

Experiment No. 4 – Effect of repeated stimuli and fatigue

Fatigue Curve

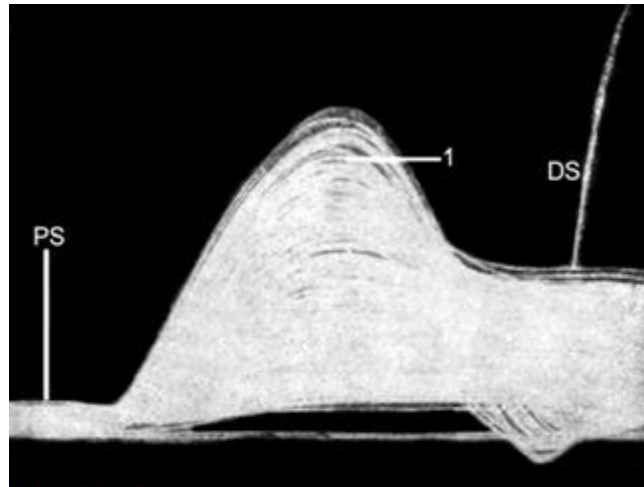


Figure 4-8: The phenomenon of fatigue. PS: point of stimulation. The record shows repeated contractions of the muscle through stimulation of its nerve. 1: first contraction, the following few contractions show beneficial effect. DS: direct stimulation of the muscle with electrodes placed on it

1. Why is the base line shifted up with the on set of fatigue?

Ans:-

The baseline shifts upward because fatigued muscle shows incomplete relaxation, leaving residual shortening.

Reason:

- During fatigue, the **relaxation of the muscle becomes incomplete**.
- The muscle does not return to its original resting length after each contraction.
- This leaves a **residual shortening** in the muscle.
- As a result, the writing lever does not come back fully to the baseline, causing an **upward shift of the baseline** with each successive contraction.

2. What is contracture?

Ans:-

Contracture is a sustained partial contraction of muscle due to incomplete relaxation, commonly seen during fatigue.

Features:

- Occurs due to **accumulation of metabolic by-products** (e.g., lactic acid).
- Leads to **persistent shortening** of the muscle.
- Seen especially during **fatigue** when muscle cannot relax fully between stimuli.

3. What is effect of fatigue on the different phases of simple muscular curve?

Ans:- Fatigue increases latent period, decreases height of contraction, and prolongs relaxation due to metabolic exhaustion and impaired Ca^{2+} handling.

A. Latent Period

- **Latent period increases.**
- Due to slowing of **excitation–contraction coupling** and delayed Ca^{2+} release.

B. Contraction Phase

- **Height of contraction decreases.**
- Force generation falls because of depletion of **ATP**, accumulation of **lactic acid**, and reduced efficiency of cross-bridge cycling.

C. Relaxation Phase

- **Relaxation becomes slower and prolonged.**
- Muscle cannot pump Ca^{2+} back into the sarcoplasmic reticulum efficiently → **incomplete relaxation.**

4. What is fatigue?

Ans:- Fatigue is a reversible decline in muscle performance due to prolonged activity, mainly from metabolic exhaustion and accumulation of metabolites.

5. What is Ergograph?

Ans:- An ergograph is an instrument that records muscular work and is used to study fatigue and endurance.

Functions:

- Measures muscle contractions in response to repeated voluntary effort.
- Helps study fatigue, endurance, and muscle efficiency.
- Commonly used with finger flexor muscles.