

# Local anaesthetic infiltration

This guideline outlines the indications and contraindications to local anaesthetic use, a guide to LA selection, maximal doses, buffering doses, mixing agents and administration advice.

## Indication

- Local anaesthesia for painful procedures such as wound debridement, suturing, foreign body retrieval and relocation of a dislocated joint such as a finger or toe.

## Contraindication

- Do not use lignocaine with adrenaline to infiltrate areas with an end arterial supply such as fingers, toes, pinna and nose.
- Local anaesthetic allergy (actually quite uncommon).

## Equipment

- Antiseptic swab
- Skin cleansing solution (e.g. chlorhexidine)
- Local anaesthetic agent (e.g. lignocaine)
- Syringe: 5 mL or 10 mL
- Needle: 25G and 21G.

## Choose your local anaesthetic agent

- **Lignocaine** is a short-acting, amide-type local anaesthetic agent. It is supplied in 0.5%, 1% and 2% concentrations without (plain) or with adrenaline. Onset of action is within 1–2 minutes and duration 1–2 hours.
- Small volumes of more concentrated solution (i.e. 2%) are used for small areas of infiltration (e.g. interphalangeal joint relocation).
- Use a larger volume of a less concentrated solution (e.g. 1%) around larger joints (e.g. knee joint aspiration).
- Use lignocaine with adrenaline for vascular sites or sites where the skin needs to be incised because adrenaline causes vasoconstriction.
- Never use lignocaine with adrenaline for nerve blocks of an extremity (fingers, toes, nose, pinna).
- **Bupivacaine** or **Ropivacaine** are long-acting, amide-type local anaesthetic agents. Onset of action is slightly longer than lignocaine, but duration of action is much longer (6–8 hours). These agents are typically used for epidural anaesthesia and nerve blocks (e.g. femoral nerve block), but can also be used instead of lignocaine to provide a longer anaesthetic effect for painful conditions.

## Mixing of short acting and long acting agents

- **Lignocaine and Bupivacaine or Ropivacaine** can be mixed to provide a quick acting with a long lasting effect when performing a nerve block or wound infiltration. The maximum doses remain unchanged and the ratio is 50:50.

## Alkalinisation of local anaesthetic solutions

- Commercially available acidic local anaesthetic solutions have a pH of typically 3.5 to 5.5.
- Local anaesthetic solutions containing adrenaline are generally at a lower pH than the same solution without adrenaline.
- A basic solution of sodium bicarbonate 8.4% can be added immediately before infection to alkalinize the solution, reducing stinging and pain experienced by the patient. Also results on more rapid drug diffusion and a quicker onset of nerve blocking.
- The following table needs to be followed as too much bicarbonate added to the local anaesthetic agent will precipitate out the solution (this will be detected as a white clouding of the solution). As precipitation increases with time, alkalinized local anaesthetic solutions should generally be freshly prepared and used promptly.

Stable Mixtures of Lignocaine, Bupivacaine and Sodium Bicarbonate			
Local anaesthetic	Volume	Sodium Bicarbonate 8.4% Volume	Ratio by Volume
Lignocaine 1%	10mls	1ml	10:1
Lignocaine 2%	10mls	1ml	10:1
Bupicaine 0.25%	20mls	0.1ml	200:1
Bupivacaine 0.5%	20mls	0.1ml	200:1
Lignocaine 1% & Bupivacaine 0.5% Mixture	10mls each, total 20mls	2ml	200:1
Lignocaine 2% & Bupivacaine 0.5% Mixture	10mls each, total 20mls	2ml	200:1

\*Must be used within 5-10minutes.

High concentrations of Ropivacaine (0.75%) precipitate at a pH greater than 6 so are **NOT** suitable for alkalinisation. Brandis, K 2011 & Davies, R 2003

## Calculating the maximum dose of local anaesthetic agent

- Maximum dose of lignocaine **without** adrenaline is 3 mg/kg.
- Maximum dose of lignocaine **with** adrenaline is 7 mg/kg.
- Maximum dose of Ropivacaine in minor nerve block is 3mg/kg.
- Maximum dose of Bupivacaine is 2mg/kg.

- **Local anaesthetics concentration in solution:**

- Lignocaine 1% = 1 g/100mL or **10 mg/mL**
- Lignocaine 2% = 2 g/100mL or **20 mg/mL**
- Ropivacaine 0.2% = 2g/1000mL or **2mg/mL**
- Ropivacaine 0.75% = 7.5g/1000ml or **7.5mg/mL**
- Bupivacaine 0.25% = 2.5g/1000ml or **2.5mg/mL**
- Bupivacaine 0.5% = 5g/1000ml or **5mg/mL**

- Thus, in a **70-kg patient do *not* use more than:**

- 20 mL 1% plain lignocaine
- 10 mL 2% plain lignocaine
- 48 mL 1% lignocaine **with** adrenaline
- 24 mL 2% lignocaine **with** adrenaline.
- 105 mL 0.2% plain ropivacaine
- 28mL 0.75% plain ropivacaine
- 56mL 0.25% plain bupivacaine
- 28mL 0.5% plain bupivacaine

### Procedural Principles

- Attach a 25G needle to a syringe filled with local anaesthetic, after checking dilution, dose and safety related to body weight.
- Enter the dermis of the skin at 45 degrees and aspirate to ensure not in a blood vessel. Infiltrate 1–2 mL local anaesthetic to raise a subdermal ‘bleb’ on the skin.
- Exchange the 25G needle for a 21G needle and enter the skin through the previously anaesthetised skin site.
- Advance the needle into the deeper tissues. Aspirate for blood before injecting any tissue. If you draw blood, withdraw a little and try again.
- Infiltrate the area to be anaesthetised and remove the needle.
- Direct the 25G needle along the line of the incision at the level of the dermis to extend the area of superficial anaesthesia, if an incision is to be made in the skin.
- Wait at least 2 minutes for the local anaesthetic to take effect.

### Tip for digital nerve blocks

- Attach a 25G needle to a syringe filled with local anaesthetic, after checking dilution, dose and safety related to body weight.
- Enter the dermis of the skin at 90 degrees through the mid proximal crease of finger and aspirate to ensure not in a blood vessel. Infiltrate 2–4 mL local anaesthetic to surround the digital nerves with local anaesthetic and massage around the lateral and medial sides of base of finger to diffuse solution around all digital nerves.



- This procedure gets the whole finger numb, palmar and dorsal aspects, with one injection. Works great with thumb too.

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#### References:

Best, C. Best, A. Best, T. & Hamilton, D. (2015) *Buffered lignocaine and bupivacaine mixture- the ideal local anaesthetic solution?* Plastic Surgery vol. 23 (2), pp. 87-90.

Brandis, K. (2011) *Alkalinisation of local anaesthetic solutions*, Australian Prescriber vol.34 (6), pp. 173-5.

Davies, R. (2003) *Buffering the pain of local anaesthetics: A systematic review*. Emergency Medicine vol. 15, pp.81-88.