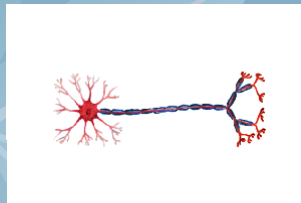
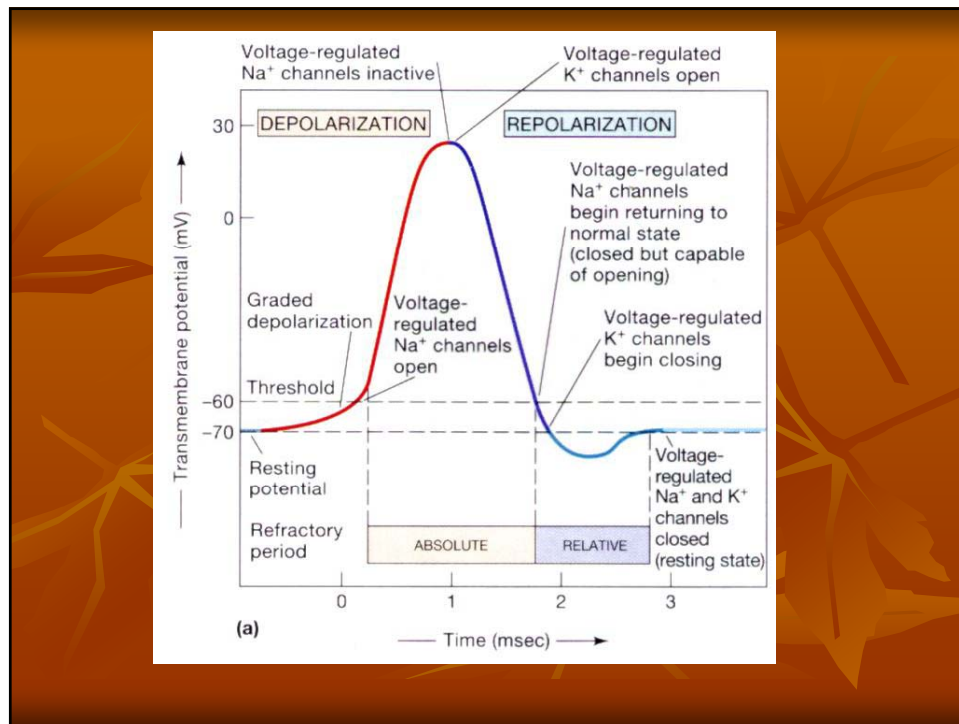




## Action Potential



✚ Rapid, large alterat° in the mb pot during which time the mb pot may change 100mV, from -90 to +35mV and then repolarize to its resting -90mb pot.



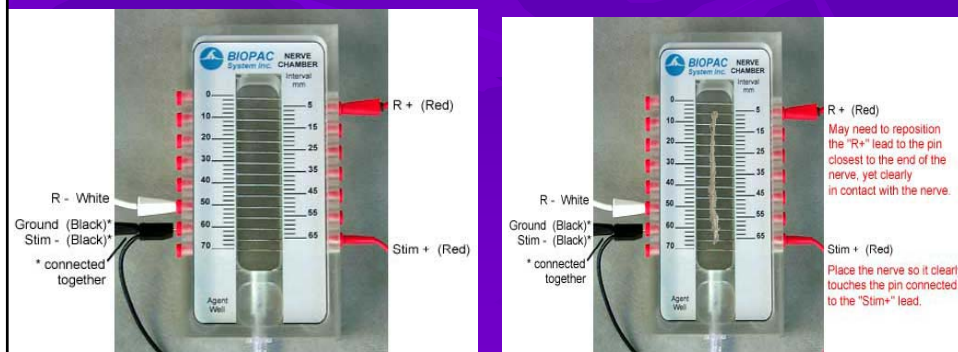
**Sub threshold stimulus:** the pot below the threshold level (cannot generate AP)

**Threshold stimuli** are the stim that are just strong enough to depolarize the mb (can generate an AP).

## AP are all or none

Increasing the stimulus above threshold level  
does not cause larger AP in single nerve fibers.

## Nerve conduct° using the frog sciatic nerve



- **Compound AP:** summated activity of AP of all fibers.
- It is not all /none because of the  $\neq$  thrlds of various fibers
- It  $\uparrow$  in amplitude as the stimulus is  $\uparrow$  until all fibers are excited
- Supramaximal stimuli produce no further  $\uparrow$  in size of the observed potential.

## **Nerve conduction velocity**

**Stimulate the nerve with a maximal voltage to obtain a full compound AP**

**Measure the time (**T**) in msec from the origin of the stimulus artifact to the peak of the potential spike.**

**Measure the distance (**D**) in cm between the stimulating and recording electrodes.**

$$\text{NCV} : \frac{\text{Distance (m /s)}}{\text{Time}}$$

CV range from **0.5m/s** for small  $\Theta$  unmyelinated fibers to about **100m/s** for large  $\Theta$  myelinated fibers.

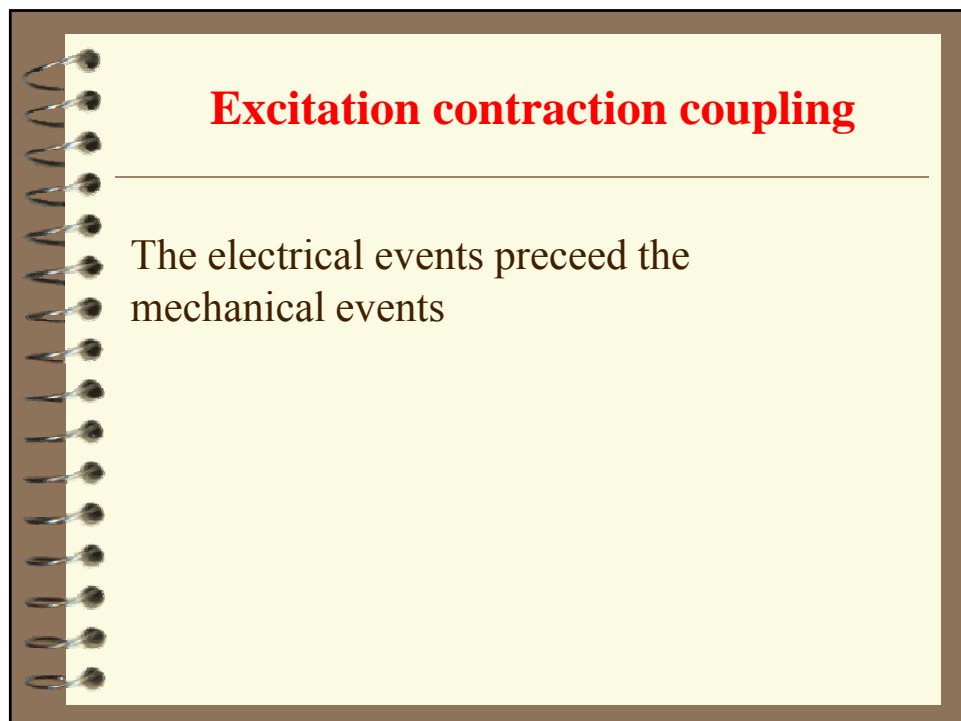
## Extracellular recording of nervous activity

### Biphasic Ap

The 2 recording electrodes on the surface of the nerve

### Monophasic AP

A small segment of the axon between the recording electrodes is crushed

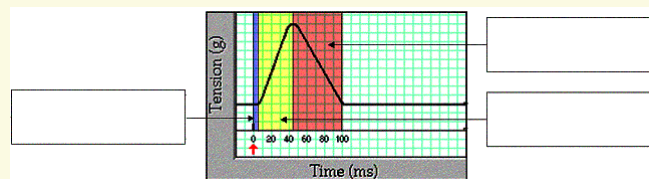


## Muscle twitch

Is a muscle contraction in response to a single stimulus of adequate strength

- ✓ Latent period
- ✓ Contraction phase
- ✓ Relaxation phase

The entire twitch lasts less than 1/10 of second



## Factors affecting muscle tension

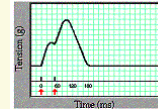
- Frequency of stimulation
- Number of motor units recruited

## Summation of contractions

An  $\uparrow$  in the frequency of stimulation, so that a new contraction occurs before the preceding one is over.

Results in the adding together of individual twitch contractions.

There is an  $\uparrow$  in the intensity of overall muscle contraction.




## Tetanic contraction

A maintained contraction in response to repetitive stimulations.




## Incomplete tetanus

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 *Presence of partial relaxation after each contraction*

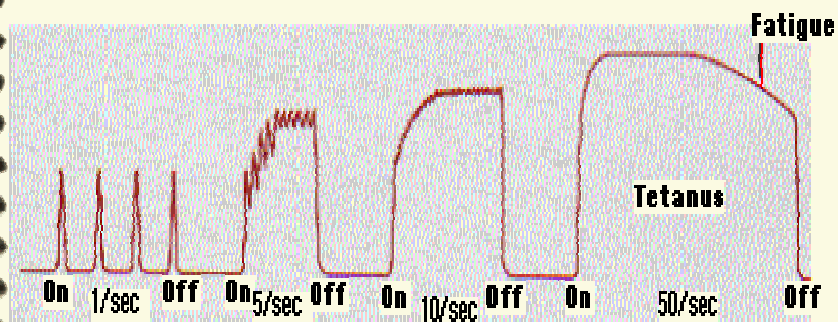
## Complete Tetanus

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 At higher stimulation frequencies, the contractions **fuse** into a smooth continuous, total contraction with **no apparent relaxation**.

## Fatigue

Continued rapid stimulation of an isolated muscle causes a gradual inability of the muscle to respond to stimulation



## Recruitment

- Multiple motor unit summation
- Increasing the stimulus strength activates more motor units and creates a stronger contraction.

