Contrast-enhanced voiding urosongraphy (ceVUS) technique

General principles: The studies described below require a minimum of two operators; one to manage the infusion of the contrast agent and monitor the patient, the other to image the patient and record the US examination. As with all contrast media, resuscitation equipment should be readily available in case of an anaphylactoid reaction.

CeVUS requires a) baseline conventional gray scale US imaging of the kidneys and bladder; (b) bladder catheterization and intravesical administration of US contrast agent suspended in normal saline; (c) serial imaging of the bladder and kidneys during bladder filling, and of the bladder and urethra during voiding using low MI contrast-specific settings on the US scanner. Reflux can be categorized as grade I-V with the same International Grading System used for conventional fluoroscopic voiding cystourethrogramy (VCUG).

Please note these guidelines are based on SPR CEUS Taskforce members’ experience and personal communication. They are subject to change and can be modified at your discretion.

1) **Optison™ (GE Healthcare):** FDA approved for adult cardiology use only. Off-label use for ceVUS.
   a. Catheterize the patient’s bladder in the same manner as for a conventional VCUG.
   b. Vent the Optison™ vial with a sterile vent spike or 18 g needle.
   c. Draw up 0.15 cc of Optison™ into a 1 cc tuberculin syringe and inject into a 250 cc bag of normal saline.
   d. Immediately prior to infusion, gently invert the bag several times to disperse the contrast material within the saline. Infuse the suspension into the bladder in the same manner as with conventional VCUG.
   e. Image the bladder, ureters, kidneys and urethra with low MI contrast-specific US settings.

2) **Lumason™ (Bracco):** FDA approved for adult and pediatric intravenous liver studies and adult echocardiography. Off-label use for ceVUS.
   a. Catheterize the patient’s bladder in the same manner as for a conventional VCUG.
   b. Prepare Lumason™ by injecting the prefilled syringe into the vial. Remember to attach the syringe to the minispire prior to insertion into the vial.
   c. Shake vial vigorously for 20 seconds. Use immediately or re-suspend by brisk hand agitation prior to use.
   d. Draw up 2.5 cc of Lumason™ into a syringe and inject into a 250 cc bag of normal saline (1% of infusion volume).
   e. Immediately prior to infusion, gently invert the bag several times to disperse the contrast material within the saline. Infuse the suspension into the bladder in the same manner as with conventional VCUG.
   f. Image the bladder, ureters, kidneys and urethra with low MI contrast-specific US settings.

3) **Definity™ (Lantheus):** FDA approved for adult cardiology use only. Off-label use for ceVUS. To date there are no published studies or other communications describing the use of Definity™ for ceVUS.