Pacific Tide

An informational newsletter

Pacific Veterinary Specialists & Emergency Service
1980 41st Avenue
Capitola, CA 95010
Specialty 831-476-2584 ~Emergency 831-476-0667

Pacific Veterinary Specialists Monterey
2 Harris Court Suite A-1
Monterey, CA 93940
Monterey Office 831-717-4834 or Capitola 831-476-2584

www.pacificveterinaryspecialists.com

July 2013
Volume 7, Issue 1

About our Author

Colleen Brady, DVM, DACVECC

Dr. Brady received her Doctorate of Veterinary Medicine from Louisiana State University in 1997. At the University of Pennsylvania, she completed her internship in 1998 and her residency in emergency and critical care in 2001, that same year she became board certified. She stayed on at the University of Pennsylvania during 2001-02 as staff lecturer at the School of Veterinary Medicine. Dr. Brady has been with PVSES for 11 years and is currently pursuing research into management of Amanita toxicity in Central California. She is actively recruiting cases to participate in sample collection and data analysis as she works with the UC Davis toxicology lab to validate (or disprove) the potential role in gall bladder drainage for this toxicity. Please feel free to call or email her with any questions about potential cases.

Colleen Brady, DVM, DACVECC

Intravenous Lipid Emulsion (ILE) therapy as a novel toxicity treatment

ILE is a relatively new treatment for certain fat soluble toxicities that has received a lot of attention in the last 5 years due to some promising results in human and veterinary medicine. ILEs are recommended for lipophilic toxins when standard therapies fail or when life threatening cardiovascular events are imminent. In veterinary medicine, they can also be considered as an adjunct therapy that can lessen hospitalization time and treatment costs. For example, injectable forms of methacarbamol have recently become expensive and hard to obtain. Using ILE can lessen the amount of this drug needed to control tremors secondary to some toxins.

Which toxins can ILEs be helpful for?

Severe THC intoxications (usually very potent marijuana butter ingestion)
Permethrin toxicity in cats
Avermectin toxicity in dogs (including ivermectin, moxidectin)
Calcium channel blocker toxicity
Specific muscle relaxers: baclofen
Local anesthetic overdose in cats: lidocaine, bupivacaine

How do ILEs work?

There are several theories. The most popular theory postulates a "lipid sink" mechanism. This theory states that the lipid emulsion provides a separate plasma compartment that traps lipophilic drugs. The log P value is a measure of lipophilicity of a drug. A drug is considered lipophilic if the log P is >1.

What kind of ILE do I need? How do I find it?

IV lipids come in 3 concentrations: 10%, 20% and 30%. <u>Toxicity should be treated with 20% formulations only.</u> These are easily obtained from a human hospital inpatient pharmacy.

The 20% formulations that are widely available include:

Intralipid 20% - Baxter Pharmaceuticals
Liposyn 20% - Hospira Pharmaceuticals
Medialipid 20% - B Braun Pharmaceuticals

Note that the 30% formulation is hyperosmolar and not intended for sole use but as a component of TPN. Do not try to dilute it as this approach will not be effective. Ten percent (10%) lipids (as are in Propofol) have an increased risk of adverse effects due to their much greater effect on lipoprotein lipase than 20% solutions.

Average cost?

Cost usually ranges from $20.00 to $60.00 for a 500 ml bag. An unopened bag has a 2 year shelf-life. It should be discarded in 24 hours once opened. Use aseptic technique to draw up and administer.

How do I give ILE?

Use a peripheral catheter with aseptic technique. Bolus 1.5 mls/kg, then give 0.25ml/kg/min for 1 to 2 hours. Can repeat in 2 to 4 hours if needed and patient has not developed lipemia. If lipemia is present, then circulating lipids are still present and adding more is not likely to be beneficial.

Any adverse effects of this treatment?

1. Lipemia. Not often seen with the first dose but more commonly with the second dose. Increases risk of secondary pancreatitis. Caution should be used in pets with diabetes or other increased risk of pancreatitis.
2. In people, hypersensitivity to the egg protein sometimes occurs but this is rare in pets.
3. Increased risk of thrombophlebitis and bacterial contamination is reported but rarely seen with short term administration.

4. There are isolated anecdotal reports of hemolysis occurring in cats after using this therapy; however it does not appear to be dose related and risk is considered similar to the risk of using propofol.
5. Although reported, immunosuppression and platelet depression is not an issue with the low short-term doses used to treat toxicity. Other reported human side effects include fat emboli, hepatosplenomegaly, jaundice, seizures, hemolytic anemia, prolonged clotting times, and thrombocytopenia.

What happens if the ILE goes subcutaneously?

Similar to extravasated propofol, subcutaneous ILE can cause local swelling and pain. If able, withdraw as much of the drug through the catheter that you can and treat supportively with warm compresses and gentle range of motion.

Can ILE be given with other anti-tremorgenic medications?

Note that valium has a very high log p value (2.82) so will be captured by the "lipid sink". Phenobarbital has a log p of 1.4 and may be trapped by ILE. Methocarbamol has a low log p of 0.43 and should not be affected by ILEs.

For additional information please visit the website http://www.lipidrescue.org/

CASE EXAMPLE:

Boomer, a 9 year old f/s Coonhound presents after being found laterally recumbent outdoors. She weighs 30kg. Owners report she has been previously healthy but seemed very restless and had excessive howling the previous night. Boomer lives on a ranch in Carmel Valley with horses, two ponds with algae and lots of wildlife. The horses had been dewormed recently. You notice the owner is unable to sit in the exam room and he explains that he has severe back pain and takes naproxen, baclofen, gabapentin and there is medicinal marijuana in the house.

Physical examination reveals a recumbent, stuporous dog with mild to moderate generalized tremors. Vital signs are as follows: T=102.5; HR 150bpm; RR 24 bpm; mm are pink and tacky and CRT is 1-2 seconds. SBP is 90mmHg. BCS = 5/9. Chest auscults clear and abdomen is soft. You note urine leakage when palpating the abdomen. Pupils are midrange and PLRs are intact and appropriate. Rectal exam reveals scant feces. CBC and chemistry profile are unremarkable except for moderate hemoconcentration. A lateral abdominal x-ray shows an empty stomach so you elect not to do gastric lavage.

You note potential toxins in the environmental history that are consistent with Boomer's clinical signs which include ivermectin, baclofen, and marijuana. Initial therapeutics include IV crystalloids, multiple boluses of methocarbamol, and enemas until clean, then rectal administration of activated charcoal.

After initial improvement, Boomer is noted to be increasingly depressed and less responsive. Hypothermia is noted and increasing respiratory depression is noted with continued mild tremors. Boomer is noted to be incontinent and leaking urine at this point. External warming is applied. You are increasingly concerned about her level of respiratory depression and potential need for intubation and ventilation. You elect to try ILE therapy to augment your supportive care as you strongly suspect marijuana toxicity.

After Boomer's IV catheter is carefully evaluated, a 45 mls (1.5mls/kg) bolus of Intralipid 20% is given followed by a CRI of 45 mls/hr (0.25 ml/kg/min) for an hour. Within 30 minutes, Boomer is much more responsive and holding her head up.

After the lipid infusion has been discontinued for one hour, clinical signs return. A follow up PCV/TS is 48/7.2 and serum is noted to be clear of lipemia. Therefore a second bolus dose is given and followed by 4 hours of ILE CRI. Charcoal enema is repeated. Boomer is noted to be much brighter and trying to stand and wag her tail. The owner calls from home with the update that a moderate amount of marijuana butter is missing from the kitchen counter and a container found outside. Boomer is monitored in hospital an additional 12 hours but shows no further signs of toxicity or pancreatitis. She is discharged uneventfully.

Our Doctors

Internal Medicine
Kelly Akol, DVM, DACVIM (small animal)
Merrianne Burtch, DVM, DACVIM(small animal)
Michelle Pressel, DVM, DACVIM (small animal)
Ryan Garcia, DVM, DACVIM (small animal)

Surgery
Lisa Metelman, MS, DVM, DACVS
Tom LaHue, DVM, DACVS

Oncology
Theresa Arteaga, DVM, DACVIM(Oncology)

Critical Care
Colleen Brady, DVM, DACVECC
Lillian Good, DVM, DACVECC

Cardiology
Mandi Kleman, DVM, DACVIM(Cardiology)

Dermatology
Katherine Doerr, DVM

Radiology (VRS)
Larry Kerr, DVM, DACVR
Mark Lee, DVM, DACVR

Emergency
Christian Robison, DVM
Kim Delkener, DVM
Mark Saphir, DVM
Jessica Kurek, DVM

Behavior
Jan Brennan, DVM (practice limited to behavior)

About Our Hospitals

Pacific Veterinary Specialists was founded to provide high quality, specialized medical care to companion animal patients. Our practice is dedicated to serving the veterinary community as a partner in total patient care. We offer comprehensive specialized services including endoscopy, Doppler ultrasound, surgery, 24-hour ICU care, and emergency and critical care. Our staff is committed to providing compassionate and thorough medical care that meets the needs of the patient, client, and referring veterinarian. In September 2011 we opened PVSM and offer internal medicine, oncology, dermatology and cardiology Tuesday through Thursday in Monterey. Behavior consultations by appointment are available on Mondays.

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Pacific Veterinary Specialists

1980 41st Avenue
Capitola, CA 95010

Adobe Animal Hosp.-Los Altos
Medical Director / DVM
4470 El Camino Real
Los Altos, CA 94022