

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.
2. In a **cardiac risk** patient the maximum dose of epinephrine is 0.04 mg or 40 µg, this equates roughly to **two cartridges** of **1:100,000** epinephrine.