

BOTH SCANS

Timing	Both scans on the same day where possible.
Position	Supine, neutral head, and the same mouth opening for both scans.
CT slice	0.5–0.625 mm ideal, 0.75 mm acceptable. Avoid above 1 mm.
CT reconstruction	Bone and soft tissue, plus MAR where metal is present. No gantry tilt.
MRI	3D isotropic, 1.0 mm voxel or smaller, distortion correction on.
Coverage	Both scans must share enough common anatomy to register on.
Export	Original thin-slice DICOM, uncompressed or lossless.
Not accepted	Screenshots, JPEG or PNG, reformats alone, lossy-compressed data.

STATE THIS ON THE IMAGING REQUEST

"MRI is intended for MRI-CT registration / image fusion for 3D surgical planning."

CT ACQUISITION

- 1 Cover skull base through mandible, including the surrounding soft tissue.
- 2 Extend beyond the region of interest so that stable bony landmarks are included to register on.
- 3 Use the thinnest slice the scanner offers. Reconstruct at an increment no larger than the slice thickness.
- 4 Acquire contiguously, with no gantry tilt.
- 5 Reconstruct a bone series and a soft-tissue series, plus MAR where restorations, plates or implants are present.
- 6 Send the thin-slice axial source series. Reformats and secondary captures cannot be used for planning.

REGISTRATION IS DRIVEN FROM THE SKULL BASE

Registration is driven from the skull base, not from the whole head. The mandible moves independently of the skull, so an alignment that is correct at the skull base can still be wrong at the mandible — which is where a mandibular resection is planned. This is why the jaw position on the two scans has to match.

IF THE SCAN IS BELOW THIS SPECIFICATION

A scan below this specification does not stop us working. Fusion is still performed, and the case record states the limit: a margin transferred from MRI carries at least half a slice thickness of positional uncertainty before registration error is added. On a 3 mm MRI that is 1.5 mm before anything else. The result is reported as indicative, not dimensional, and it is not used to set a resection margin.

PATIENT POSITIONING

- 1 Supine, head neutral. No rotation and no lateral tilt.
- 2 The mouth opening and mandibular position must be the same on both scans. This is the most common cause of failed fusion in the jaws.
- 3 Use head support or immobilisation to limit movement.
- 4 Remove earrings, piercings and removable dental appliances before both scans.
- 5 Book both scans on the same day where the department can arrange it.

For cranial and midfacial cases, a moderate difference in head position can be corrected during registration. For the mandible it cannot. The mandible is a separate mobile bone, so a difference in jaw position between the two scans cannot be undone afterwards.

MRI ACQUISITION

- 1 Acquire a 3D isotropic or near-isotropic sequence, not a thick 2D multi-slice stack.
- 2 Target 1.0 mm isotropic voxels or smaller through the region of interest.
- 3 Turn on 3D geometric distortion correction and export the corrected series. Vendor names vary: 3D DisCo, Distortion Correction 3D, 2D/3D Distortion Correction.
- 4 Use a higher receive bandwidth where feasible, to reduce distortion.
- 5 Cover the region of interest plus anatomy that overlaps the CT field. Registration depends on that shared anatomy.
- 6 3D T2-weighted isotropic is required. Add 3D T1-weighted fat-suppressed post-contrast isotropic where clinically indicated, and any further sequences the case needs.

DIFFERENT FRAMEOFREFERENCEUIDS ARE EXPECTED

CT and MRI acquired separately will normally carry different FrameOfReferenceUIDs. This is expected and does not prevent fusion. Registration is performed on the underlying spatial geometry, not on matching UUIDs. What matters is that each dataset keeps its own original, unaltered geometry. If a radiology department advises that fusion is not possible for this reason, please contact us — it is a common misunderstanding.