Chapter 9

Scatter Radiation and Its Control

Learning Objectives

- List and explain two types of interactions between radiation and matter that produce scatter radiation
- Explain the problems caused by scatter radiation in radiography
- List factors that affect the quantity of scatter radiation fog on a radiograph
- Identify scatter radiation fog on a radiograph

Learning Objectives (Cont'd)

- List four measures that can be taken to reduce the quantity of scatter radiation fog on radiographs
- List common grid ratios and state the appropriate application of each

Learning Objectives (Cont'd)

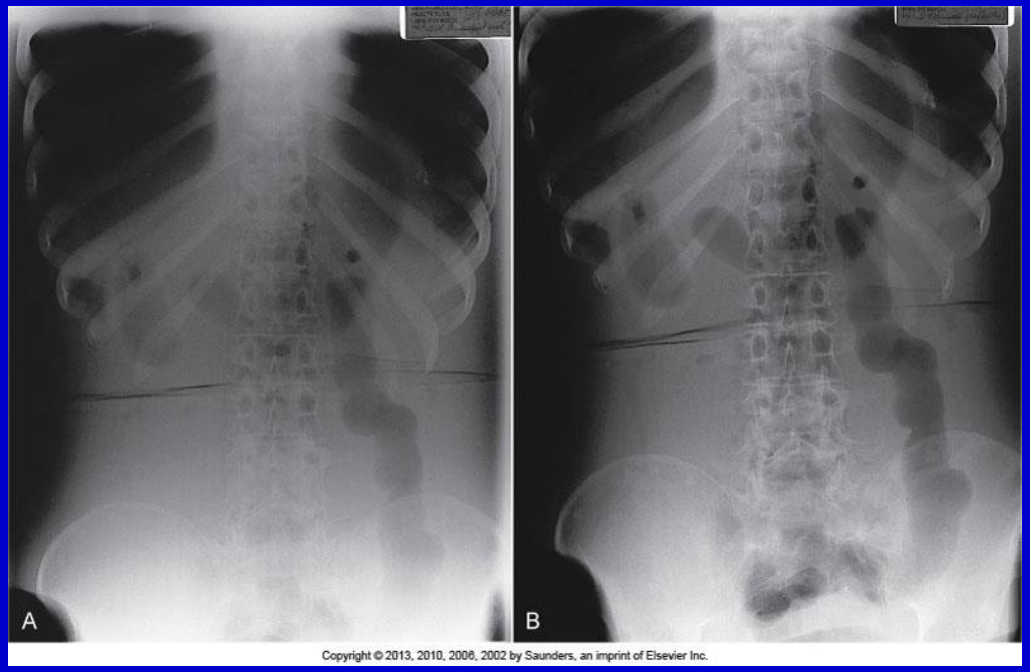
- Define what is meant by *grid cutoff* and list four causes of this phenomenon
- Explain the difference between a Bucky and a stationary grid
- State the criteria for determining whether grid use is appropriate

Scatter Radiation

- Refers to x-rays that expose the IR but do not contribute to image formation
- Produced by x-ray interaction with the:
  - Patient
  - X-ray table
  - Cassette
  - Other objects in the path of the x-ray beam
- Interactions may be termed:
  - Compton effect
  - Photoelectric effect

Effects of Scatter Radiation

- Increased density (fog)
- Decreased contrast resulting in more gray shades
- Reduced visibility of detail

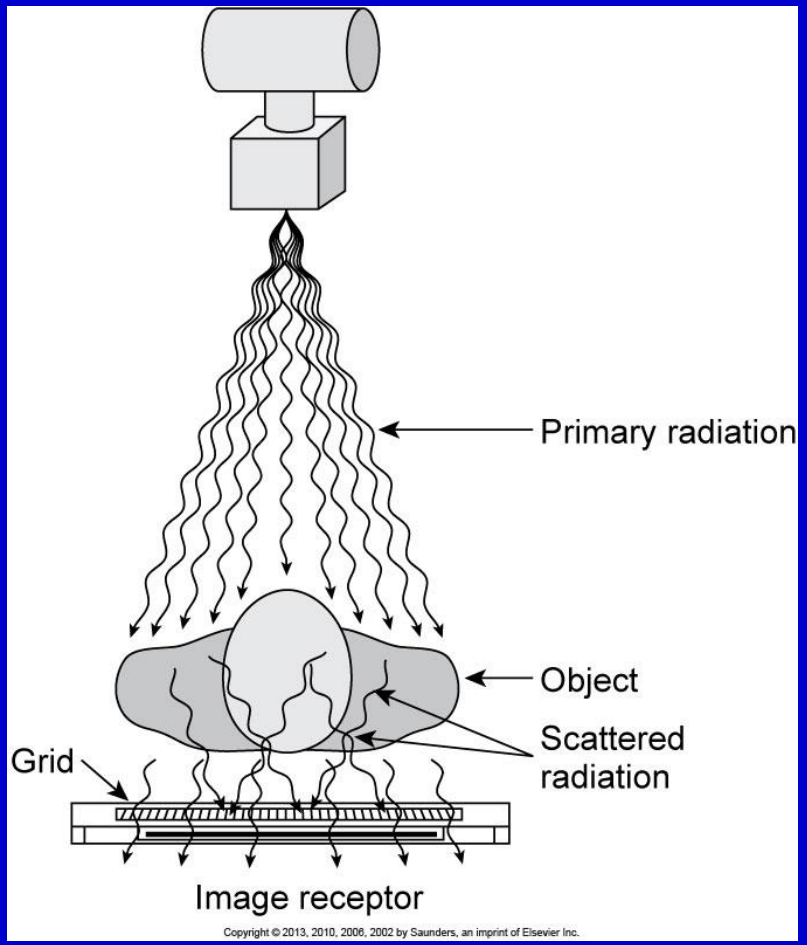


Factors Affecting Quantity of Scatter Radiation

- The amount of scatter radiation increases with increases in:
  - Tissue volume or thickness
  - Tissue density (atomic number)
  - Kilovoltage
  - Wider collimation
- Control scatter radiation by:
  - Limiting x-ray field size to area of interest
  - Using an appropriate kilovoltage
  - Using a grid

Grids

- Placed between the patient and IR to absorb scatter radiation
- Composed of alternating strips of lead and radiolucent interspace material
- May be moving or stationary

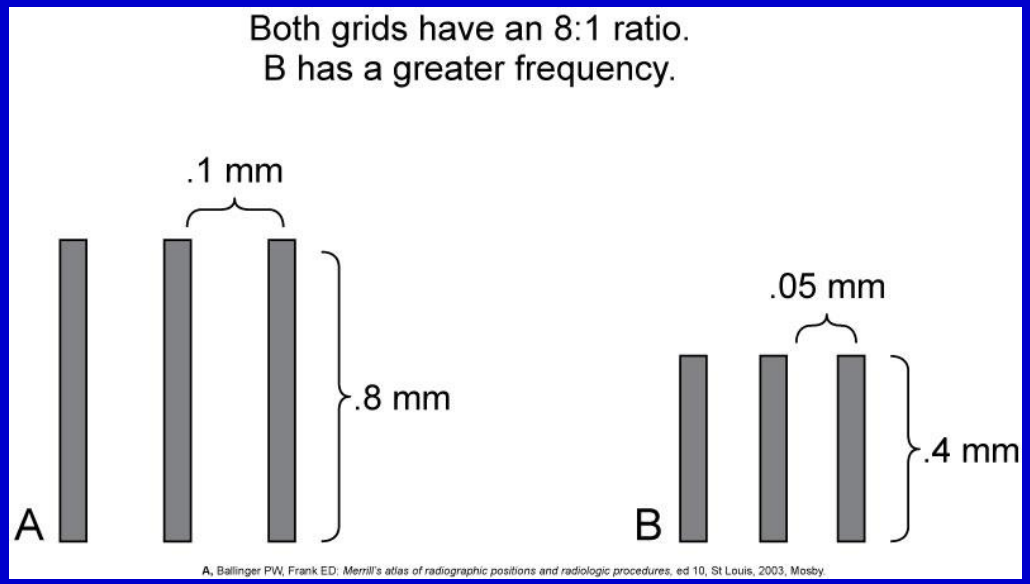


Grid Frequency and Radius

- Frequency refers to the distance between lead strips
  - Frequency ranges between 60 and 196 lead lines per inch
- Radius refers to the alignment or focusing of the lead strips to diverging primary x-ray beam

Grid Ratio

- Refers to the ratio of the height of the lead strips to the distance between them
- Absorption of scatter radiation increases as grid ratio increases



Grid Cutoff

- Misaligned grids result in:
  - Visible grid lines and decreased density caused by absorption of the primary beam
- Grid misalignment includes:
  - Angling the x-ray tube toward one side of the grid
  - Off-centering the x-ray tube
  - Placing the grid off-level
  - SID outside grid focal range
  - Placing grid upside down

Specialty Grids

- Parallel
  - Lead strips are parallel to each other
  - Use when a long SID is necessary
- Crosshatch or crossed
  - Two sets of lead strips that are at right angles
  - More likely to produce grid cutoff

Summary

- Scatter radiation refers to x-rays that expose the IR but do not contribute to image formation
- Scatter radiation is produced when x-rays undergo a Compton, or photoelectric interaction with matter
- Increased density from scatter radiation results in lower contrast and loss of resolution

Summary (Cont'd)

- The effects of scatter radiation can be controlled by limiting x-ray field size to area of interest, using an appropriate kilovoltage, and using a grid
- Grids are manufactured with different ratios

Summary (Cont'd)

- As grid ratio increases, the absorption of scatter radiation also increases
- Misalignment of a grid may result in visible grid lines and a loss of density or grid cutoff
- General purpose grids are typically focused to the SID
- Specialty grids include parallel and crosshatch