In Reply:—We thank Dr. Chappell et al. for their interest in our article and insightful review. They first question the abstract’s conclusion that “The use of vasopressor and diuretics is also associated with acute renal failure,” and specifically highlight concern regarding the applicability of the conclusion to “healthy individuals.” Dr. Chappell et al. also highlight an important element of our data presented in the discussion section, the use of a single serum marker as a measure of renal function during a nonsteady postoperative state suffers from questionable accuracy, regardless of which formula is chosen. The Modification of Diet in Renal Disease formula was derived from data in patients with existing chronic kidney disease. Later, it was modified to incorporate race-specific variations, providing additional accuracy in African-Americans. Conversely, the Cockcroft–Gault formula was derived using patients with and without chronic kidney disease. The Cockcroft–Gault formula suffers from the absence of any race-specific measures. The Modification of Diet in Renal Disease formula suffers from the absence of any weight-based measures. We used the Cockcroft–Gault formula for several reasons: (1) It is more accurate across a broad range of renal function, (2) it incorporates weight and the effect of weight on anticipated normal serum creatinine, (3) it is used more widely in pharmacologic dosing practice, and (4) the Modification of Diet in Renal Disease formula is known to underestimate glomerular filtration rate in patients with normal renal function. I identify patients with normal preoperative renal function as the foundation of our methodology and guided us to the use of the Cockcroft–Gault formula.

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Minimizing the Risk of Intravascular Injection during Ultrasound-guided Peripheral Nerve Blockade

To the Editor—We read with interest the recently published case reports by Loubert et al.1 and Zetlaoui et al.2 regarding suspected inadvertent intravascular injection of local anesthetic (LA) and LA toxicity during ultrasound-guided axillary brachial plexus blockade. While ultrasound likely reduces the risk of accidental vascular puncture compared with “blind” peripheral nerve stimulation,3 these two case reports demonstrate that the risk of intravascular injection persists despite ultrasound guidance.1,2 In 2006 and 2007 at the Toronto Western Hospital, we performed 1,797 ultrasound-guided brachial plexus blocks without any sign or symptom of LA toxicity. Good fortune notwithstanding, there are several important principles that merit thoughtful consideration to improve detection of accidental intravascular injection and possibly prevent LA toxicity during ultrasound-guided peripheral nerve blockade. We believe that the most reliable feature during real-time ultrasound imaging indicative of intravascular injection is the failure to visualize a hypoechoic fluid bolus on the ultrasound monitor during and/or after injection of as little as 1 ml of injectate. Indeed, we customarily initiate LA injection with a 1-ml bolus to exclude intravascular or intraneural4,5 needle tip placement before proceeding with 5-ml increments of injectate. Visualization of the needle tip does not preclude intravascular injection per se; it is the real-time observation of hypoechoic fluid causing tissue dispersion that most consistently excludes intravascular injection. The absence of a discernible extraneural hypoechoic fluid bolus on the ultrasound monitor means that either the needle tip is intravascular or the plane of imaging is inaccurate.

We are also hesitant to recommend the use of ultrasound for perivascular block techniques as described by Loubert et al.1 Rather, we contend that perineural LA deposition is the safest application of ultrasound technology. There can be multiple veins traveling alongside landmark pulsatile arteries, especially in the axilla. Veins are exquisitely collapsible with even the slightest amount of pressure applied by the transducer to the skin, and can therefore vanish from sonographic view, fooling even the most experienced providers, as demonstrated by these two recent case reports.1,2 We therefore use systematic scanning of the intended block site before needle insertion. Our current practice is scanning of the intended block site before needle insertion. Our ultrasound-guided Peripheral Nerve Blocks and Intravascular Injection

To the Editor.—In the April issue of ANESTHESIOLOGY, Loubert et al.1 and Zetlaoui et al.2 reported about possible intravascular injection after an ultrasound-guided axillary block. Their reports highlight the need for vigilance in the performance of ultrasound-guided blocks. This and similar reports of complications3–5 after ultrasound-guided regional blocks reinforce the need for proper training, and the understanding that ultrasound, after all, is only a tool. Any tool should be used with full cognizance of its limitations. The major limitations of ultrasound-guided blocks are technical,6 including the angle of incidence, needle visualization, and possibly artifacts.7,8 Training in the proper holding of the probe while analyzing and while injecting help overcome some of the complications. Sometimes even with proper training, complications do occur.1

The reports4,5 have similarities and differences besides the ultrasound-guided axillary block and intravascular complication leading to seizure. One of them described the changes in vital signs,1 and the other described the rise in serum creatinine. Nephron 1976; 16:459–66

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