### ASA Physical Status Classification System

<table>
<thead>
<tr>
<th>Classification</th>
<th>Medical description of patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASA I</td>
<td>No known systemic disease</td>
</tr>
<tr>
<td>ASA II</td>
<td>Mild or well controlled systemic disease</td>
</tr>
<tr>
<td>ASA III</td>
<td>Multiple or moderately controlled systemic disease(s)</td>
</tr>
<tr>
<td>ASA IV</td>
<td>Poorly controlled systemic disease(s)</td>
</tr>
<tr>
<td>ASA V</td>
<td>Alcoholic patient</td>
</tr>
<tr>
<td>6</td>
<td>Emergency</td>
</tr>
</tbody>
</table>

- The American Society of Anesthesiologists (ASA) Physical Status classification system
- The purpose of the grading system is to assess the degree of a patient's "sickness" or "physical state" prior to selecting the anesthetic or prior to performing surgery

### Topical

- Unable to penetrate intact skin but do penetrate abraded (or sunburned) skin or any mucous membranes
- Higher concentration used topically than that injected
- Higher concentrations facilitate diffusion through the mucous membrane but also increase the potential toxicity

### Topical

- No vasoconstrictor
  - Vasodilator properties take over, increasing absorption
- Injectable locals may be ineffective topically
  - The necessary concentrations for topical anesthesia would be associated with local tissue toxicity and systemic overdose

### Topical benzocaine and lidocaine

- Insoluble in water, but soluble in alcohol, propylene glycol, polyethylene glycol, and other vehicles for surface application
- Slowly absorbed into the cardiovascular system \(\rightarrow\) not likely to produce overdose reactions
EMLA
- Eutectic Mixture of Local Anesthetics
- Cream composed of lidocaine 2.5% and prilocaine 2.5%
- Emulsion in which the oil phase is a eutectic mixture in 1:1 ratio by weight
- Designed as a topical able to provide surface anesthesia of intact skin
- Applied 1 hour before procedure, maximum effect at 2-3 hours
- Lasts 1-2 hours after removal

Prevention of L.A. Overdose
- Primary Prevention
- Always aspirate
- Inject slowly
- Use vasoconstrictors if no contraindications

Distribution of Local Anesthetic
- Highly perfused organs such as the brain, head, liver, kidneys, lungs and spleen are more affected
- Blood level influenced by
  - Rate at which the drug is absorbed into the cardiovascular system
  - Rate of distribution of the drug from the vascular compartment to the tissue (cardiac function)
  - Elimination through metabolic and/or excretory pathways

Distribution of Local Anesthetic
- The rate at which a local anesthetic is removed from the blood is elimination half-life of the drug
  - One half-life= 50% reduction
  - Two half-lives=75% reduction
  - Three half-lives= 87.5% reduction
  - Four half-lives=94% reduction
  - Five half-lives=97% reduction
  - Six half-lives=98.5% reduction

Distribution of Local Anesthetic
- Half-life of local anesthetics
  - Procaine 0.1*
  - Cocaine 0.7*
  - Lidocaine 1.6
  - Mepivacaine 1.9
  - Bupivacaine 3.5

*Esters: Hydrolyzed in the plasma by pseudocholinesterase. Amides: Biotransformation by liver and excreted via kidneys

Pharmacology
Systemic Toxicity

CNS Toxicity at low to moderate overdose levels

- Signs
  - Slurred speech
  - Shivering
  - Muscular twitching
  - Tremors of face or distal extremities

- Symptoms
  - Numbness
  - Warm/flushed feeling of skin
  - Light-headedness
  - Dizziness
  - Visual disturbances (inability to focus)
  - Auditory disturbances (tinnitus)
  - Drowsiness
  - Disorientation

CNS Toxicity at moderate to high overdose levels

- Signs
  - Generalized tonic-clonic seizures
  - Generalized CNS depression
  - Depressed BP, heart rate and respiratory rate

Drug Interactions

- Beta-blockers and cimetadine (Tagamet) – decreased liver metabolism of amide L.A.’s
- CNS and CVS depressants – possible additive or supra-additive effect
- Tricyclic antidepressants – enhanced effect of vasoconstrictor, dysrhythmias
- Digitalis glycosides – risk of cardiac dysrhythmias
- Cocaine – increased sympathomimetic response, cardiac dysrhythmias, cardiac arrest

Contraindications for Local Anesthetics

<table>
<thead>
<tr>
<th>Medical Problem</th>
<th>Drugs to avoid</th>
<th>Type of contraindication</th>
<th>Alternative drug</th>
</tr>
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<tbody>
<tr>
<td>Local anesthetic allergy, documented</td>
<td>All LAs in same chemical class (e.g. esters)</td>
<td>Absolute</td>
<td>LAs in a different chemical class (e.g. amides)</td>
</tr>
<tr>
<td>Bisulfite allergy</td>
<td>Vasoconstrictor-containing local anesthetic</td>
<td>Absolute</td>
<td>Any local anesthetic without vasoconstrictor</td>
</tr>
<tr>
<td>Atypical plasma cholinesterase</td>
<td>Esters</td>
<td>Relative</td>
<td>Amides</td>
</tr>
<tr>
<td>Methemoglobinemia, idiopathic or congenital</td>
<td>Articaine, prilocaine</td>
<td>Relative</td>
<td>Other amides or esters</td>
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<td>Significant liver dysfunction (ASA III-IV)</td>
<td>Amides</td>
<td>Relative</td>
<td>Amides or esters, but judiciously</td>
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<tr>
<td>Significant renal dysfunction (ASA III-IV)</td>
<td>Amides or esters</td>
<td>Relative</td>
<td>Amides or esters, but judiciously</td>
</tr>
<tr>
<td>Significant cardiovascular dysfunction (ASA III-IV)</td>
<td>High concentrations of vasoconstrictors*</td>
<td>Relative</td>
<td>LAs with Epi 1:200,000 or 1:100,000 or mepivacaine 3% or prilocaine 4% (nerve block)</td>
</tr>
<tr>
<td>Clinical hyperthyroidism</td>
<td>High concentrations of vasoconstrictors*</td>
<td>Relative</td>
<td>LAs with Epi 1:200,000 or 1:100,000 or mepivacaine 3% or prilocaine 4% (nerve block)</td>
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