

STANDARDS FOR DIAGNOSTIC IMAGING

CT TECHNIQUES



STANDARD CT TECHNIQUES

INTRODUCTION:

These standards are only intended as a guide. It is understood that different radiologists will have different preferred methods for performing different scans, with different rationales, in a wide variety of clinical settings, and these should take precedence. It is also understood that CT scanners of different makes and models may also need differing protocols to be employed, and that as time passes technology and medical knowledge will change, also leading to changed protocol planning.

College of Physicians and Surgeons of Saskatchewan and Diagnostic Imaging Network representatives have instigated a directive that all Medical Imaging facilities with CT departments should include standard protocols for CT in their protocol manuals. The following are suggested techniques for a relatively basic CT scanner. These could be used as a starting point for an individual department's own protocols, or as a set of default standards. While it is hoped and strongly urged that CT scans should NOT be performed when a consulting/supervising radiologist is absent, unless another radiologist has first been consulted (say, for tele-radiological coverage to a remote site), it is possible that the protocols below might be a useful guide to radiologists and/or CT technologists when instructions cannot be clarified, or in rare circumstances when scanning MUST proceed before radiological consultation is possible.

These protocols are offered only for acute indications; it is assumed that for other indications, dedicated, case-specific techniques would need to be planned, and non-acute timing should allow for this. It is also more likely that there would be an even greater variety of individually preferred methods in these cases (say, a wash-out protocol for an adrenal lesion, or a multi-phase study for a liver mass), and as such, a single set of guidelines would become fairly meaningless.

TRAUMA:

HEAD: 2.5x2.5 post. fossa, 5x5 above to vertex; non-helical axials; + bone recons

FACE: 2.5x1.25 helical; + bone recons; + coronal reformats (poss. Direct coronal scanning if C/spine cleared and if orbital injury of particular concern)

SPINE: 2.5x1.25 helical; + bone recons; + sagittal/coronal reformats

NECK: 2.5x1.25 helical during iv + C (timing depends on indication); + post-processing as for (cervical) spine

CHEST/ABDO/PELVIS: 5x2.5 helical during iv+C (delay about 20 sec for chest and 70 sec for abdo/pelvis; poss. 5 min delay if assessing pelvicalyceal excretion)

BONY PELVIS: 3x1.5 helical; + bone recons; +sag/cor reformats

BONY EXTREMITIES: 1.5x0.6 helical; + bone recons; + sag/cor reformats

ACUTE CHEST (non-traumatic):

PULMONARY EMBOLUS: 2.5x1.25 helical (above arch to bases) with timed iv+C (test dose curve or ROI trigger method at PA – guessing 'around 15-20 sec' only as last resort); + sag/cor reformat slabs 6x3

RESPIRATORY FAILURE: 5x2.5 helical iv+C (test dose curve or ROI trigger method at arch – guessing 'around 25-30 sec' only as a last resort)

AORTIC DISSECTION/ANEURYSM: 5x5 plain, then 2.5x1.25 helical iv+C (test dose curve or ROI trigger method at arch – guessing 'around 25-30 sec' only as last resort); scan from lung apices down through CIA's

ACUTE TOXIC STATE (HIGH SUSPICION OF ABSCESS):

HEAD: 2.5x2.5 post. fossa, 5x5 above to vertex; non-helical axials; plain first, then iv+C (scan post bolus)

NECK: 2.5x1.25 helical during iv+C

CHEST, ABDO/PELVIS: 5x2.5 helical; iv+C; oral +C for abdo/pelvis

CVA/TIA:

2.5x2.5 post. fossa, 5x5 above to vertex; non-helical axials

RAPID DECR. LOC (non-trauma), OTHER ACUTE CNS Sx's:

2.5x2.5 post. fossa, 5x5 above to vertex; non-helical axials; initially plain, then iv+C (scan post bolus)

CENTRAL DISK HERNIATION (bowel or bladder signs):

2.5x1.25 – L2 – Lower Sacrum

OTHER: MUST CALL INTERPRETING RADIOLOGIST FIRST!

Other considerations, really beyond the scope of these protocols, include:

Dural sinus thrombosis – refer to MRI centre unless outweighed by transport problems/risks or other MRI contraindications. Then use helical 2.5X1.25 axials post. fossa, to vertex, 60 sec after bolus iv+C

Peripheral CT Angio for Arterial Occlusion – only if an Interventional Radiologist or Vascular Surgeon available, except perhaps if a negative study would obviate transfer need. All these cases should be discussed with surgeon.

Cardiac CT Angio – only Regina can do this at this time, but likely a future consideration.

Both Periph and Cardiac CT angio would require advanced analysis packages not likely available in non-tertiary centres anyway (could change!)

- 1) Contrast iv (“iv+C) **not to be administered if contraindicated** (including, but not limited to situations of contrast allergy, or renal insufficiency). Adult dose is generally around 100 cc. Pediatric = 1 cc/kg. Injection rates are very variable depending on a machine’s scan speed (wanting contrast to last, say, through the length of an aorta, but also such that one is not still injecting contrast after the scan has ended). The facility for a following saline ‘flush’ will also alter iv contrast volumes and injection rates (as might the site and trustworthiness of the iv access point). In general, for adults, one should use a rate of at least 3 cc/sec, with Pulmonary Embolism studies needing 5-6 cc/sec.
- 2) *axb* means “*a*” mm cuts at “*b*” mm intervals.
- 3) ‘Estimates’ of last-resort contrast injection delay times would need to be lengthened in patients with decreased cardiac output (say, 30 sec instead of 20 sec for a chest CT patient with congestive failure). Distance of iv site from heart will also affect timing (such as a foot iv rather than an antecubital fossa one). Such errors tend to compound each other to the point that best-guess techniques are inadequate when timing is crucial (e.g. in a pulmonary embolus scan).