

## MR Cervix

### MRI Pelvis W & WO Contrast

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**Contact:** (866) 761-4200, option 1

**Standard uses:** Cervical cancer staging.

**Patient prep:**

- (1) NPO for at least 4 hours prior to study.
- (2) Void before examination.

**Oral contrast:** None.

**Coil:** Phase array body coil.

**Coverage:** Position the coil such that there is good coverage and signal from the uterus.

- Include at least iliac crests to the perineum.

**Intravenous contrast:** Single dose gadolinium @ 2 cc / sec (Gadavist, or MultiHance if Gadavist is unavailable).

**Other:** *If possible, use of endovaginal gel is preferred.*

- Sterile gel is preferred to reduce irritation
  - KY jelly packets used for transvaginal US may be available in the US suite; bacteriostatic surgical lubricant (Surgilube) can also be used, if available

**INSTRUCTIONS:**

- Patient will *self-administer* approximately 30-60 cc of vaginal gel.
- Prior to administration, place 2 blue pads (Chux pads) under the patient – to help retain gel:
  - 1. Place first pad horizontally onto the MR table
  - 2. Place second pad on top of and perpendicular to the first pad
    - Patient will sit on this pad to self-administer
    - This pad should then be pulled between patient's legs after self-administration and taped to anterior pelvis

**NOTES:**

1. Small FOV T2 plane through the cervix is VERY important.
2. Unless otherwise noted, planes are *orthogonal* (to the magnet) axial, coronal, sagittal (i.e., not specifically oriented to an organ).
3. Place a SAT band over the anterior belly fat on *all* sequences.
4. Ensure phase encoding direction is right to left on *all* sequences.

## SUMMARY

1. Localizer
  2. Coronal T2 (Ultra fast SE) non-FS (large FOV)
  3. Axial T1 GRE in/out
  4. Sag T2 (Fast SE) non-FS (small FOV)
  5. Axial T2 (Ultra fast SE) non-FS (large FOV)
  6. Axial T2 (Ultra fast SE) FS (large FOV)
  7. Oblique axial T2 (Fast SE) non-FS (small FOV – to cervix)
  8. Oblique coronal T2 (Fast SE) non-FS (small FOV – to cervix)
  9. Oblique axial T1 FS pre-contrast
  10. Oblique axial T1 FS post-contrast (x3)
  11. Coronal T1 FS post-contrast
  12. Sag T1 FS post-contrast
  13. Axial DWI/ADC
  14. Subtractions (axial x 3)
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### **Sequences:**

1. 3 plane localizer with breath hold
2. Coronal T2 Ultra fast SE (HASTE, SSFSE, FASE) without fat suppression
  - a. Breath hold
    - i. Concatenation/multi-breath hold is less desirable than single breath hold
  - b. FOV: Iliac crests to symphysis pubis.
    - i. Complete front to back coverage (skin to skin)
  - c. Goal parameters
    - i. 7 mm thickness, 25% gap (1.5 mm)
3. Axial T1 GRE in and out of phase
  - a. Iliac crests to symphysis pubis
  - b. Goal parameters
    - i. Slice thickness 4 mm
    - ii. In plane acquired resolution <1 mm
    - iii. Number of averages >= 2
4. Sagittal T2 fast SE (Turbo SE, Fast SE) without fat suppression - small FOV  
***(this is one of the most important sequences)***
  - a. FOV: Should be relatively small (see below) = cover the entire uterus and cervix –  
**Mid-sacrum to the symphysis pubis**  
**Ideal FOV sagittal T2 FSE**



- b. Goal parameters
      - i. Slice thickness 2 mm
      - ii. In plane acquired resolution <1 mm
      - iii. Number of averages  $\geq 2$
      - iv. *Low-threshold to repeat if there is motion***
  
5. Axial T2 Ultra fast SE (HASTE, SSFSE, FASE) without fat suppression
  - a. Large FOV: Iliac crests to symphysis pubis.
  - b. Goal parameters
    - i. Slice thickness 4-4.5 mm
    - ii. In plane acquired resolution <1 mm
    - iii. Number of averages  $\geq 2$
  
6. Axial T2 Ultra fast SE (HASTE, SSFSE, FASE) with fat suppression
  - c. Large FOV = Superior iliac crest to perineum
  - d. Goal parameters
    - i. Slice thickness 4-4.5 mm
    - ii. In plane acquired resolution <1 mm
    - iii. Number of averages  $\geq 2$
  
7. *Oblique* axial T2 fast SE (Turbo SE, Fast SE) without fat suppression - small FOV  
***(this is one of the most important sequences)***
  - a. FOV = Cover entire uterus
    - i. CC extent: At least sacral promontory to below perineum
    - ii. PLANE angulation: Thin slice “true” axial to plane of the CERVIX = **short axis to the CERVIX**
      1. *Call radiologist if you have difficulty, occasionally a double oblique technique will be needed when there is significant rotation of the cervix/uterus*
  - b. Goal parameters
    - i. FOV approximately 200 mm**
    - ii. Slice thickness 3 mm, 0% gap
    - iii. In plane acquired resolution <1 mm
    - iv. Number of averages  $\geq 2$
  
8. *Oblique* coronal T2 fast SE (Turbo SE, Fast SE) without fat suppression - small FOV
  - a. FOV = Cover entire uterus and adjacent structures
    - i. Slices should extend superiorly into bladder and sacrum, covering entire region of interest
    - ii. PLANE ANGULATION: Thin slices “true coronal” to #7. (i.e., in the plane of the CERVIX = **long axis to the CERVIX**)
  - b. Goal parameters
    - i. Slice thickness 3 mm
    - ii. In plane acquired resolution <1 mm
    - iii. Number of averages  $\geq 2$
  
9. *Oblique* axial T1 Ultra fast 3D-GRE with fat suppression (VIBE, LAVA, TIGRE) **pre-contrast**
  - a. Breath hold
    - i. Concatenation/multi-breath hold is less desirable than single breath hold
  - b. FOV: Superior iliac crest through the perineum

- i. Same plane angulation as #7.
  - c. Goal parameters
    - i. Thickness:  $\leq 3$  mm
  
- 10. *Oblique* axial T1 Ultra fast 3D-GRE with fat suppression (VIBE, LAVA, TIGRE) **post-contrast (x3)**
  - a. Breath hold
    - i. Concatenation/multi-breath hold is less desirable than single breath hold
  - b. FOV – as #9.
    - i. Same plane angulation as #7.
  - c. Slice thickness  $\leq 3$  mm
  - d. Timing: **25 sec, 60 sec, 2 min**
  
- 11. Coronal T1 Ultra fast 3D-GRE with fat suppression (VIBE, LAVA, TIGRE) **post-contrast**
  - a. Breath hold
    - i. Concatenation/multi-breath hold is less desirable than single breath hold
  - b. FOV: Cover front to back (skin to skin), including at least from uterus/sacral promontory to perineum
  - c. Slice thickness  $\leq 3$  mm
  - d. Timing: after last axial post in #10, **approx. 3 min delay post injection**
  
- 12. Sagittal T1 Ultra fast 3D-GRE with fat suppression (VIBE, LAVA, TIGRE) **post-contrast**
  - a. Breath hold
    - i. Concatenation/multi-breath hold is less desirable than single breath hold
  - b. FOV: Cover pelvic organs, extending into each femoral head
  - c. Slice thickness  $\leq 3$  mm
  - d. Timing: after coronal #11, **approx. 4 min delay post injection**
  
- 13. Axial DWI/ADC
  - a. FOV: Iliac crests to symphysis pubis.
  - b. Free breathing
  - c. Goal parameters
    - i. DWI: 50/400/800
    - ii. ADC map
  
- 14. Subtraction series: 3 total (axial)

**Radiologist's perspective:**

MRI offers superior soft tissue contrast resolution compared to CT and US, making it an ideal modality for imaging the female pelvis.

This exam is for staging of cervical cancer. The relationship of this tumor to the surrounding parametrium is critical for deciding management by referring physicians, which is why small FOV *oblique* planes are obtained through the cervix. If there are questions about finding optimal obliquity, please contact a body radiologist.