

Intravenous Lipid Emulsion

Intravenous fat emulsion (ILE) has been used in patient care for decades under the trade name Intralipid, as a source of calories and as a vehicle to deliver drugs that are poorly soluble in water including some anesthetic agents, sedatives, analgesics and antihypertensives. ILE is an oil-in-water emulsion that consists of one or more triglyceride-containing oils, a phospholipid emulsifier and glycerin. Animal studies, case reports and case series suggest that 20% ILE may aid in the resuscitation of hemodynamically unstable patients as a result of an overdose of a lipophilic drug.

Mechanism/Indications: Although the exact mechanism of action of ILE for rescue therapy is not clearly understood, the strongest evidence supports the lipid sink/sponge mechanism. Once in circulation, the emulsion acts as a sink/sponge, extracting lipophilic drug molecules. This reduces drug distribution to tissue and enhances redistribution from the tissue to the non-aqueous part of the plasma. Although most of the data regarding the use of ILE as an antidote relate to overdoses of local anesthetics such as bupivacaine, its use for severe overdoses with other lipid-soluble substances can be considered. ILE may be considered for patients with hemodynamic instability, or status epilepticus, after ingestion of a lipid-soluble substance in whom maximal treatment with standard resuscitation methods has failed. Possible benefit of ILE has been suggested for cyclic antidepressant, bupropion, lipophilic beta blockers and calcium channel blockers. However, the quality of evidence for its use for non-local anesthetic poisoning is low and results are variable.

Dosing: Although ILE is available in a variety of strengths, the recommended formulation is 20%. The adult dose is 20% ILE 1.5 mL/kg (lean body weight) IV bolus over one minute, followed by an infusion of 20% ILE 0.25 mL/kg/min IV given over 30-60 minutes. The bolus dose may be repeated once, as needed, and the infusion rate can be doubled to 0.5 mL/kg/min if hemodynamic instability persists. The effect of ILE on drug toxicity should be seen within minutes of the IV bolus administration(s) and sustained during the infusion that follows.

Adverse Effects/Contraindications: There are limited safety data concerning the use of ILE as rescue therapy. Case reports suggest that ILE can be used in children although guidance on optimal dosing and safety are needed. Adverse effects associated with the use of ILE have mostly been reported when used for parenteral nutrition and include hypertriglyceridemia, acute pancreatitis, cholestasis and increased risk of infection. Rapid infusions of ILE have the potential to induce fat overload syndrome, characterized by hyperlipidemia, fever, hepatomegaly, anemia, coagulation disturbances, seizures and coma. Increased pulmonary artery pressure leading to acute lung injury (ALI) has been noted in patients with acute respiratory distress syndrome (ARDS) in whom IFE was utilized as rescue therapy. Administration within the recommended daily doses and infusion rates of ILE 20% should minimize the potential for these toxicities. ILE is contraindicated in patients with hypersensitivity to any component of the formulation, or severe egg or legume (soybean) allergies. Since ILE can alter certain hematologic parameters, it is important to draw labs such as ABG, CBC, electrolytes, triglycerides and serum drug concentrations prior to dosing.

Intravenous Fat Emulsions (continued)

For more on intravenous fat emulsions:

- *Bania TC. Antidotes in Depth: Intravenous Fat Emulsion. In: Hoffman RS, Howland MA, Lewin NA, Nelson LS, Goldfrank LR, editors: Goldfrank's Toxicologic Emergencies. 10th ed. New York NY, 2015;931-7.*
- *Harvey M, Cave G. Lipid emulsion in local anesthetic toxicity. Curr Opin Anaesthesiol. 2017;30:632-8. Levine M, Hoffman RS, Lavergne V et al. Systematic review of the effect of intravenous lipid emulsion therapy for non-local anesthetics toxicity. Clin Toxicol. 2016;54:194-221. www.lipidrescue.org*
- *Presley JD, Chyka PA. Intravenous lipid emulsion to reverse acute drug toxicity in pediatric patients. Ann Pharmacother 2013;47:735-43.*

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