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- ***Quality Control for Radiology Board Examinations:***
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- **Gamma camera:**
  - Daily
    - Extrinsic flood field uniformity: Co57 or Tc-99m source, need 5-10 million counts with <5% non-uniformity.
    - Energy window calibration on pulse height analyzer: For Tc-99m need to be within 20% of 140 keV.
  - Weekly:
    - Phantom tests: spatial resolution and linearity
    - Intrinsic flood (intrinsic flood=no collimator, use point source; extrinsic flood=keep collimator in place and use flood source)
- **SPECT/CT:**
  - Weekly:
    - Center of rotation test (look for tuning fork artifact, google for images)
  - Quarterly:
    - Flood source at every angle, look for concentric ring artifacts
    - Phantom test (SPECT the phantom and look for registration and attenuation correction probs)
- **CT from SPECT/CT:**
  - Needs to be zero'd daily (scan air (nothing) and set all receptors to zero to make them uniform)
- **Dose Calibrator:**
  - Daily:
    - Constancy (energy reading must stay within 5%)
  - Quarterly:
    - Linearity (use Tc-99m, need to test from 30 **u**Ci to highest energy used, typically 200 **m**Ci).
  - Annual:
    - Accuracy (use NIST standardized source)
    - Geometry is tested annually **and** at installation/repair (confirms that different volumes of activity and/or container shapes don't change the reading)
- **PET:**
  - Daily:
    - Blank scan using the system transmission source (internal radiation source on older generation scanners for attenuation correction before current PET/CT systems, used to equalize the receptor output and make sure you get an even response in the system)
  - Monthly:
    - Normalization (use use a phantom with a flood source and make sure the lines are straight and not curved/squiggly)

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- **NaI well counter:**
  - Daily:
    - Sensitivity (basically same as consistency)
  - Annual:
    - Efficiency determination (record counts per minute and compare this to the known disintegrations per minute of a standard source)
    - Chi squared test (make sure that actual readings over time give you a poisson distribution/normal curve.)
    - Linearity (use Cs137 and make sure the 602 keV peak is detected accurately)
- **Geiger Muller and Ion Chambers:**
  - Calibrate on receipt, repair and annually (typically send it out, not something done in house)
  - Daily
    - Check consistency with the calibrated source that is typically on the instrument itself
    - Make sure battery is charged.
- **Mammography:**
  - Daily:
    - Check processor (obsolete and don't know what this means but could still be asked, remnant of screen film days)
    - Dark room cleanliness (obsolete but who knows if they will ask this)
  - Weekly:
    - View box conditions/monitor check
    - Phantom test (Very high yield), need to see 4/6 fibers, 3/5 speck groups and 3/5 masses
  - Quarterly
    - Repeat analysis (this is the number of exams the techs had to repeat due to poor positioning, etc)
  - Semi-annual:
    - Compression (ensure you get 25-45 lbs compression per federal law)
    - Dark room fog (this is stray light that can expose films, also obsolete so could be tested)
    - Screen film contrast (same as above)
  - Annual
    - Medical physicist does her equipment assessment once a year to make sure everything is working

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- **Ultrasound:**
  - Annual:
    - Uniformity (hold probe to air and check uniformity of image)
    - Artifact survey
    - System sensitivity (this is how deep probe can image)
    - Display
  - Optional but highly recommended annual tests: spatial resolution, contrast, geometric accuracy, also should make sure measurements are accurate (1 cm measurement is actually 1cm, etc).
- **MRI:**
  - Weekly:
    - Phantom test for contrast, geometric accuracy, artifact analysis
    - Center frequency (are the precessional frequencies accurate?)
    - Table position
  - Annual: like mammography, the medical physicist does all the more complicated tests each year (check RF pulses, B0 uniformity, slice thickness, etc)
- **CT:**
  - Weekly: check noise (blank scan and check HU distribution)
  - Monthly:
    - Phantom to test low contrast resolution and high contrast resolution
    - CT number uniformity (make sure HU numbers are same in center of image as at edge of image)
  - Semi-annual: physicist tests CT every 6 months unlike mammography and MRI which is every year, physicists tests radiation dose output every year