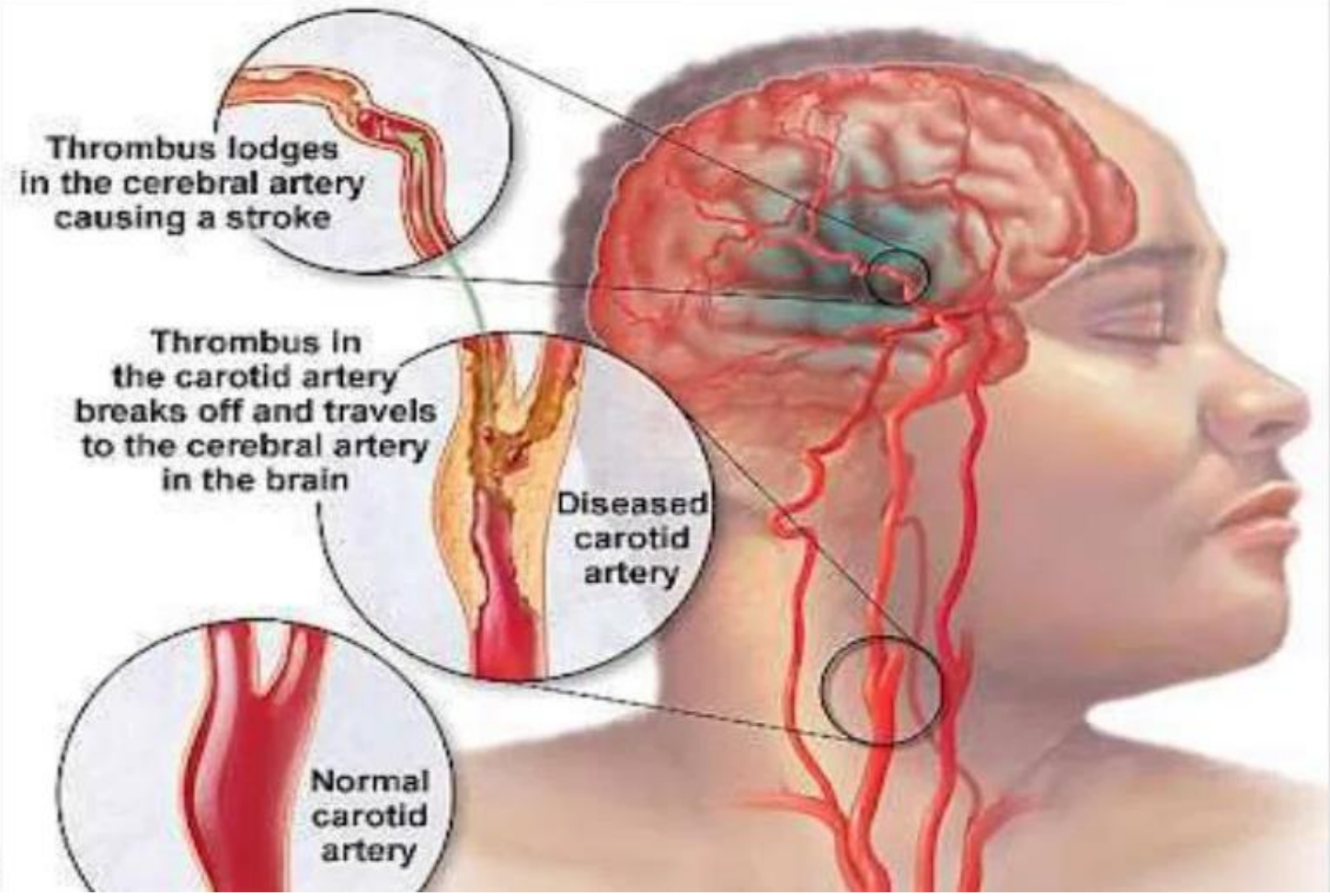
- **Studies have indicated that calcium supplements do not prevent heart disease and some controversial reports suggest that they might even increase risk.**

Some tips to lower your sodium (salt) intake:

- **Look** for foods that are labeled "low-sodium," "sodium-free," "no salt added," or "unsalted." Check the total sodium content on food labels.
- **Don't** cook with salt or add salt to your food. Try pepper, garlic, lemon, or other spices for flavor instead.
- **Avoid** processed meats (particularly cured meats, bacon, hot dogs, sausage, and ham). Processed meats have been associated with increased risk for heart disease.
- **Avoid** foods that are naturally high in sodium, like, nuts, olives, pickles, sauerkraut, soy tomato and other vegetable juices, and cheese.
- **Take care** when eating out. Stick to steamed, grilled, baked, boiled, and broiled foods with no added salt, sauce, or cheese.
- **Use** oil and vinegar, rather than bottled dressings, on salads.
- **Eat** fresh fruit or sorbet when having dessert.

STROKE


Atherosclerotic clot
Blood clot
ADAM.


Thrombus lodges in the cerebral artery causing a stroke
Thrombus in the carotid artery breaks off and travels to the cerebral artery in the brain
Diseased carotid artery
Normal carotid artery

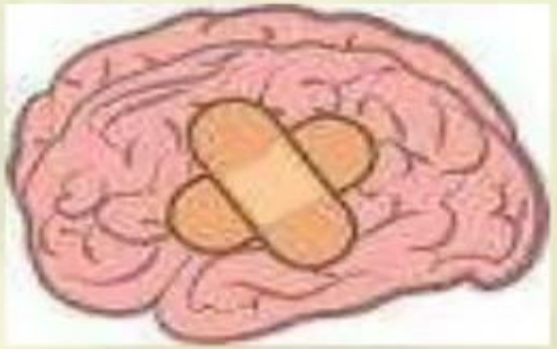
Stroke

- *stroke is the loss of brain function due to a disturbance in the blood supply to the brain. This disturbance is due to either ischemia (lack of blood flow) or hemorrhage*

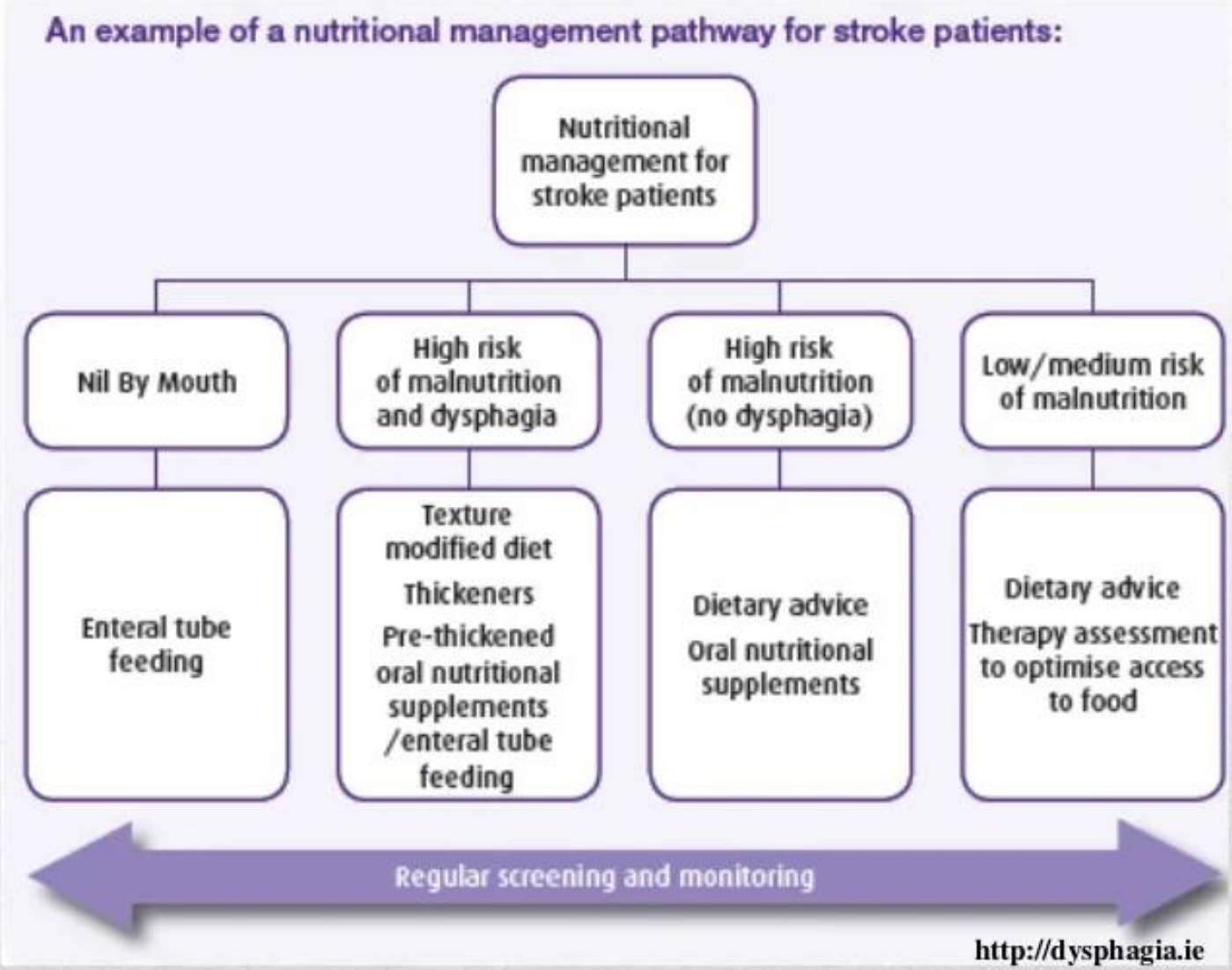
- *Risk factors for stroke include old age, high blood pressure, diabetes, high cholesterol and tobacco smoking .High blood pressure is the most important modifiable risk factor*

SIGNS & SYMPTOMS

Prevention of Stroke



- *Weight Reduction*
- *Smoking cessation*
- *Reduce salt & saturated fat intake.*
- *5 fruits / vegetables a day*
- *Limit alcohol consumption*
- *Regular exercise*
- *If you are hypertensive then don't skip your Anti-hypertensive drugs*



Nutrition Care Process

- **MIND diet**

  - ↓cognitive decline in stroke survivors
  - rich in whole foods, including fruits and vegetables
  - elements of the Mediterranean-style diet and the DASH diet

American Stroke Association's International Stroke Conference 2018

Healthy Nutrition Guidelines

HEALTHY EATING PLATE

Use healthy oils (like olive and canola oil) for cooking, on salad, and at the table. Limit butter. Avoid trans fat.

Drink water, tea, or coffee (with little or no sugar). Limit milk/dairy (1-2 servings/day) and juice (1 small glass/day). Avoid sugary drinks.

The more veggies – and the greater the variety – the better. Potatoes and French fries don't count.

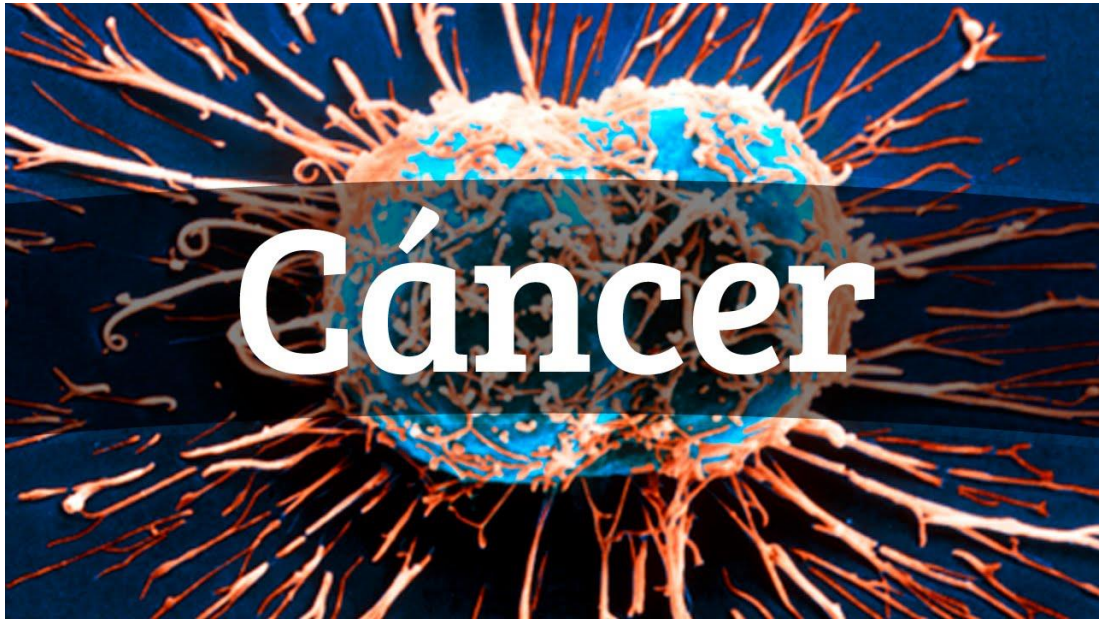
Eat a variety of whole grains (like whole-wheat bread, whole-grain pasta, and brown rice). Limit refined grains (like white rice and white bread).

Eat plenty of fruits of all colors.

Choose fish, poultry, beans, and nuts; limit red meat and cheese; avoid bacon, cold cuts, and other processed meats.

STAY ACTIVE!


World Cancer


Cáncer

Cancer

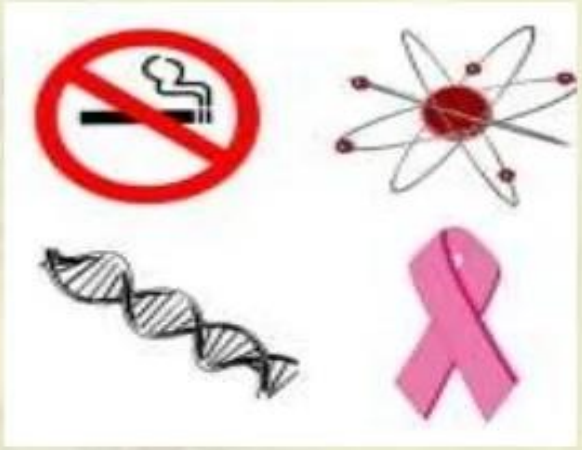
- *A disease caused by uncontrolled cell growth Benign tumors are not cancerous and usually do not spread.*
- *Malignant tumors are cancerous and do spread*
- *Causes:*
  - *Certain viruses (HPV)*
  - *Radiation (UV rays, X-rays)*
  - *Chemicals in tobacco smoke*
  - *Asbestos (material used in fireproofing)*

RISK FACTORS

- Tobacco use/ Smoking
- Sexually Transmitted Diseases
- Dietary Factors
- Radiation
- Alcohol Intake

Prevention of cancer

- ***Don't' smoke!***
- ***Wear sunscreen; stay away from tanning beds***
- ***Eat your veggies and cut the fat***
- ***Eat moderate protein***
- ***Stay active***
- ***Get regular medical check-ups***



ENERGY

Calorie requirements are

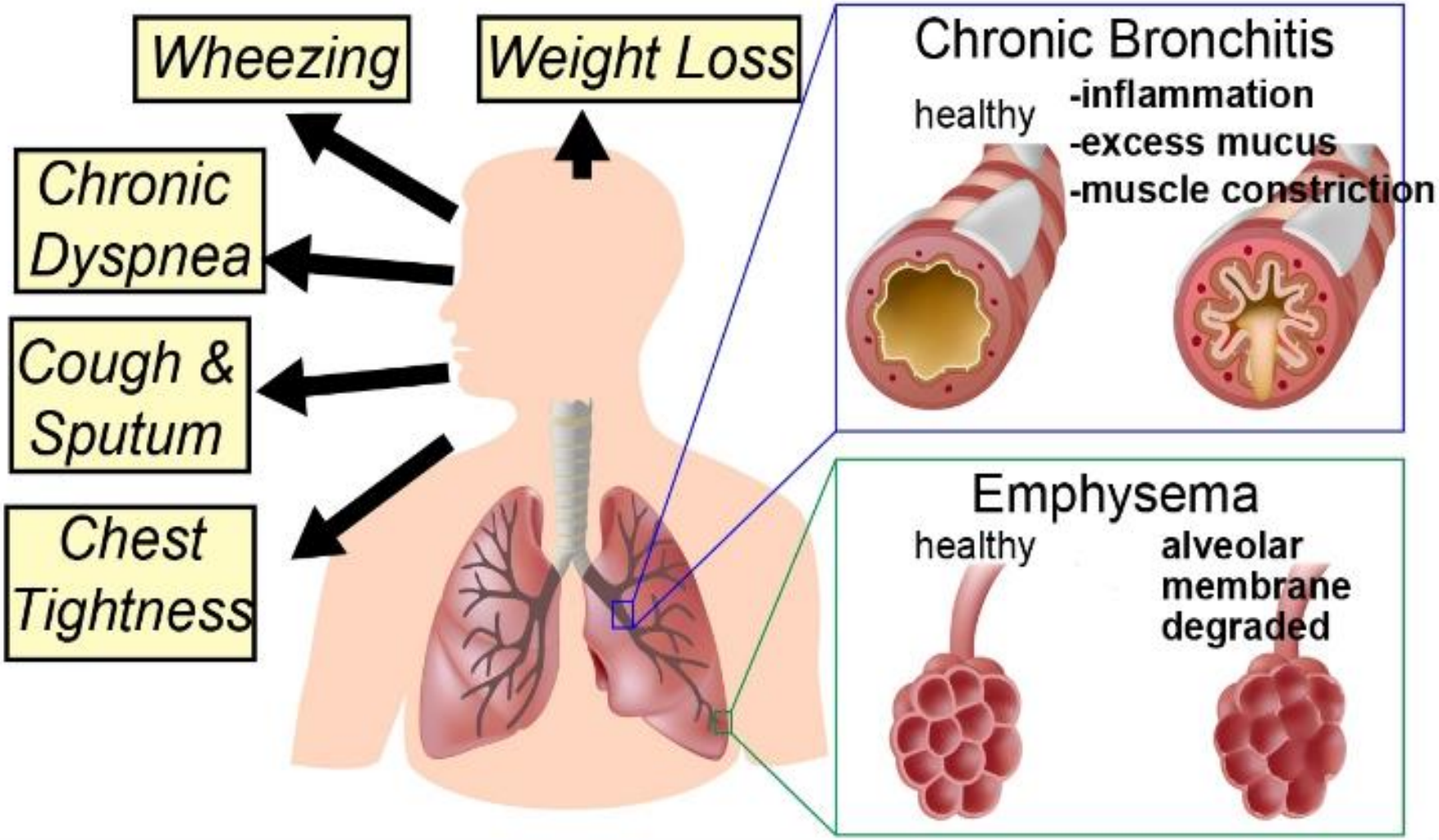
- **20-25kcal/kg** for non ambulatory or sedentary patient
- **30-35kcal/kg** for slightly hypermetabolic, weight gain/anabolism
- **40-45kcal/kg** for hypermetabolic or severly stressed patient, signicicant malabsorption.

PROTEIN

Additional protein is required for regenaeration, healing and rehabilitation.

- **0.8-1.0g/kg-** normal maintenance level
- **1.5-2.5g/kg** if increased protein demands exist. E.g. protein losing enteropathy, hyper metabolism or extreme wasting

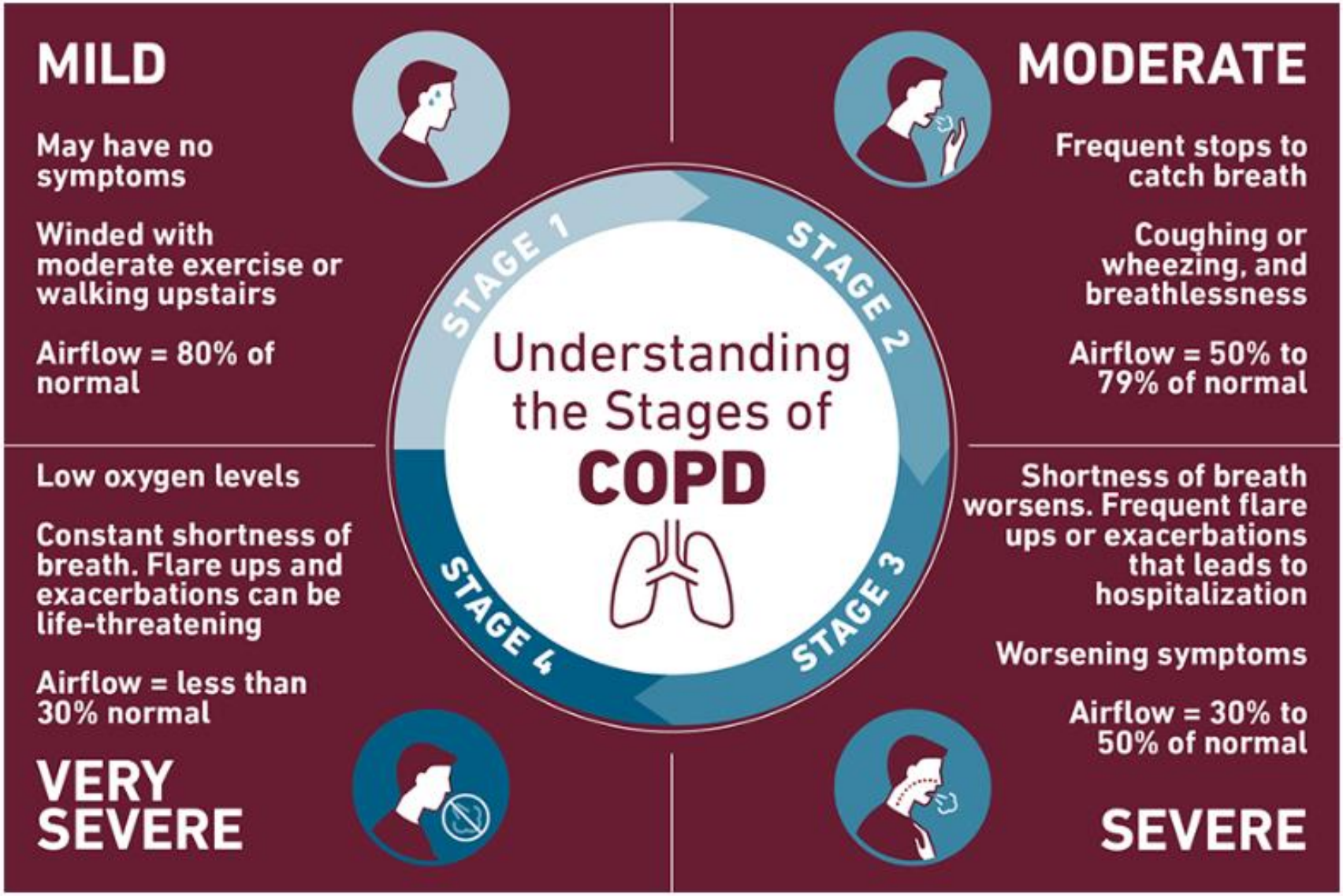
Chronic Obstructive Pulmonary Disease



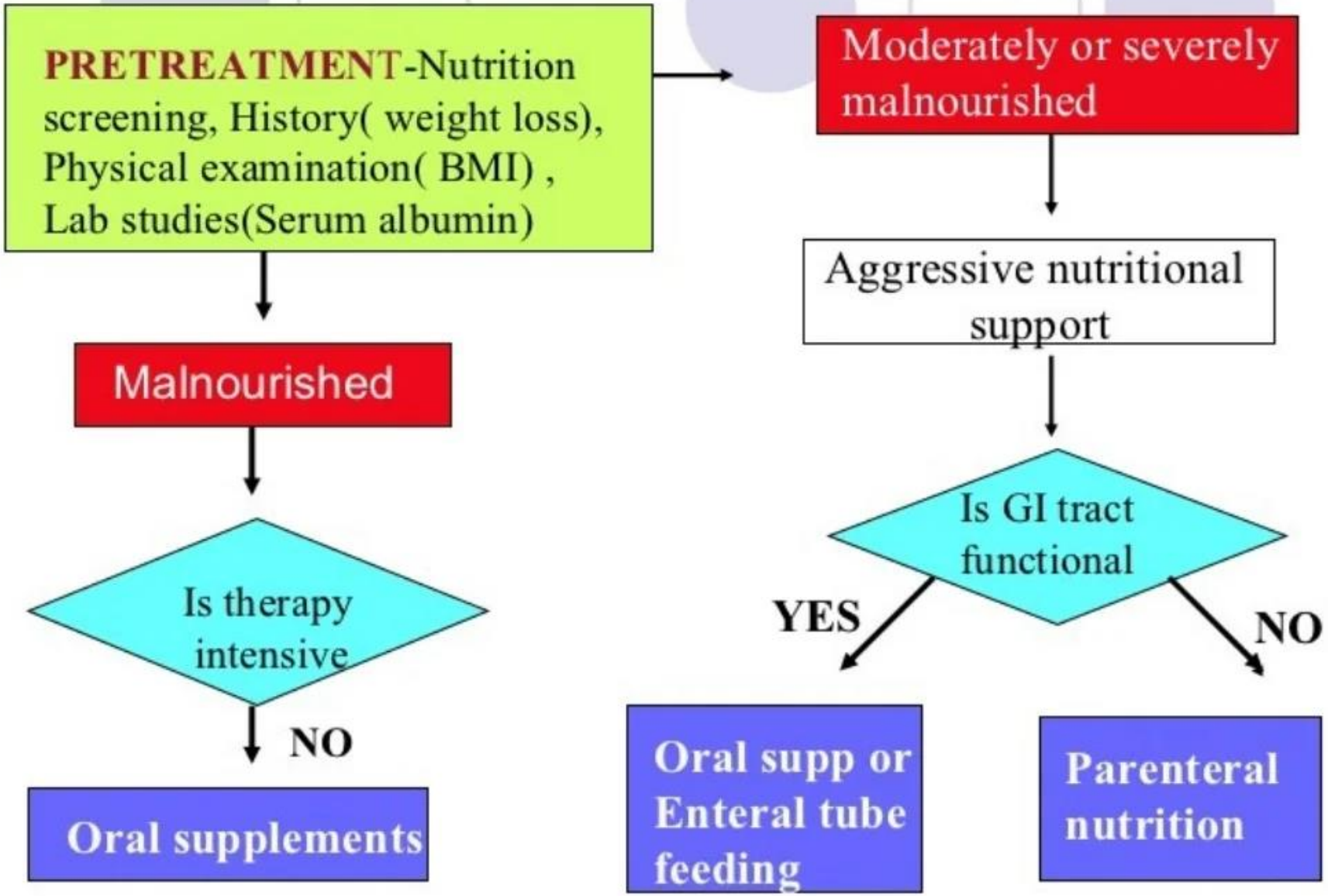
Chronic Obstructive Pulmonary Disease

- *Chronic obstructive pulmonary disease (COPD), also known as chronic obstructive lung disease (COLD) characterized by chronically poor airflow. It typically worsens over time. The main symptoms include shortness of breath, cough and sputum production.*
- *Tobacco smoking is the most common cause of COPD, with a number of other factors such as air pollution and genetics playing a smaller role.*
- *Intense and prolonged exposure to workplace dusts, chemicals and fumes increase the risk of COPD in both smokers and nonsmokers.*
- *Malnutrition & Low Birth weight is also a reason for Respiratory disease . Being either underweight or overweight can affect the symptoms*

Stages of COPD



Approach to nutrition support



Prevention of COPD

- *Quit Smoking.*
- *Have Healthy Diet*
- *Take nutrition supplements if malnourished*
- *Do Breathing exercise*
- *Avoid exposure to fumes & dust .*
- *Improve both indoor & outdoor air quality*

Depression Causes

genetics

brain chemistry imbalance

poor nutrition

physical health issue

drugs

stress

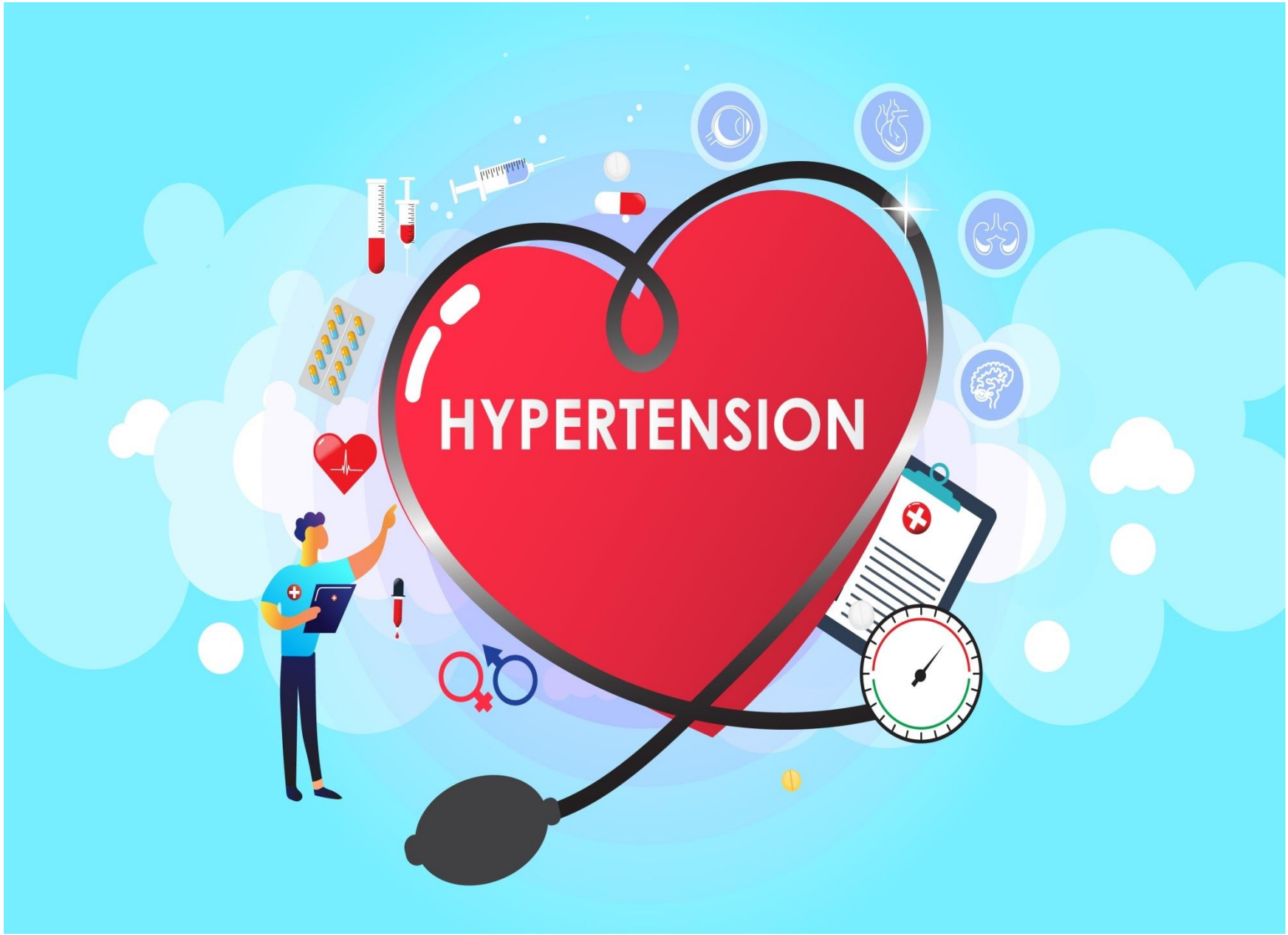
Depression

- *Depression is a state of low mood and aversion to activity that can affect a person's thoughts, behavior, feelings and sense of well-being. Depressed people can feel sad, anxious, empty, hopeless, worried, helpless, worthless, guilty, irritable, hurt, or restless.*
- *Life events and life style that may precipitate depressed mood include childbirth, menopause financial difficulties, job problems, a medical diagnosis ,loss of a loved one, natural disasters, social isolation, relationship troubles, jealousy, separation.*

Prevention of Depression

- ***Healthy Eating-*** *The easiest way to improve your diet is to cut out the junk. Avoiding foods high in refined sugar, and foods packed with saturated fats should be your first step. include amino-acid-rich foods—such as meat, dairy products, and certain fruits and vegetables in your diet. Complex carbohydrate help to stimulate the feel good neurotransmitter serotonin, carbohydrates can be found in whole grains, legumes, vegetables such as spinach and broccoli, fruits such as oranges & pears.*

- ***Exercise*-increases your body's production of natural antidepressants. Research has shown that exercise reduces stress, improves mood, boosts self-esteem, and provides restful sleep.**
- ***Weight loss- Losing weight not only improves your self-esteem and overall health, but also may give your mind the boost it needs. Eating right and exercising regularly is the tried-and-true method for losing weight and keeping it off.**


HYPERTENSION

DEFINITION

- **Hypertension** (HTN or HT), also known as high blood pressure (HBP), is a long term medical condition in which the blood pressure in the arteries is persistently elevated.
- The SBP will be more than or equal of 140 mmHg and DBP will be more than or equal of 90 mmHg

TYPES

- **Pre hypertension**: SBP: 120-139 mmHg
  DBP: 80-89 mmHg

- **Hypertension stage I**: SBP: 140-159 mmHg
  DBP: 90-99 mmHg

- **Hypertension stage II**: SBP: More or equal to 160 mmHg
  DBP: More or equal to 100 mmHg

- **Pregnancy induced HTN**: because of increased production of hormones and enzymes during pregnancy.

ETIOLOGY

- **Primary HTN**: it is the elevation in BP without an identified cause.
- **Secondary HTN**: it is the elevation in BP with an exact cause. This type is account for 5-10% of total cases.
- The causes of Secondary HTN includes
  - Congenital narrowing of aorta
  - Renal disease
  - Endocrine disorders like cushing's syndrome
  - Neurological disorders like brain tumors and head injury
  - Sleep apnea
  - Medications like oral contraceptive pills, NSAID, and coccaine
  - Cirrhosis of liver

RISK FACTORS

- Age: chance of CAD after 50 yrs of age
- Alcohol, smoking and DM
- Excessive dietary intake of sodium
- Gender
- Family history
- Obesity
- Sedentary life style
- stress

MANAGEMENT

- Mainly the management of hypertension is possible by two ways, which include
  - **Life style modification**
  - **Pharmacological therapy**

LIFE STYLE MODIFICATION

The life style modification measures mainly includes,

- Weight reduction
- DASH Diet (Dietary approaches to stop hypertension)
- Dietary sodium reduction
- Reduce alcohol
- Exercise
- Stress management

Principle of diet: A normal calorie, normal protein, complex carbohydrates, low fat, low sodium, and high potassium diet should be provided.

1. If the patient is obese low calorie diet should be provided.
2. As they are prone to atherosclerosis it is advisable to avoid high intake of fats.
3. Complex carbohydrates should be provided.
4. Moderate restriction of sodium reduces diastolic pressure by 6-10mm Hg and enhances blood pressure.
5. A high potassium diet should be given because low levels of it cause the body to retain sodium and water.

Foods to be included:

- Grains, vegetables, fruits (fruits and vegetables are good sources of potassium), skimmed milk, lean meat, and certain fish can be given.



Foods to be avoided:

- Salt in cooking or at the table, ajinomoto, baking powder, preserved foods such as pickles, canned foods, potato chips, papads, ketchup, sauce, baked foods such as biscuits, cakes, peanut butter, frozen peas, shell fish, and dry fish, etc.

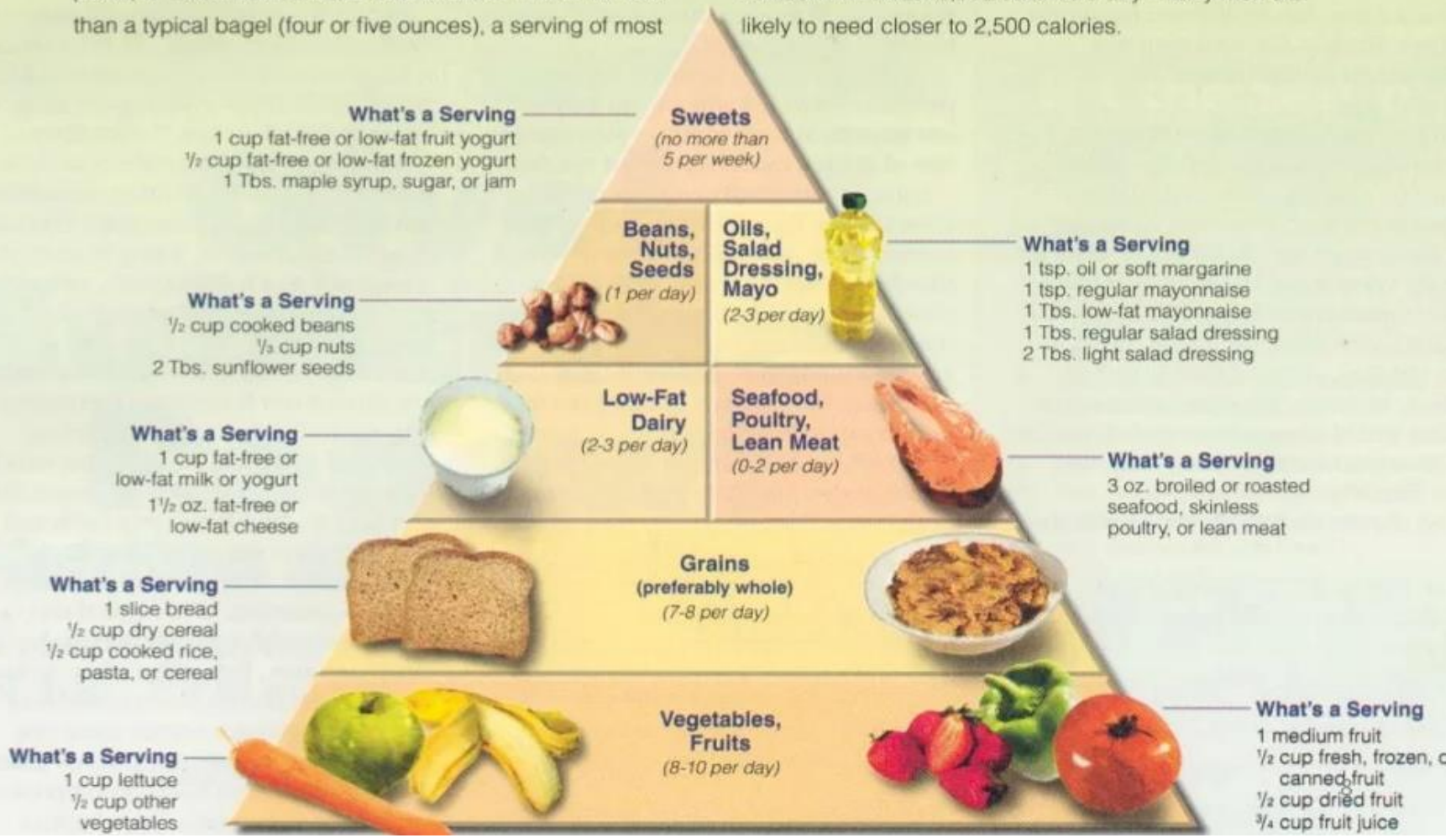



A DASHing Pyramid

Here's how the DASH diet would look if it took the shape of a pyramid. If you want to follow it, make sure you pay attention to the rather small serving sizes.

A serving of grains, for example, is just half a cup of cereal, pasta, or rice or a one-ounce slice of bread. That's far less than a typical bagel (four or five ounces), a serving of most cereals (one cup), or a restaurant-size serving of spaghetti (about three cups). Servings of seafood, poultry, meat, oils, fruits, and vegetables are also petite.

If you think you'd starve on this diet, remember that it's for someone who eats 2,000 calories a day. Many men are likely to need closer to 2,500 calories.




SUGAR
DIABETES
MELLITUS

INTRODUCTION

- **Diabetes mellitus** (**DM**), is a group of metabolic diseases in which there are high blood sugar levels over a prolonged period.

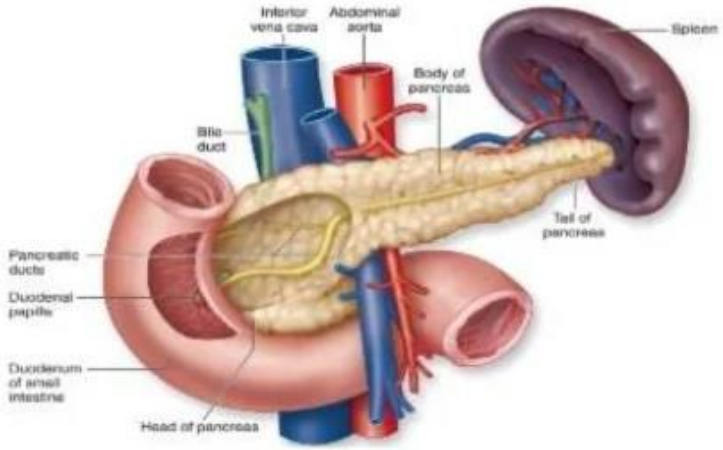
- Symptoms of high blood sugar include frequent urination, increased thirst, and increased hunger.

- If left untreated, diabetes can cause many complications.

- _____ _____ _____abetic ketoacidosis, nonketotic hyperosmolar coma, or death.

- Serious long-term complications include heart disease, stroke, chronic kidney failure, foot ulcers, and damage to the eyes.

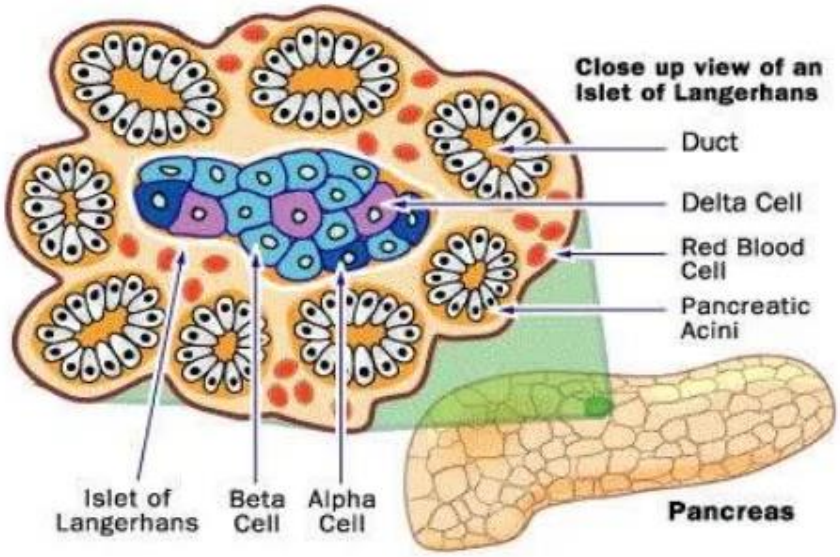
- Diabetes is due to either the pancreas not producing enough insulin or the cells of the body not responding properly to the insulin produced.

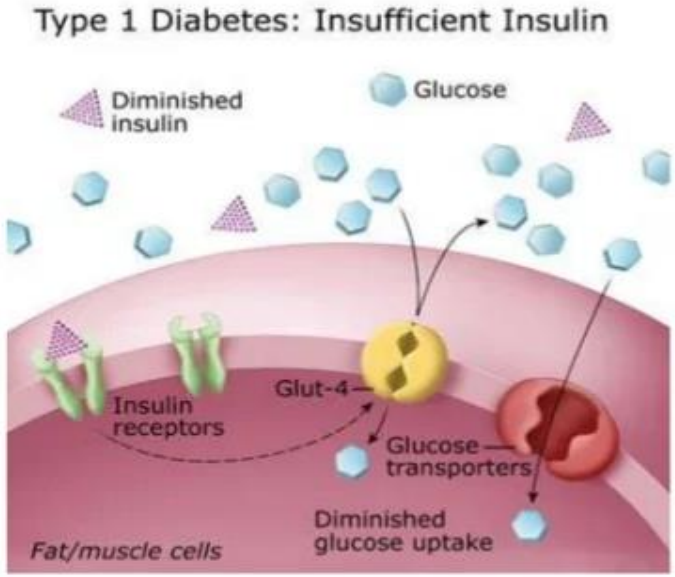


- There are three main types of diabetes mellitus:
  - Type 1 DM
  - Type 2 DM
  - Gestational Diabetes

Type 1 DM

- Results from the pancreas's failure to produce enough insulin.





- This form was previously referred to as "insulin-dependent diabetes mellitus" (IDDM) or "juvenile diabetes".

- The cause is unknown.

- Type 2 DM
  - Begins with insulin resistance, a condition in which cells fail to respond to insulin properly.

  - This form was previously referred to as "non insulin-dependent diabetes mellitus" (NIDDM) or "adult-onset diabetes".
  - The primary cause is excessive body weight and not enough exercise.

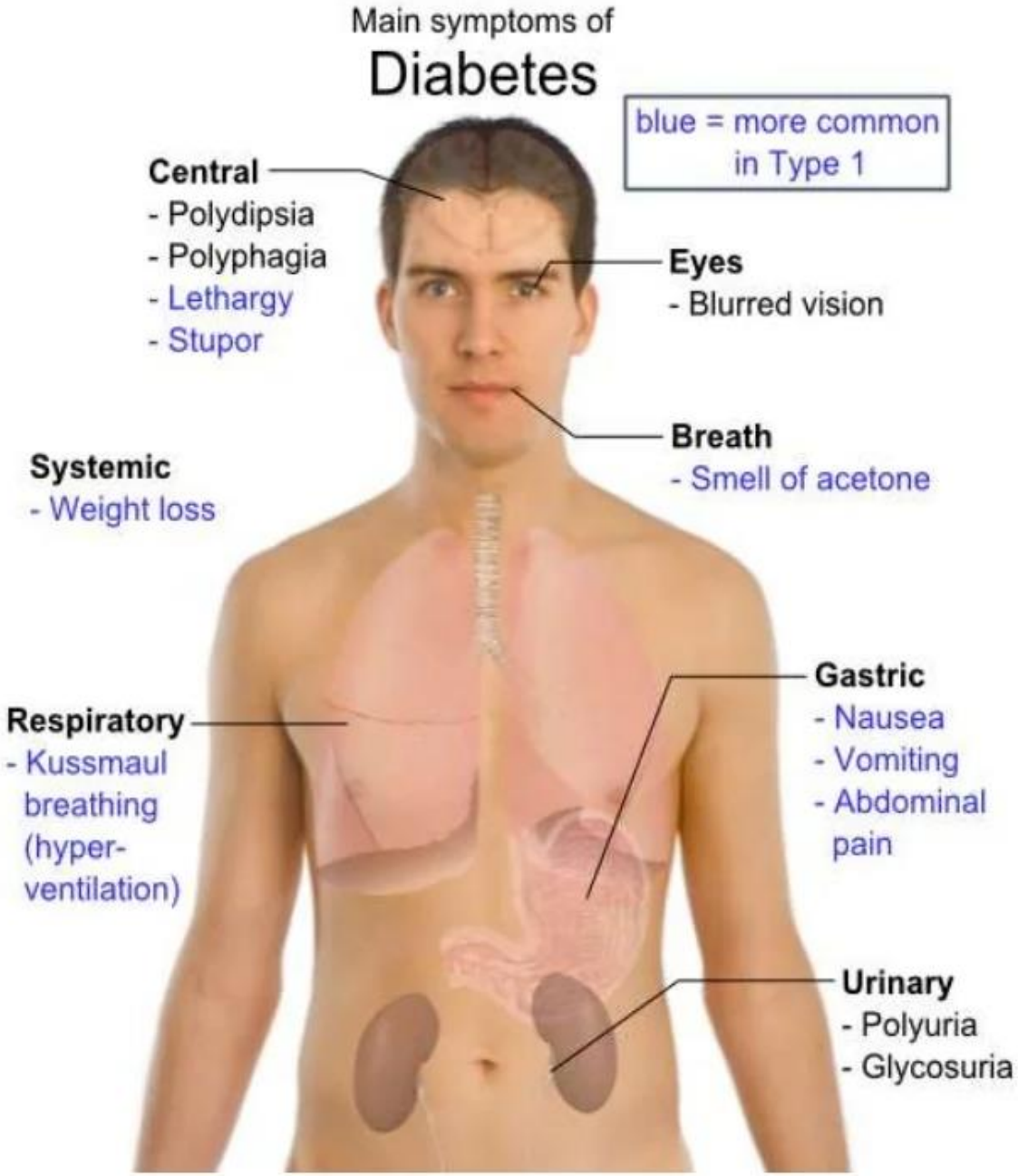
Gestational Diabetes

Is the third main form and occurs in pregnant women without a previous history of diabetes

Comparison of type 1 and 2 diabetes

Feature	Type 1 diabetes	Type 2 diabetes
Onset	Sudden	Gradual
Age at onset	Mostly in children	Mostly in adults
Body size	Thin or normal	Often obese
Ketoacidosis	Common	Rare
Autoantibodies	Usually present	Absent
Endogenous insulin	Low or absent	Normal, decreased or increased
Concordance in identical twins	50%	90%
Prevalence	~10%	~90%

SIGNS AND SYMPTOMS



SIGNS AND SYMPTOMS

- The classic symptoms of untreated diabetes are
  - weight loss
  - polyuria (increased urination)
  - polydipsia (increased thirst) and
  - polyphagia (increased hunger).

- Symptoms may develop rapidly (weeks or months) in type 1 DM, while they usually develop much more slowly and may be subtle or absent in type 2 DM.

Signs and symptoms

In addition they also include:

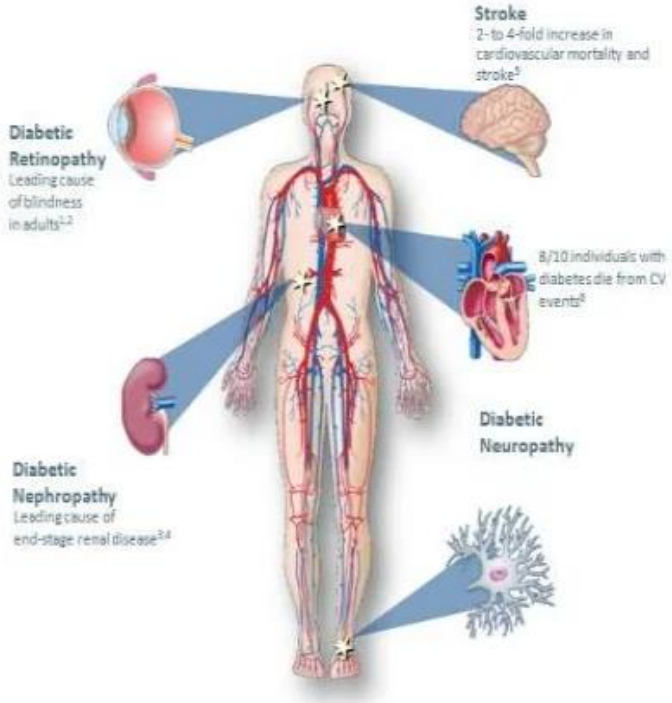
- Blurry vision
- Headache
- Fatigue
- Slow healing of cuts and
- Itchy skin.

- Prolonged high blood glucose can cause glucose absorption in the lens of the eye, which leads to changes in its shape, resulting in vision changes.

- A number of skin rashes that can occur in diabetes are collectively known as diabetic dermadromes

COMPLICATIONS

- All forms of diabetes increase the risk of long-term complications. These typically develop after many years (10–20)
  - The major long-term complications relate to damage to blood vessels.
    - Diabetes doubles the risk of cardiovascular disease
- About 75% of deaths in diabetics are due to coronary artery disease.
  - Other "macrovascular" diseases (stroke)
  - peripheral vascular disease.



COMPLICATIONS

- The primary complications of diabetes due to damage in small blood vessels include damage to the eyes, kidneys, and nerves.

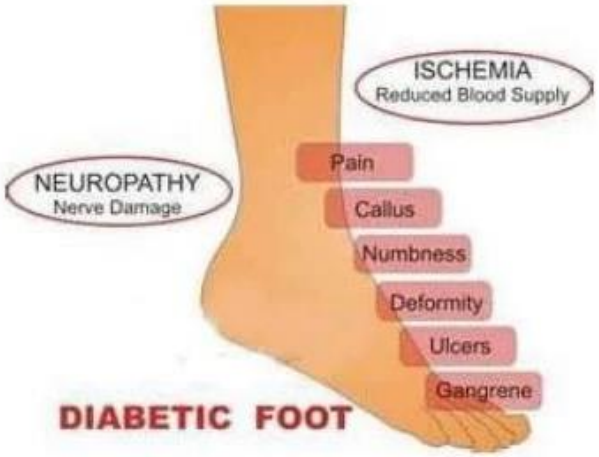
- Damage to the eyes, known as diabetic retinopathy, is caused by damage to the blood vessels in the retina of the eye, and can result in gradual vision loss and blindness.

- Damage to the kidneys, known as diabetic nephropathy, can lead to tissue scarring, urine protein loss, and eventually chronic kidney disease, sometimes requiring dialysis or kidney transplant.

- Damage to the nerves of the body, known as diabetic neuropathy, is the most common complication of diabetes.

COMPLICATIONS

- The symptoms can include numbness, tingling, pain, and altered pain sensation, which can lead to damage to the skin.

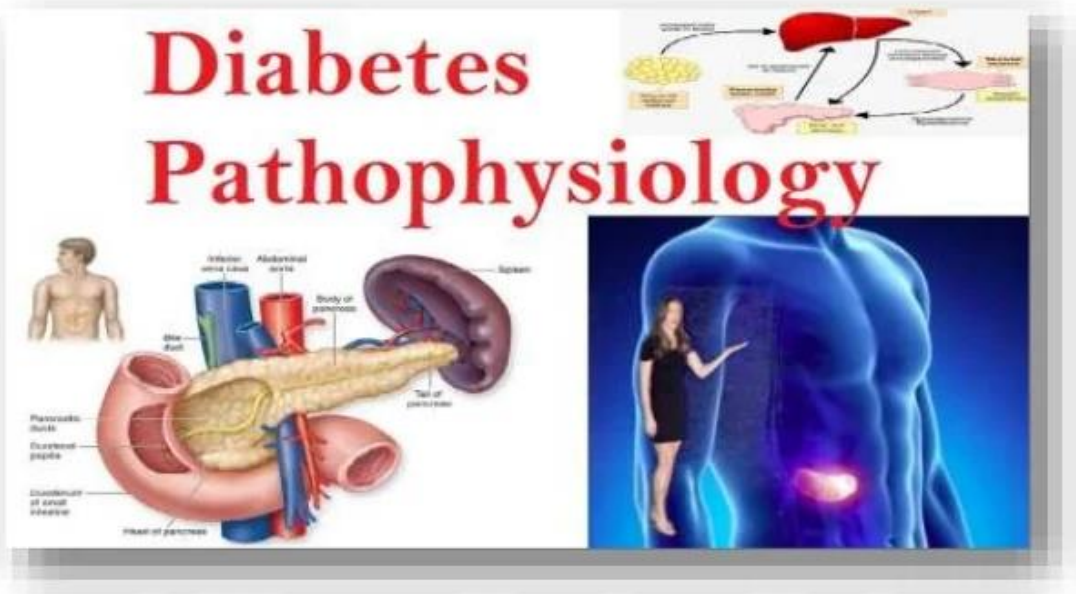


- Diabetes-related foot problems (such as diabetic foot ulcers) may occur, and can be difficult to treat, occasionally requiring amputation.

- Additionally, proximal diabetic neuropathy causes painful muscle wasting and weakness – Diabetic Amyotrophy.

PATHOPHYSIOLOGY - GENERAL

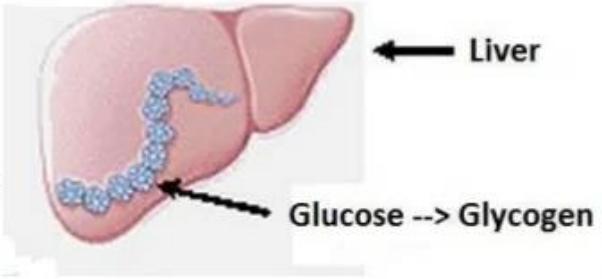
- Insulin is the principal hormone that regulates the uptake of glucose from the blood into cells of the body, especially liver, adipose tissue and muscle, except smooth muscle, in which insulin acts via the IGF-1 (Insulin-like growth factor - 1).



- Therefore, deficiency of insulin or the insensitivity of its receptors plays a central role in all forms of diabetes mellitus.

PATHOPHYSIOLOGY

- The body obtains glucose from three main places:
  - The intestinal absorption of food
  - The breakdown of glycogen, the storage form of glucose found in the liver
  - Gluconeogenesis, the generation of glucose from non-carbohydrate substrates in the body.

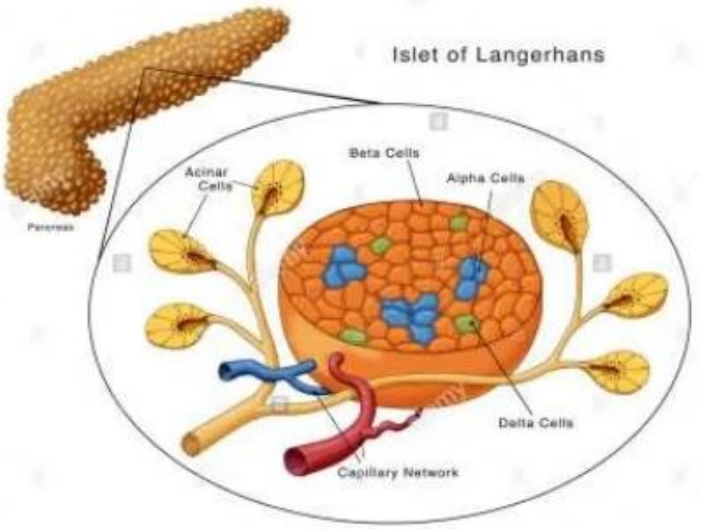


PATHOPHYSIOLOGY

- Insulin plays a critical role in balancing glucose levels in the body:
  - ✓ It can inhibit the breakdown of glycogen or the process of gluconeogenesis.
  - ✓ It can stimulate the transport of glucose into fat and muscle cells.
  - ✓ It can stimulate the storage of glucose in the form of glycogen.

PATHOPHYSIOLOGY

- Insulin is released into the blood by beta cells (β-cells), found in the islets of Langerhans in the pancreas, in response to rising levels of blood glucose, typically after eating.

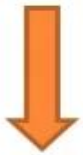


- Lower glucose levels result in decreased insulin release from the beta cells and results in the breakdown of glycogen to glucose.

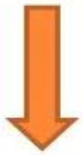
- This process is mainly controlled by the hormone glucagon, which acts in the opposite manner to insulin.

PATHOPHYSIOLOGY

- If the amount of insulin available is insufficient
- If cells respond poorly to the effects of insulin
- If the insulin itself is defective



- Then glucose will not be absorbed properly by the body cells



- The net effect is persistently high levels of blood glucose, poor protein synthesis, and break down of fat storage

- Acidosis.

PATHOPHYSIOLOGY

- When the glucose concentration in the blood remains high over time, the kidneys will reach a threshold of reabsorption → Glycosuria.

↓

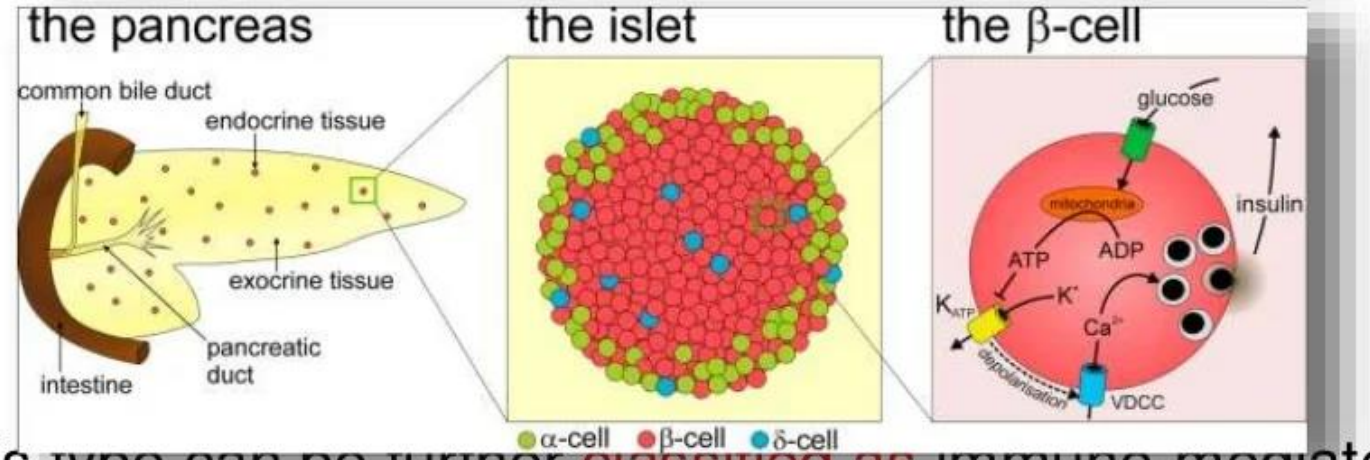
- This increases the osmotic pressure of the urine → polyuria → increased fluid loss

↓

- Lost blood volume will be replaced osmotically from water held in body cells and other body compartments → dehydration → polydipsia

PATHOPHYSIOLOGY - TYPE 1

- Type 1 diabetes mellitus is characterized by loss of the insulin-producing beta cells of the islets of Langerhans in the pancreas, leading to insulin deficiency.



- This type can be further classified as immune-mediated or idiopathic.
  - The majority of type 1 diabetes is of the immune-mediated nature, in which a T-cell-mediated autoimmune attack leads to the loss of beta cells and thus insulin.

PATHOPHYSIOLOGY - TYPE 1

- Most affected people are otherwise healthy and of a healthy weight when onset occurs.

- Sensitivity and responsiveness to insulin are usually normal, especially in the early stages.

- Type 1 diabetes can affect children or adults, but was traditionally termed "juvenile diabetes" because a majority of these diabetes cases were in children.

PATHOPHYSIOLOGY - TYPE 1

- Type 1 diabetes is partly inherited, with multiple genes, including certain HLA genotypes, known to influence the risk of diabetes.

- In genetically susceptible people, the onset of diabetes can be triggered by one or more environmental factors, such as a viral infection or diet.
  - Among dietary factors, gluten may lead to type 1 diabetes, but the mechanism is not fully understood

PATHOPHYSIOLOGY - TYPE 2

- Type 2 DM is characterized by insulin resistance.
- The defective responsiveness of body tissues to insulin is believed to involve the insulin receptor.
  - In the early stage of type 2, the predominant abnormality is reduced insulin sensitivity.
- Type 2 DM is due primarily to lifestyle factors and genetics.

PATHOPHYSIOLOGY - TYPE 2

- A number of lifestyle factors are known to be important to the development of type 2 DM, including
  - Obesity
  - lack of physical activity
  - poor diet
  - Stress

- Dietary factors also influence the risk of developing type 2 DM such as
  - sugar-sweetened drinks
  - Type of fats in diet
    - saturated fats and trans fatty acids **increasing** the risk
    - polyunsaturated and monounsaturated fat **decreasing** the risk
  - Eating lots of white rice also may increase the risk of diabetes.
  - A lack of exercise is believed to cause 7% of cases

PATHOPHYSIOLOGY - GESTATIONAL DIABETES

- Gestational diabetes mellitus (GDM) resembles type 2 DM in several aspects.
  - Involves a combination of relatively inadequate insulin secretion and responsiveness.
  - It occurs in about 2–10% of all pregnancies and may improve or disappear after delivery.

PATHOPHYSIOLOGY - GESTATIONAL DIABETES

- However, after pregnancy approximately 5–10% of women with gestational diabetes are found to have diabetes mellitus, most commonly type 2.

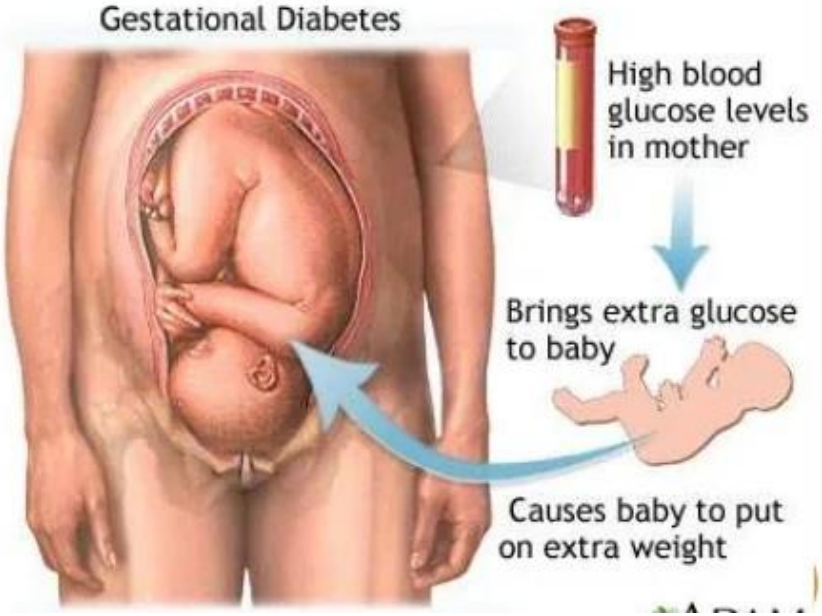
- Gestational diabetes is fully treatable, but requires careful medical supervision throughout the pregnancy.

- Management may include dietary changes, blood glucose monitoring, and in some cases, insulin may be required.

PATHOPHYSIOLOGY - GESTATIONAL DIABETES

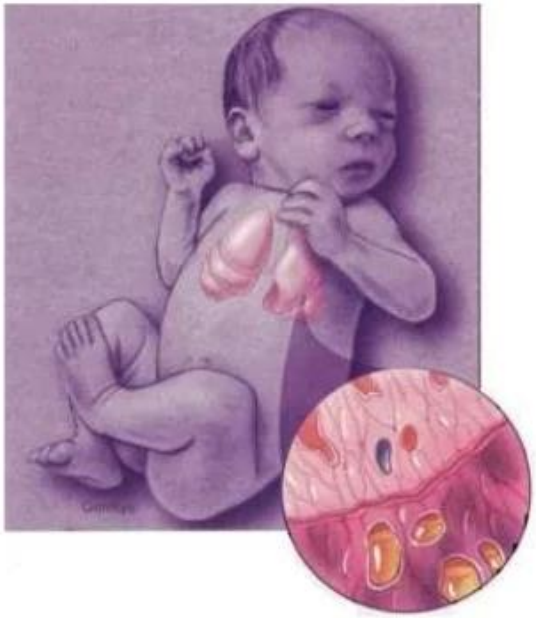
- Though it may be transient, untreated gestational diabetes can damage the health of the fetus or mother.

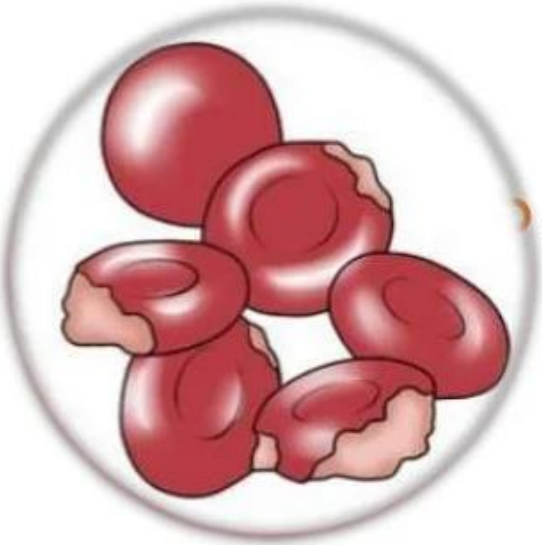
- Risks to the baby include:
  - Macrosomia (high birth weight)
  - Congenital Heart Defects
  - Central Nervous System Abnormalities
  - Skeletal Muscle Malformations.



Pathophysiology - Gestational diabetes

- Increased levels of insulin in a fetus's blood may inhibit fetal surfactant production and cause respiratory distress syndrome.





- A high blood bilirubin level may result from red blood cell destruction.

PATHOPHYSIOLOGY - GESTATIONAL DIABETES

- In severe cases, perinatal death may occur, most commonly as a result of poor placental perfusion due to vascular impairment.

- Labor induction may be indicated with decreased placental function.

- A Caesarean section may be performed if there is marked fetal distress or an increased risk of injury associated with macrosomia, such as shoulder dystocia.

- 4) Pre-diabetes
  - At least 79 million people are diagnosed with pre-diabetes each year
  - above average blood glucose levels, not high enough to be classified under type 1 or type 2 diabetes
  - long-term damage to body, including heart and circulatory system
  - Starts with unhealthy eating habits & inadequate exercise

EMERGENCY MANAGEMENT

- **Hypo**glycemia
  - Initial signs : mood changes, decreased spontaneity, hunger and weakness.
  - Followed by sweating, incoherence, tachycardia.
  - Results in unconsciousness, hypotension, hypothermia, seizures, coma, even death.

EMERGENCY MANAGEMENT

- 15 grams of fast-acting oral carbohydrate.
- Measured blood sugar.
- Loss of consciousness: 25-30ml 50% dextrose solution iv. over 3 min period.
- Glucagon 1mg.

EMERGENCY MANAGEMENT

- Severe **hyper**glycemia
  - A prolonged onset
  - Ketoacidosis may develop with nausea, vomiting, abdominal pain and acetone odor.
  - Difficult to different hypoglycemia or hyperglycemia.

LOW BLOOD SUGAR
*Hypo*glycemia

Signs and Symptoms


SWEATING


TREMBLING


DIZZINESS


MOOD CHANGES

HUNGER

HEADACHES


BLURRED VISION


EXTREME TIREDNESS AND PALENESS

HIGH BLOOD SUGAR
*Hyper*glycemia

Signs and Symptoms:


DRY MOUTH

EXTREME THIRST

FREQUENT URGE TO URINATE

DROWSINESS


FREQUENT BED WETTING


STOMACH PAIN

DIAGNOSIS

- Can be diagnosed by demonstrating any one of the following:
  - Fasting plasma glucose level ≥ 7.0 mmol/l (126 mg/dl)
  - Plasma glucose ≥ 11.1 mmol/l (200 mg/dl) two hours after a 75 g oral glucose load as in a glucose tolerance test.
  - Symptoms of high blood sugar and casual plasma glucose ≥ 11.1 mmol/l (200 mg/dl)
  - Glycated hemoglobin (HbA_{1C}) ≥ 48 mmol/mol (≥ 6.5 DCCT %)

DIAGNOSIS

- **Oral Glucose Tolerance Test (OGTT)**

  - Measures the body's ability to metobolise glucose
  - Most commonly done to check for gestational diabetes.
  - The patient is asked to take a glucose drink and their blood glucose level is measured before and at intervals after the sugary drink is taken.
  - For the standard glucose tolerance test, we should drink 75 grams or 100 grams.

OGTT Result's :

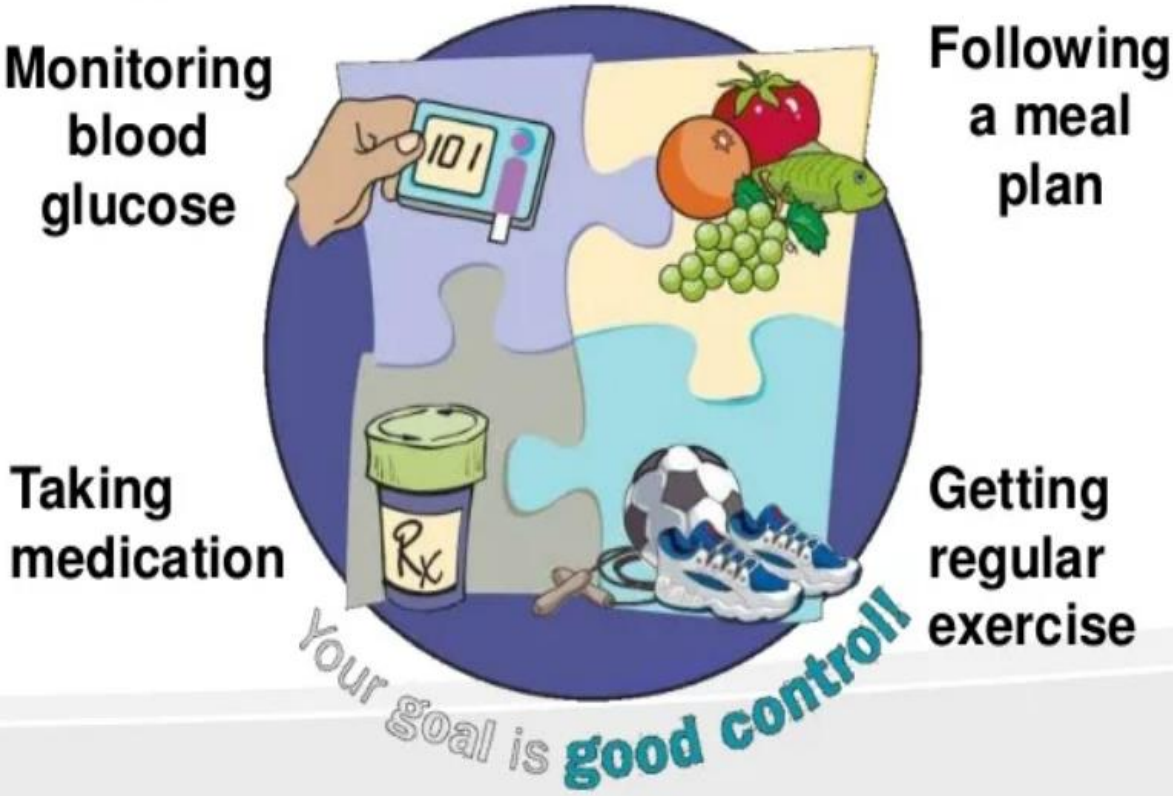
- **People without diabetes**
  - **Fasting value (before test):** under 6 mmol/L
  - **At 2 hours:** under 7.8 mmol/L
- **People with impaired glucose tolerance (IGT)**
  - **Fasting value (before test):** 6.0 to 7.0 mmol/L
  - **At 2 hours:** 7.9 to 11.0 mmol/L
- **Diabetic levels**
  - **Fasting value (before test):** over 7.0 mmol/L
  - **At 2 hours:** over 11.0 mmol/L

MANAGEMENT

- **Lifestyle**
  - Good nutrition
  - Regular exercise
  - Diet control to maintain blood pressure.
- **Medications**
- **Surgery**
  - Pancreas transplant
  - kidney transplantation
  - Weight loss surgery

INTRODUCTION TO SELF-MANAGEMENT:

Key pieces of diabetes self-management:



Importance of proper diet in a Diabetic Patient:

1. To provide adequate nutrition.
2. To control blood sugar and lipids.
3. To maintain ideal weight.
4. Less medication.
5. To prevent complications.

Carbohydrates

- Diabetics-not restrict the carbohydrate intake but alter the carbohydrate type.
- Eg-cereals, pulses -complex sugars.
- Sugar, jaggery , honey and jam -simple sugar .
- 55-60% of total daily intake of calories.

Proteins

Proteins can be obtained from-meat, pulses, legumes,milk.

They help to reduce the blood glucose and lipids.

10-15% of total daily intake of calories.

Fats

- Are concentrated forms of energy.
- 3 types -saturated ,monounsaturated and polyunsaturated.
- Saturated =ghee , butter, coconut oil -taken in small quantities.
- 20-25% of total daily intake of calories.

Dietary fiber

- Part of food not digested in the gut-unavailable carbohydrate.
- Eg-Whole grains, ragi, jowar, oats, green leafy vegetables.
- Help reduce blood glucose, serum cholesterol, relieve constipation.
- Intake of 25 gm dietary fiber per 1000 cal. –optimum

Glycemic index

- Area under the 2 hour blood glucose response curve(AUC)following the ingestion of a fixed portion of test carbohydrate (50g) as a proportion of the standard either glucose or white bread.

Low GI(55 or less)

1-Fruits,veg(except potato, watermelon).

2-Whole grains, beans

3- Lentils

Medium GI(55-69)

1-Sucrose

2-Basamati Rice

3-Brown Rice

High GI(70 or more)

1-Baked potato

2-White bread

3- Syrupy foods

4-Candies

FOODS ALLOWED (FREELY)

- GREEN LEAFY VEGETABLES
- OTHER VEGETABLES
- HIGH FIBRE FOODS (OATS, WHEAT BRAN)
- SPICES
- BUTTERMILK
- LEMON
- BLACK COFFEE & TEA WITHOUT SUGAR

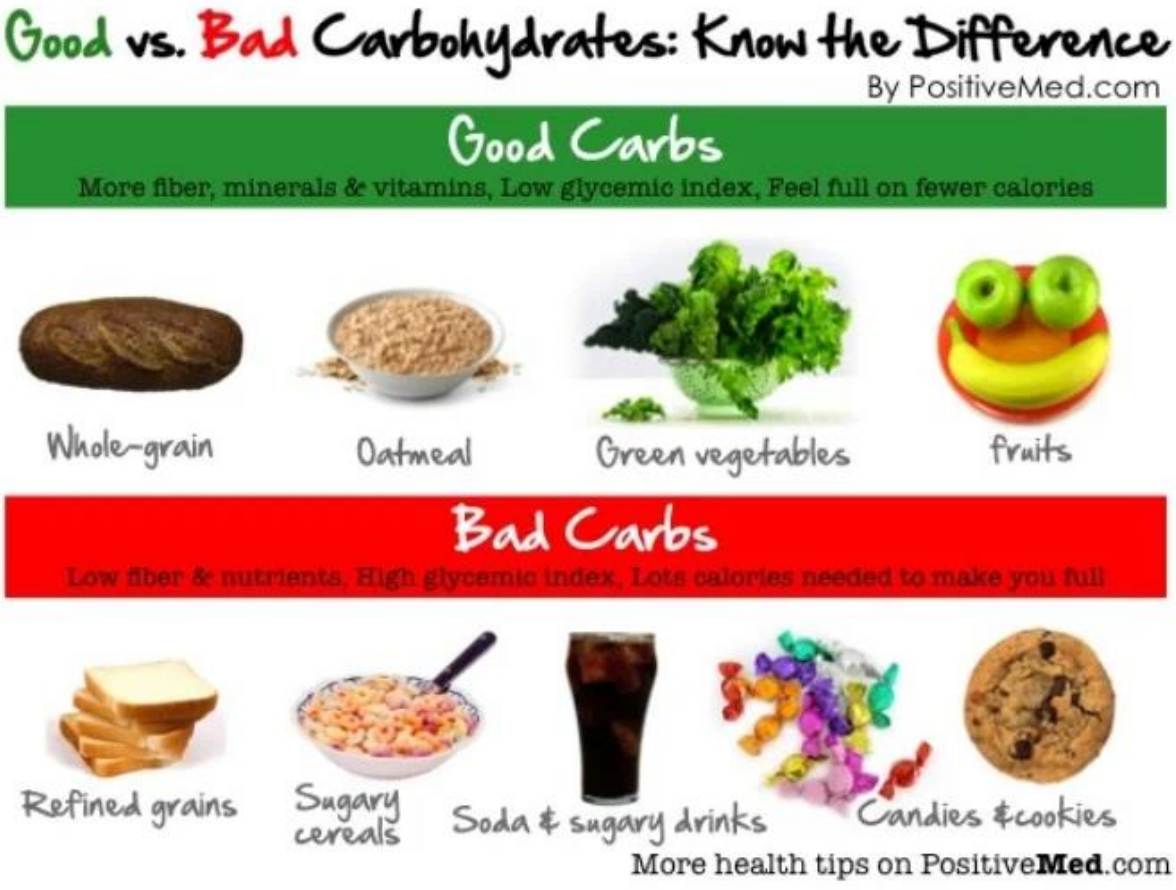
Veggies

- Good veggies:
  - Lettuce, Cauliflower, Spinach, Bell Peppers, Cabbage, Tomatoes, Green Beans, Eggplant, Broccoli, Cucumber, Mushrooms, Celery, Bitter-Gourd
- Avoid starchy veggies:
  - Potatoes, Corn, Green Peas, Pumpkin, Carrots

FOOD ALLOWED (MODERATELY)

- CEREALS
- PULSES (WITH HUSK)
- ROOTS & TUBERS
- FRUITS (NON-SWEET VARIETY)
- MILK PRODUCTS (SKIMMED MILK)
- EGGS

Good vs. Bad Carbs



Fruits

- Good Fruits:
  - All berries, pear, apple, orange, plum, nectarine, cantaloupe, peaches, Kiwi
- Avoid:
  - Fruit juices (even %100 pure)
  - Canned Fruits
  - Fruits with added sugar
  - Bananas, grapes, mangoes, pineapples
- Dry Fruit

Grains & Starches

- Example: Roti, Rice, Bread, Cereal, Pasta, Potatoes, Buns, Medha, Maaki Atta
- Good Grains:
  - Whole wheat flour (Kanak)
  - Whole oats/oatmeal (Dalia)
  - Bengal Gram (Channa Atta)
  - Buckwheat (Okhla)
  - Gram Flour (Besan)
  - Pearl Millet (Bajra)
  - Brown Rice

Dairy Products

- Milk (Skim or 1%)
- Yogurt (Home-made, Fat-free, 1%)
- Lassi (Plain, Salted)
- Panner (occasionally)
- Ghee/Butter (Limited/Avoid)

DO'S

- YOGASANS ARE MOST SUITES EXERCISE FOR DIABETES

DO'S

- ALWAYS CONSULT YOUR DOCTOR BEFORE STARTING YOUR EXERCISE ROUTINE
- START GRADUAL BUT REGULAR
- EXERCISE DAILY AT THE SAME TIME
- PARTICIPATE IN ACTIVE SPORTS LIKE JOGGING, SWMMING
- KEEP SUGAR OR SWEET CANDY TO AVOID LOW BLOOD SUGAR LEVELS

DON'TS

- AVOID EXERCISE SOON AFTER INJECTING INSULINE
- DO NOT EXERCISE ON AN EMPTY STOMACH
- DO NOT EXERCISE IF YOUR SUGAR LEVELS ARE HIGH AND YOUR DIABETES IS NOT IN CONTROL.

Regular Schedule

- Eat regular meals and snacks
- Space meals 4-6 hours apart
- Do NOT Skip Meals
- Eat meals of similar size
- Increase/Decrease snack(s)
  - Sugar low/high
  - Smaller/Larger meal during day
  - Extra/No exercise
- Drink plenty of water
- Limit salt intake

Portion Sizes

Hand Symbol	Equivalent	Foods	Calories	Servings
	**Fist** 1 cup	Rice, pasta Fruit	200 75	3 - 4x/day 2 - 3x/day
	**Two Fists** 2 cups	Veggies	40	2 - 3x/day
	**Palm** 3 ounces	Meat Fish Poultry	160 160 160	1 - 2x/day 1 - 2x/day 1 - 2x/day
	**Handful** 1 ounce	Nuts Raisins	170 85	2 - 3x/day 2 - 3x/day
	**2 Handfuls** 2 ounces	Chips Popcorn Pretzels	150 120 100	<1x/week <1x/week <1x/week
	**Thumb** 1 ounce	Peanut butter Hard cheese	170 100	2 - 3x/day 2 - 3x/day
	**Thumb tip** 1 teaspoon	Cooking oil Mayo, butter Sugar	40 35 15	3 - 4x/day 1 - 2x/day 1 - 2x/day

Keys of healthy lifestyle:

- Participate in a lifetime physical activity program
- Eat three nutritious meals each day
- Avoid meaningless snacking
- Maintain healthy weight
- Do not smoke cigarettes
- Get enough sleep
- Avoid alcohol consumption
- Control stress

Avoid stress to a healthy lifestyle

- Healthy lifestyle habits can also help you reverse your stress response, enabling you to avoid or even reverse the negative effects of chronic stress.
- Stress relief plan involves finding ways to calm down quickly so you can more effectively manage stress as it comes, while avoiding the negative effects of chronic stress. Another important way to relieve stress is to maintain healthy lifestyle habits.

Yogas & Asanas

- Yoga has been practiced for more than 5000 years
- Relieves Stress & Anxiety
- Boost positive Energy and Mood
- Help normalize Blood Pressure
- Speeds up a Sluggish Digestion by massaging surrounding muscles
- Increases Muscle Flexibility, Strength & Endurance
- Increases feelings of Calm & Wellbeing

Exercise and fitness

Make exercise fun by exercising with a friend

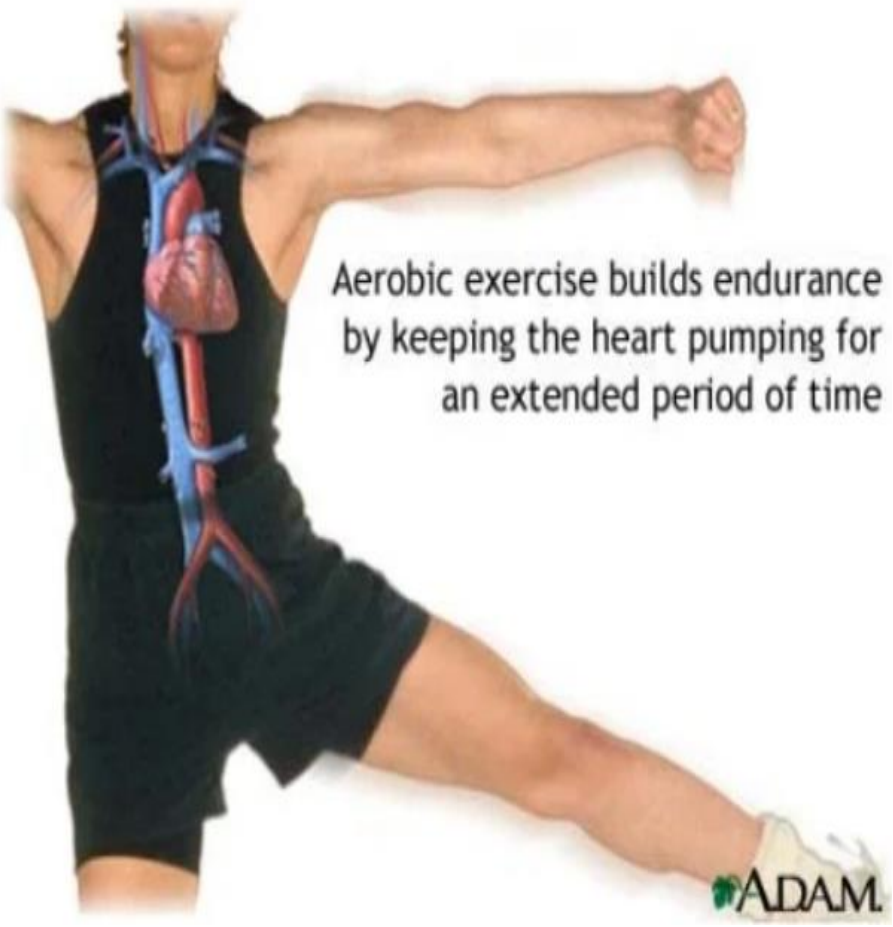
Meditation & Breathing Techniques

- It can reverse the Stress Response, thereby provides a shield against the effects of Chronic Stress
- Heart Rate and Breathing slows down, Blood Pressure normalizes
- Oxygen can be used more efficiently
- Adrenal glands produce less Cortisol
- Mind ages at a slower rate
- Improves Immune Function

Aerobic Exercise

Cycling, Walking, Running, Swimming, Treadmill, Jump Rope

- Aerobic exercise has long been a popular approach to achieving Weight Loss & Physical Fitness
- Improves Circulation Efficiency & reduces Blood Pressure
- Strengthens & Enlarges the Heart Muscles to improve its Pumping Efficiency
- Facilitate the flow of air in and out of the Lungs
- Strengthens the Respiratory Muscles



Stop smoking!

STOP SMOKING!

Smoking gives you yellow fingers and teeth. That means your house will stink and your children might start complaining! So if you don't want a stinky house or yellow fingers and teeth...

STOP SMOKING!

Fact!

Smoking kills over 250 bus loads of people every year!

Tips to Active Lifestyle

- Incorporate physical activity and exercise into your daily tasks
- Set yourself achievable goals and challenges to stay motivated and rewarded
- Plan and prioritise you activities with rest periods
- Use aids to help you stay physically active and able to do more
- Get a good night's rest, but avoid sitting or lying still as much as possible during the day
- Cycling or walking to the local store instead of driving to pick up small items
- Getting off public transport one stop early and walk the extra distance
- Purposefully park your car a little further from the office, mall or store
- Make it fun! Try a new sport like Tennis or Badminton. More you enjoy the exercise, more likely you are to stick to it


THANK
YOU