

Handout

*Saskatchewan Dental Hygienists Association
Saturday April 29th, 2017*

Local Anesthesia: A Review and Update

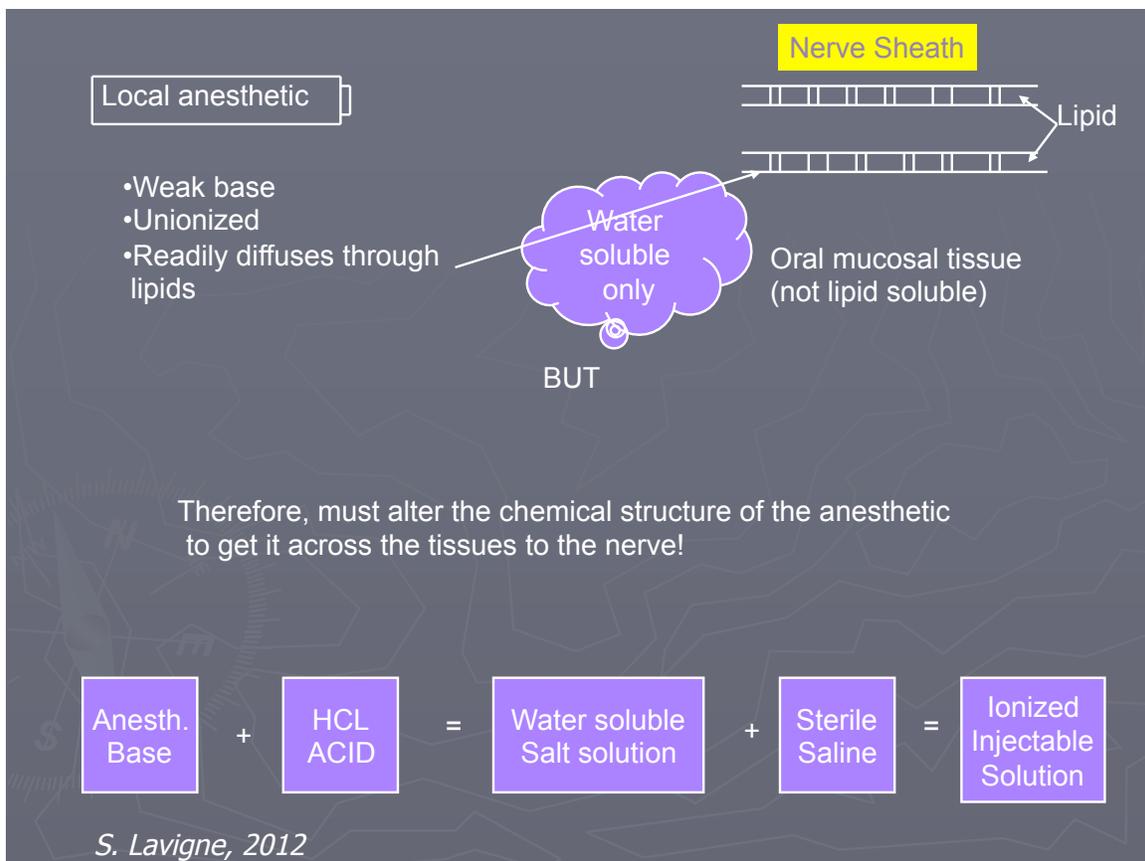
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Mechanism of Action of Local Anesthetics

The primary effect of local anesthetic is a decrease in the permeability of the nerve membrane to sodium ions

Sequence of Action

1. Displacement of calcium ions from nerve receptor site
2. Binding of local anesthetic molecule to this receptor site
3. Blockade of the sodium channel
4. Decrease in sodium conductance
5. Depression of rate of electrical depolarization
6. Failure to reach *Threshold Potential* level
7. Lack of development of propagated action potential
8. Conduction blocked.



Drug Interactions

- ▶ CNS Depressants (eg. Narcotics, anti-anxiety agents, phenothiazines and barbiturates) if used with local anesthetics *potentiate* the cardiorespiratory action of the LA.
- ▶ Conjoint use of LA's and drugs that share a common metabolic pathway may produce adverse reactions
- ▶ Both ester type anesthetics and the depolarizing muscle relaxant succinylcholine require plasma pseudocholinesterase for hydrolysis (prolonged apnea may result from concomitant use of these drugs)
- ▶ Drugs that induce production of hepatic microsomal enzymes (eg. Barbiturates) may alter the rate of metabolism of amide anesthetics (increase hepatic microsomal enzymes = > rate of metabolism of the LA)

Contraindications for the Use of Vasoconstrictors

- ▶ Very few contraindications to the concentrations found in dental anesthetics
- ▶ There are 4 types of patients for whom the administration of vasoconstrictors must be carefully weighed

Absolute Contraindications:

1. Patients with high blood pressure (>115/200)
2. Patients with cardiovascular disease
 - myocardial infarction within 6 mos.
 - Patients who experience angina daily
 - Patients with untreated or uncontrolled congestive heart failure
 - Recent coronary artery bypass surgery
 - Severe cardiac arrhythmias, despite drug therapy

*Epinephrine may be used in patients with mild to moderate cardiovascular disease

3. Hyperthyroid patients
4. Sulphite sensitivity

Relative Contraindications (Antidepressant Medications)

Tricyclic Antidepressants

Amitriptyline (Elavil)
Nortriptyline (Aventyl, Pamelor)
Imipramine (Tofranil)
Doxepin (Sinequan)
Amoxapine (Asendin)
Desipramine (Norpramin)
Protrityline (Vivactil)
Clomipramine (Anafranil)

Monoamine Oxydase

Inhibitors (MAO)

Isocarboxazid (Marplan)
Phenelzine (Nardil)
Tranlycypromine (Parnate)
Trimipramine (Surmontil)

Relative Contraindications: Beta-Blockers (non-selective* only)

Non-Selective Beta-Blockers

Propranolol (Inderal)
Nadolol (Corgard)
Timolol (Blockadren Timolate,
Pindolol ((Visken)
Alprenolol (Aptine)
Labetalol ((Trandate, Nomodyne)
Oxprenolol (Trasicor)
Sotalol (Sotacort)
Carteolol (Cartrol)
Penbutolol (Levatol)

Selective Beta Blockers

Metoprolol (Lopressor)
Atenolol (Tenormin)
Acebutolol (Sectral)
Betaxolol (Kerlone)
Esmolol (Brevibloc)
Bisoprolol (Zebeta)

Maximum Safe Doses

<u>Product</u>	<u>Maximum Safe Dose/Absolute</u>	
	<u>Maximum</u>	
Lidocaine	4.4 mg/kg	300mg
Mepivacaine	4.4 mg/kg	300 mg
Prilocaine	6 mg /kg	400 mg
Bupivacaine	1.3 mg/kg	90 mg
Articaine	7 mg/kg	500 mg