

ACR Appropriateness Criteria® Diagnostic Imaging Procedure Terminology

GENERAL INFORMATION

Diagnostic imaging procedures in the ACR Appropriateness Criteria (AC) documents must adhere to the standardized procedure names as defined by the AC Committee. The goal is to eliminate duplicative procedure names in the AC and to maximize the clarity of the recommendation for the ordering provider. Another goal is eventually to harmonize diagnostic imaging procedures and terminology across all ACR programs through [ACR Common](#).

The goal is to provide clear standard procedure names in order to:

- 1) allow identification of the risks and benefits related to performing the procedure,
- 2) guide ordering providers, and
- 3) estimate a relative radiation level

This creates complexity for standardization because some facilities may have very detailed names while others take a broader approach. The standard procedure name may provide more detail than a “billable” procedure name (ie, the procedure names found in the current procedural terminology codes [CPT]) and is not intended to be used as coding guidance. The standard procedure name may provide less detail than a diagnostic radiology protocol name. Importantly, there should be sufficient information for the ordering provider and radiologist to understand what procedure is recommended without restricting their clinical judgment to reduce potential risks.

- The current list of procedures used in the AC Diagnostic Imaging topics can be found [here](#).
- All new AC procedures must be approved by the AC Committee Chair.
- All AC procedure names must include the modality, body region, and IV contrast use (if applicable).
- Other AC procedure name modifiers such as modality modifier (eg, angiography, myelography,) may be included in the procedure name when those modifiers clarify the procedure and recommendation.

CROSS-SECTIONAL IMAGING PROCEDURES

Contrast Use

When the procedure name for CT, MR, or US specifies contrast use, it generally refers only to intravenous (IV) contrast.

- Other nonintravenous contrast variations (eg, oral, rectal) may be discussed in the narrative and can be included in the procedure name with approval from the AC Committee Chair.
- [Table 1](#) provides additional information on required contrast variations for commonly used cross-sectional imaging modalities.

CT and CTA Terminology and Definitions

For the purposes of distinguishing between CT and CTA, ACR AC topics use the definition in the [Practice Parameter for the Performance and Interpretation of Body Computed Tomography Angiography](#):

“CTA uses a thin-section CT acquisition that is timed to coincide with peak arterial or venous enhancement. The resultant volumetric dataset is interpreted using primary transverse reconstructions as well as multiplanar reformations and 3D renderings.”

All elements are essential: 1) timing, 2) reconstructions/reformats, and 3) 3-D renderings. Standard CTs with contrast also include timing issues and reconstructions/reformats. Only in CTA, however, is 3-D rendering a **required** element. This corresponds to the definitions that the CMS has applied to the Current Procedural Terminology codes.

Ultrasound Terminology and Definitions

- US: This term refers to ultrasound procedures using grayscale only. No IV contrast or Doppler is used.
- US color Doppler: This term refers to ultrasound procedures with color display of Doppler velocities superimposed on a grayscale image.
- US duplex Doppler: This term refers to ultrasound procedures with simultaneous grayscale and/or color plus spectral Doppler.
- Spectral Doppler refers to graphic display of flow velocities versus time. Any use of spectral Doppler will be categorized as US duplex Doppler, whether or not color is used.
- US with IV contrast: This term refers to ultrasound procedures performed with IV contrast.

Power Doppler is NOT a separate procedure. If relevant, the comments in the text may mention power Doppler.

Point of Care Ultrasound will NOT be listed as a separate procedure on the variant tables in the AC topics, because it is considered an extension of the physical exam. It may be briefly discussed in the narrative text for relevant topics.

Certain studies may use color doppler in addition to primarily grayscale US for assessment of non-vascular structures (e.g. twinkle artifact for renal stones, differentiation of solid from cystic lesions, evaluation for soft tissue inflammation, detection of ureteral jets). Color Doppler in such settings is not used for flow or vascular velocity evaluation and these studies are still contained within the general US definition.

NUCLEAR MEDICINE PROCEDURES

- When the radionuclide affects the appropriateness recommendations (ie, the risks or benefits of the procedure), it will be included in the procedure name listed on variant table(s) (eg, procedures using iodine radionuclides). This is a very rare situation, and the nuclear medicine expert assigned to the AC topic will determine when the radionuclide should be included in the procedure name for that topic.
- The procedure names listed on the variant tables use the term “scan” (rather than scintigraphy) for nuclear medicine procedures using gamma cameras.
- The full name for all procedure(s), including the radiopharmaceutical(s), will be included in the AC topic narrative. If multiple radiopharmaceuticals can be used, the most commonly used radiopharmaceutical will be identified.
- If more than one radionuclide can be used for a nuclear medicine procedure and the Relative Radiation Level (RRL) assignment varies depending on the radionuclide, the most commonly used radionuclide for the procedure determines the RRL assignment.

[Table 2](#) provides additional information about the terminology and body areas for nuclear medicine procedures.

Table 1. Contrast Variations

Procedure	Terminology	Possible Contrast Variation(s)	Required contrast variations
Computed tomography	CT	<ul style="list-style-type: none"> • with IV contrast • without IV contrast • without and with IV contrast 	<ul style="list-style-type: none"> • with IV contrast • without IV contrast • without and with IV contrast
Computed tomography with 2-4 phases done during contrast administration	CT multiphase	<ul style="list-style-type: none"> • with IV contrast 	<ul style="list-style-type: none"> • with IV contrast
Computed tomography with perfusion imaging	CT perfusion	<ul style="list-style-type: none"> • with IV contrast 	<ul style="list-style-type: none"> • with IV contrast
Computed tomography angiography	CTA	<ul style="list-style-type: none"> • with IV contrast • without and with IV contrast 	<ul style="list-style-type: none"> • with IV contrast
Computed tomography urography	CTU	<ul style="list-style-type: none"> • without and with IV contrast 	<ul style="list-style-type: none"> • without and with IV contrast
Computed tomography venography	CTV	<ul style="list-style-type: none"> • with IV contrast 	<ul style="list-style-type: none"> • with IV contrast
Magnetic resonance imaging	MRI	<ul style="list-style-type: none"> • with IV contrast • without IV contrast • without and with IV contrast • without and with hepatobiliary IV contrast (for specified GI topics) 	<p>All topics except neuro:</p> <ul style="list-style-type: none"> • without IV contrast • without and with IV contrast <p>Neuro topics:</p> <ul style="list-style-type: none"> • with IV contrast • without IV contrast • without and with IV contrast
Magnetic resonance urography	MRU	<ul style="list-style-type: none"> • without and with IV contrast • without IV contrast 	<ul style="list-style-type: none"> • without and with IV contrast
Magnetic resonance angiography	MRA	<ul style="list-style-type: none"> • with IV contrast • without IV contrast • without and with IV contrast 	<p>All topics except neuro:</p> <ul style="list-style-type: none"> • One contrast variation required <p>Neuro topics:</p> <ul style="list-style-type: none"> • with IV contrast • without IV contrast • without and with IV contrast
Magnetic resonance venography	MRV	<ul style="list-style-type: none"> • with IV contrast • without IV contrast • without and with IV contrast 	<p>All topics except neuro:</p> <ul style="list-style-type: none"> • One contrast variation required <p>Neuro topics:</p> <ul style="list-style-type: none"> • with IV contrast • without IV contrast • without and with IV contrast
Mammography	Mammography	<ul style="list-style-type: none"> • with IV contrast 	None required.
Ultrasound	US	<ul style="list-style-type: none"> • with IV contrast 	None required. If “US with IV contrast” is included, the basic US exam must also be included.

Table 2. Nuclear Medicine Procedures

Procedure	Terminology	Body Areas	Example
PET/CT*	[Chemical molecule of the radiopharmaceutical] [PET/CT] [body area]	<ul style="list-style-type: none"> • Whole body • Skull base to mid-thigh • Brain • Heart 	FDG-PET/CT whole body
PET/MRI	[Chemical molecule of the radiopharmaceutical] [PET/MRI] [body area]	<ul style="list-style-type: none"> • Whole body • Skull base to mid-thigh • Brain • Heart 	FDG-PET/MRI whole body
PET	[Chemical molecule of the radiopharmaceutical] [PET]	<ul style="list-style-type: none"> • Breast 	FDG-PET breast dedicated
SPECT or SPECT/CT**	[SPECT or SPECT/CT] [body area]	<ul style="list-style-type: none"> • Whole body • Brain • Heart • Specific body area (eg, pelvis) 	SPECT or SPECT/CT pelvis
Bone Scan	[Bone scan] [Body area]	<ul style="list-style-type: none"> • Whole body • Specific body area (eg, knee) 	Bone scan whole body
3-Phase Bone Scan	[3-phase bone scan] [Body area]	<ul style="list-style-type: none"> • Whole body • Specific body area (eg, knee) 	3-phase bone scan knee
Other nuclear medicine procedures	[Procedure] [Body area] or [Radionuclide] [Procedure] [Body area]	<ul style="list-style-type: none"> • Specific body area 	V/Q scan lung I-123 uptake scan neck

* For the CT component of “PET/CT” examinations, it is assumed that a lower dose CT (compared to diagnostic CT) is used for anatomic localization and attenuation correction. For adults, the typical CTDIvol = [2-4] mGy and the effective dose estimate is 3-6 mSv.¹ For pediatric examinations, the typical effective dose estimate is 1-2 mSv.^{2,3}

**For “SPECT or SPECT/CT” examinations, dose from the radiopharmaceutical is used to determine RRL and any CT dose is not included. These examinations are performed much more frequently without CT than with CT. When CT is used, a lower dose CT (compared to diagnostic CT) is typically used for anatomic localization and attenuation correction, and the scan range is more limited than in most PET/CT examinations.

¹ <https://www.imagewisely.org/Imaging-Modalities/Nuclear-Medicine/Optimizing-Oncologic-FDG-PETCT-Scans>

² Brady SL, Shulkin BL. Ultralow dose computed tomography attenuation correction for pediatric PET CT using adaptive statistical iterative reconstruction. Med Phys 2015;42:558-66.

³ Brady SL, Shulkin BL. Dose optimization: a review of CT imaging for PET attenuation correction. Clinical and Translational Imaging 2017;5:359-71.