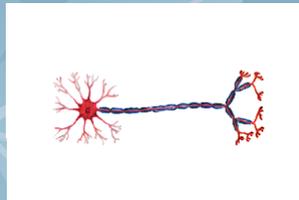
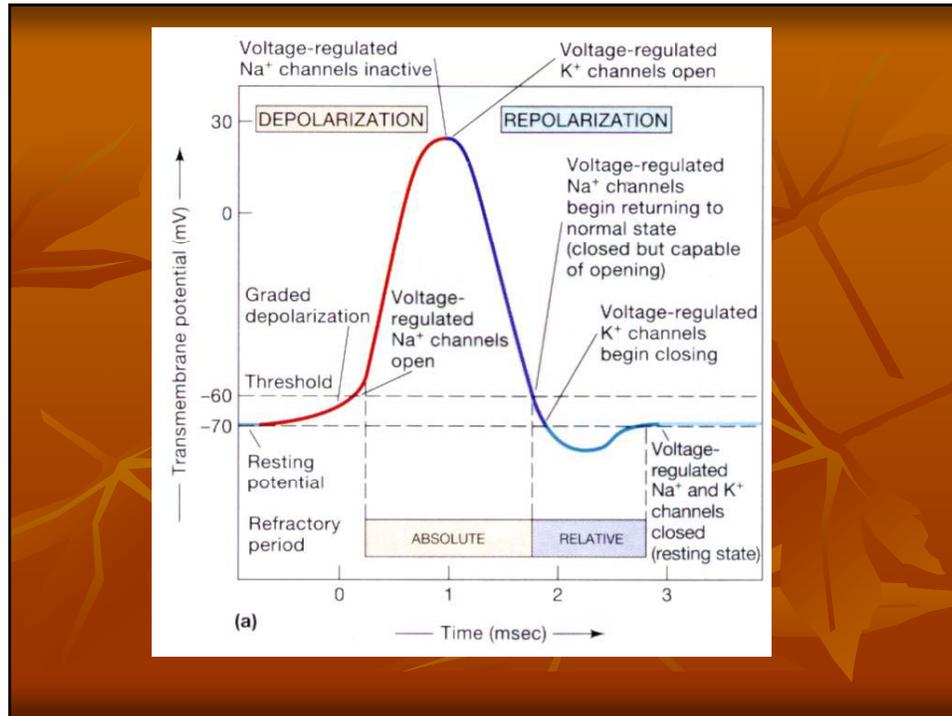




## Action Potential



✚ 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.



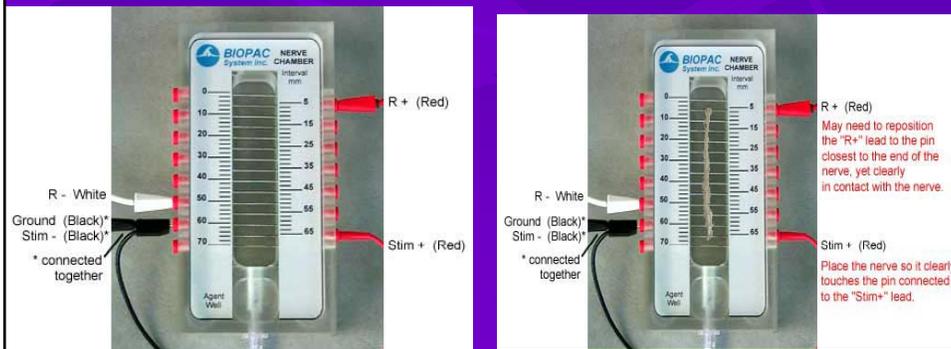
**Sub threshold stimulus:** the pot below the threshold level (cannot generate AP)

**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.**

**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.**

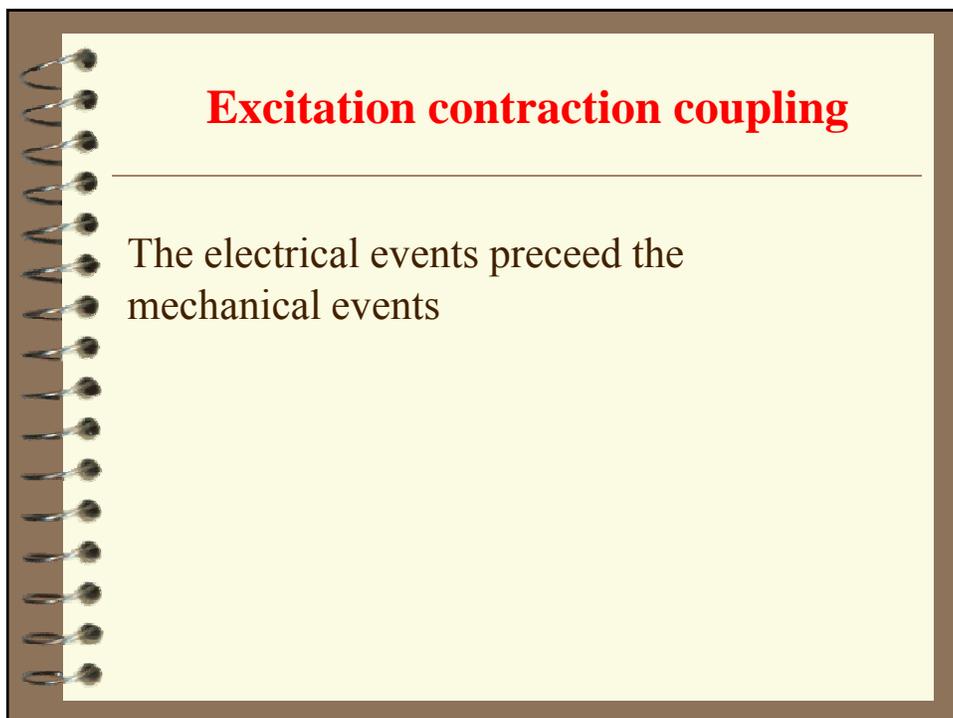
## **Extracellular recording of nervous activity**

### **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

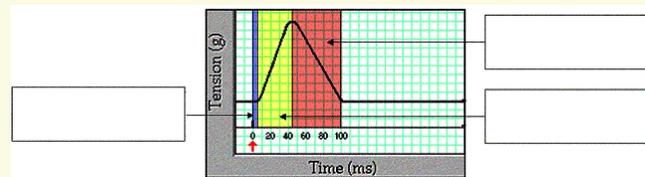


## Muscle twitch

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

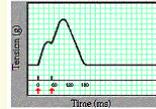
- ☞ Frequency of stimulation
- ☞ Number of motor units recruited

## 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*

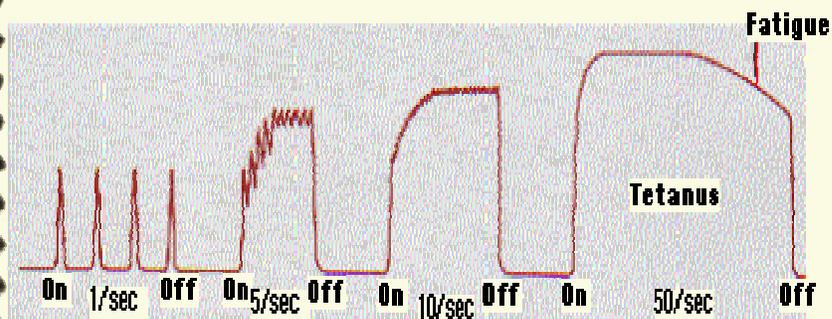
## Complete Tetanus

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

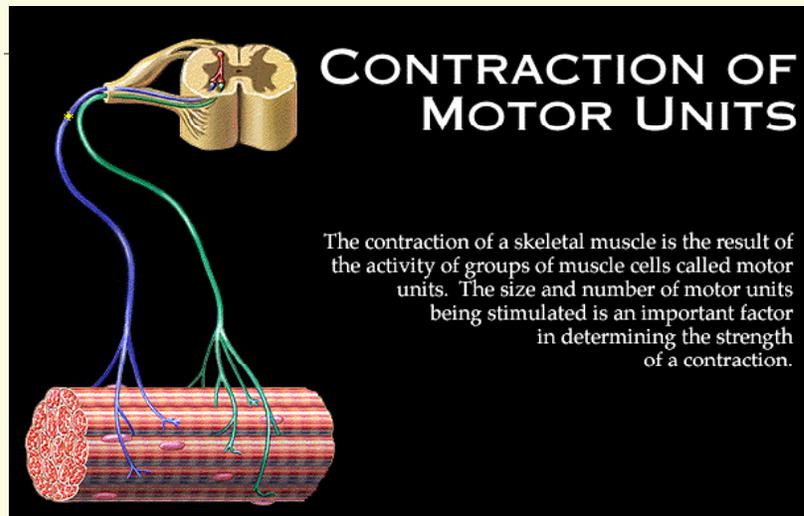
## Fatigue

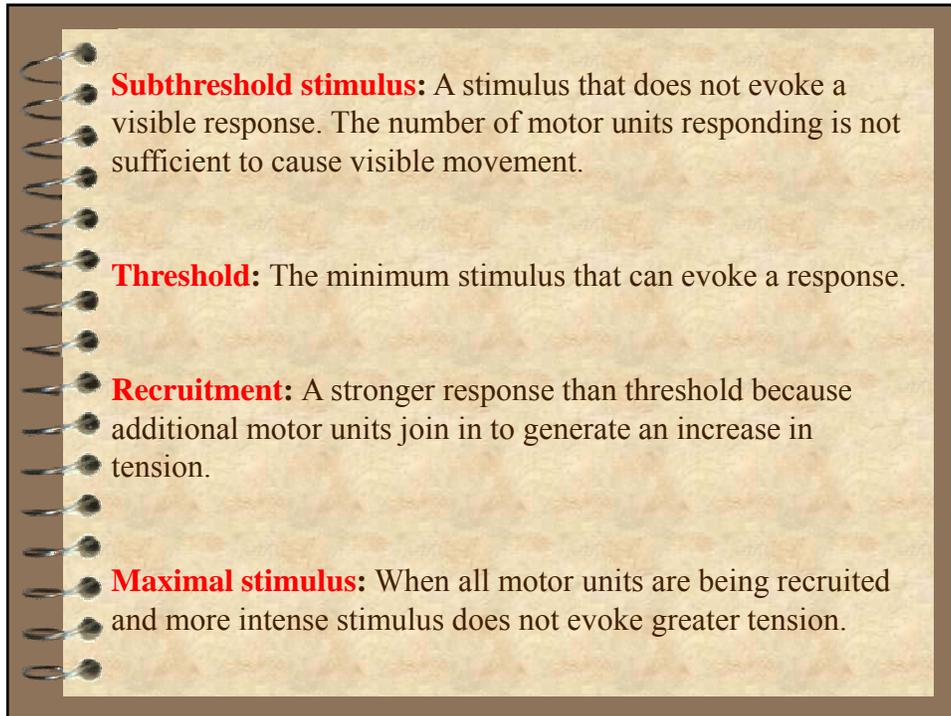
Continued rapid stimulation of an isolated muscle causes a gradual inability of the muscle to respond to stimulation



## Recruitment

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



A graphic of a spiral-bound notebook with a light brown, textured paper surface. The spiral binding is on the left side. The text is written in a simple, black, sans-serif font.

**Subthreshold stimulus:** A stimulus that does not evoke a visible response. The number of motor units responding is not sufficient to cause visible movement.

**Threshold:** The minimum stimulus that can evoke a response.

**Recruitment:** A stronger response than threshold because additional motor units join in to generate an increase in tension.

**Maximal stimulus:** When all motor units are being recruited and more intense stimulus does not evoke greater tension.

