**Submission ID #: 60300**

**Scriptwriter Name: Bridget Colvin**

**Project Page Link:** <http://www.jove.com/files_upload.php?src=18391548>

**Title:** **Imaging Features of Systemic Sclerosis-Associated Interstitial Lung Disease**

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**Author Questionnaire:**

**1.** Microscopy: Does your protocol involve video microscopy? N

**2.** Does your protocol demonstrate software usage? Y

If yes, we will need you to record using [screen recording software](https://obsproject.com/) to capture the steps. If you use a Mac, [QuickTime X](https://www.apple.com/support/mac-apps/quicktime/) also has the ability to record the steps. Please upload all screen captured files to your [project page](http://www.jove.com/files_upload.php?src=18391548).

**3.** Which steps from the protocol section below are the most important for viewers to see?

2.2.

**4.** What is the single most difficult aspect of this procedure and what do you do to ensure success?

2.2. One of the most overlooked aspects for proper HRCT image acquisition is preparing the patient and ensuring that the patient follows the breathing instructions properly. In order to circumvent a potential issue in this respect, practicing breathing instructions – “take a deep breath and hold it” for inspiration and “breath out and hold your breath” for expiration – with the patient prior to scanning can go a long way in minimizing artifacts and ensuring a high quality scan.

**5.** Will the filming need to take place in multiple locations (greater than walking distance)? N

Section - Introduction

***Videographer: Interviewee Headshots are required. Take a headshot for each interviewee.***

1. **REQUIRED Interview Statements (Said by you on camera): All interview statements may be edited for length and clarity.**
   1. **Jonathan Chung**: This HRCT protocol is important for diagnosing SSc-ILD and can be used for one-off scanning or sequential scanning over time, which can help guide treatment decisions **[1]**.
      1. INTERVIEW: Named talent says the statement above in an interview-style shot, looking slightly off-camera
   2. **Jonathan Chung**: HRCT is considered the most sensitive, non-invasive mean for facilitating the differential diagnosis of SSc-ILD and can be used to predict future courses of lung disease and therapeutic responses **[1]**.
      1. INTERVIEW: Named talent says the statement above in an interview-style shot, looking slightly off-camera

Section - Protocol

1. **High-Resolution Computed Tomography (HRCT) Scanning**
   1. To confirm the target area, first set the HRCT scanner parameters as outlined in the Table **[1-TXT]**.
      1. LAB MEDIA: Table 1 **TEXT: Use thinnest collimation, shortest rotation time, and highest reasonable pitch**
   2. While giving breathing instructions to the patient **[1]**, acquire a volumetric supine inspiratory scan from the lung apices to the lung base **[2-TXT]**.
      1. WIDE: Talent giving breathing instructions to patient Videographer: Important/difficult step - please capture breathing instructions audio as possible; Video Editor: please include breathing instructions audio as possible
      2. SCREEN: To be provided by Authors: Scan of lung apices to lung base being acquired **TEXT: Acquire scan at peak of inspiration**
   3. Next, acquire a sequential supine expiratory scan with 10-20-millimeter gaps from 2 centimeters below the lung apices to the lung base **[1]** followed by a sequential prone inspiratory optional with 10-20-millimeter gaps from the carina to the lung base **[2]**.
      1. SCREEN: To be provided by Authors: Supine expiratory scan being acquired
      2. SCREEN: To be provided by Authors: Prone inspiratory scan being acquired
   4. For optimal quality volumetric scans, obtain less than 2-millimeter images with a high-spatial resolution reconstruction **[1]**.
      1. SCREEN: To be provided by Authors: Shot of <2-mm image(s)
   5. Review each scan image immediately after acquisition **[1]** and repeat the scan if motion artifacts are present **[2]** or if an inadequate inspiration has occurred **[3]**.
      1. Talent reviewing scan, with monitor visible in frame
      2. LAB MEDIA: To be provided by Authors: Shot of scan w/ motion artifact
      3. LAB MEDIA: To be provided by Authors: Shot of scan w/ inadequate inspiration
   6. When all of the scans have been acquired, prepare an interpretive report **[1]** and share the report and images with the Patient’s care team and medical records **[2]**.
      1. Talent at computer, preparing report
      2. SCREEN: To be provided by Authors: Report and/or image file being added to email or similar “sharing” data visual

Section – Results

1. **Results: Representative HRCT Imaging of Systemic Sclerosis-Associated Interstitial Lung Disease (SSc-ILD)** 
   1. Key features of SSc-ILD as assessed by HRCT commonly include a non-specific interstitial pneumonia patternwith peripheral ground-glass opacities **[1]** and extensive traction bronchiectasis **[3]**.
      1. LAB MEDIA: Figure 1 *Video Editor please emphasize dark areas with white patterns in all 3 images*
      2. LAB MEDIA: Figure 2 *Video Editor please emphasize small black vessel opening in center of image*
   2. As observed in these images, central predominance or peripheral distribution with subpleural sparing is highly suggestive of non-specific interstitial pneumonia **[1]**.
      1. LAB MEDIA: Figure 3 *Video Editor please emphasize small, squeeze black vessel in left image*
   3. Typically, traction bronchiectasis and traction bronchiolectasis are often the predominant features of systemic sclerosis-related interstitial lung disease **[1]**.
      1. LAB MEDIA: Figure 4 *Video Editor please emphasize dark areas with white pattern in both images*
   4. Additional findings may include honeycombing, which is observed more commonly in diffuse forms of systemic sclerosis **[1]**, and a dilated air-filled esophagus **[2]**.
      1. LAB MEDIA: Figure 5 *Video Editor please emphasize dark areas with white pattern in both images*
      2. LAB MEDIA: Figure 6 *Video Editor please emphasize large black vessel in center of image*
   5. A pulmonary artery size greater than the adjacent ascending aorta suggests a coexistent pulmonary hypertension, even in patients without fibrotic lung disease **[1]**.
      1. LAB MEDIA: Figure 6 *Video Editor please emphasize black vessel to the left of center black vessel*
   6. Here two sets of axial and coronal chest HRCT images taken 10 years apart in a patient with systemic sclerosis-associated-interstitial lung disease can be observed **[1]**.
      1. LAB MEDIA: Figure 7 *Video Editor please emphasize Figures 7A and 7C together then Figures 7B and 7D together*
   7. The initial axial and coronal images demonstrate a basilar predominant ground-glass opacity **[1]** and reticulation with mild traction bronchiectasis and subpleural sparing consistent with non-specific interstitial pneumonia **[2]**.
      1. LAB MEDIA: Figures 7A and 7C *Video Editor please emphasize dark areas with white pattern in both images*
      2. LAB MEDIA: Figures 7A and 7C *Video Editor please emphasize small, squeezed black vessel in Figure 7A*
   8. In the images obtained 10 years later, an increased reticulation and traction bronchiolectasis at the lung bases **[1]** with a decrease in the ground-glass opacity that is consistent with a mild worsening of pulmonary fibrosis can be observed **[2]**.
      1. LAB MEDIA: Figures 7B and 7D *Video Editor please emphasize closed area in Figure 7B where black vessel was in Figure 7A*
      2. LAB MEDIA: Figures 7B and 7D *Video Editor please dark areas with white pattern in both images*

Section - Conclusion

1. **Conclusion Interview Statements: (Said by you on camera) - All interview statements may be edited for length and clarity.**
   1. **Jonathan Chung**: Be sure to acquire supine inspiration, prone inspiration, and expiration images without motion artifacts using thin reconstructions or acquisition slice thickness. Asking patients to take 2-3 breaths can be beneficial **[1]**.
      1. INTERVIEW: Named talent says the statement above in an interview-style shot, looking slightly off-camera (Step: 2.2., 2.3.)
   2. **Jonathan Chung**: Forced vital capacity assessments can be performed in correlation with HRCT to assess a patient’s disease stage per the Goh staging system and can be helpful in making treatment decisions **[1]**.
      1. INTERVIEW: Named talent says the statement above in an interview-style shot, looking slightly off-camera