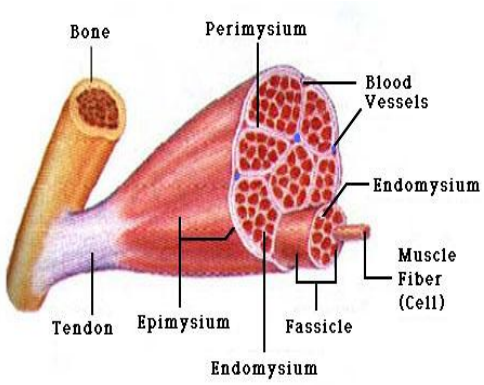
"He who studies medicine without books sails an uncharted sea, but he who studies medicine without patients does not go to sea at all." – William Osler

430
MEDICINE
TEAMWORK

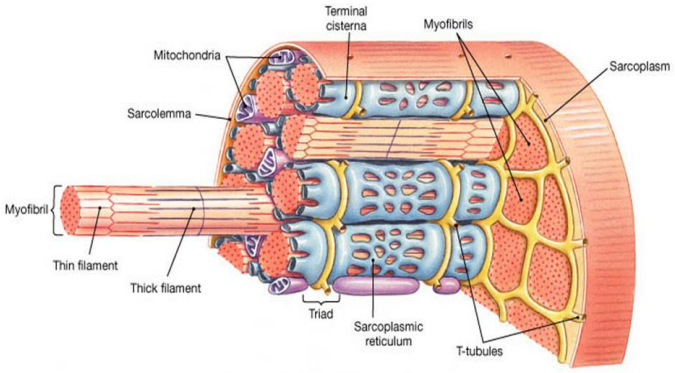
MYOPATHIES

Done By: Hend alqahtani

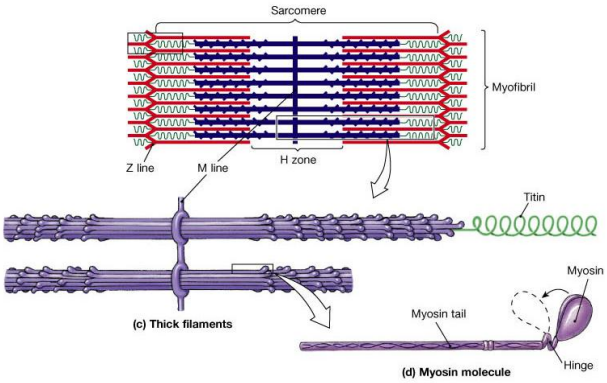
Brief review of anatomy:

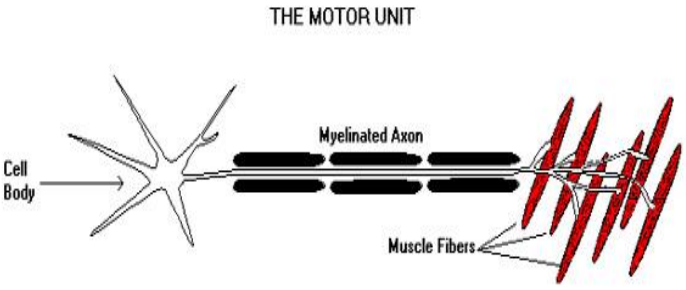


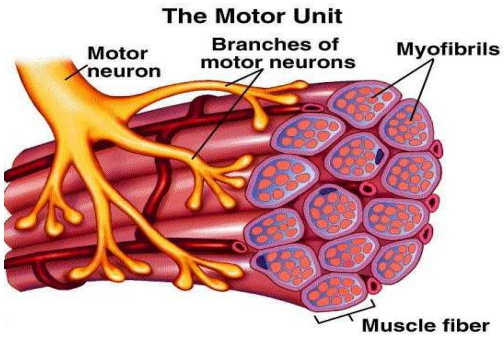
single muscle fiber :



Thick filaments: myosin (helps in the contraction)







Motor unit :

One single lower motor nerve innervate **group of muscle fiber.**

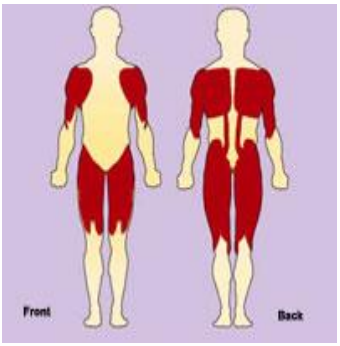
Muscle Fibers	
Type I : SLOW	**Type II: FAST (a & b)**
Slow switch and long contraction time (e.g. Anti-gravity muscle)	**Fast**
High O2 ➔ aerobic	**Anaerobic**
More myoglobin and mitochondria	**Less myoglobin & mitochondria**
Less fatigable	**Fatigable**

Most skeletal muscles have mixture of the

Common symptoms	
Positive +	**negative -**
Myalgia **Cramps** **Contractures** **Myoglobinuria** **Moonie (difficulty in relaxation)**	**Weakness** **Fatigue** **Atrophy** **Periodic paralysis** **Cardiomyopathy**

No correlating sensory symptoms

Patterns of weakness:



- Proximal arm and leg distribution➔ by far most common
- Distal distribution
- Proximal arm and distal leg (scapulo-peroneal)
- Distal arm and proximal leg
- Prominent ptosis
- Prominent head drop

Pattern + temporal profile = appropriate DDx list of myopathies

General approach:

Hx : focus on: 1) age of onset
2) Temporal profile(if the symptom come and go)
3) Triggers of onset (e.g. drugs, certain dose of steroid)
4) Family hx (tree)

P/E

➔ Determine pattern, severity, and degree of disability
➔ Full neurological and general exam (cardiac, thyroid, LNs,….)

Investigations

➔ CK, EMG, Biopsy (from moderately affected muscle)
➔ Specific for the cause or complication like genetics, ESR…

Electromyography (EMG) : is a technique for evaluating and recording the electrical activity produced by skeletal muscle. Inserting a needle inside the muscle and record its electricity

Lower vs. Upper Motor Neuron Weakness

	Upper Motor Neuron (Brain to corticospinal tract)	**Lower Motor Neuron (Anterior horn cells to peripheral nerves)**
Reflexes	Hyperactive +/- clonus	Diminished or absent
Atrophy	Absent* (Disuse atrophy can develop after initial presentation)	Present
Fasciculations	Absent	Present
Tone	Increased (spasticity)	Decreased or absent
Extensor planter reflex	Up-going (Babinski's sign)	Down-going

Distinguishing Lower Motor Neuron Weakness from Muscle Weakness

	Due to Neuropathy	Due to Myopathy
Distribution	Distal > proximal	Proximal > distal
Fasciculation	May be present	Absent
Reflexes	Diminished	Can be preserved (initial phase)
Sensory signs/symptoms	May be present	Absent

Types of myopathies :

- Channelopathies
- Muscular dystrophies
- Congenital
- Inflammatory
- Mitochondrial
- Metabolic (inherited)
- Acquired
- Drug(s) induced
- Others
- Infection induced
- metabolic

-Congenital myopathies :

- + deformities and contractures
- May affect breathing
- Early childhood presentation , affect growth .
- AD (majority), AR, or sporadic

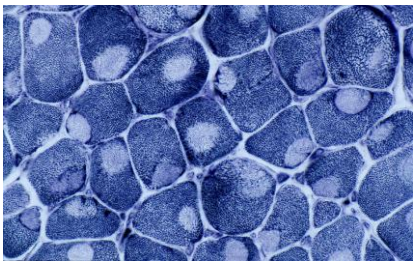
IMP. Central core myopathy may associate with malignant hyperthermia when go for anesthesia

Dx:

muscle biopsy +/- genetic testing

Rx

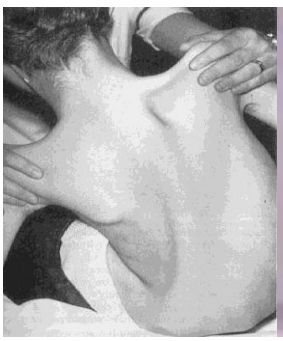
-Genetic counseling
-Medical and surgical Rx for complications
-Teach re prenatal Dx

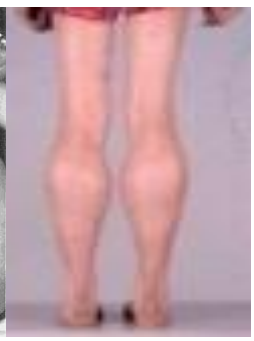


-Duchenne Muscular Dystrophy :

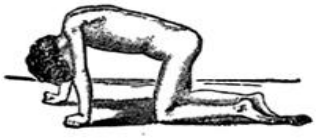
Dystrophinopathy

- First described in 1881- dystrophin gene (protein around the muscle wall, important in the contraction mechanism) discovered in the early 1980's .
- **Cause:** deficiency of dystrophin, resulting in progressive loss of muscle fibers
- **Becker's type:** reduced amount of dystrophin with more benign course
- Affects ~ 1 in 3500 live **male** births **X-linked disease** - Xp21
- 50% of cases are sporadic
- Boys with age of onset at 3-5 years
- Initial symptoms: difficulty getting up from deep position and climbing steps, waddling gait
- Weakness most pronounced in limb-girdle muscles, trunk erectors; craniobulbar muscles are spared
- Skeletal deformities.

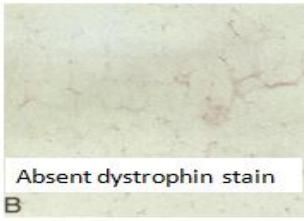


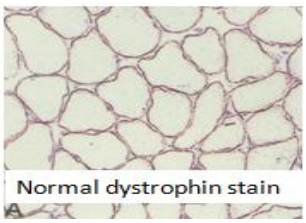


- Enlarged calves (pseudo-hypertrophy)
- Cardiomyopathy
- Inability to walk by 9-11 years
- Death occurs usually in the 3rd decade, from respiratory insufficiency
- Female carriers: usually asymptomatic .



Gower's sign:
Indicates weakness of the proximal muscles, patient that has to use his hands and arms to "walk" up his own body from a squatting position due to lack of hip and thigh muscle strength.



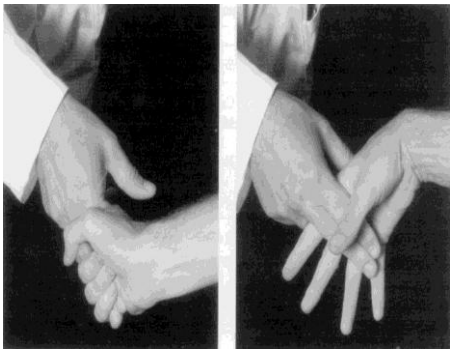


Dx
- Lack of immunostaining of dystrophin in muscle biopsy
- Demonstration of deletion in the dystrophin gene (limitation: small gene deletion in 30%)

Rx:
- Supportive care, and Rx of complications
- Steroids: delay deterioration
- Genetic counseling

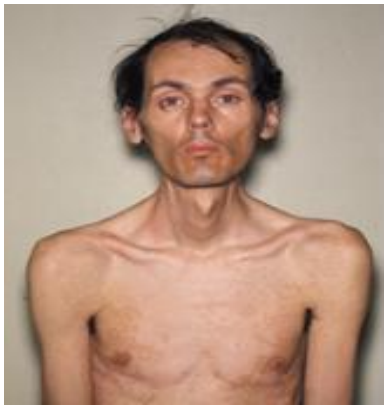
-Myotonic Dystrophy :

- Prevalence: 1 in 8000
- Cause: CTG repeat expansion in a gene on chr. 19
- Autosomal dominant inheritance with anticipation
- More CTG repeats ➔ younger age of onset
- Usual onset: 3rd decade
- Multisystemic disease:
  - Myotonia: hyperexcitability of muscle membrane → inability of quick muscle relaxation
  - Progressive muscular weakness and wasting, most prominent in cranial and distal muscles
  - Cataracts, frontal balding, testicular atrophy, diabetes
  - Cardiac abnormalities, mental retardation



Myotonia(difficulty in relaxtion)

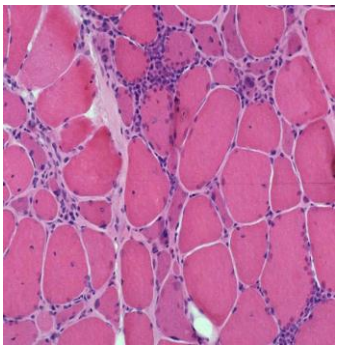
Dx:
- Genetic testing
- Screen for associated medical conditions like DM, cardiac,…



Rx:
- Counseling
- Supportive
- Prenatal Dx

- Idiopathic Inflammatory Myopathies :

- Heterogeneous group of disorders characterized by:
  - Proximal muscle weakness
  - Non-suppurative inflammation of skeletal muscle with predominantly lymphocytic infiltrates .
- **Types:**
  - **Polymyositis (PM)**
  - **Dermatomyositis (DM)**
  - **Inclusion Body Myositis (IBM)**
  - Juvenile Dermatomyositis
  - Myositis associated with malignancy
  - Myositis associated with collagen vascular disease .
- 2-8 cases per million per year
- **Female:male = 2:1**
- May associate with **malignancy** are common after the age of 50 years
- 35% with dermatomyositis (ovarian or lung)
- 15% with polymyositis (lymphoma or lung)
- Mechanism:
- Cell mediated in polymyositis and IBM
- Humoral response with vasculitis in dermatomyositis
- **Diagnosis**
  - Clinical presentation
  - Elevation of CK (may >10 times normal)… more at initial phase
  - AST, ALT, and LDH are elevated in most cases
  - Classic EMG findings for myositis
  - Muscle biopsy



Treatment:

- Corticosteroids (prednisone)… less beneficial for IBM
- Immuno-suppresive agents like azathioprine, methotrexate, mycophenylate mofetil
- IVIG, and Plasma exchange
- Screening for malignancy: early detection!

1-Polymyositis :

- Neck muscles (esp. flexors) involved in 50% of patients
- Dysphagia & dysphonia may occur
- Ocular and facial muscles almost never affected
- Distal muscles are spared in majority of pts
- Usually affect adults
- Usually insidious onset over 3-6 months
- No identifiable precipitant
- Shoulder and pelvic girdle muscles affected most severely

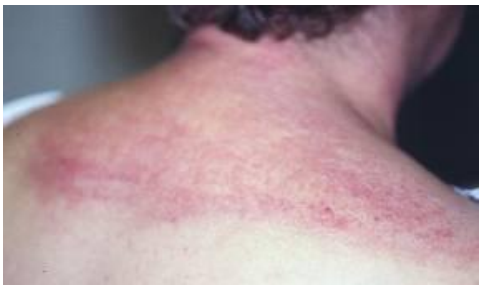
Systemic features

- **Cardiac disturbances :**
  - Asymptomatic ECG changes
  - Conduction disturbances
  - Supraventricular arrhythmias
  - Cardiomyopathy
  - Congestive heart failure
- **Respiratory involvement**
  - Interstitial fibrosis
  - Interstitial pneumonitis
- **Systemic symptoms**
  - Arthralgias
  - Fever, malaise
  - Raynaud's phenomenon

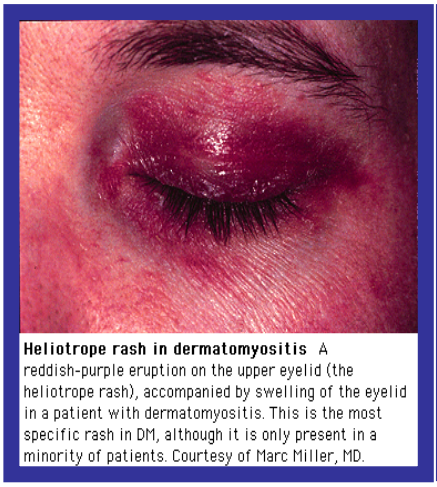
Raynaud's disease :
is a condition that causes some areas of your body — such as your fingers, toes, the tip of your nose and your ears — to feel numb and cool in response to cold temperatures or stress. In Raynaud's disease, smaller arteries that supply blood to your skin narrow, limiting blood circulation to affected areas.

2-Dermatomyositis :

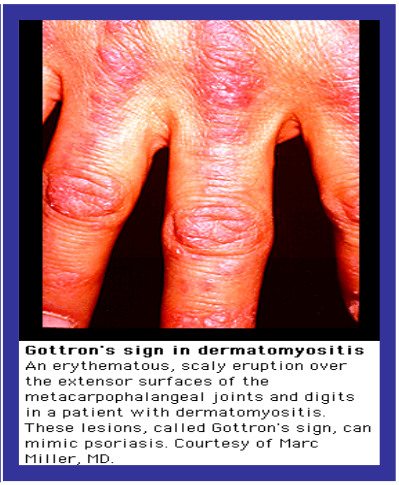
- Features of Polymyositis as well as **cutaneous** manifestations
- The skin lesions may precede or follow the muscle syndrome
- Gottron's sign (erythematous eruption over the extensor surfaces of the metacarpophalangeal and interphalangeal joints of the fingers.)
- Heliotrope rash (The classic rash seen on the face of patients with dermatomyositis)
- Shawl sign (diffuse, flat, erythematous lesion over the back and shoulders or in a "V" over the posterior neck and back or neck and upper chest)



Shawl sign



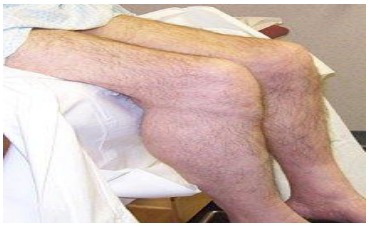
Heliotrope rash in dermatomyositis A reddish-purple eruption on the upper eyelid (the heliotrope rash), accompanied by swelling of the eyelid in a patient with dermatomyositis. This is the most specific rash in DM, although it is only present in a minority of patients. Courtesy of Marc Miller, MD.



Gottron's sign in dermatomyositis An erythematous, scaly eruption over the extensor surfaces of the metacarpophalangeal joints and digits in a patient with dermatomyositis. These lesions, called Gottron's sign, can mimic psoriasis. Courtesy of Marc Miller, MD.

3- Inclusion Body Myositis :

- Usually affects adults >50 yrs , More male
- Gradual painless weakness of quadriceps and fingers flexors
- Affects other muscles



-Endocrine- myopathies

- Thyrotoxic myopathy
- Hypothyroidism
- Hyperparathyroidism
- Adrenal insufficiency
- Hypokalemia
- Others

-Drug-induced Myopathies

- Corticosteroids
- Statins
- ETOH (ethanol)
- Heroin
- Many others

Steroid-induced Myopathies

- Exact incidence and prevalence ?
- More in women
- Reported with inhaled steroids too

Mechanism:

- decreased protein synthesis
- increased protein degradation
- alterations in carbohydrate metabolism
- mitochondrial alterations
- electrolyte disturbances
- decreased sarcolemmal excitability

Tests:

CK, EMG, and muscle biopsy are typically **normal**

Treatment:

- Re-assess indication of steroid and consider dose reduction
- Avoid excessive exercises
- Pain control and other supportive measures

❖ **Summery**

26.120 The muscular dystrophies

Type	Genetics	Age of onset	Muscles affected	Other features
Myotonic dystrophy (DM1)	Autosomal dominant; expanded triplet repeat chromosome 19q	Any	Face (incl. ptosis), sternomastoids, distal limb, generalised later	Myotonia, cognitive dulling, cardiac conduction abnormalities, lens opacities, frontal balding, hypogonadism
Proximal myotonic myopathy (PROMM; DM2)	Autosomal dominant; quadruplet repeat expansion in *Zn finger protein 9* gene chromosome 3q	Adult	Proximal, especially thigh, sometimes muscle hypertrophy	As for DM1 but cognition not affected Muscle pain
Duchenne	X-linked; deletions in *dystrophin* gene	First 5 years	Proximal and limb girdle	Pseudohypertrophy of calves Cardiomyopathy
Becker	X-linked; deletions in *dystrophin* gene	Late childhood/ early adult	Proximal and limb girdle	Pseudohypertrophy of calves Cardiomyopathy

_ from Davidson's medicine .

References :

- Davidson's medicine .
- Step up to medicine
- http://en.wikipedia.org/wiki/Electromyography
- http://www.mayoclinic.com/health/raynauds-disease/DS00433