**Imaging Obesity-Kristin Beinschroth, BSRS, R.T.(R), CRT(R)(F)**

* Objectives
1. Define obesity in terms of BMI.
2. Explain obesity trends in the U.S. and California.
3. Identify medical imaging equipment suited for bariatric patients.
4. Discuss alternatives available for imaging obese patients.
5. Determine dose reduction strategies for obese patients in diagnostic imaging and fluoroscopy.
* Definition of Obesity
	+ The CDC defines obesity in the following ways:

\*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.

* 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)

References

* California Department of Public Health. Radiologic Health Branch. (1987, July 18). Fluoroscopic Installations(17 CCR 30307). Washington, DC: U.S. Government Printing Office. Retrieved October 8, 2018 from [https://govt.westlaw.com/calregs/Document/IDADABE10D60611DE88AEDDE29ED1DC0A?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)#co\_anchor\_IB87CD91673784DAFA5FC4A892EDC6363](https://govt.westlaw.com/calregs/Document/IDADABE10D60611DE88AEDDE29ED1DC0A?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default))
* Centers for Disease Control and Prevention. (2016) “Defining Adult Overweight and Obesity”. Page last updated 2016 June 16. Retrieved from <https://www.cdc.gov/obesity/adult/defining.html>
* Centers for Disease Control and Prevention. (2018) “Adult Obesity Prevalence Maps”. Page last updated 2018 September 12. Retrieved from <https://www.cdc.gov/obesity/data/prevalence-maps.html>
* Del Medical (2018). *“*Tables”. Retrieved from <http://www.umgxray.com/tables.asp>
* General Electric Company (2018). “Optima XR646 HD X-ray system powered by Helix”. Retrieved from <https://www.gehealthcare.com/en/products/radiography/fixed-rad-systems/optima-xr646-hd-x-ray-system-powered-by-helix>
* General Electric Company (2018). “Precision 600 FP”. Retrieved from <https://www.gehealthcare.com/en/products/fluoroscopy-systems/precision-600fp>
* Koninklijke Philips (2004-2018). “Digital Diagnost”. Retrieved from <https://www.usa.philips.com/healthcare/product/HC712220/digitaldiagnost-digital-radiography-system>
* Koninklijke Philips (2004-2018). “Juno DRF”. Retrieved from <https://www.usa.philips.com/healthcare/product/HC709020/juno-drf-diagnostic-radiography-fluoroscopy-system>
* Siemens Healthcare GmbH (2016). *RAD TC CM/CS/DS: Elevating tables for radiographic applications.* Retrieved from <https://static.healthcare.siemens.com/siemens_hwem-hwem_ssxa_websites-context-root/wcm/idc/groups/public/documents/download/mda1/mti0/~edisp/data-sheet-rad-tables-02004346.pdf>
* Siemens Healthcare GmbH (2018). *The smart way to invest in remote fluoroscopy: Luminos dRF Max*. Retrieved from <https://www.healthcare.siemens.com/fluoroscopy/over-table-systems/luminos-drf-max/technical-specifications>
* Villa Radiology Systems (2013). *Apollo DRF: DR+RF system with Dynamic Flat Panel Detector.* Distributed by Del Medical. Retrieved from <http://www.umgxray.com/pdf/villaapollodrf.pdf>