1-Griscelli Syndrome : mutations in one of the proteins which are involved in vesicular movement and fusion. Those proteins can be RABs (RAB27A), Myosin (MYO5A), and MLPH.

-Symptoms: silver gray hair, melanin clumps in hair shaft and pigmentary dilution of the skin.

Diseases that are related to lysosomal enzymes

2-"**Gaucher disease: accumulation of Glucocerebroside due to mutation in** lysosomal enzyme called **glucocerebrosidase**.

-Type 1: (Least severe, most common) the nervous system is not involved; spleen and liver enlargement, development of bone lesions as well as foam appearance of lysosomes

-type 2 and 3: (More severe, much rarer): the only cells affected in Gaucher'sdisease are macrophages.

3-**A)Pompedisease (type II) :** *normal* but its *amount is excessive* accumulation of glycogen due to mutation in l

4-**B) I-Cell disease :** deficiency in the targeting of lumenal lysosomal proteins

-symptoms : very small size, specific facial features , severe psychomotor retardation leading to death between 5 and 8 years of age.

Diseases that are related to peroximal proteins

- 5-Zellweger syndrome : mutations in at least 10 genes such as the receptor of PTS1 which is responsible for importing of peroxisomal .

6-X-linked adrenoleukodystrophy (XALD): such as -Defective transport of very long chain fatty acids (VLCFA) across the peroxisomal membrane which are important as source of energy for brain as well as acetyl-choline synthesis .

-symptoms : problems occur in the adrenal gland and leukocytes.

Mitochondrial diseases

- 7-**Leber's hereditary optic neuropathy (LHON):** mutation in one of the mitochondrial transfer RNA genes required for synthesis of the mitochondrial proteins responsible for electron transport and production of ATP . “Males never transmit LHON to their offspring ”

- -symptoms : reduce the efficiency of oxidative phosphorylation and ATP generation, as well as blindness because of degeneration of the optic nerve between 15-35 years

- other mitochondrial diseases : (MELAS),(LHON) ,(NARP)

8-**X-linked Emery-Dreifuss muscular dystrophy: due to mutation emery mutation or mutations in lamins A and C (in case of non-sex-linked inheritance)**

-symptoms : 1. Stiff elbows,neck and heels.

2. patients may need a pacemaker.

3. Wastingandweakeningofthemuscles

* other diseases related to lamins mutation : **Dunnigan-type partial lipodystrophy**, **Charcot- Marie-Tooth disorder type 2B1, and Hutchinson-Gliford progeria**.

9-**Duchenne's :** severe frame shift mutation while **Becker's is** moderate; deletion mutation

-both are due to mutation in dystrophin which links actin filaments to transmembrane proteins of the muscle cell plasma membrane , x-linked and cause degeneration of skeletal muscle, with small-sized bodies and curved musculoskeletal system

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10-diseases related to mutation is kinesin motor protein of microtubules

- -(ALS): reduces the ability of neurons to move organelles from the cell body to the axon leading to neurodegeneration.
- -Charcot Marie tooth disease

11-diseases related to mutations in intermediate filaments proteins :

- -Human epidermolysis blossa:mutation in keratin causing skin blisters after minor trauma

- -ALS : related to mutation in intermediate filament type 4 leading to muscle atrophy, paralysis, and eventual death.

diseases that are related to collagen.

12-**Scurvy :** hydroxylation of proline is missed making the crosslinking between the fibers weaker .

13-***Osteogenesis imperfecta(OI) :*** deficiency in bone formation due to mutations in **COL1A1 and COL1A2 genes "autosomal dominant "**

-Type I : the mildest form

Type II: the most severe form

-**Milder** forms generate a **severe crippling disease.**

14-Chondrodysplasia (Achondroplasia) : mutations affecting **type II collagen leading to** dwarfism

15-**Ehlers-Danlos syndrome :** excessive flexibility in joints ,mainly due to mutations in type III collagen and collagen processing enzymes such as **lysyl hydroxylase and ProCollagen Peptidase . it also leads to** fragile blood vessels.

Diseases related to elastin

16- **Marfan's syndrome :** mutations in Fibrillin in **Microfibrils .**

-Signs and symptoms: **1**)A tall, thin build, long arms, legs, fingers, and toes. **2**)Flexible joints **3**)Scoliosis, or curvature of the spine **4**)A chest that sinks in or sticks out **5**)Crowded teeth **6**) Flat feet. And also **may cause rapture of aorta**.

17 **emphysema (destructive lung disease),** Due to a **dysfunctional alpha-1 antitrypsin** leading to **increased activity of Elastase** in lungs . it is due to lysine to-glutamate mutation as well as oxidizing methionine as a result of smoking

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18-Glaucoma: due to increasing in GAGs branches resulting in difficulties facing the fluid that must go outside the eye

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19-diseases due mutations in connexions and gap junctions

a) **Charcot-Marie-Toothdisease**(degenerationofperipheralmyelinated nerves)

b) **Deafness**: inability to rapidly exchange K^+ c) **Cataracts**:inabilitytoobtainnutrientsfromthelensepithelialcells,the eye turns into an opaque structure which is unable to pass the light to structures such as the optic nerve.

d) Skin disease

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