

## ACR Update in Nuclear Medicine Accreditation

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### Disclaimer

- ACR physics subcommittee for nuclear medicine accreditation.
- My facility is ACR accredited for Nuclear Medicine and PET.
- I have attempted to provide accurate information. Information on the ACR website will be the most current and correct information.
  - [www.acraccreditation.org](http://www.acraccreditation.org)

### Accreditation Statistics

June 30, 2018				
Modality	Active *		Accredited	
	Facilities	Units	Facilities	Units
NM	3525	5762	3488	5640
PET	1591	1702	1509	1662

\* Active = Accredited + new + under review.

### Changes to the Accreditation Process

In the fall of 2018, all sites (except mammography facilities with screen-film units) will be required to upload images for accreditation.

Visit [www.acraccreditation.org](http://www.acraccreditation.org) to find the most current instructions for uploading images.

### Changes to the NM Accreditation Process

- 7/1/2010 – Only the Data Spectrum Deluxe Phantom will be accepted.
- 8/1/2011 – Data Spectrum Small SPECT phantom approved.
- 9/19/2011 –  $^{201}\text{Tl}$  and  $^{67}\text{Ga}/^{111}\text{In}$  SPECT requirement removed.
- 7/10/2014 – Continuing experience and CME requirements for physicians and physicists.
- 6/23/16 – Added ABR MOC to the existing CEU requirements.

### Some Minor Tweaks

- Removed recon method from clinical data form.
- Added alternative reconstruction to phantom form.
- Annual tests
  - Count rate performance
    - Maximum is the only requirement
  - Formatter was removed
- Adding new exams

Nuclear Medicine Clinical Exams Required by ACR		
Module 1: Planar	Module 2: SPECT	Module 3: Cardiology
Required Studies		
<ul style="list-style-type: none"> <li>Whole body or spot bone</li> </ul>	<ul style="list-style-type: none"> <li>Bone SPECT</li> </ul>	<ul style="list-style-type: none"> <li>SPECT myocardial perfusion</li> </ul>
Select one additional study for each module		
<ul style="list-style-type: none"> <li>Bone scan*</li> <li>Hepatobiliary</li> <li>Perfusion lung</li> <li>MUGA</li> <li>Gallium *</li> <li>Octreotide*</li> <li>Thyroid</li> <li>Gastric Emptying</li> <li>Renal</li> </ul>	<ul style="list-style-type: none"> <li>Bone</li> <li>Brain</li> <li>Gallium</li> <li>Hepatic blood pool</li> <li>Liver</li> <li>Octreotide</li> <li>Myocardial perfusion               <ul style="list-style-type: none"> <li>Must apply for Nuclear Cardiology if this is used.</li> </ul> </li> <li>Parathyroid</li> <li>MIBG</li> </ul>	<ul style="list-style-type: none"> <li>MUGA</li> <li>Myocardial perfusion</li> <li>Gated SPECT</li> </ul>
* Whole body or spot		

## PET Clinical Exams

- 2 PET clinical exams for each module
- One normal and one abnormal
- Modules
  - Oncology
    - Coronal only
    - No fused images
  - Brain
    - Transaxial, sagittal, and coronal
    - Attenuation correction
  - Cardiac
    - AHA/ACC standard orientation

## Works in Progress

- PET SUV Analysis
  - Currently not failing systems for SUV out of range.
    - Reviewing SUV statistics
    - Wide range of values
  - Plan is to start using SUV as a pass/fail criteria.
- PET/MR QC and SUV ranges
  - Have committee members with PET/MR reviewing QC requirements.
  - Looking at data for SUV values.
  - Can submit the PET data for accreditation.

## QC and Phantom Data Scored by the ACR for Accreditation

Module 1 Planar	Module 2 SPECT	Module 3 Myocardial Perfusion	Module 4 PET
<ul style="list-style-type: none"> <li>Planar uniformity</li> <li>Planar resolution</li> </ul>	<ul style="list-style-type: none"> <li>Planar uniformity</li> <li>Planar resolution</li> <li>SPECT               <ul style="list-style-type: none"> <li>Uniformity</li> <li>Resolution</li> <li>Contrast</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Planar uniformity</li> <li>Planar resolution</li> <li>SPECT               <ul style="list-style-type: none"> <li>Uniformity</li> <li>Resolution</li> <li>Contrast</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>PET Phantom               <ul style="list-style-type: none"> <li>Uniformity</li> <li>Contrast</li> <li>Resolution</li> </ul> </li> </ul>

## ACR Approved SPECT Phantom



- Cylindrical phantom
  - Internal radius 10.8 cm
  - Internal length 20 cm
- Lower half
  - 6 pie-shaped sections of Lucite rods.
  - Rod diameters: 4.8, 6.4, 7.9, 9.5, 11.1, and 12.7 mm
- Upper half
  - 6 Lucite spheres
  - Sphere diameters: 9.5, 12.7, 15.9, 19.1, 25.4, and 31.8 mm

## Data Spectrum Small SPECT Phantom

- Approved for:
- D-SPECT
  - GE 530c
  - GE 570c
  - CardiArc
  - maiCam
  - C!
  - P3000
  - ClearVision
  - Neurologica



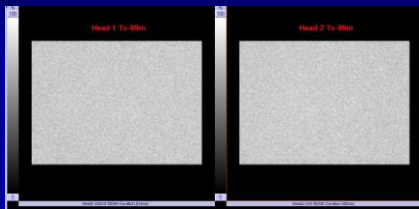
## Data Spectrum SPECT/PET Phantom



## Common Pitfalls

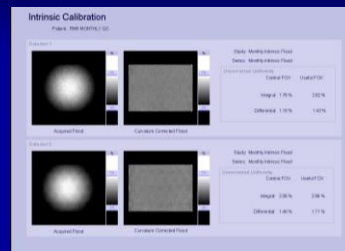
- Incorrect/incomplete paperwork
- Failure to read and then follow instructions
  - Images acquired for the wrong number of counts
    - Uniformity image < or > 10 M counts
    - SPECT phantom < 32 M counts
  - SPECT data not processed properly.
  - PET phantom not filled properly
  - Attenuation correction not applied
- Procedures not in compliance with standards

## Field Uniformity



- 10 Million Counts
- 256 matrix
- 0-100% window
- Clearly labeled
- Grayscale

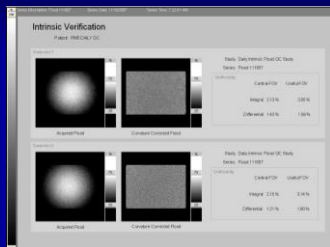
## Uniformity Calibration Flood



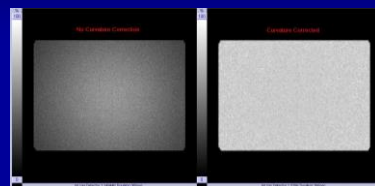
### Problems

- Calibration data
  - 100-200 M cts.
- Uniformity correction is not applied.
- Windowed incorrectly

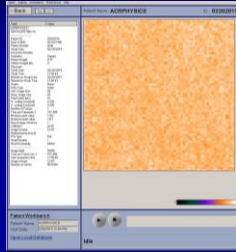
## Windowed Incorrectly



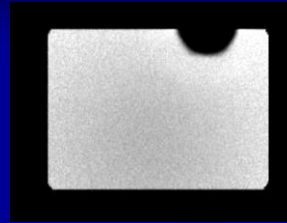
## No Curvature Correction (Particular to Siemens Cameras)



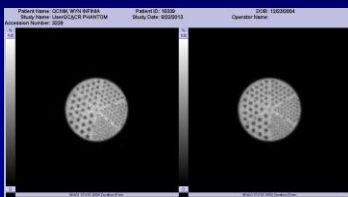
### Color Image



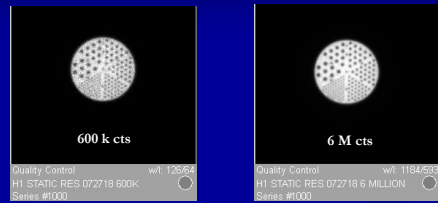
### PMT Failure



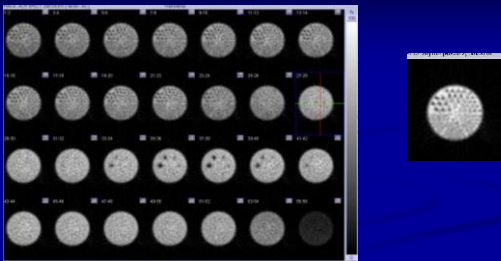
### Planar Resolution Data



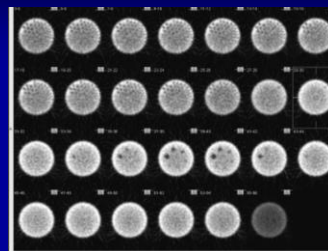
### Planar Resolution Data



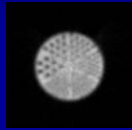
### SPECT Reconstructed Data



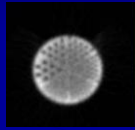
### Without Attenuation Correction



### Summed Resolution Image With and Without Attenuation Correction

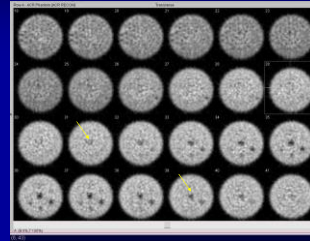


AC

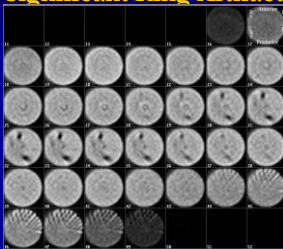


NAC

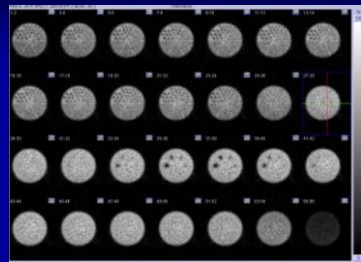
### Severe Non-uniformity Artifact



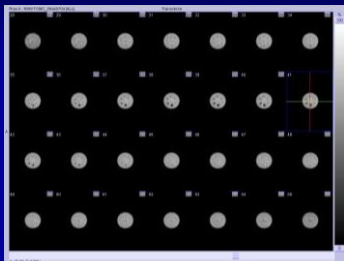
### Phantom Assembled Incorrectly and Significant Ring Artifact



### Images Correctly Sized



### Images too Small



### Images too Large

