

• Lidocaine; Procaine } $\Rightarrow$ Na^+ channel blockers

• Tetrodotoxin; Saxitoxin }

• Tetraethylammonium (TEA)
• 4-aminopyridine (4-AP) } $\Rightarrow$ K^+ channel blockers

• Digitalis
• Dinitrophenol } $\text{Na}^+ - \text{K}^+$ ATPase blockers

- Duration of single nerve action potential = 1 ms
- Equilibrium potential for Na^+ = +60 mV

Erlanger - Gasser Classification:

Type A fibres: 70 - 120 m/s
12 - 20 μm

$\text{A}\alpha$ - extrafusal fibres in skeletal muscle, carry proprioception

$\text{A}\beta$ - carry touch, pressure

$\text{A}\gamma$ - supply intrafusal fibres in muscle spindles

$\text{A}\delta$ - fast conducting nociceptive fibres

Type B - preganglionic autonomic afferent & efferent fibres

- 3 - 15 m/s

- < 3 μm

Type C - unmyelinated fibres

→ Dorsal root fibres $\Rightarrow$ 0.4 - 1.2 μm
 $\Rightarrow$ 0.5 - 2 m/s

→ Postganglionic sympathetic fibres $\Rightarrow$ 0.3 - 1.3 μm
 $\Rightarrow$ 0.7 - 2.3 m/s

- Ia $\rightarrow$ A α
 - Ib $\rightarrow$ A α
 - II $\rightarrow$ A β
 - III $\rightarrow$ A δ
 - IV $\rightarrow$ C - dorsal root fibres
- Numerical classification of sensory fibers

Susceptibility to:

Hypoxia: B > A > C

Pressure: A > B > C

Local anesthetics: C > B > A

- Width of synaptic cleft $\approx$ 40-100 nm
- Ach receptors at NMJ $\Rightarrow$ nicotinic type
- Each vesicle $\Rightarrow$ 4,000 - 10,000 Ach molecules

Synaptobrevin $\Rightarrow$ required for binding & release of Ach vesicle to pre-synaptic membrane
 SNAP-25 $\rightarrow$ A, B
 Syntaxin $\rightarrow$ C

Pre-synaptic Blockers - Botulinum toxin $\Rightarrow$ lethal dose in humans = 2-3 μ g
 - Hemicholinium

Post-Synaptic Blockers $\rightarrow$ Competitive - Curare, Gallamine
 $\rightarrow$ Depolarizing - succinylcholine, carbamylcholine

Other drugs $\rightarrow$ Reversible AchE inhibitors - Neostigmine, physostigmine
 $\rightarrow$ Irreversible AchE inhibitors - organophosphorus compounds, nerve gases

- Atropine is a muscarinic receptor antagonist $\therefore$ used as antidote in nerve gas exposure
- Immunosuppressants = Glucocorticoids, Azathioprine

NMJ:

- RMP of skeletal muscle = -90 mV
- Duration of AP = 2-4 ms
- Contractile response begins 2ms after onset of AP $\Rightarrow$ latent period

- $\text{ATP} \longrightarrow \text{ADP} + \text{P}_i + \underline{7.3 \text{ Kcal}}$
- Rigor Mortis $\Rightarrow$ starts 3 to 4 h after death
 - $\Rightarrow$ completed about 12 h after death
 - $\Rightarrow$ disappears 48 to 60 h after death due to disintegration of muscle proteins
- Duchenne muscular dystrophy / Pseudohypertrophic MD $\Rightarrow$ X-linked recessive disorder
 - $\Rightarrow$ dystrophin gene $\rightarrow$ located in p21 region of X-chromosome.
- Inflammatory myopathy $\Rightarrow$ poliomyelitis - destruction of motor neurons in anterior horn of spinal cord by poliovirus

Smooth Muscles:

- Troponin protein complex is absent in smooth muscles
- RMP of visceral smooth muscles $\Rightarrow -30$ to -70 mV (avg = -50 mV .)

Windkessel vessels — aorta & large arteries

Resistance vessels — arterioles, metarterioles, smaller arteries

Exchange vessels — capillaries

Capacitance vessels — large & small veins