LOCAL ANESTHESIA

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OBJECTIVES:

- DEFINITION
- CLASSIFICATION
- MECHANISM OF ACTION
INTRODUCTION

ANAESTHESIA:

GENERAL ANAESTHESIA

LOCAL ANAESTHESIA
## Difference Between General Anaesthesia & Local Anaesthesia

<table>
<thead>
<tr>
<th>Features</th>
<th>Gen. Anaesthesia</th>
<th>Local Anaesthesia</th>
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<tbody>
<tr>
<td>Site of action</td>
<td>CNS</td>
<td>Peripheral nerves</td>
</tr>
<tr>
<td>Area of body involved</td>
<td>Whole body</td>
<td>Restricted area</td>
</tr>
<tr>
<td>Consciousness</td>
<td>Lost</td>
<td>Unaltered</td>
</tr>
<tr>
<td>Care of vital functions</td>
<td>Essential</td>
<td>Usually not needed</td>
</tr>
<tr>
<td>Poor health patients</td>
<td>Risky</td>
<td>Safer</td>
</tr>
<tr>
<td>Use in non cooperative patients</td>
<td>Possible</td>
<td>Not possible</td>
</tr>
<tr>
<td>Major surgery</td>
<td>Preferred</td>
<td>Cannot be preferred</td>
</tr>
<tr>
<td>Minor surgery</td>
<td>Not preferred</td>
<td>preferred</td>
</tr>
</tbody>
</table>
DEFENITION

- DRUGS THAT CAUSE REVERSIBLE LOSS OF SENSATION (aka. Pain) IN LOCALIZED AREA OF THE BODY.

- Block nerve impulses w/o nerve damage

- Block sensation and motor impulses (vsocon.)!!!!!!!!!, Consciousness?
Vasoconstrictor

- Vasoconstrictor used - adrenaline (1:50,000 to 1:200,000).
- Prolongs duration of action of LAs by decreasing rate of removal from local site into circulation.
- Enhances intensity of nerve block.
- Reduces systemic toxicity of LAs.
- Provides more bloodless field for surgery.
PROPERTIES OF LOCAL ANESTHESIA

I==It should not be **irritating** to tissue to which it is applied
N==It should not cause any permanent alteration of **nerve** structure
S==Its **systemic** toxicity should be low
T==**Time of onset** of anesthesia should be short
E==It should be **effective** regardless of whether it is injected into the tissue or applied locally to mucous membranes
D==The **duration of action** should be long enough to permit the completion of procedure
MECHANISM OF ACTION
Mechanism - LAs

- As you know, entry of Na+ is essential for Action potential
- Two things happen:
  - Rate and rise of AP and maximum depolarization decreases – **slowing of conduction**.
  - Finally, local depolarization fails to reach threshold potential – **conduction block**.

![Graph showing effect of progressively increasing concentrations of a local anaesthetic on the generation of an action potential in a nerve fibre.](image)
Mechanism of LAs – contd.

- LAs interact with a receptor within the voltage sensitive Na+ channel and raise the threshold of opening the channel.
- Na+ permeability decreased and ultimately stopped in response to stimulus or impulse.
- Impulse conduction is interrupted when a critical length of fiber is blocked (2-3 nodes of Ranvier).
CLASSIFICATION

-Injectable:  
  -Low potency, short duration: Procaine
  -Intermediate Potency: Lidocaine
  -High potency, long duration: Tetracaine

-Surface Anesthesia:  
  -Soluble: Cocaine
  -Insoluble: Benzocaine
Chemical Classification:

- Ester-Linked
- Amide-Linked

All are weak bases!
Chemistry of LAs (Clinical significance)

- Cross sensitivity (allergy with ESTER LINKAGE)
  - Occurs with drugs in the same chemical class
  - Esters are metabolized to common metabolite PABA
  - Allergy rarely occurs with amide linkage class

- Biotransformation/duration of action
  - **ESTERS** are rapidly metabolized in the plasma by a cholinesterase
  - **AMIDES** are more slowly destroyed by liver microsomal P450 enzymes.
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