AMERICAN SOCIETY OF
REGIONAL ANESTHESIA AND PAIN MEDICINE

Checklist for Treatment of Local Anesthetic Systemic Toxicity

The Pharmacologic Treatment of Local Anesthetic Systemic Toxicity (LAST) is Different from Other Cardiac Arrest Scenarios

- ❑ **Get Help**
- ❑ **Initial Focus**
  - ❑ **Airway management:** ventilate with 100% oxygen
  - ❑ **Seizure suppression:** benzodiazepines are preferred; **AVOID propofol** in patients having signs of cardiovascular instability
  - ❑ **Alert** the nearest facility having **cardiopulmonary bypass** capability
- ❑ **Management of Cardiac Arrhythmias**
  - ❑ **Basic and Advanced Cardiac Life Support (ACLS)** will require adjustment of medications and perhaps prolonged effort
  - ❑ **AVOID vasopressin, calcium channel blockers, beta blockers, or local anesthetic**
  - ❑ **REDUCE epinephrine dose to <1 mcg/kg**
- ❑ **Lipid Emulsion (20%) Therapy** (values in parenthesis are for 70kg patient)
  - ❑ **Bolus 1.5 mL/kg** (lean body mass) intravenously over 1 minute (~100mL)
  - ❑ **Continuous infusion 0.25 mL/kg/min** (~18 mL/min; adjust by roller clamp)
  - ❑ Repeat bolus once or twice for persistent cardiovascular collapse
  - ❑ Double the infusion rate to 0.5 mL/kg/min if blood pressure remains low
  - ❑ **Continue infusion** for at least10 minutes after attaining circulatory stability
  - ❑ Recommended upper limit: Approximately 10 mL/kg lipid emulsion over the first 30 minutes
- ❑ **Post LAST events at** www.lipidrescue.org and report use of lipid to www.lipidregistry.org

BE PREPARED

- We strongly advise that those using local anesthetics (LA) in doses sufficient to produce local anesthetic systemic toxicity (LAST) establish a plan for managing this complication. Making a *Local Anesthetic Toxicity Kit* and posting instructions for its use are encouraged.

RISK REDUCTION (*BE SENSIBLE*)

- Use the least dose of LA necessary to achieve the desired extent and duration of block.
- Local anesthetic blood levels are influenced by site and of injection and dose. Factors that can increase the likelihood of LAST include: advanced age, heart failure, ischemic heart disease, conduction abnormalities, metabolic (e.g., mitochondrial) disease, liver disease, low plasma protein concentration, metabolic or respiratory acidosis, medications that inhibit sodium channels. Patients with severe cardiac dysfunction, particularly very low ejection fraction, are more sensitive to LAST and also more prone to 'stacked' injections (with resulting elevated LA tissue concentrations) due to slowed circulation time.
- Consider using a pharmacologic marker and/or test dose, e.g. epinephrine 5 mcg/mL of LA. Know the expected response, onset, duration, and limitations of "test dose" in identifying intravascular injection.
- Aspirate the syringe prior to *each* injection while observing for blood.
- Inject incrementally, while observing for signs and querying for symptoms of toxicity between each injection.

DETECTION (*BE VIGILANT*)

- Use standard American Society of Anesthesiologists (ASA) monitors.
- Monitor the patient during and after completing injection as clinical toxicity can be delayed up to 30 minutes.
- Communicate frequently with the patient to query for symptoms of toxicity.
- Consider LAST in any patient with altered mental status, neurological symptoms or cardiovascular instability following a regional anesthetic.
- Central nervous system signs (may be subtle or absent)
  - *Excitation* (agitation, confusion, muscle twitching, seizure)
  - *Depression* (drowsiness, obtundation, coma or apnea)
  - *Non-specific* (metallic taste, circumoral numbness, diplopia, tinnitus, dizziness)
- Cardiovascular signs (often the only manifestation of severe LAST)
  - *Initially may be hyperdynamic* (hypertension, tachycardia, ventricular arrhythmias), then
  - *Progressive hypotension*
  - *Conduction block, bradycardia or asystole*
  - *Ventricular arrhythmia* (ventricular tachycardia, Torsades de Pointes, ventricular fibrillation)
- Sedative hypnotic drugs reduce seizure risk but even light sedation may abolish the patient's ability to recognize or report symptoms of rising LA concentrations.

TREATMENT

- Timing of lipid infusion in LAST is controversial. The most conservative approach, waiting until after ACLS has proven unsuccessful, is unreasonable because early treatment can prevent cardiovascular collapse. Infusing lipid at the earliest sign of LAST can result in unnecessary treatment since only a fraction of patients will progress to severe toxicity. The most reasonable approach is to implement lipid therapy on the basis of clinical severity and rate of progression of LAST.
- There is laboratory evidence that epinephrine can impair resuscitation from LAST and reduce the efficacy of lipid rescue. Therefore it is recommended to avoid high doses of epinephrine and use smaller doses, e.g., <1mcg/kg, for treating hypotension.
- Propofol *should not be used* when there are signs of cardiovascular instability. Propofol is a cardiovascular depressant with lipid content too low to provide benefit. Its use is discouraged when there is a risk of progression to cardiovascular collapse.
- Prolonged monitoring (> 12 hours) is recommended after any signs of systemic LA toxicity, since cardiovascular depression due to local anesthetics can persist or recur after treatment.

The ASRA Practice Advisory on Local Anesthetic Toxicity is published in the society's official publication *Regional Anesthesia and Pain Medicine,* and can be downloaded from the journal Web site at www.rapm.org.

Neal JM, Bernards CM, Butterworth JF, et al. ASRA practice advisory on local anesthetic systemic toxicity. *Reg Anesth Pain Med* 2010;35:152-161.