

Hands on Protocol Optimization

Learning objectives

- Execute and analyze CT protocols through hands-on experience.
- Observe how improper protocol setup can cause scanners to “run out of output.”
- Explain how acquisition and reconstruction parameters directly affect spatial resolution.

Demonstration/Hands-On Activity with Mobile CT

Gather around the mobile CT lab and investigate how the mobile CT differs from an MDCT.

Before optimizing protocols, it is critical to understand how mobile scanners differ from conventional fixed CT systems.

What are some of the key differences of the ImageRing (mobile CT) scanner that could affect protocol design:

Key Differences	
1	
2	
3	

Briefly explain how an independent source and detector can be utilized to achieve a larger Field of View (FOV) than a conventional rigid gantry setup.

Scenario 1 – Scan Speed

List different kinds of patient motion.

Motion Types	
1	
2	
3	
4	
5	

The Breath-Hold Experiment

A long scan is highly susceptible to motion artifacts because patients must hold their breath for the entire duration. Let's test our own limits.

- **Your breath-hold time:** _____ seconds
- **Group average breath-hold time:** _____ seconds

Goal: Decrease the scan duration to _____ **seconds** for clinical viability.

Scan measurements:

Scan Mode	Rotation Time	Pitch	Collimation	kV	mA	Dose	Noise	Scan Time

Using math or qualitative explanation, explain why scan speed and tube output cannot be optimized simultaneously.

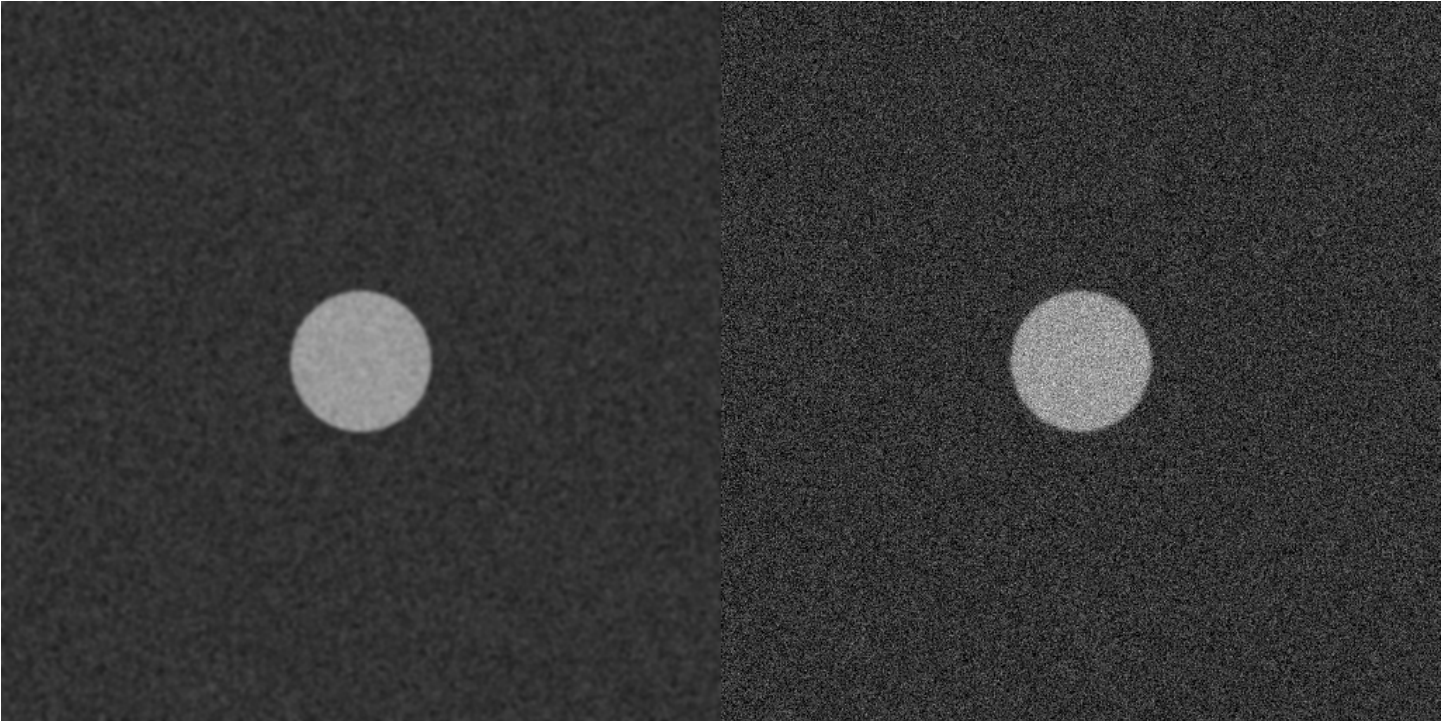
What is relationship between dose and image noise for CT? Give equation or explain in words.

Tie this all together, what are the most difficult types of patients to scan and why?

How would patient size affect the CT protocol?

Scenario 2 - Sharpness

Which image is sharper?



Measure sharpness in the different scan modes

Scan Description	Focal Spot	Grid size	Kernel	mA	Standard Dev LP	Standard Dev Background	Sharpness

Open the Resolution or Contrast images, focus on the central ROI. Score texture from 1 (fine-grained) to 5 (coarse/blotchy or plastic-like).

