J. Med. Toxicol.
DOI 10.1007/s13181-016-0550-z

POSITION STATEMENT

ACMT Position Statement: Guidance for the Use of Intravenous Lipid Emulsion

American College of Medical Toxicology

Received: 25 March 2016 / Accepted: 6 April 2016

Keywords Toxicology · Lipid emulsion · Intralipid · Lipid resuscitation

The purpose of this document is to discuss the parenteral use of intravenous lipid emulsion (ILE) with the intent of reducing the clinical manifestations of toxicity from excessive doses of certain medications. Authors have suggested that ILE increases inotropy, augments mitochondrial fatty acid metabolism, and creates a "lipid sink," decreasing the bioavailability of lipid-soluble medications [1].

This therapy has shown some promising results in poisoning by lipid-soluble cardiotoxic medications [2–6]. The data from experience with poisoned humans is anecdotal and mixed, although they do suggest that ILE may be beneficial in select circumstances [7, 8]. However, authors have reported the following in associating with ILE: lipemic interference with laboratory studies, pancreatitis (usually mild), acute respiratory distress syndrome, and reduction in effectiveness of other antidotes [9, 10]. The decision to initiate ILE is solely discretionary and is based on the clinical judgment of the treating physician. The 2015 American Heart Association Guidelines state "it may be reasonable to administer [ILE], concomitant with standard resuscitative care, to patients with local anesthetic systemic toxicity and particularly to patients who have premonitory neurotoxicity" from bupivacaine (Class IIb) and that "it may be reasonable to administer [ILE] to patients with other forms of drug toxicity who are failing standard resuscitative measures [11]."

Given the uncertainty of its beneficial effect in human poisonings, it is the opinion of the American College of Medical Toxicology that there are no standard of care requirements to use, or to choose not to use, ILE. However, in circumstances where there is serious hemodynamic, or other, instability from a xenobiotic with a high degree of lipid solubility, ILE is viewed as a reasonable consideration for therapy. If ILE is used, it should be instituted for patients with hemodynamic instability or seizures who are not responsive to standard resuscitation measures, such as fluid replacement, inotropes, and vasopressors, where appropriate. The decision to use ILE instead of, or in conjunction with, other therapies that have been anecdotally reported to be effective, such as high-dose insulin, is to be based on the clinical judgment of the treating physician. Where possible, it is recommended that these therapies be administered in consultation with a medical toxicologist.

There are no validated, evidence-based dosing regimens. The American Heart Association described a 1.5 mL/kg bolus followed by a 0.25 mL/kg/min infusion, continued for 30–60 minutes to a maximum infusion of 10 mL/kg [11]. *Lipidrescue.org* recommends repeating this initial bolus one to two times for persistent "cardiovascular collapse," raising the infusion rate to 0.5 mL/kg/min for persistent hypotension, and limiting the total dose to 10–12 mL/kg over the first 30 minutes [2]. Additional dosing recommendations include a loading dose of 1.5 mL/kg, followed by 3–5 minutes of infusion at 0.25 mL/kg, and then a maintenance infusion of 0.025 mg/kg/min [9]. This lower infusion rate may be sufficient to maintain the positive effects of lipids while avoiding lipid overload.

✉ American College of Medical Toxicology
positionstatements@acmt.net

[1] ACMT, Phoenix, AZ, USA

Published online: 27 April 2016

Recommended Guideline

Given the uncertainty of its beneficial effect in human poisonings, it is the opinion of the American College of Medical Toxicology that there are no standard of care requirements to use, or to choose not to use, ILE. However, in circumstances where there is serious hemodynamic, or other, instability from a xenobiotic with a high degree of lipid solubility, ILE is viewed as a reasonable consideration for therapy.

If the decision is made to initiate ILE, the following guideline is recommended. This suggested guideline is a modification of the one posted on LipidRescue.org. However, it is completely appropriate if the treating physician, based on his/her clinical judgment or other authoritative recommendations, chooses to alter the manner in which ILE is administered.

1) A 20 % lipid emulsion (e.g., Intralipid) should be administered as a 1.5 mL/kg bolus. The bolus should be administered over 2–3 minutes. A repeat bolus can be considered if there is a failed response to the first bolus.
2) The bolus may be followed immediately by an infusion of 20 % lipid emulsion at a rate of 0.25 mL/kg/min. After 3 minutes of this infusion rate, response to the bolus and initial infusion should be assessed. If there has been a significant response, the infusion rate may be adjusted to 0.025 mL/kg/min (i.e., 1/10 the initial rate) [9]. This recommendation is based on concerns for adverse effects from extremely high cumulative rates of lipid infusion, and a desire to be able to monitor the impact of initial therapy in a dynamic enteral overdose situation. Blood pressure, heart rate, and other available hemodynamic parameters should be recorded at least every 15 minutes during the infusion.
3) If there is an initial response to the bolus followed by the re-emergence of instability during the lowest-dose infusion, the infusion rate could be increased back to 0.25 mL/kg/min or, in severe cases, the bolus could be repeated. There is no known maximal dose, but other authors have suggested a maximum dose of 10 mL/kg.

This guideline has been reviewed and approved by the ACMT Board of Directors. Disclosure statements for participating members of the ACMT Board of Directors are available. While the opinions of individual practitioners may differ, this is the position of the College at the time written, after a review of the issue and pertinent literature.

Acknowledgments ACMT would like to acknowledge Members of the Position Statement and Guidelines Committee for authorship of this statement: Andrew Stolbach (Chair), Jeffrey Brent, Peter Chase, Howard Greller, Ronald Kirschner, Charles McKay, Thomas Kurt, Lewis Nelson, Sean Rhyee, Silas Smith, Brandon Warrick.

Compliance with Ethical Standard

Conflicts of Interest None.

Sources of Funding None.

References

1. Ozcan MS, Weinberg G. Intravenous lipid emulsion for the treatment of drug toxicity. J Intensive Care Med. 2014;29:59–70.
2. LipidRescue(TM) Resuscitation… For Drug Toxicity. http://lipidrescue.org/. Accessed 30 Dec 2015
3. Cave G, Harvey M. Intravenous lipid emulsion as antidote beyond local anesthetic toxicity: a systematic review. Acad Emerg Med. 2009;16:815–24.
4. Cave G, Harvey M, Willers J, Uncles D, Meek T, Picard J, et al. LIPAEMIC report: results of clinical use of intravenous lipid emulsion in drug toxicity reported to an online lipid registry. J Med Toxicol. 2014;10:133–42.
5. Eren Cevik S, Tasyurek T, Guneysel O. Intralipid emulsion treatment as an antidote in lipophilic drug intoxications. Am J Emerg Med. 2014;32:1103–8.
6. Meaney CJ, Sareh H, Hayes BD, Gonzales JP. Intravenous lipid emulsion in the management of amlodipine overdose. Hosp Pharm. 2013;48:848–54.
7. Levine M, Hoffman RS, Lavergne V, Stork CM, Graudins A, Chuang R, et al. Systematic review of the effect of intravenous lipid emulsion therapy for non-local anesthetics toxicity. Clin Toxicol. 2016;54:194–221.
8. Hoegberg LCG, Bania TC, Lavergne V, et al. Systematic review of the effect of intravenous lipid emulsion therapy for local anesthetic toxicity. Clin Toxicol. 2016;54:167–93.
9. Fettiplace MR, Akpa BS, Rubinstein I, Weinberg G. Confusion about infusion: rational volume limits for intravenous lipid emulsion during treatment of oral overdoses. Ann Emerg Med. 2015;66:185–8.
10. Levine M, Skolnik AB, Ruha A-M, Bosak A, Menke N, Pizon AF. Complications following antidotal use of intravenous lipid emulsion therapy. J Med Toxicol. 2014;10:10–4.
11. Lavonas EJ, Drennan IR, Gabrielli A, Heffner AC, Hoyte CO, Orkin AM, et al. Part 10: special circumstances of resuscitation. Circulation. 2015;132:S501–18.