

What is Computed Tomography?

- Computed tomography (CT) is the process of creating cross-sectional tomographic planes of any part of the body (Long, Rollins, Smith, & Merrill, 2019)

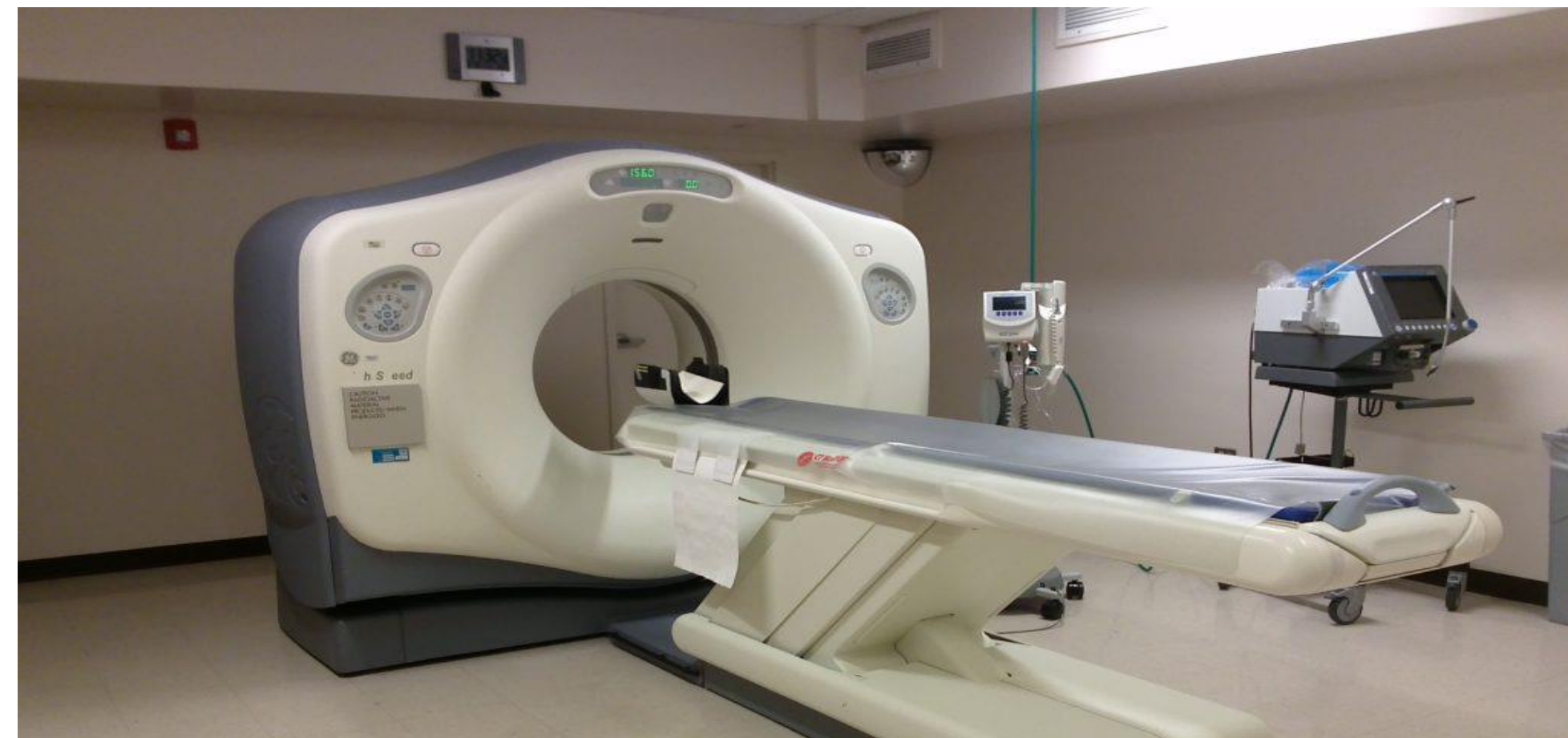


Image of a CT machine
(Tully, 2016, Section-Header)

What is CT-Guided Lung Biopsy?

- CT-guided lung biopsy is a procedure performed to remove lung tissue or cells from the body for examination under a microscope to determine if lung disease or cancer is present (Johns Hopkins Medicine, 2021)
- CT-guided lung biopsies are essential procedures, are minimally invasive, and have low morbidity and mortality rates (Deniz et al., 2022, p. 219)

Procedure

- Technologists assist the radiologist during the procedure. The radiologist is sterile while the technologist is not. The role of the technologist is to scan the patient as directed and assist the radiologist when needed.
- The radiologist gives the patient a local anesthetic and cleanses the area where the needle will be inserted. Next, a needle is used to perforate the skin. Once the needle is in, the doctor guides the needle to the area of interest in the chest wall.
- The technologist performs scans of the chest until the radiologist is in the location, then a sample is taken. Once the radiologist is satisfied with the samples, the needle will be removed. The technologist cleans the patient, and the site is covered. The patient usually stays in a recovery room for a short period before discharge. (Johns Hopkins Medicine, 2021)

Facts About Lung Cancer

- Lung cancer is the most common type of cancer in the world
- Smoking is the leading cause
- The second cause is radon
- Early stages may be asymptomatic
- There are 3 types: non-small cell, small cell, and lung carcinoid tumors (Hersh, 2020)

Indications

- Abnormal x-ray or CT scan
- If fluid is found in the lung
- To determine if a mass in the lung is cancerous or benign
- After a failed bronchoscopy

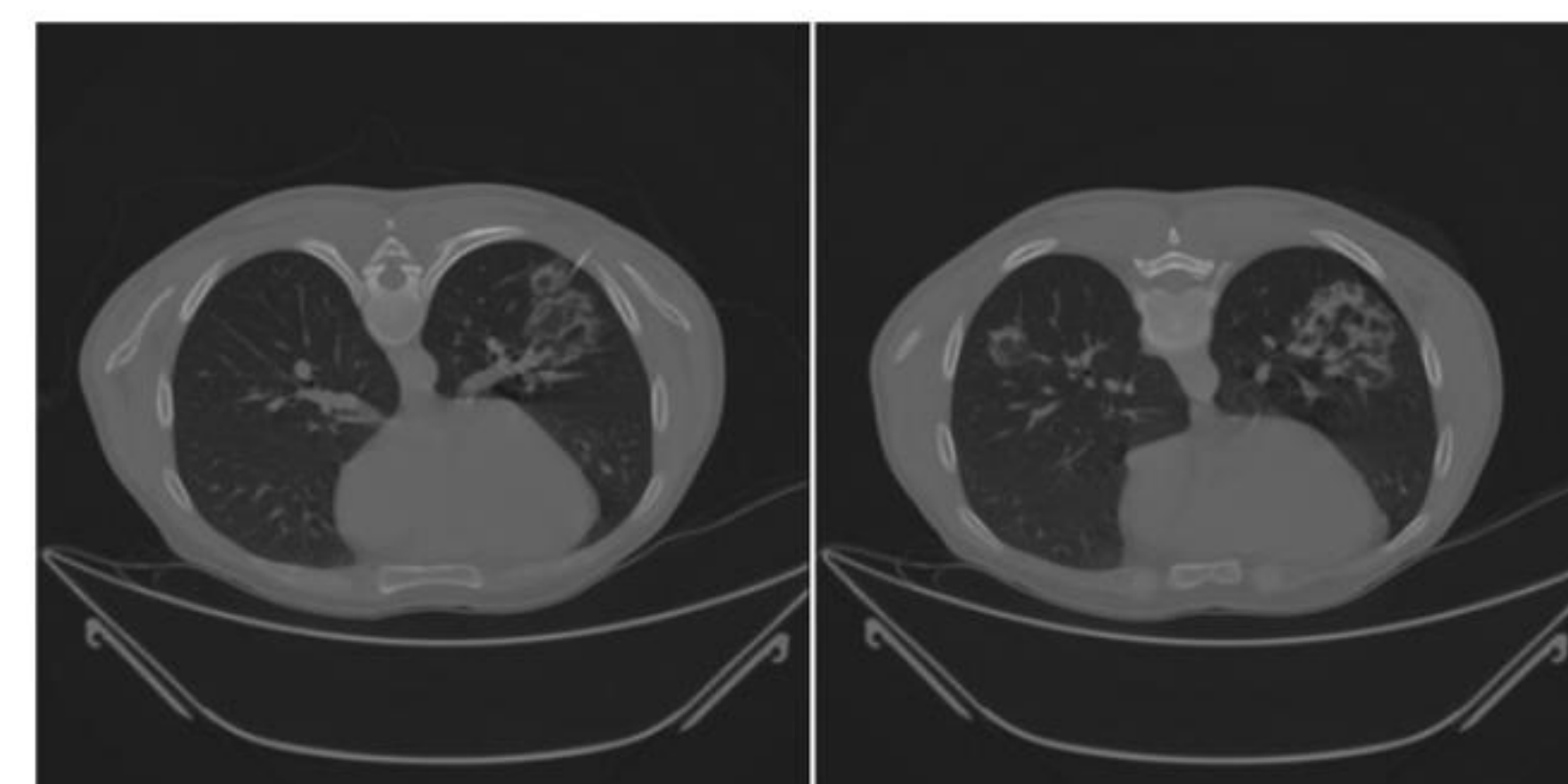
Contraindications

- Any chance of pregnancy
- Allergies to medications or anesthetic agents
- If patient is on an anticoagulant medication
- History of chronic obstructive pulmonary disease (COPD)
 - Approximately 31.3% increased risk of a pneumothorax (Zhou et al., 2020, para. 10)

Complications

- Most common complication is a pneumothorax
- Excessive bleeding in the lung
- Infection such as pneumonia
- Difficulty breathing (Johns Hopkins Medicine, 2021)

Below is an example of a post CT-guided lung biopsy pneumothorax in the left lung (Deniz et al., 2022 Figure 1a, 1b, p. 223)



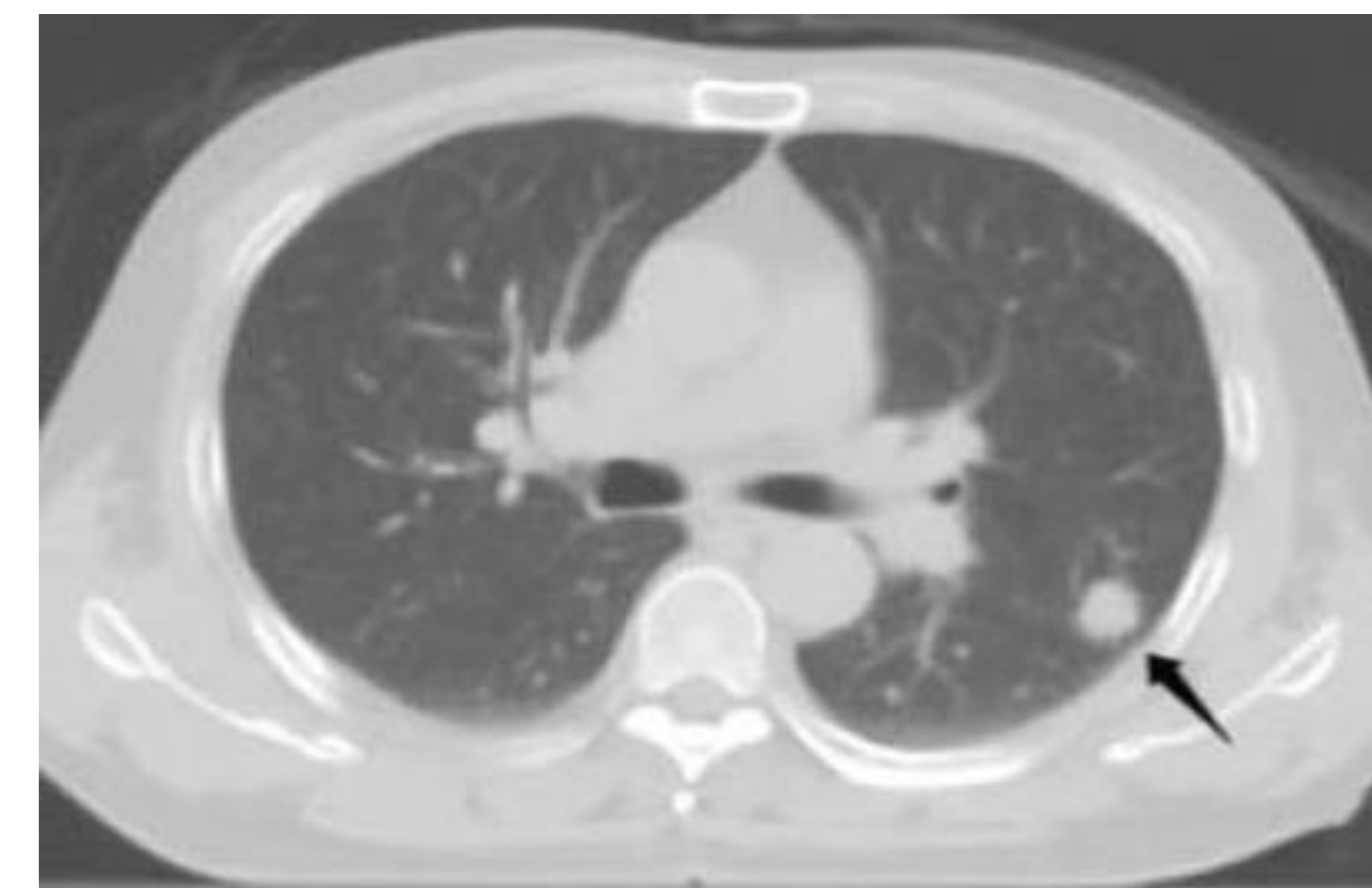
Pulmonary Nodules

- Abnormal growths that form in the lungs and can be malignant or benign
- Grouped by their diameter: small, medium, large

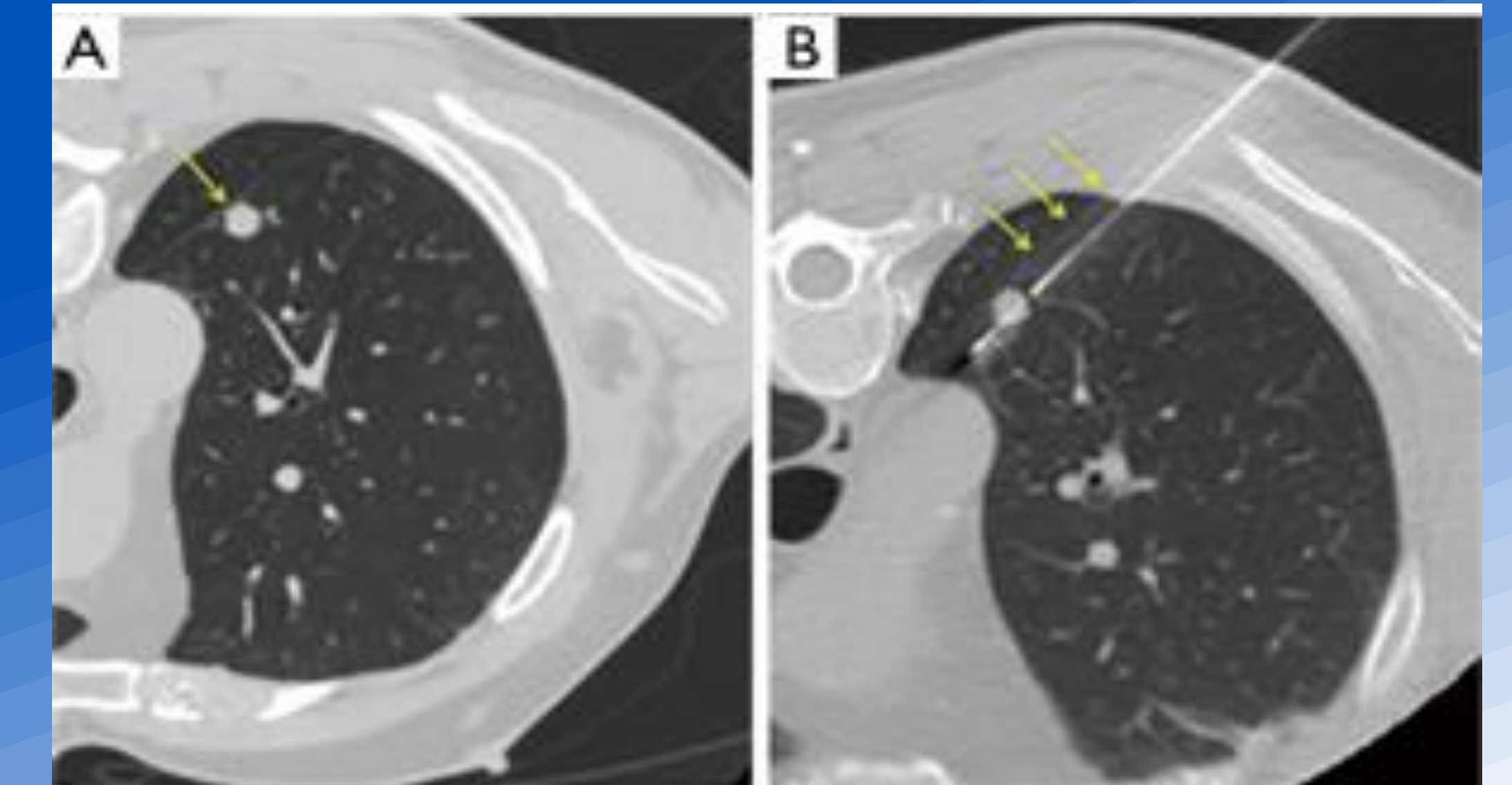
A study in 2020 was conducted to show the risk factors based on different sized pulmonary nodules (Liu et al., 2022)

According to the study:

- Occurrence of pulmonary hemorrhage in small nodules was greater than medium and large nodules
- The size of the needle, puncture site, and the depth the needle went into the lung, affect the incidence of pulmonary hemorrhage
- The accuracy of CT-guided lung biopsy in benign lesions is greater than 80% and greater than 90% in malignant lesions
- The sensitivity of CT-guided lung biopsies in detecting pulmonary nodules of different sizes was approximately 100%, indicating this procedure is an effective & accurate tool in diagnosing lung cancer (Liu et al., 2022, pp. 3-6)



CT image showing a pulmonary nodule
(Liu et al., 2022, Figure 1a, p. 4)



CT image of a core needle biopsy
(Junior et al., 2017, Figure 2a, 2b, p. 3)

Core needle vs. Fine Needle Aspiration Biopsy (FNAB)

- Core biopsies
 - Preferred for benign lesions
 - Accuracy rate approximately 93.6%
- FNBA
 - Preferred for malignant lesions
 - Accuracy rate approximately 95%
 - Used when lesion is closer to large vascular structures
- No significant risk between core needle and FNAB (Deniz et al., 2022, p. 222)

Conclusion/Future Advancements

- CT-guided lung biopsies are the superior procedure compared to bronchoscopies. CT-guided lung biopsies have improved the accuracy in diagnosing patients as well as being a safer procedure.
- As technology advances, new procedures such as robotic bronchoscopies are being used. Robotic bronchoscopy uses high resolution CT imaging to enhance visualization of lung anatomy.
- Robotic bronchoscopy is becoming more widely used as a safer and accurate resource in diagnosing pulmonary nodules.

(Freyaldenhoven & Tsukada, 2023, p. 260)