Onset Speed inversely proportional to **pKa** (i.e. directly proportional to unionised fraction)

Anaestheasier
Novice

Duration of action directly proportional to **protein-binding**

Summary Sheet:
Local Anaesthetics

Chemistry

Local anaesthetics are all **weak bases**.

Amide Local Anaesthetics have.a longer half-life and are metabolised in the liver.

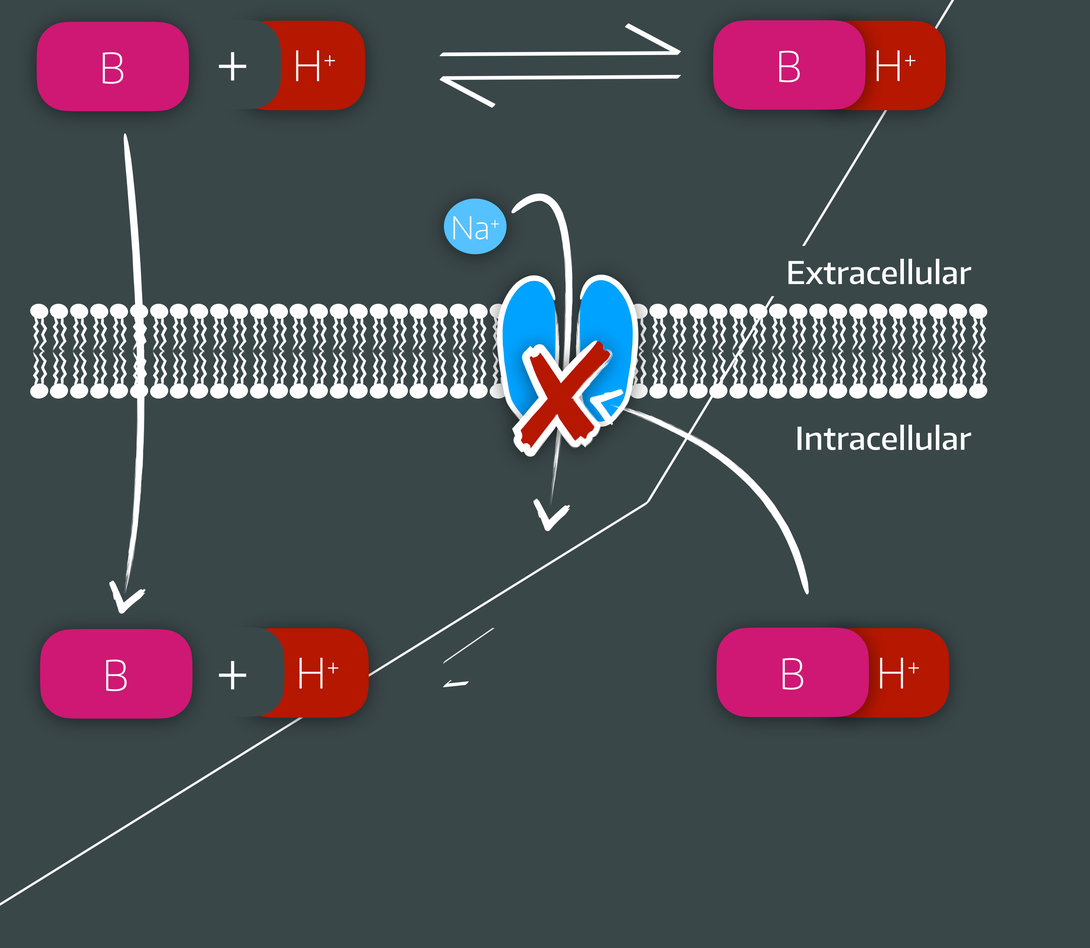
Ester Local Anaesthetics are rapidly inactivated by plasma/liver esterases.

Toxicity

Paraesthesia | Light-headedness & Dizziness | Visual/auditory disturbances | Confusion | Shivering | Twitching | Seizures

Myocardial depression | Prolonged phase 0 | Dysrhythmias | VF

Mode of Action



Amides

Lidocaine

Max Dose: 3mg/kg
c̄ Adrenaline: 7mg/kg

pKa: 7.9
Unionised fraction at pH 7.4: 25%
Protein-binding: 70%
Elimination $t_{½}$: 100 mins
Less lipid-soluble than Bupivicaine (so 8 × less potent)

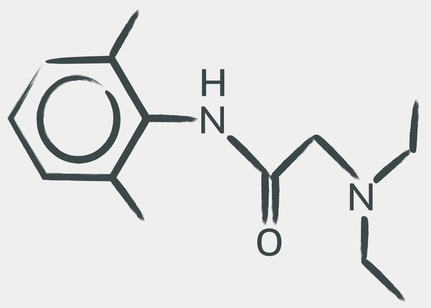
Bupivicaine

Max Dose: 2mg/kg
c̄ Adrenaline: 2mg/kg

pKa: 8.1
Unionised fraction at pH 7.4: 15%
Protein-binding: 95%
Elimination $t_{½}$: 160 mins
More lipid-soluble than Lidocaine (so 8 × more potent)

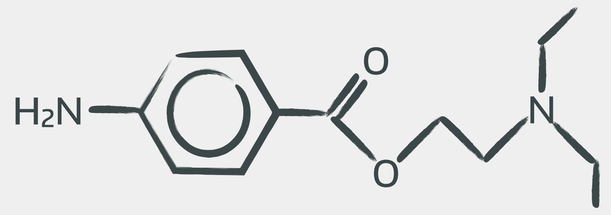
Levobupivicaine

Less motor block & vasodilatation
97% Protein-bound
Lower risk of cardio toxicity



Lidocaine

Anaestheasier

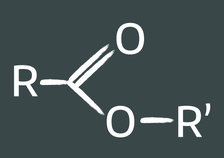


Procaine

Summary Sheet:

Local Anaesthetics (Part 2)

Esters



Short acting

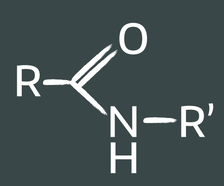
Slow onset

Poor penetration

Allergenic
(due to PABA)

Plasma cholinesterase metabolism

Amides



Medium acting

Rapid onset

Good penetration

Less allergenic

Hepatic microsomal enzymatic metabolism

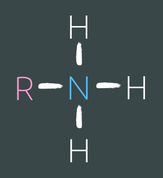
Why add Adrenaline?

- Delay systemic absorption
- Reduce peak serum concentration
- Increase duration
- Only bupivicaine & cocaine have vasoconstrictor activity

Henderson-Hasselbalch Equation

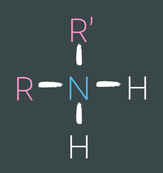
$$pH = pKa + \log\left(\frac{A^-}{HA}\right)$$

Primary Amines



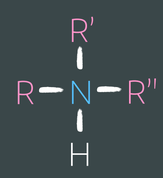
Low activity
Irritant

Secondary Amines



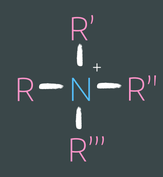
Good activity
Irritant

Tertiary Amines



Good activity
Less irritant

Quaternary Amines



Poor tissue penetration

	pKa	Speed of Onset	Lipid Solubility	Potency	Protein Binding	Duration of Action	Max Dose
Prilocaine	7.9	Fast	50	2	55	Short	6mg/kg
Lidocaine	7.9	Fast	150	2	70	Medium	3mg/kg 7mg/kg with adrenaline
Ropivacaine	8.1	Medium	300	6	94	Long	3mg/kg
Bupivacaine	8.1	Medium	1000	8	95	Long	2mg/kg
Levobupivacaine	8.1	Medium	1000	8	95	Long	2mg/kg