Advanced-Technology QA Consortium
DICOM Workshop:

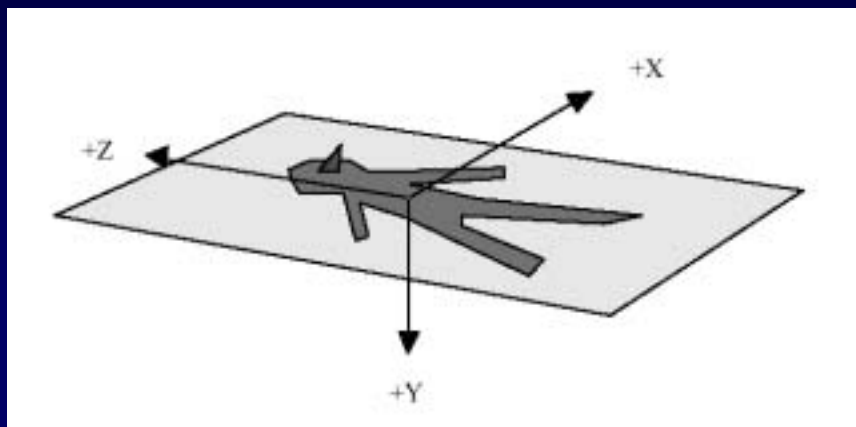# Image IODs

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IODs for Images

- ATC supports the following (single-frame) Image Information Objects:
  - CT Image
  - MR Image
  - US Image
- ATC is investigating support for
  - PET Image

Coordinate Systems

- Primary Image Series defines the patient coordinate system for treatment planning

- For CT and MR Image Series (but not US)

  - Rotation with respect to Patient Coordinate System is specified by direction cosines in Image Orientation (Patient) (0020,0037) .

  - Translation with respect to Patient Coordinate System is specified by vector in Image Position (Patient) (0020,0032).
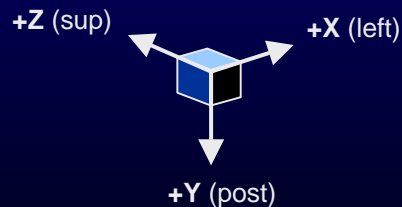
DICOM Patient Coordinate System

+X: to the left side of patient
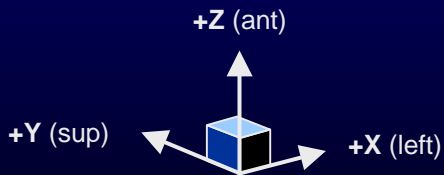
+Y: to posterior of patient
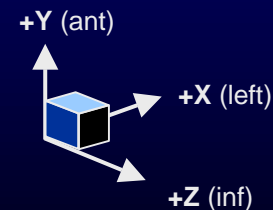
+Z: toward head of patient

Measurements are in mm.

DICOM

+Z (sup)
+X (left)
+Y (post)

Units: mm

IEC-61217

+Z (ant)
+Y (sup)
+X (left)

Units: cm or mm

RTOG Data Exchange

+Y (ant)
+X (left)
+Z (inf)

Units: cm

Image Plane Module

Field	Tag	Type	Comment
Pixel Spacing	(0028,0030)	1	Image row and column spacing
Image Orientation (Patient)	(0020,0037)	1	Direction cosines of image plane with respect to patient

- Row and column spacing **must be equal** (square pixels) for CT.

- Primary image sets from treatment planning systems are anticipated to be un-rotated with respect to the patient coordinate system, i.e., direction cosines are (1,0,0 and 0,1,0). Others are not currently supported.

CT Image Requirements

- Image Rescale parameters are needed to compute Electron Density from CT:
  - Rescale Intercept (0028,1052)
  - Rescale Slope (0028,1053)
- Linkage between planes is via Frame of Reference UID

MR Image Requirements

- Only transverse slices are supported by the ATC for treatment planning data sets.

- Currently, no ATC-supported protocols allow MR images as the primary treatment planning image set.

- If MR Image acquisition parameters are not maintained by the TPS, the following values may be used:

  - Image Type (0008,0008) of DERIVED\SECONDARY\OTHER

  - Scanning Sequence (0018,0020) of RM, i.e., "Research Mode".

  - Sequence Variant (0018,0021) of NONE