OBESITY

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Internal Medicine
3rd class
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OBESITY

Learning objectives;

1. Make the definition and classification of obesity according to body mass index(BMI) formula.
2. Recognize the types of obesity according to various body fat distribution patterns.
3. Review the pathogenesis of obesity.
4. Understand the causes of obesity.
5. Clarify the complications of obesity.
6. Explain the clinical assessment of obese patient.
7. List the important investigations of obesity.
8. Explain the management of obesity.

Obesity

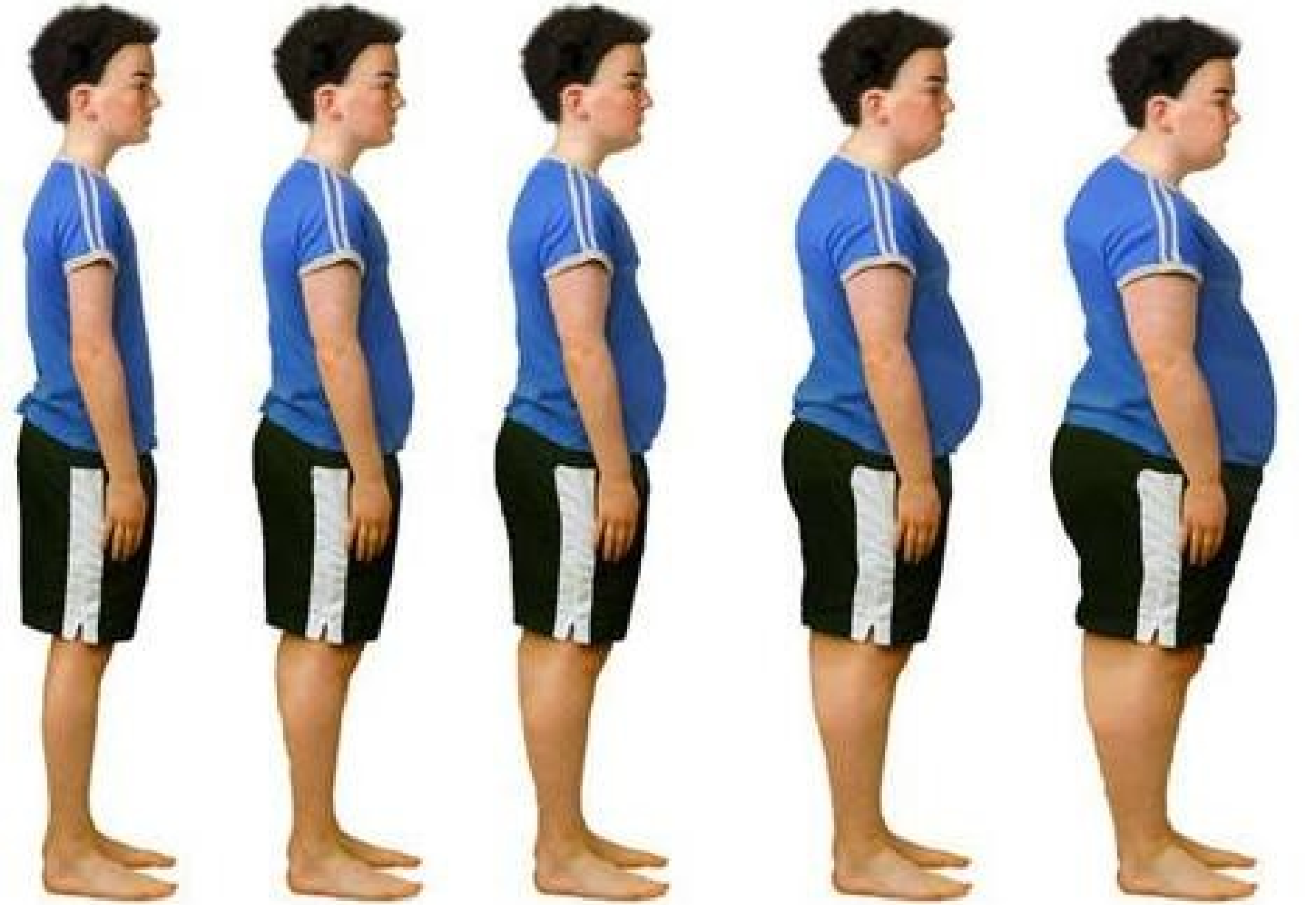
Define as; A nutritional disorder in which excess body fat has been accumulated to the extent that it may have an adverse effect on health.

Body Mass Index (BMI) is ≥ 30 kg/m2 .

body mass index (BMI) = weight/height2 (in kg/m2)

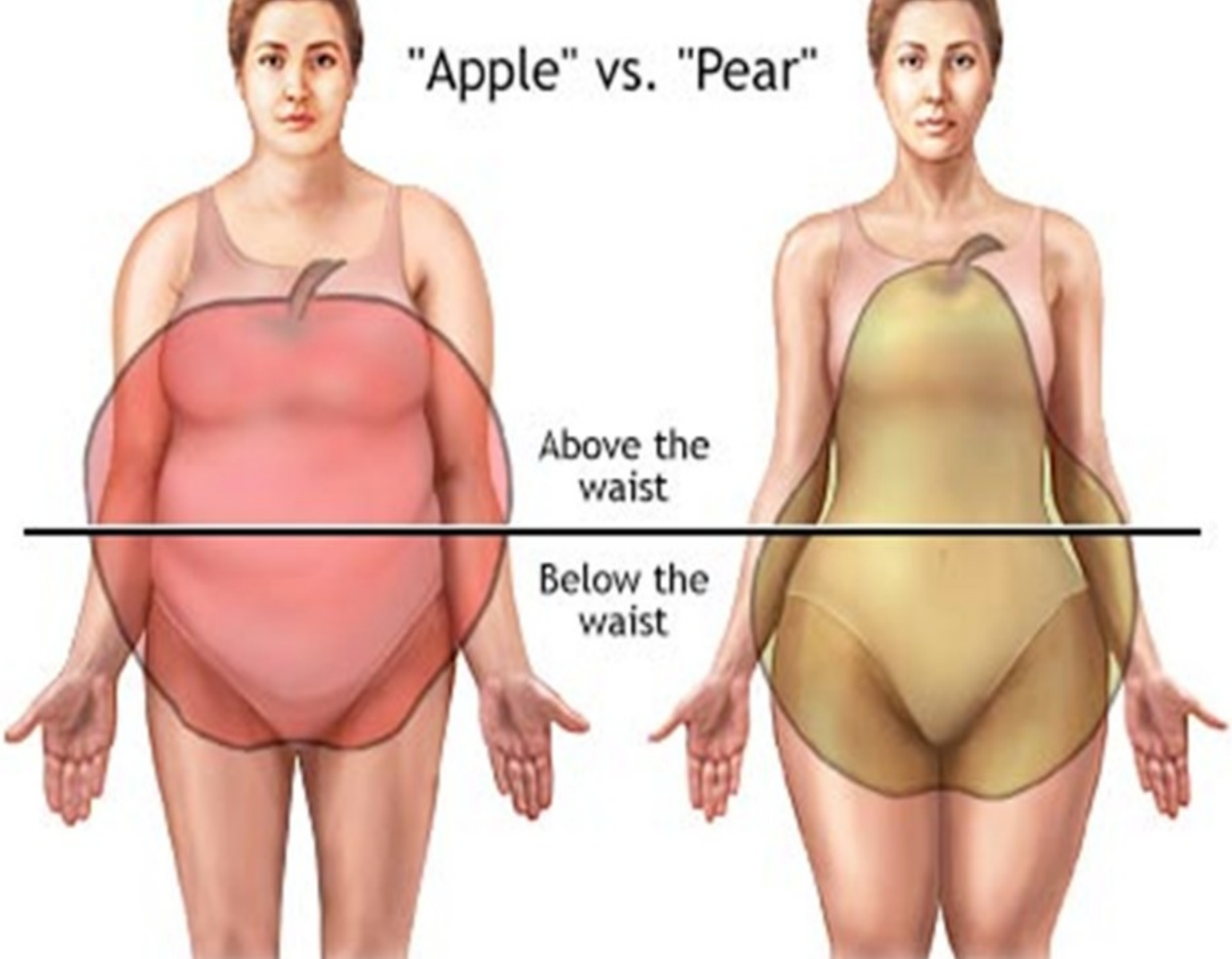
Obesity Classification Based on Body Mass Index (BMI)

Classification	BMI
Underweight	<20
Ideal	20-24.9
Overweight	25-29.9
Obese	30-40
Severely obese	>40



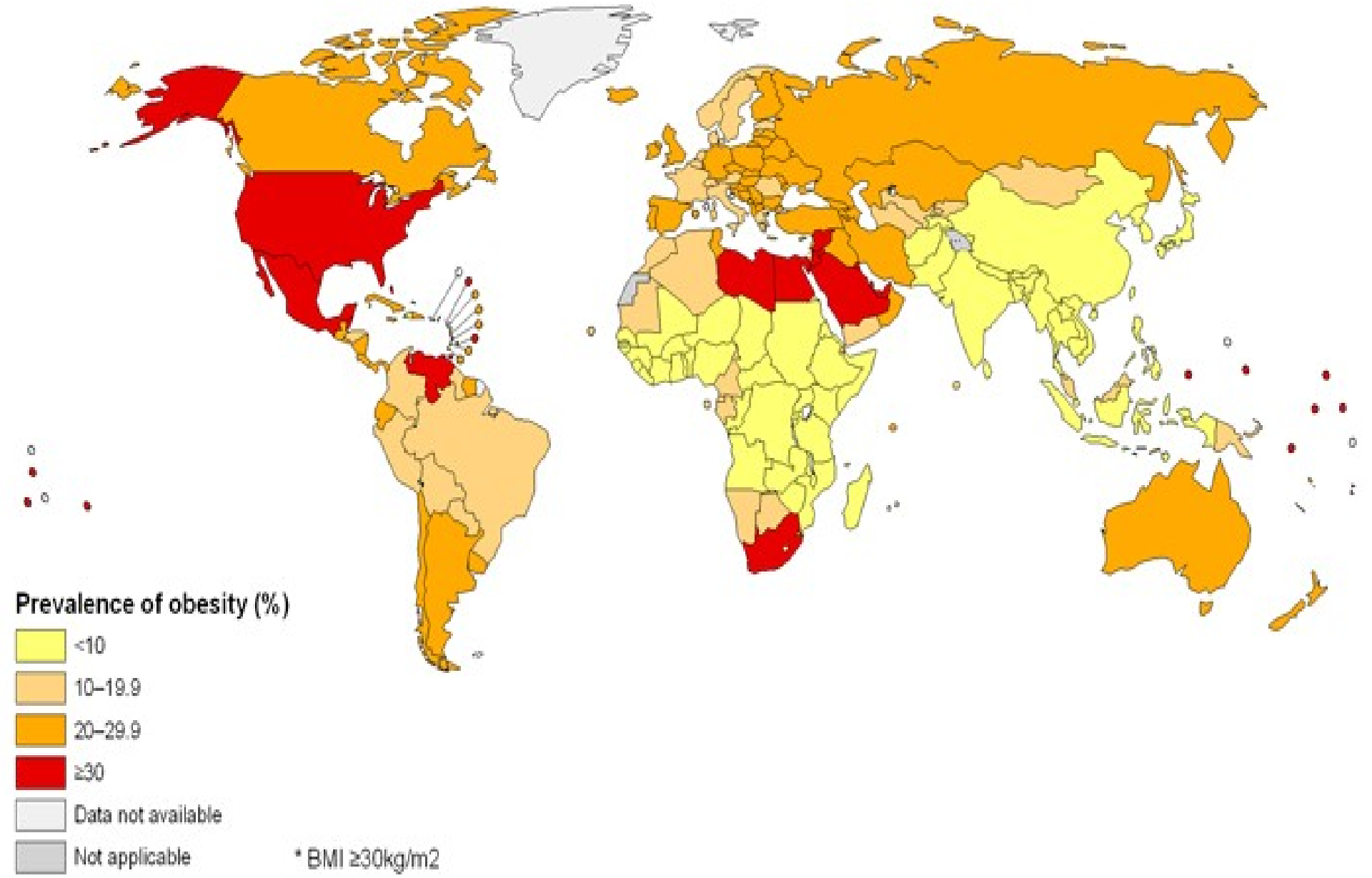
The types of obesity according to body fat distribution;

1. Intra-abdominal fat accumulation causes 'central' ('abdominal', 'visceral', 'android' or 'apple-shaped') obesity. This form is more common in men and is more closely associated with type 2 diabetes, the metabolic syndrome and cardiovascular disease.
2. Generalised fat accumulation ('gynoid' or 'pear-shaped') obesity


"Apple" vs. "Pear"
Above the waist
Below the waist

The prevalence of obesity has increased ~threefold within the last 20 years and continues to rise.

Obesity has reached epidemic proportions throughout the world, and this has also affected people of Arabic countries, especially those in higher-income and oil-producing countries, due to rapid urbanization and improved living conditions (changes in food consumption, socioeconomic status and physical activity).



World Health Organization, prevalence of adult

Metabolic syndrome (Syndrome X)

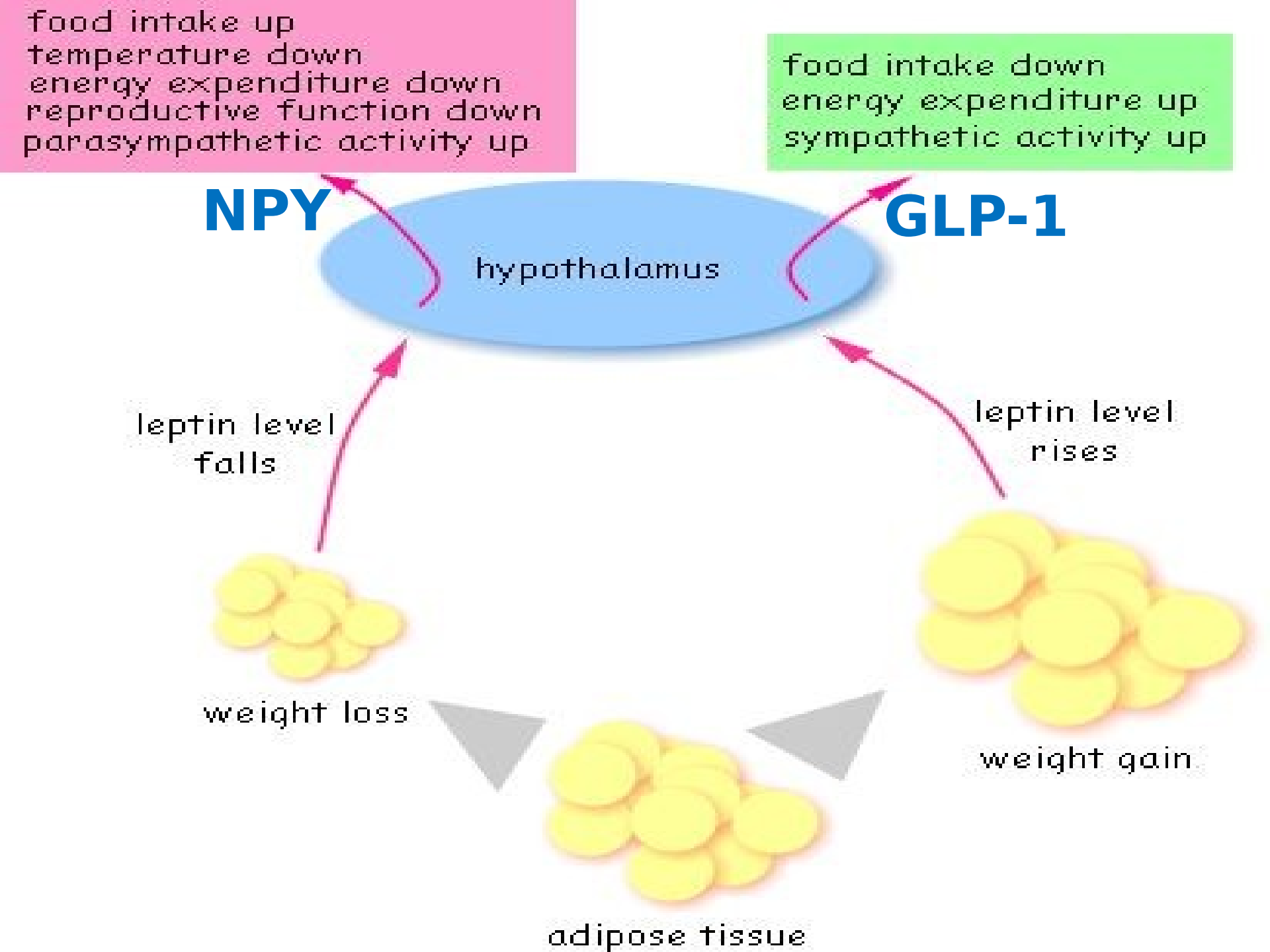
- Central obesity
- High blood pressure
- High triglycerides
- Low HDL-cholesterol
- Insulin resistance

Pathogenesis of obesity

Leptin; A hormone produced primarily by fat cells.

The overfed adipocyte secretes leptin, which circulates and binds to receptors in the hypothalamus, causing;

1. Release of glucagon-like peptide-1 (GLP-1) (appetite suppresser).
2. Inhibiting neuropeptide Y (NPY) (stimulator of appetite).


food intake up
temperature down
energy expenditure down
reproductive function down
parasympathetic activity up
food intake down
energy expenditure up
sympathetic activity up
NPY
GLP-1
hypothalamus
leptin level falls
leptin level rises
weight loss
weight gain
adipose tissue

- **Low leptin level signal starvation and stimulate feeding.**
- **Congenital leptin deficiency lead to hyperphagia and severe obesity.**

Insulin; Stimulates lipoprotein lipase permitting uptake of dietary fat by the adipocyte.

- **Leptin suppresses insulin production.**
- **Thus common forms of human obesity actually appear to be leptin resistant.**

Aetiology

Obesity result from discrepancy between energy consumption and expenditure. It is caused by long term positive energy balance.

Aetiology

1-Role of genetic and environment;

Obesity= Gene + availability of palatable food + sedentary lifestyle.

Majority of human obesity is related to the combination of polygenic susceptibility traits and environmental conditions.

a- Polygenic disorder;

b- Single gene disorders; cause severe childhood obesity; Prader-Willi and

Prader- Willi Syndrome: short stature, poor motor skills, weight gain and underdeveloped sex organs.

Lawrence-Moon-Biedl syndromes: Short stature, obesity, polydactyly, retinal disorders, and hypogonadism.

2- Reversible causes of obesity;

A- Endocrine factors

- Hypothyroidism
- Hypothalamic tumours or injury
- Cushing's syndrome
- Insulinoma

B- Drug treatments

- Tricyclic antidepressants
- Corticosteroids
- Sulphonylureas
- Sodium valproate
- Oestrogen-containing contraceptive pill
- β-blockers


Complications of obesity

Risk factors	Outcomes
'Metabolic syndrome' **Type 2 diabetes** **Hypertension** **Hyperlipidaemia**	**Coronary heart disease** **Stroke** **Diabetes complications**
Liver fat accumulation	**Non-alcoholic steatohepatitis** **Cirrhosis**
Restricted ventilation	**Exertional dyspnoea** **Sleep apnoea** **Respiratory failure (Pickwickian syndrome)**
Mechanical effects of weight	**Urinary incontinence** **Osteoarthritis** **Varicose veins**

Increased peripheral steroid interconversion in adipose tissue	**Hormone-dependent cancers (breast, uterus)** **Polycystic ovary syndrome (infertility, hirsutism)**
Others	**Psychological morbidity (low self-esteem, depression)** **Socioeconomic disadvantage (lower income)** **Gallstones** **Colorectal cancer** **Skin infections (groin and submammary**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Clinical assessment

1- History; dietary history: food consumption, binge eating, nocturnal eating, alcohol consumption. Any symptoms related to weight gain e.g. poor sleep or snoring or dyspepsia. Taking relevant drugs

- **Underlying disorder such as hypothyroidism or Cushing's syndrome.**
- **Complications of obesity**
- **Family history of obesity, DM, HT, or ischemic heart disease.**
- **Impact of obesity on the patient's life and work. Is his work active or sedentary. Is there regular exercise? Are there any psychological problems as depression?**

2- Examination and measurements;

- **BMI =kg/m2**

Example: adult Wt 70 kg and Ht 1.75 m the BMI is =70/1.752 = 22.9 .

- **Waist circumference of**

  > 102 cm in men = obesity

  > 88 cm in women = obesity

- **Waist-to-hip circumference ratio**

  > 1 in men = android obesity

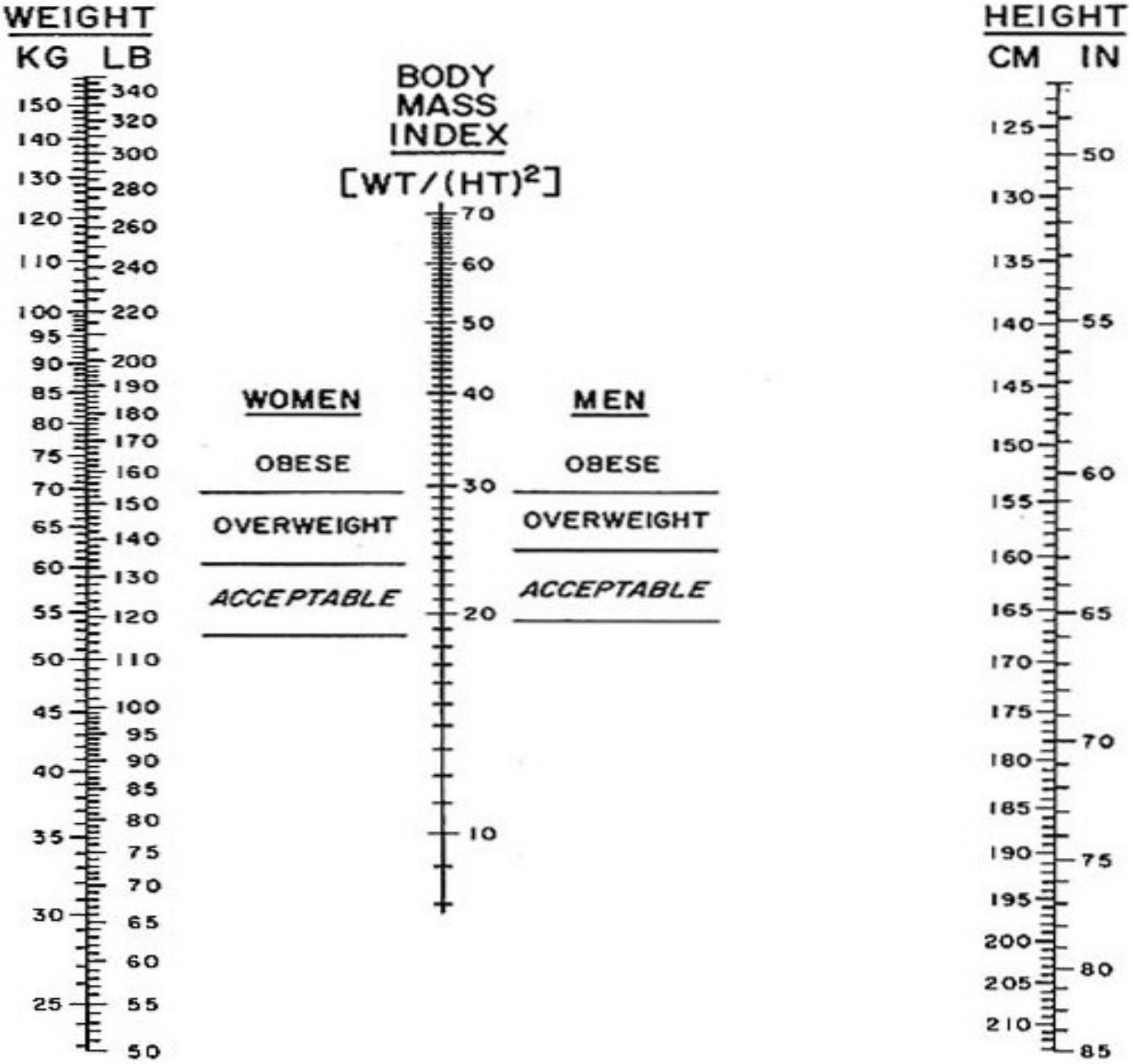
  > 0.9 in women = android obesity

Female

Male

- **Anthropometry; skin fold thickness. By using calipers, typically at the forearm.**
- **Densitometry; under water weighting.**
- **B.P; with large cuff.**
- **Search of complications.**
- **Look for signs of hypothyroidism or Cushing's syndrome.**

Nomogram for determining body mass index. To use this nomogram, place a ruler or other straight edge between the body weight (without clothes) in kilograms or pounds located on the left-hand line and the height (without shoes) in centimeters




HARPENDEN
SKINFOLD CALIPER
0120
SKINFOLD CALIPER
0.2 mm

Investigations

- Blood glucose and a serum lipid profile
- Serum transaminases
- Thyroid function tests
- Overnight dexamethasone suppression test or 24-hour urine free cortisol
- ECG

Management

1-Lifestyle advice;

A-avoid of the 'obesogenic'

Obesogenic environment
1-Increasing energy intake
↑ Portion sizes
↑ Snacking and loss of regular meals
↑ Energy-dense food (mainly fat)

2-Decreasing energy expenditure
↑ Car ownership
↓ Walking to school/work
↑ Automation; ↓ manual activities
↓ Sports in schools
↑ Time spent on video games and watching TV
↑ Central heating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B- Changes in eating behavior; avoidance of snacking, and take regular meals to encourage satiety. Adequate hydration with meals helps to limit calorie intake by causing gastric distension.

C- Maximize their physical activity; e.g. walking rather than driving.

2- Weight loss diets;

To maintains balance of nutrients and suppress hunger

Low-calorie diet therapy for obesity

Diet	% carbohydr.	% fat	% protein
Normal	50	30	15
Moderate fat	60	25	15
Low carbohydrate	10	60	30
High protein	43	30	27
Low fat	70	13	17

Note;

- **The goal is to lose ~0.5 kg/week.**
- **There is no role for starvation diets --a risk of sudden death.**

3- Drugs; No role for diuretics, or thyroxine

A- Orlistat; Inhibits pancreatic lipases -- decreases hydrolysis of ingested dietary fat and absorption by ~30%.

Side-effects include malabsorption of fat and fat soluble vitamins.

B- Sibutramine; Reduces food intake through β1-adrenoceptor and serotonin receptor agonist activity in the central nervous system.

Side-effects include dry mouth, constipation, insomnia and increase blood pressure.

- **Drug therapy is usually reserved for patients with high risk of complications from obesity.**


Xenical® 120 mg
Orlistat
84 kapsler, harde
Roche

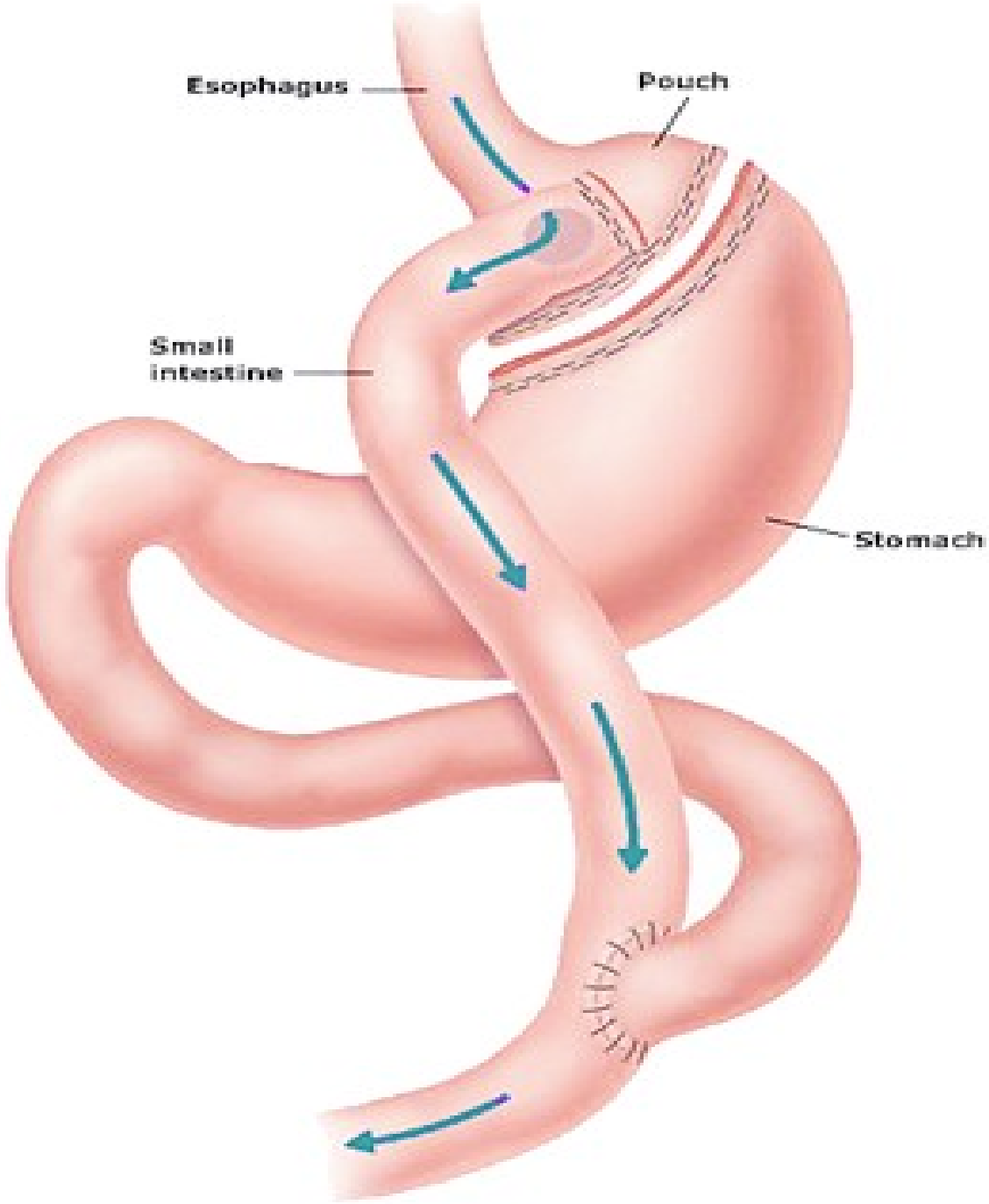

28 Capsules
Meridia® 10 mg
Sibutramine hydrochloride monohydrate
For the treatment of obesity
counting as an illness
UNIPHARMA

4-Surgery ; 'Bariatric' surgery to reduce the size of the stomach is by far the most effective long-term treatment for obesity.

In whom have very high risks of complications of obesity and drug therapy has been ineffective.

5-Treatment of additional risk factors;

Smoking, excess alcohol consumption, diabetes mellitus, hyperlipidemia and hypertension.


Esophagus
Pouch
Small intestine
Stomach


BEFORE
AFTER

Quiz

What are the difference between figure A and B regarding obesity

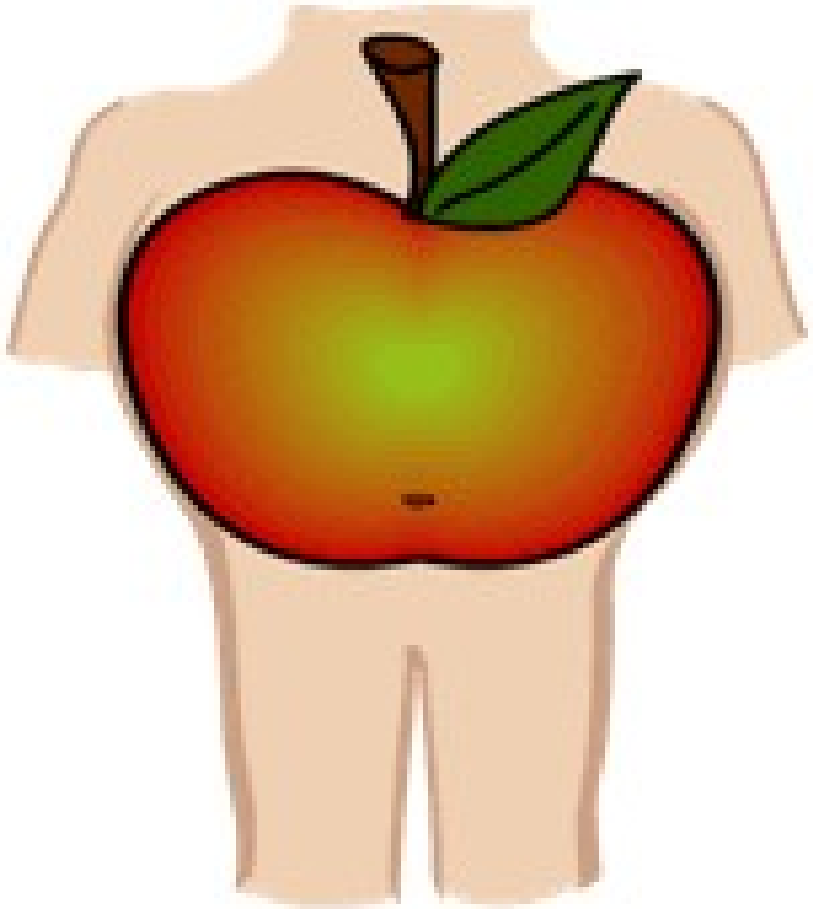


Figure A

Figure B

THANKS