

IMAGING OBESITY

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OBJECTIVES

- Define obesity in terms of BMI.
- Explain obesity trends in the U.S. and California.
- Identify medical imaging equipment suited for bariatric patients.
- Discuss alternatives available for imaging obese patients.
- Determine dose reduction strategies for obese patients in diagnostic imaging and fluoroscopy.

DEFINITION OF OBESITY

- The CDC defines obesity in the following ways:

BMI	Classification
<18.4	Underweight
18.5-24.9	Healthy weight
25.0-<30	Overweight
30 and above	Obese

*BMI only takes height and weight into account (not muscle mass or body fat percentage), but it has been recognized as an effective tool in defining weight on a population basis. BMI shows moderate correlation with other more accurate tests of body fat.

<https://www.cdc.gov/obesity/adult/defining.html>



<https://www.cdc.gov/obesity/data/prevalence-maps.html>

RECENT DATA

- 2017-Education
 - Obesity is inversely proportional to education level
 - The lowest level of self-reported obesity is in college graduates (22.7%) (CDC, 2018)
 - The highest level of self-reported obesity is in those with less than a high school diploma (35.6%) (CDC, 2018)
- 2017- Age
 - Young adults are half as likely as middle aged adults to be categorized as obese (CDC, 2018)
 - 18-24 yrs old= 16.5%; 45-54 yrs old= 35.8% (CDC, 2018)
- Ethnicity-
 - Higher prevalence in non-Hispanic black adults (38.4%) and Hispanic adults (32.6%) [as compared to non-Hispanic white adults (28.6%)] (CDC, 2018)

DISEASES LINKED TO OBESITY

- Coronary Heart Disease
- Type 2 diabetes
- Hypertension
- Hypercholesterolemia
- Stroke
- Liver disease
- Gallbladder disease
- Sleep apnea
- Respiratory problems

LIMITATIONS OF EQUIPMENT

- Physical limitations
 - Table weight limits
 - Table width
 - Gown sizes
 - Contrast dosages
- Physics limitations
 - kVp limitations
 - Digital imaging calls for higher kVp

RADIOGRAPHY TABLES

- Table weight limits
 - Del Medical- 800, 700, 650, 500 lbs.- fully extended
 - GE Bariatric Table- 882 lbs.- static (GE Discovery XR646)
 - Dynamic- 705 lbs
 - Philips- 496 lbs (Digital Diagnost)
 - Siemens- 617 lbs static, 441 lbs otherwise
- Table width-
 - Del Medical- 26", 32", 36"
 - GE Bariatric Table- 36.61"
 - Philips- 29.5", up to 33.5"
 - Siemens- 31.5"



FLUOROSCOPY TABLES

- Table weight limits
 - Del Medical Apollo DRF- 626 lbs, 507 lbs dynamic (up from Apollo, 440 lbs)
 - Available with optional "open table top" allowing 4-side access to patient
 - GE Precision 600FP- 600 lbs (static only)
 - Juno DRF- 626 lbs in all movements
 - Philips Juno DRF- 626 lbs in all movements (up from Digital Diagnost=496 lbs)
 - 23.6" maximum tabletop to detector housing clearance, 31.5" wide
 - Siemens Luminos DRF Max- 661 lbs, 31.5" wide
- Target-to-panel (target to table top) distance must be at least 12" (CA RHB)
 - 40" SID
 - 28" clearance (average)

PATIENT DOSE

- Digital boasts reduced dose
 - Higher kVp allowable, lower mAs
 - Histograms, Automatic Rescaling, Masking
 - Less repeats on technique alone
 - Large detectors (17"x17")
- Del Medical- contrast optimization, high sensitivity detector
- GE- ¼ the mAs of CR imaging, consistent brightness and contrast (software)
- Philips- UNIQUE- Unified Image Quality Enhancement
- Siemens- enhanced contrast, dynamic noise reduction, "lowest possible dose", filters to reduce does (when detector is not fully covered)

PATIENT DOSE IN FLUOROSCOPY

- Physics review
 - More Ks, more greys
 - Thicker part= higher kVp
 - Increased thickness= more scatter
 - Automatic Brightness Control
 - DAP
 - Skin dose vs. deep organ dose

DOSE REDUCTION IN FLUOROSCOPY

- ABC- delivers the precise dose needed as determined by image quality specs of manufacturer
- Pulsed fluoroscopy
- Filtration
- Keep II close to the patient
- Maintaining minimum SSD
- Consider radiography instead of fluoroscopy
- Staff protection

OTHER EQUIPMENT DESIGNED FOR OBESE PATIENTS

- KangaruWeb™
- Semi-Fowler position
 - Table tilt
 - Risk for respiratory compromise in supine or prone positions, hypoxia
- Increased needle lengths (for interventional and specials)



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