Questions of Adr agonists

1.Compare the cardiovascular pharmacologic effects of epinephrine with norepinephrine.

2. Please state clinical applications of epinephrine.

3.Select the proper application for epinephrine, norepinephrine and isoproterenol.

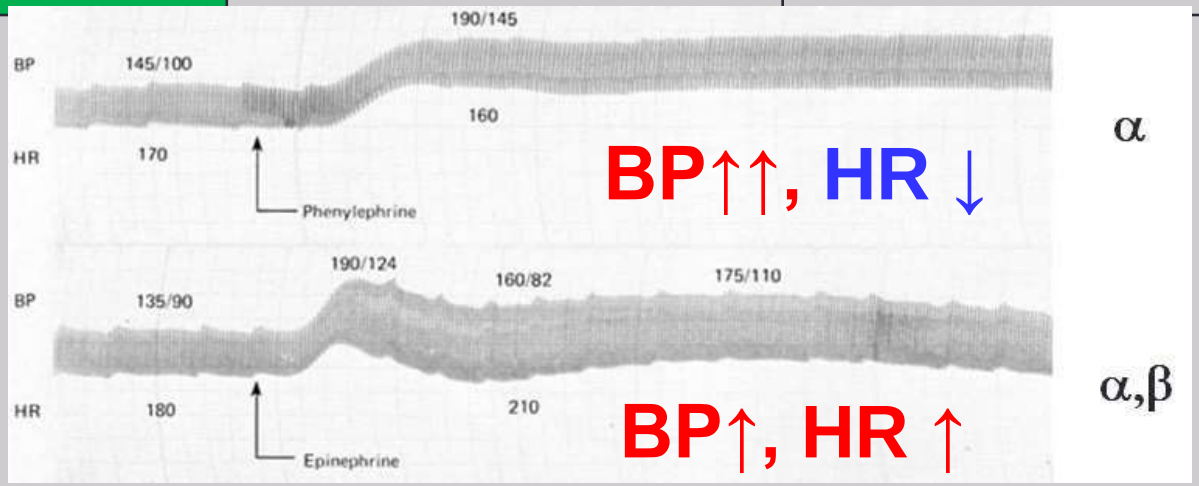
A. Hypovolemic shock with high peripheral resistance

B. Anaphylactic shock

C. Cardiogenic shock with low peripheral resistance

1. Compare the cardiovascular pharmacologic effects of epinephrine with norepinephrine.

Tissues and effects	Adr (α+β)	NE(α)
Heart	Excite (β1)	
Vessel	Constrict (α, skin, mucosa, kidney) Dilate (β2, skeletal muscle, coronary artery)	Strong vasoconstriction (skin, mucosa, kidney)
BP	Increase	Increase
HR	Increase	Reflexible decrease



2. Please state clinical applications of epinephrine.

α+β	**Anaphylactic shock**
β_1→heart excitation	**Cardiac arrest**
β_2→bronchodilation	**Bronchial asthma**
α→vasoconstriction	**Anesthetic adjuvant** **Topical hemostatic agent**
α →↑outflow of aqueous humor	**a**

3. Select the proper application for epinephrine, norepinephrine and isoproterenol.

A. Hypovolemic shock with high peripheral resistance **isoproterenol**

B. Anaphylactic shock **epinephrine**

C. Cardiogenic shock with low peripheral resistance **norepinephrine**

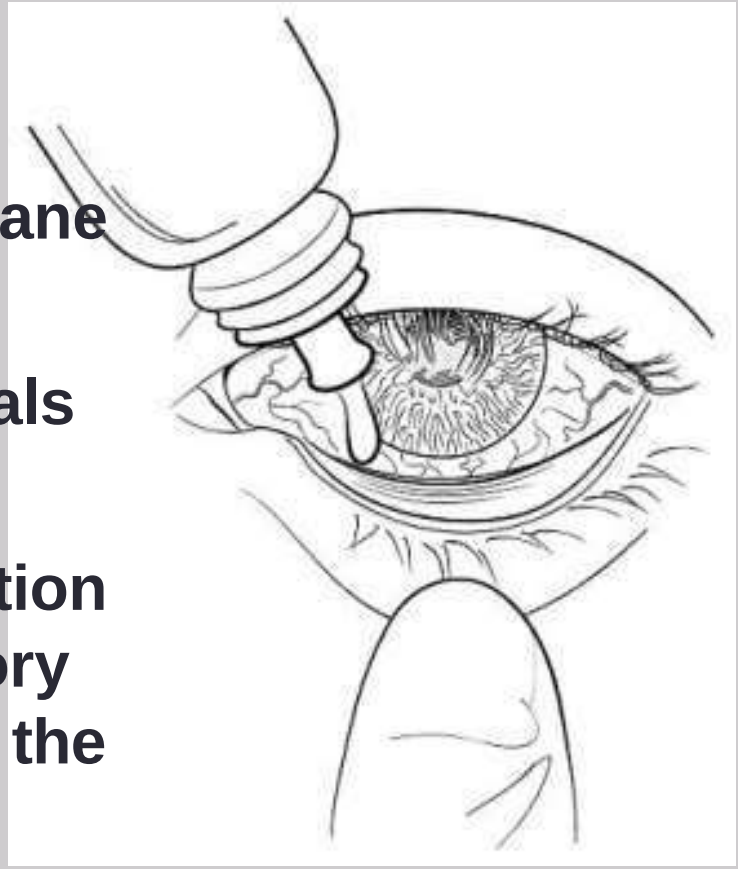
- **General anesthetics**
  - **CNS depressants used to produce loss of pain sensation and consciousness**
- **Local anesthetics**
  - **Used to cause loss of pain sensation in a limited area of the body**

Types of Local Anesthesia

1. **Surface anesthesia**
2. **Infiltration anesthesia**
3. **Conduction anesthesia**
4. **Epidural Anesthesia**
5. **Subarachnoidal anesthesia (spinal Anesthesia)**

Surface anesthesia (表面麻醉)

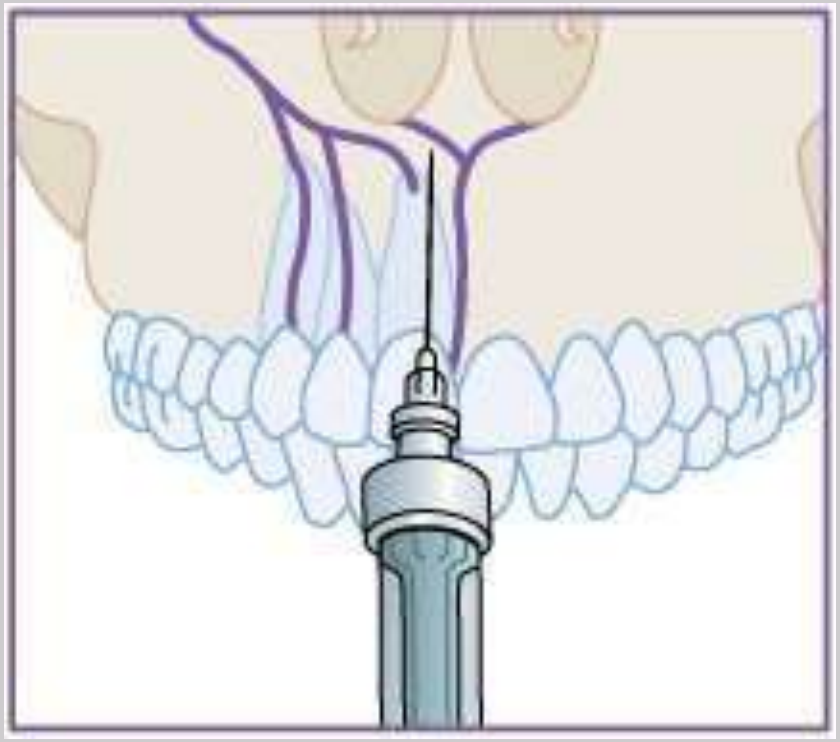
- **Injection location:** mucous membrane surfaces
- **Nerve blockage:** the nerve terminals in the mucosa
- **Application:** Used during examination procedures involving the respiratory tract, the surface of the cornea (of the eye) and the oral mucosa



- **Infiltration anesthesia (浸润麻醉)**

✓**Injection location:** **under the skin in the area of surgical incision**

✓**Nerve blockage:** **the nerve endings of subcutaneous tissues or operative incision.**

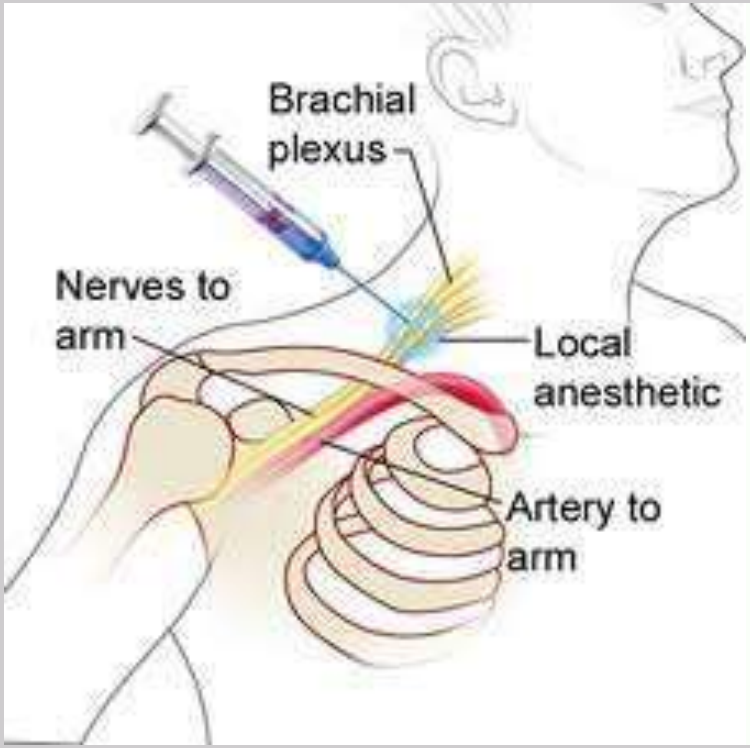


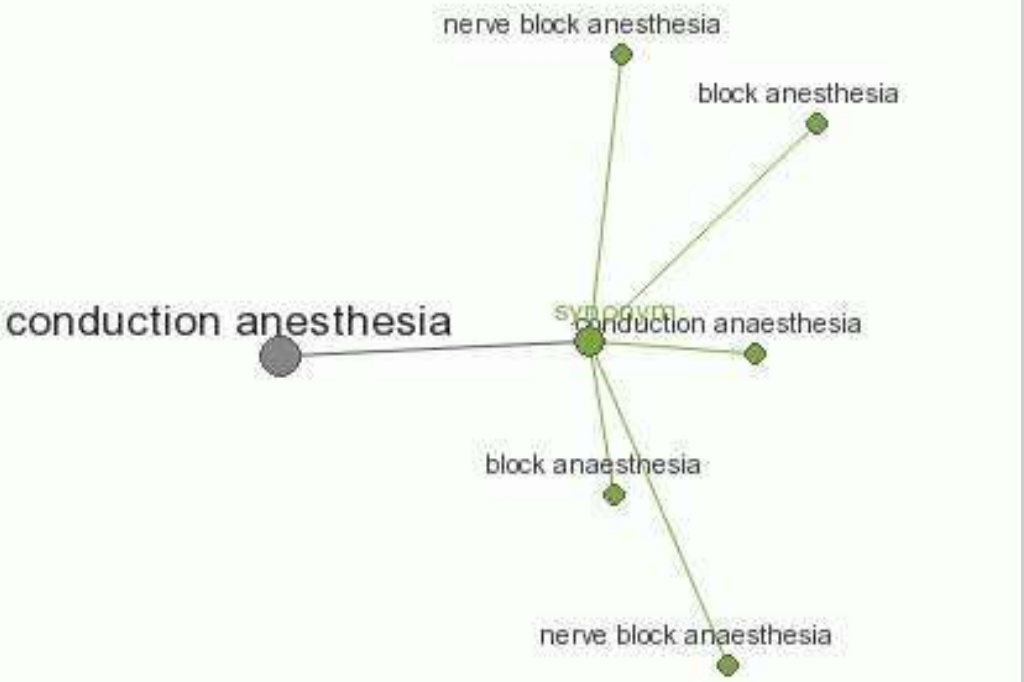
Dental operation
(such as tooth extraction)

- **Conduction anesthesia (传导麻醉)**

✓**Injection location:** **an area near peripheral nerve cord, a sympathetic nerve plexus, or a local pain-sensitive trigger point.**

✓**Nerve blockage:** **nerve trunk**





- **Epidural Anesthesia**

(硬膜外麻醉)

- **Injection location:**

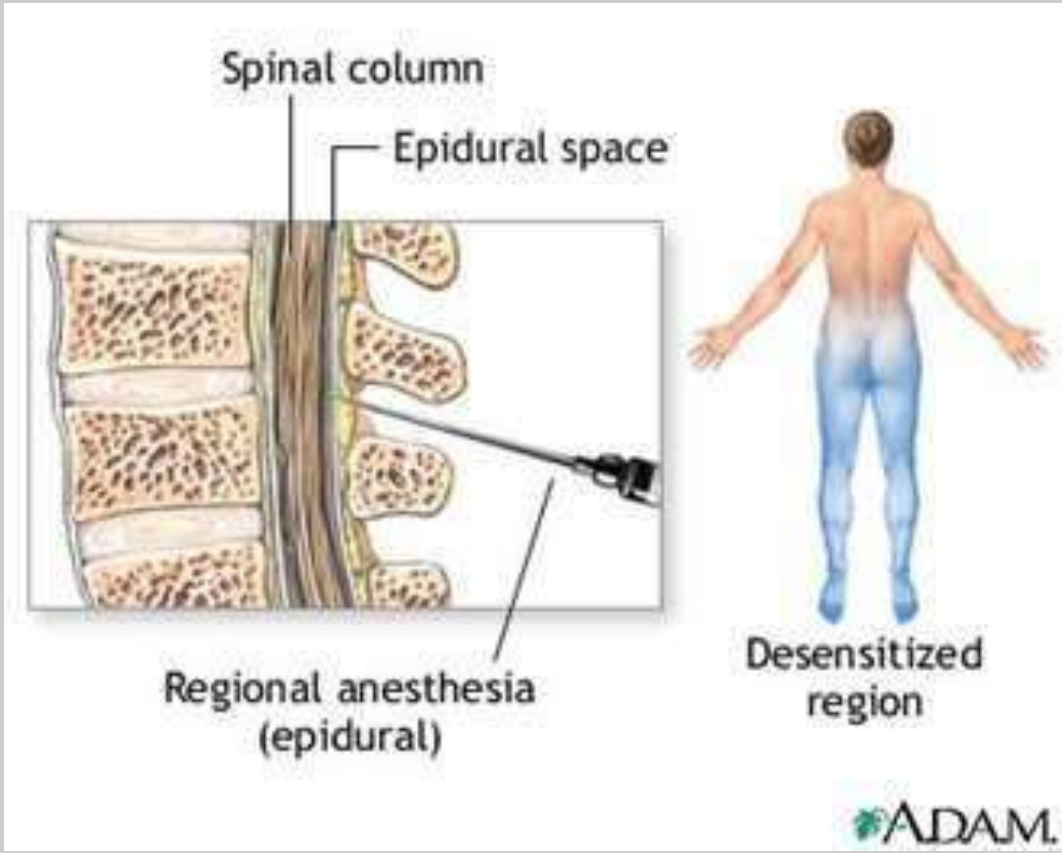
  the epidural space

- **Nerve blockage:**

  the spinal nerve roots between endorhachis and ligamentum flavum

Application:

femoral surgery



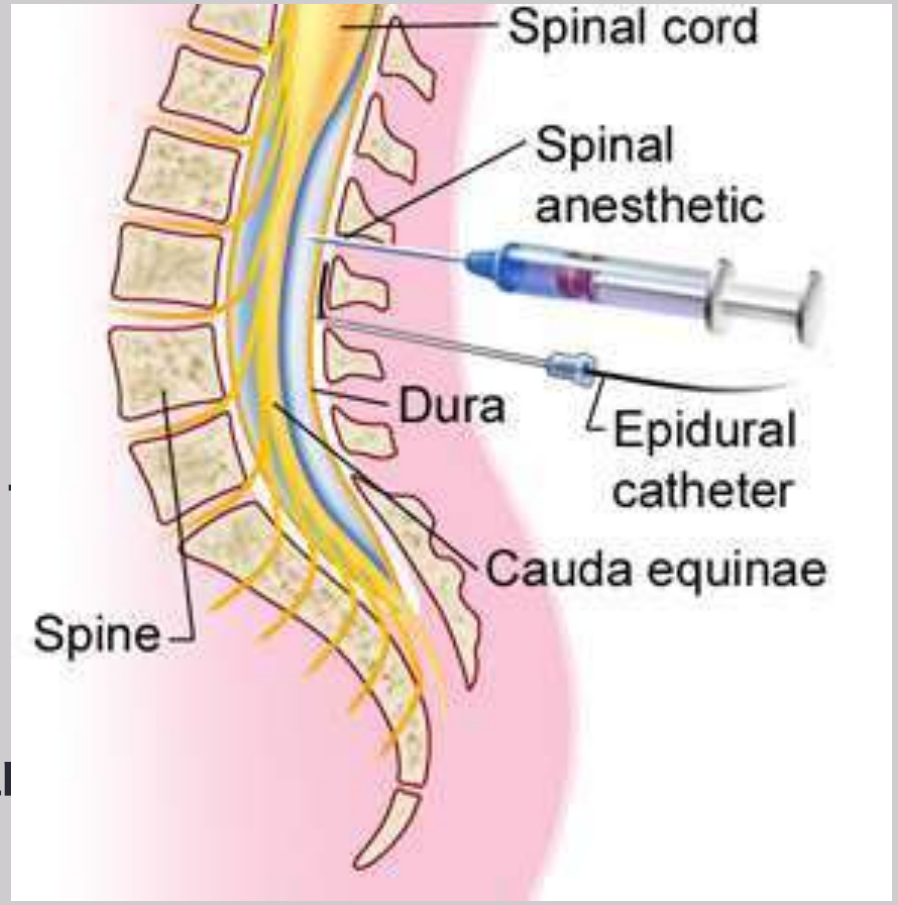
- **Side effects:**
  - Respiratory arrest
  - BP drops

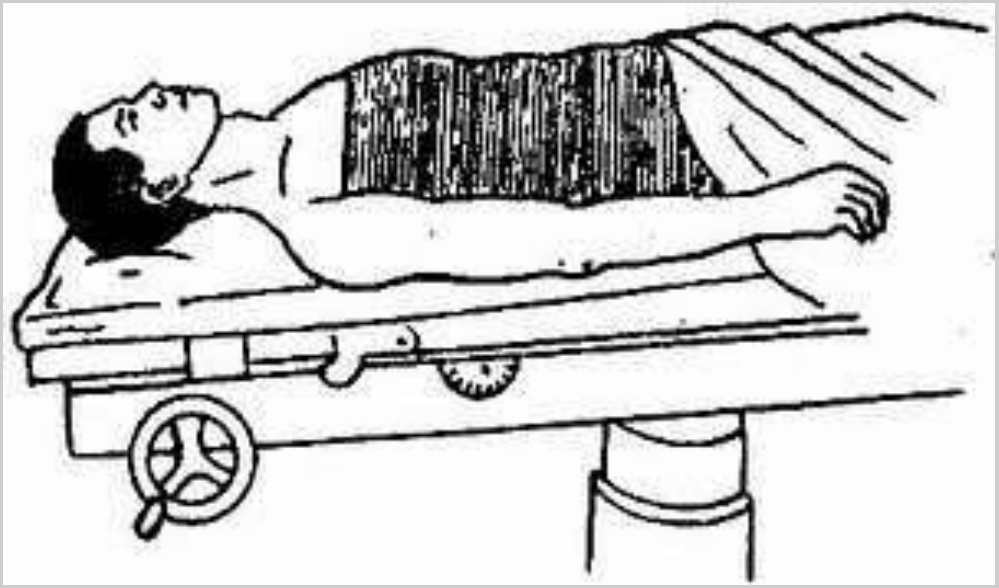
- **Subarachnoidal anesthesia 蛛网膜下腔麻醉 (spinal Anesthesia 脊髓麻醉)**

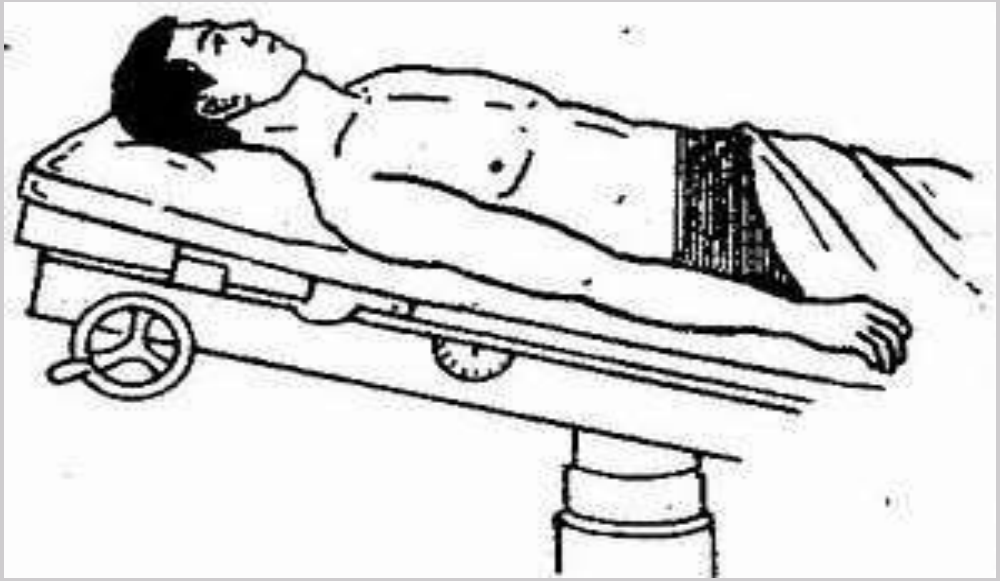
✓**Injection location:** the subarachnoid space of the spinal cord

✓**Nerve blockage:** the spinal nerve roots in subarachnoid space

✓**Application:** abdominal (e.g. Caesarean and femoral surgery

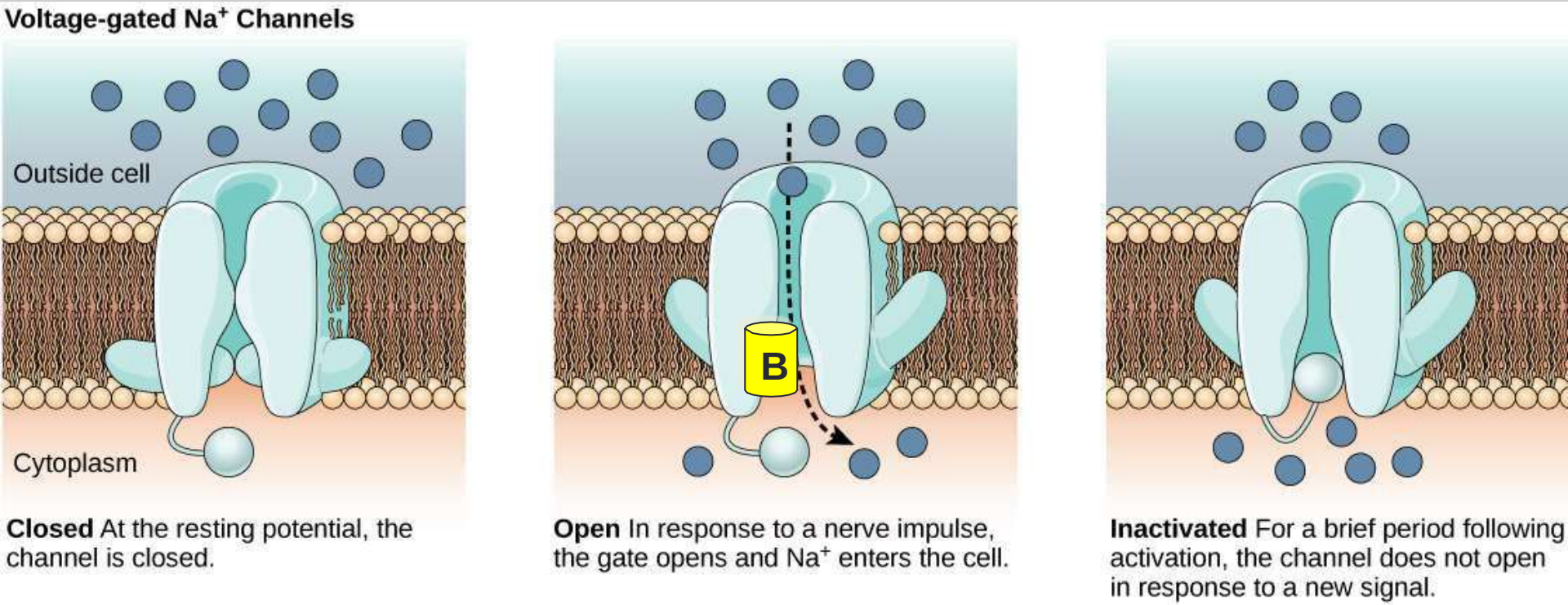






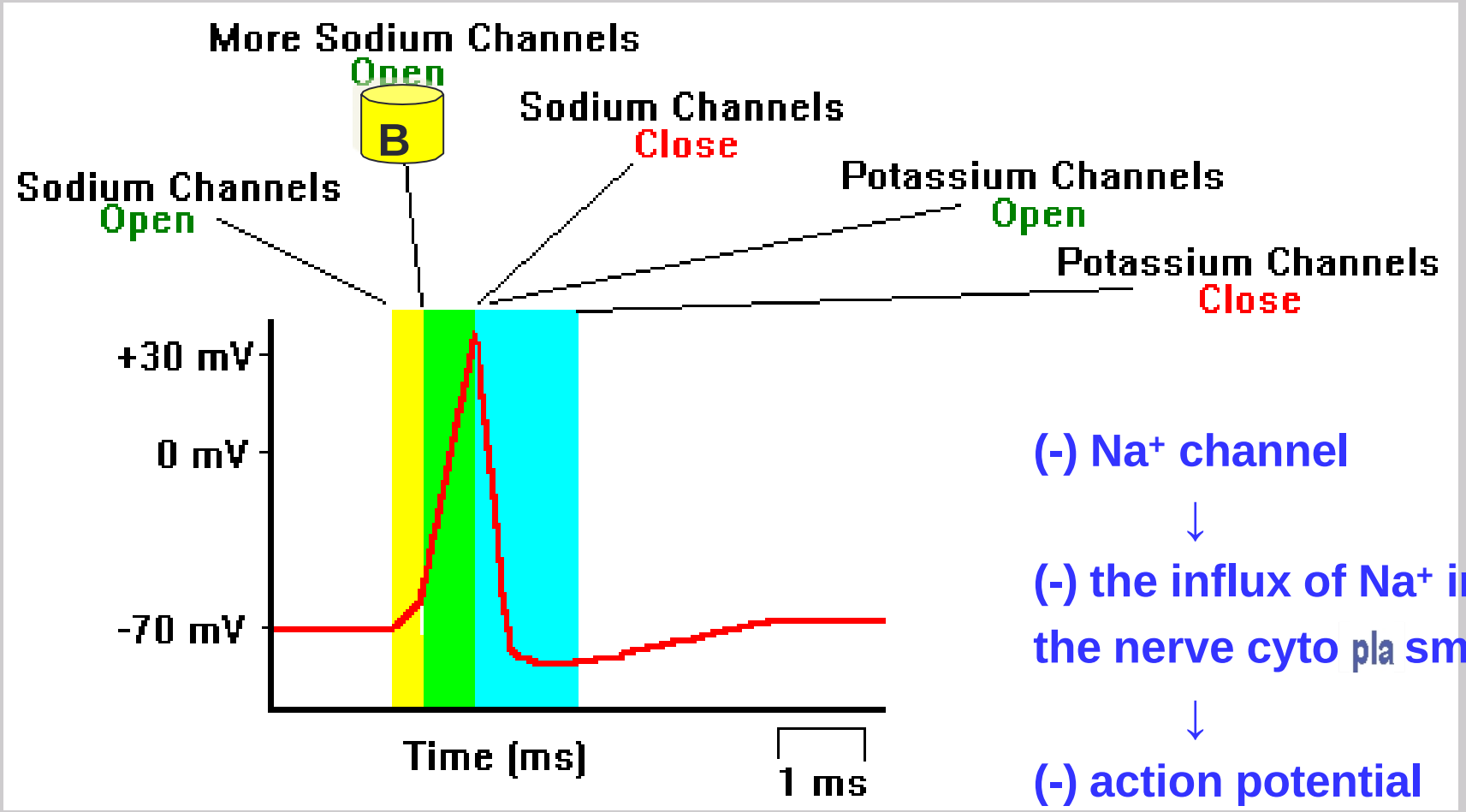
Basic Pharmacology of Local Anesthetics

Mechanism of action



Closed **Open** **Inactivated**

Blockage of voltage-gated Na+ channels



(-) Na^+ channel

↓

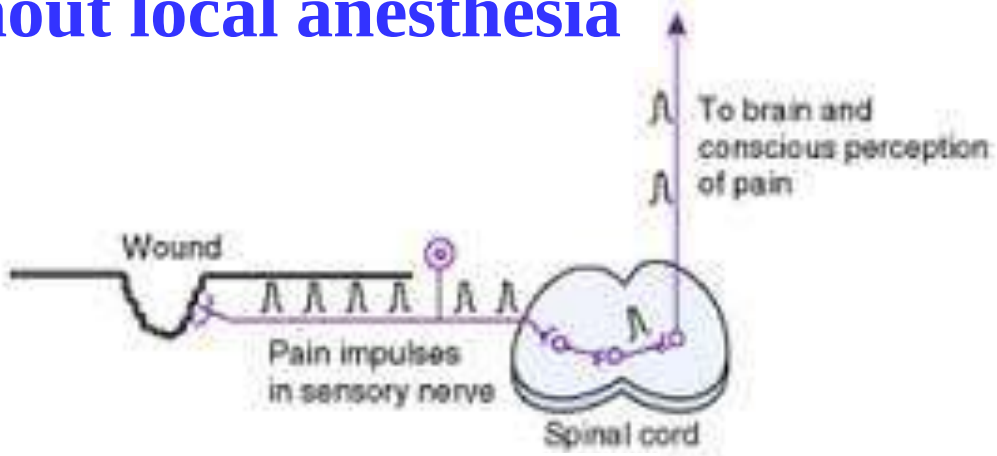
(-) the influx of Na^+ into the nerve cyto pla sm

↓

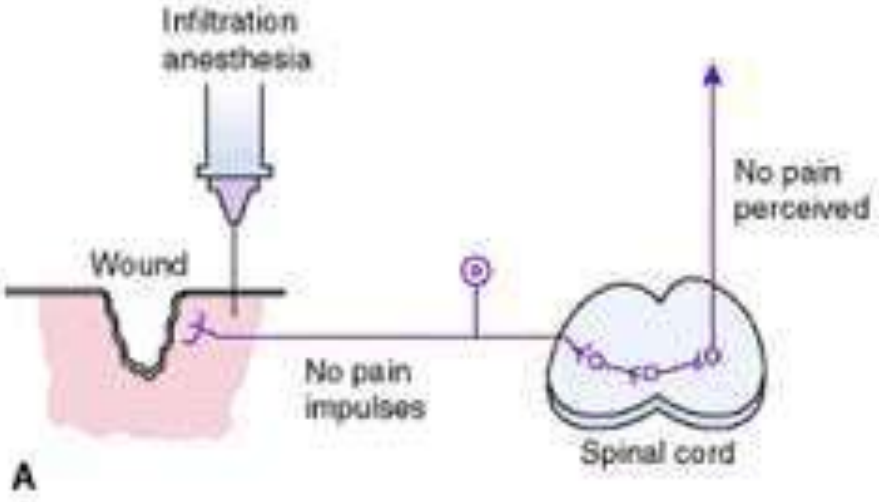
(-) action potential

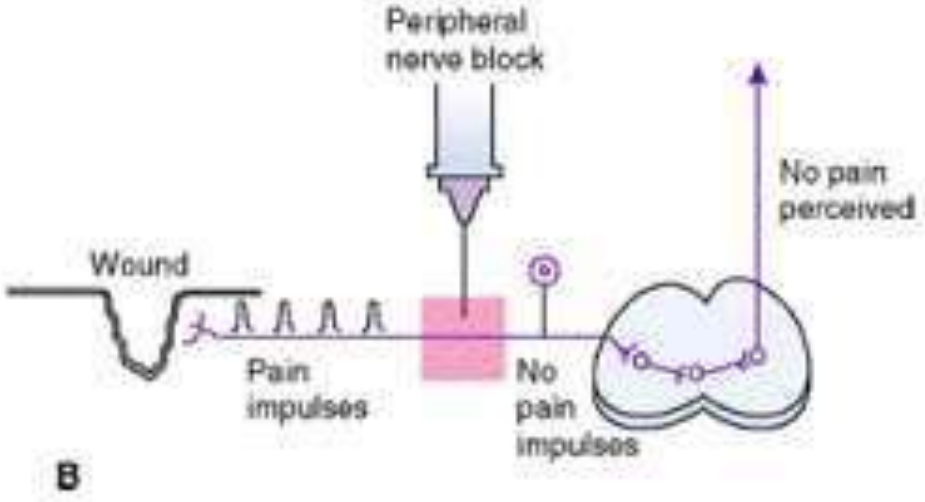
Use-dependence: neurons in excited state are more sensitive than ones in silencing state.

Without local anesthesia



With local anesthesia





Other mechanisms

- **Countless targets:**
  - Other channels (eg, potassium and calcium)
  - Enzymes (eg, AC, carnitine-acylcarnitine translocase)
  - Receptors (eg, NMDA-R, GPCR, 5-HT_3-R, neurokinin-1 R [substance P receptor])