**ASA Physical Status Classification System**

<table>
<thead>
<tr>
<th>ASA 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(s)</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>Morbidly ill patient</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**

- Effective only on surface tissues (2 to 3 mm)
- Tissues deep to the area of application are poorly anesthetized

**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, 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 hr
  - Cocaine: 0.7 hr
  - Lidocaine: 1.6 hr
  - Mepivacaine: 1.9 hr
  - Bupivacaine: 3.5 hr

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

**Pharmacology**

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*FIG. 3-6. Fate of local anesthetic agents. (Mather, L.E., and Coakline, M.J.: Local anesthetics and their current clinical use. Drugs, 16:166, 1983)*
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 cimetidine (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>
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<tbody>
<tr>
<td>Local anesthetic allergy, documented</td>
<td>All LAs in same chemical class</td>
<td>Absolute</td>
<td>LAs in a different chemical class (e.g. amides)</td>
</tr>
<tr>
<td></td>
<td>(e.g. esters)</td>
<td></td>
<td></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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<tr>
<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>
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<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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