

LDCT Acquisition Guidelines



Australian Government

NATIONAL
LUNG CANCER
SCREENING
PROGRAM



The Royal Australian
and New Zealand
College of Radiologists®



ANZSTR
Australian and New Zealand
Society of Thoracic Radiology

LDCT Acquisition Guidelines - National Lung Cancer Screening Program

Low Dose Chest CT for the National Lung Cancer Screening Program		
Anatomical: Participant related		
Parameter	Specification	Remarks
Positioning	<ul style="list-style-type: none"> Participant is supine and placed in iso-centre of the gantry Both arms are positioned above the head If a participant is unable to elevate arms, ensure a necessary and appropriate increase in dose to maintain image quality Remove any items outside the patient which could produce image artefacts, such as jewelry 	Improper centring should be avoided, as this would affect image quality in the low dose CT scan and can affect dose modulation.
Breathing instruction	<ul style="list-style-type: none"> Breath-hold at maximal inspiration 	Give proper breathing instruction prior to commencement of the CT acquisition.
CT gantry tilt	<ul style="list-style-type: none"> No gantry tilt 	
Scanning mode	<ul style="list-style-type: none"> Helical 	
Localiser (scout/topogram) image	<ul style="list-style-type: none"> Should be restricted to only the chest 	Image should be inspected for external objects.
Anatomical coverage	<ul style="list-style-type: none"> Entire lung volume from apices to bases 	Careful planning to limit the anatomical coverage to only the lungs. Avoids unnecessary increase in radiation dose. Excess scan range can generate additional findings in other organs of no clinical value.

Scan duration/acquisition time	<ul style="list-style-type: none"> • ≤ 10 seconds 	Acquisition time ≤ 10 second can be achieved with current modern ≥ 64 multi-detector row CT scanners using appropriate pitch. Most people in the community are able to cope with ≤ 10 second breath-hold requirements.
Display field of view (FOV)	<ul style="list-style-type: none"> • 1 cm beyond the rib cage 	Decreasing display FOV, when possible. Results in smaller voxel size and better volumetry.
Radiation Dose		
Radiation dose	<ul style="list-style-type: none"> • CTDIvol ≤ 3.0 mGy but lower doses will be achievable with some equipment; ideally ≤ 1.0 mGy where equipment is capable 	Dose is estimated using the 32cm diameter CTDI phantom. The maximum allowed CTDIvol dose of 3.0 mGy for an average size patient has been determined by the Medical Services Advisory Committee and is specified in the Medicare Benefits Schedule for screening LDCT.
Acquisition Protocol		
Scan Parameter	Parameter Specification	Comments
Scanner type	<ul style="list-style-type: none"> • Ideally multidetector CT with 64 or more detector rows to minimise breath-holding time and motion artifact 	
Contrast	<ul style="list-style-type: none"> • No IV contrast 	
kVp	<ul style="list-style-type: none"> • Generally 100 to 120 kVp 	Consider 100 kVp for smaller participant body habitus to optimise radiation dose and improve contrast resolution.

Tube current (mA)	<ul style="list-style-type: none"> Should be set in combination with kVp and pitch 	
Adjustment in scanner output for participant size	<ul style="list-style-type: none"> Using tube current modulation and beam-hardening filtering Noise level should ensure diagnostic quality of lung parenchyma and accurate volumetric measurement 	Use of organ dose modulation is recommended where available.
Maximum tube rotation time	<ul style="list-style-type: none"> Ideally ≤ 0.5 seconds 	Tailored to achieve minimum acceptable image quality.
Pitch (IEC definition)	<ul style="list-style-type: none"> Dependent on machine technology, typically less than 1.2 for single source scanners; high pitch mode can be used for dual source CT scanners Pitch should be optimised in order to achieve the best resolution with the lowest optimal dose and artifact 	Set with other technical parameters and image quality expectations to achieve as low as reasonably achievable radiation dose.
Reconstructed image width for transverse, sagittal and coronal images	<ul style="list-style-type: none"> Optimally 1.00 mm but up to 1.25 mm if the scanner cannot accommodate thinner slice reconstructions 	
Slice interval	<ul style="list-style-type: none"> ≤ 1.00 mm 	
Reconstruction filters/algorithms	<ul style="list-style-type: none"> Generally, preset by the CT manufacturers and selected according to the practice requirements 	Typically, body (soft tissue) and lung filters/algorithms. Refer to CT manufacturers' recommendations and volumetry software requirements.
Reconstruction algorithm	<ul style="list-style-type: none"> Ideally iterative and/or deep learning image reconstruction 	
Image Analysis		
Window width (WW)/ Window level (WL)	<ul style="list-style-type: none"> Lung and mediastinum 	
Viewing	<ul style="list-style-type: none"> Soft copy reading with provision for multiplanar reformats and Maximum Intensity Projections 	Routine use of MIPs and multiplanar reformats.

The American Association for Physicists in Medicine provides illustrative manufacturer-specific protocols at <https://www.aapm.org/pubs/ctprotocols/documents/lungcancerscreeningct.pdf>. These can be reviewed to aid protocol development.

Note that these may still require local optimisation for image quality and do not necessarily represent doses as low as reasonably achievable. Individual judgement is required at the practice level.

Changes to this document

The College may amend this document at any time and will ensure that future amendments comply with applicable law.

Version Control

Version	Author	Reason/description of change	Date
1.0	ANZSTR Technical Subcommittee		

Related documents

The LDCT Acquisition Guidelines is one of a number of reporting documents required for the National Lung Cancer Screening Program which will launch in July 2025. All documents below have been developed specifically for the program and will be published on the RANZCR National Lung Cancer Screening Program web page: [National Lung Cancer Screening Program \(NLCSP\) | RANZCR](#)

Title	Scope i.e. what does it cover
Structured Clinical Radiology Report	Structure for written reporting of LCS LDCT
Nodule Management Protocol	Guidelines for reporting and management of nodules
Additional Findings Guidelines	Additional findings (AFs) on LCS are defined as low-dose CT findings unrelated to the primary purpose of identifying lung cancer
Safe Use of Volumetry Software and AI/CAD Software in the NLCSP Australia	Use of volumetry for lung nodule management

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References

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