

## • vasoconstrictive properties

Vasoconstrictors (*i.e.*, *epinephrine* and *levonordefrin*) are added to local anesthetics because of their **vasoconstrictive** properties. Vasoconstriction at the site of injection is beneficial because it limits the uptake of the anesthetic by the vasculature, thereby **increasing the duration** of the anesthetic and **diminishing systemic effects** (*reducing systemic toxicity*). **Note:** The use of a vasopressor-containing local anesthetic also may actually be responsible for the sensation of burning on injection. The addition of a vasopressor and an antioxidant (*sodium bisulfite*) lowers the pH of the solution to between 3.3 and 4, significantly more acidic than solutions not containing a vasopressor (*pH about 5.5*). Patients are more likely to feel the burning sensation with these solutions. **Note:** Malamed's book states that "local anesthetics containing the vasoconstrictor levonordefrin (*Neo-Cobefrin*) have become impossible to obtain (*June 2004*)."

**Important:** To minimize the likelihood of intravascular injection, **aspiration** should be performed before the local anesthetic solution is injected. If blood is aspirated, the needle must be repositioned until no return of blood can be elicited by aspiration.

**Adverse reactions** following the administration of a local anesthetic are, in general, dose-related and may result from high plasma levels caused by excessive dosage, rapid absorption, or **unintentional intravascular injection**.

**Systemic toxicities of local anesthetics:** Initial clinical signs and symptoms of **mild to moderate** toxicity include: talkativeness, apprehension, excitability, slurred speech, dizziness, and disorientation. The signs and symptoms of **severe toxicity** include: seizures, respiratory depression, coma, and death.

**Important:** The excitatory manifestations may be very brief or may not occur at all, in which case the first manifestation of toxicity may be drowsiness merging into unconsciousness and respiratory arrest.

**Remember: Cardiovascular manifestations** are usually **depressant** and are characterized by bradycardia, hypotension, and cardiovascular collapse, which may lead to cardiac arrest. **Note:** In local anesthesia, the **depression of respiration** is a manifestation of the toxic effects of the solution.



1. For a **normal healthy** (*ASA I*) patient, the maximum dose of epinephrine is 0.2 mg or **200 µg**, this equates to roughly **11 cartridges** of 1:100,000 epinephrine. (*The maximum dose of lidocaine is 7mg/kg of body weight. Thus, for healthy adult patients, epinephrine is usually the limiting factor.*)
2. In a **cardiac risk** patient, the maximum dose of epinephrine is 0.04 mg or **40 µg**, which equates roughly to **two cartridges** of 1:100,000 epinephrine.