

[Test Your Knowledge: Lung Ultrasound To Assess Volume Status in CKD](#)

Point of care ultrasound use has increased over the last decade, and nephrologists are becoming more proficient in adopting this technology. A recent Narrative Review by [Covic et al](#) published in *AJKD* summarizes the use of lung ultrasound for assessment of volume status in chronic kidney disease. Test your knowledge on your understanding of lung ultrasound with this quiz. Be sure to watch the videos [here](#) for examples of common lung ultrasound findings!

Note: Some of the answers to this quiz are not explicitly found in [Covic et al](#), but similar points are emphasized in the Narrative Review.

1. Which one of the following statements about B-lines is TRUE?
 - A. B-lines are reverberation artifacts arising from volumetric variations between aerated and fluid-filled parts of the lung tissue
 - B. B-lines are evenly spaced horizontal lines at integer multiples of the distance from the skin to the pleural line
 - C. B-lines are indicative of well-aerated lung
 - D. B-lines are diagnostic with 100% specificity for pneumothorax
 - E. B-lines never extend all the way to the edge of the field without fading

2. Which of the following statements about practical aspects of using lung ultrasound to determine B-line score is FALSE?
 - A. B-line score has consistently shown low interoperator variability
 - B. B-lines score can be obtained with any type of ultrasound device, any transducer frequency, and any probe footprint
 - C. B-line score is easy to learn and can be taught remotely through web-based modules with short learning curve
 - D. B-line score can be performed satisfactorily in less than 5 minutes
 - E. A 28-point B-line score is necessary to provide clinically useful information

3. Which of the following has been shown to have the highest accuracy for distinguishing acute decompensated heart failure from other causes of acute dyspnea in emergency department settings?
 - A. Chest radiography
 - B. Physical examination
 - C. Clinical history
 - D. Natriuretic peptides
 - E. Lung ultrasound

4. When compared with transpulmonary thermodilution in critically ill patients with severe acute respiratory distress syndrome, what is the area under the receiver-operator curve of lung ultrasound B-line score for the detection of moderate pulmonary congestion (an area under the curve of 1.0 represents a perfect test, an area under the curve of 0.5 represents a worthless test)?
 - A. 0.50
 - B. 0.66
 - C. 0.75
 - D. 0.80
 - E. 0.94

5. Which of the following categories of pulmonary disease does NOT produce a B-line pattern on lung ultrasound?
 - A. Pulmonary edema
 - B. Acute respiratory distress syndrome
 - C. Reactive airways disease
 - D. Diffuse interstitial lung disease
 - E. Multifocal pneumonia

6. In patients with CKD, higher B-line score as measured by lung ultrasound has been shown to be associated with which of the following?
 - A. Poorer functional status
 - B. Cardiac events
 - C. Increased all-cause mortality
 - D. Hospital readmission
 - E. All of the above

– Quiz prepared by Jordan Brown, AJKDBlog Guest Contributor, and Nathaniel Reisinger @nephrothaniel, AJKDBlog Contributor.

To view [Covic et al](#) (subscription required), please visit [AJKD.org](#).

Title: [Use of Lung Ultrasound for the Assessment of Volume Status in CKD](#)

Authors: Adrian Covic, Dimitrie Siriopol, and Luminita Voroneanu

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[Solutions to AJKDBlog's Test Your Knowledge: Lung Ultrasound](#)

1. **A. B-lines are reverberation artifacts arising from volumetric variations between aerated and fluid-filled parts of the lung tissue**

They may rarely occur due to impedance mismatch between the pleura and thickened interlobular septae. Choice B refers to the A-line artifact. Choice C is incorrect: while B-lines can be seen in well-aerated lung, they are associated with increasing pulmonary congestion. Choice D is incorrect, the presence of a B-line pattern rules out a pneumothorax at that point. Loss of normal lung sliding and a stratosphere sign on M-mode ultrasound is indicative of pneumothorax. Choice E is incorrect, B-lines by consensus definition extend all the way to the edge of the field without fading. Z-lines are similar radially oriented lines which do not extend all the way to the edge of the field.

2. **E. A 28-point B-line score is necessary to provide clinically useful information**

The 28-point lung ultrasound is a potent research tool good for obtaining highly granular data, but many other scanning patterns have been validated. **Choice A** is true: B-line score has been consistently shown to have low interoperator variability. **Choice B** is true: B-line score can be assessed with any model ultrasound and any ultrasound probe: curvilinear, linear, microconvex, and phased array. **Choice C** is true: B-line score is easy to learn and can be taught using web-based modules. **Choice D** is correct: a 28-point B-line ultrasound can be obtained in 5 minutes.

3. **E. Lung ultrasound**

In the emergency department, lung ultrasonography has higher clinical accuracy than clinical workup, chest radiography, and natriuretic peptides for differentiating acute decompensated heart failure from other etiologies of acute dyspnea.

4. **E. 0.94**

When assessed using transpulmonary thermodilution as the gold-standard for measuring extravascular lung water in critically ill patients, lung ultrasound has very high discriminatory power for assessing moderate and severe lung congestion, with areas under the receiver operator curves of 0.94 and 0.96, respectively.

5. C. Reactive airways disease

Pulmonary edema, diffuse interstitial lung diseases, acute respiratory distress syndrome, and multifocal pneumonia all produce a B-line pattern, whereas asthma and COPD produce an A-line pattern.

6. E. All of the above

All of the above adverse outcomes have been associated with higher B-line scores using lung ultrasound in patients with CKD.

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