

Appendix 1: CT Quality Score

For this study a minimum image data quality of the underlying CT image data is required. The image data quality is measured by applying a scoring scheme to a number of quality criteria and summing individual score values to a total image quality score. In addition, mandatory requirements are specified for each of the individual criteria.

For a case to be included in the study, the following conditions must be met:

- The case is not rejected by one of the scoring criteria.
- All mandatory requirements must be met.
- The sum of scores does not exceed 4.

The following table defines the individual mandatory requirements, quality criteria and score values.

Scan range:	Must cover the complete pancreas and tumor
Score = 0:	From top of liver to top of pelvis or bottom of pancreas and tumor, whatever is more caudal
Score = 1:	Pancreas and tumor completely covered, but not full range as required for score = 0
Reject:	Pancreas or tumor not completely covered
Slice overlap:	Slice thickness must not be smaller than slice spacing, overlap must not exceed 50%. <i>Remark: Slice overlap = slice thickness / slice spacing - 1</i>
Score = 0:	$0 \leq \text{slice overlap} \leq 0.3$
Score = 1:	$0.3 < \text{slice overlap} \leq 0.5$
Reject:	Slice thickness < slice spacing or slice overlap > 0.5
Slice spacing (arterial phase):	Must be between 0.625 mm and 1.5 mm. Series with slice spacing below 0.625 mm will be upsampled by factor 2.
Score = 0:	$0.625 \text{ mm} \leq \text{slice spacing} \leq 1.0 \text{ mm}$
Score = 1:	$1.0 \text{ mm} < \text{slice spacing} \leq 1.5 \text{ mm}$
Reject:	Slice spacing above 1.5 mm
Slice spacing (venous phase):	Must be between 0.8 mm and 1.7 mm. Series with slice spacing below

phase):	0.8 mm will be upsampled by factor 2.
Score = 0:	0.8 mm ≤ slice spacing ≤ 1.25
Score = 1:	1.25 < slice spacing ≤ 1.7
Reject:	Slice spacing above 1.7 mm
Image noise (arterial phase):	Image noise in arterial phase, measured as standard deviation in ROI of liver parenchyma not including vessels or lesions, must not exceed 35 HU
Score = 0:	Image noise ≤ 20 HU
Score = 1:	Image noise ≤ 35 HU
Reject:	Image noise > 35 HU
Image noise (venous phase):	Image noise in venous phase, measured as standard deviation in ROI of liver parenchyma not including vessels or lesions, must not exceed 35 HU
Score = 0:	Image noise ≤ 20 HU
Score = 1:	Image noise ≤ 35 HU
Reject:	Image noise > 35 HU
Arterial vessel contrast:	Arterial contrast must be ≥ image noise level, but at least 20 HU <i>Remark: Arterial contrast = difference in mean density between major arteries and liver parenchyma</i>
Score = 0:	Arterial contrast ≥ maximum of 30 HU and 1.5 x image noise
Score = 1:	Arterial contrast ≥ maximum of 20 HU and image noise
Reject:	Arterial contrast < maximum of 20 HU and image noise
Venous vessel contrast:	Venous contrast must be ≥ image noise level, but at least 20 HU <i>Remark: Venous contrast = difference in mean density between major veins and liver parenchyma</i>
Score = 0:	Venous contrast ≥ maximum of 30 HU and 1.5 x image noise
Score = 1:	Venous contrast ≥ maximum of 20 HU and image noise
Reject:	Venous contrast < maximum of 20 HU and image noise

Breathing or motion artifacts:	Breathing or motion artifacts must not obscure relevant vascular bifurcations
Score = 0:	No visible breathing or motion artifacts
Score = 1:	Breathing or motion artifacts visible, but all relevant vascular bifurcations can be identified
Reject:	Breathing or motion artifacts obscure relevant vascular bifurcations
Metal artifacts	Pancreas and surrounding region must not be affected by metal artifacts. Metal artifacts are only considered within the relevant scan range, i.e. from top of liver to top of pelvis (see above).
Score = 0:	No metal artifacts within relevant scan range
Score = 1:	Visible metal artifacts within scan range, but not affecting pancreas or surrounding region
Reject:	Visible metal artifacts affecting pancreas or surrounding region
Additional mandatory requirements	
Gantry tilt:	No gantry tilt allowed (gantry tilt = 0°)
Matrix size:	Matrix size must be 512 x 512 or larger
Pixel spacing:	Pixel spacing must be constant within each image series