1.5T MRI BODY PROTOCOLS
(Updated 3/26/2018)

General Guidelines

🔹 NEVER hesitate to reach out to a radiologist for guidance!
🔹 Siemens / GE terminology, other abbreviations:
  o HASTE / SSFSE
  o Vibe / Lava
  o TruFisp / Fiesta
  o Breath Hold (BH)
🔹 Abdominal Contrast – full dose by weight, 3ml/sec, following by 20ml normal saline flush
  o Arterial phase is most crucial with liver imaging. Care bolus series should be positioned just inferior to right side diaphragm & immediate post initiated when contrast is seen in descending aorta.
  o Delayed post to be performed at minimum of 5 minutes post injection.
🔹 Always perform T1 FS Axial Pre, even if not contrasted.
🔹 Careful of tight FOVs with the use of iPAT, the combination of the two can lead to artifacts.
  o If using iPAT, must have at least two coil elements on in the phase direction.
🔹 Sedation
  o MRCP – can sedate, but do not give patient oral contract agent.
  o Enterography – do not sedate
  o Defecography – do not sedate

ABDOMEN
T2 HASTE Cor
T1 Axial in & out of phase (7x2)
T2 HASTE Axial (7x2)
T2 FS Axial (7x2)
T1 FS 3D Axial vibe pre
BOLUS FULL DOSE
T1 FS 3D Axial vibe immediate post
T1 FS 3D Axial vibe 2 min post
T1 FS 3D Axial vibe delayed post

NOTE:
  • Subtract the T1 FS Axial vibe pre with the posts & all sequences to Synapse.
  • Send Care Bolus to PACS.

ABDOMEN WITHOUT CONTRAST
T2 HASTE Cor
T1 Axial in & out of phase (7x2)
T2 HASTE Axial (7x2)
T2 FS Axial (7x2)
T1 FS 3D Axial vibe
ABDOMINAL WALL
T1 Axial
T2 FS Axial
T1 Cor
T2 FS Cor
T1 Sag
T2 FS Sag

NOTE: Contrast, if needed: T1 FS Axial pre & post with subtraction. Additional post plane beneficial.
- Always place skin marker.
- Run phase direction to best minimize motion artifact.
- May use STIR for poor FS. Must have optimal FS in region of interest through entire abdominal wall.

ADRENALS INITIAL EXAM
T2 FS Axial
T2 HASTE Axial
T1 Axial in & out of phase (2.5x2.5mm)(3mm @ 1.5T SM/SW/VIL)
T1 Cor in & out of phase
T1 FS 3D Axial vibe pre
CONTRAST FULL DOSE
T1 FS 3D Axial vibe post
T1 FS 3D Axial vibe delayed post

ADRENALS KNOWN MASS / FOLLOW-UP
T2 FS Axial
T2 HASTE Axial
T1 Axial in & out of phase (2.5x2.5mm)(3mm @ 1.5T SM/SW)
T1 Cor in & out of phase
T1 FS 3D Axial vibe

NOTE:
- It is acceptable to only include adrenals if evaluating a known mass. IV Contrast is not needed if the patient has had a previous adrenal MRI for the same mass; it is only needed on the initial study.
- Symphony scanners at San Marcos & Southwood, T1 Axial in & out of phase is set at 3mm.

ANAL SPHINCTER FOR DR. ERNEST GRAVES
T1 Axial (FOV to include full pelvis, 6x1)
T2 Axial (240 FOV, 6x1)
T2 Cor (FOV to include full pelvis, 5x1.5)

NOTE: Consult Dr. Salinas or Dr. Shah for placement of the following sequences.
T2 hires Axial (240 FOV, 2.5x0 through anal sphincter)
T2 hires Cor (240 FOV, 2.5x0 through anal sphincter)
APPENDICITIS DURING PREGNANCY

- Include from mid upper abdomen through pubic symphysis on all scans.

HASTE Axial (4x1)
HASTE Cor (4x1)
HASTE FS Cor
HASTE Sag (4x1)
HASTE FS Axial (4x1)
T1 Axial (in phase)

NOTE: Exam to be reviewed with a radiologist prior to completion.

BONE SURVEY FOR METASTASIS

T1 Cor Upper (480 FOV, 8x0, include orbits to diaphragm)
STIR Cor Upper
T1 Sag Upper (480 FOV, 6x0, spine only, from orbits to diaphragm)
STIR Sag Upper
T1 Cor Lower (480 FOV, 8x0, include diaphragm to femoral heads)
STIR Cor Lower
T1 Sag Lower (480 FOV, 6x0, spine only, from diaphragm to femoral heads)
STIR Sag Lower

NOTE: Only performed MID, QRY, & CIC.

BREAST *3T PREFERRED

T1 3D Axial
STIR Axial
T1 FS 3D Axial Pre
BOLUS FULL DOSE
T1 FS 3D Axial Dynamic Post x4 (4 consecutive measurements at ~ 75 seconds each)
T1 FS or Water Excitation hires 3D Axial post
T1 FS 3D Axial Subtractions: Subtract the pre T1 FS 3D Axial from each post T1 FS 3D Axial Dynamic sequence.

NOTE:
- Pre-menopausal: exam should be scheduled within 7-14 days of the onset of their menstrual cycle. Only with radiologist approval or a new diagnosis of breast cancer may this rule be overlooked.
- Subtract the T1 FS 3D Axial pre from each post.
- T1 FS Axial 2 min delay: SAG MPR (3X1)
- T1 FS Axial 2 min delay: LATERAL MIP (12 images, approx. 15 degrees between, left to right)
BREAST IMPLANT RUPTURE WITHOUT CONTRAST *3T PREFERRED* Always perform as individual / free standing exam.
TIRM WS Axial
TIRM WS COR
LT TIRM WS Sag
RT TIRM WS Sag

BREAST – HOSPITAL PROTOCOL FOR THOSE WITH SEPARATE CAD SYSTEM (NOT FOR ARA USE)
T1 3D Axial
STIR Axial
T1 FS 3D Axial Pre
BOLUS FULL DOSE
T1 FS 3D Axial Posts
T1 FS hires 3D Axial post
T1 FS Sag post *include if not sending to Cadstream

NOTE:
• Pre-menopausal: exam should be scheduled within 7-14 days of the onset of their menstrual cycle. Only with radiologist approval or a new diagnosis of breast cancer may this rule be overlooked.
• Subtract the T1 FS 3D Axial pre from each post.
• T1 FS Axial 2 min delay: SAG MPR (3X1)
• T1 FS Axial 2 min delay: LATERAL MIP (12 images, approx. 15 degrees between, left to right)
• Preferred centering. Center breast in FOV, do not include whole chest.

CHEST (entire chest, not for a chest wall study)
• Check with a Radiologist before performing an MR, may prefer CT

T1 Axial
T1 Cor
T1 Sag
T2 FS Axial (HASTE IR if poor FS)
T2 FS Cor (HASTE IR if poor FS)
T2 FS Sag (HASTE IR if poor FS)
**ENTEROGRAPHY**

- Do not scan on an Espree due to the limited Cor FOV. Include mid liver to mid bladder.

Localizer BH & free breathing (480 FOV)
T2 HASTE Cor (6x.6)
Trufi Cor
T2 HASTE Axial (5x1)
T2 HASTE FS Axial
PD/T2 Axial
Trufi Axial
T1 FS Cor vibe pre (5x0)

2ND ½ GLUCAGON – CONTRAST, HAND INJECT
T1 FS Cor vibe immediate post
T1 FS Cor vibe 90 second post
T1 FS Axial post (5x1)
T1 FS Cor post (6x.6)

**NOTE:**
- Subtract the T1 FS Cor vibe pre from each post vibe. Send the resulting 2 sequences to synapse.
- Scan patient prone if the patient’s condition allows.
- Give ½ of the Glucagon dose at the beginning of the exam & the other ½ prior to contrast injection.
- The patient is required to drink 1 full bottle of Breeza 60, 40, & 20 minutes prior to the exam.
- Do not sedate.

**KIDNEY (tuberous sclerosis)**
T1 Axial in & out of phase (include entire liver through kidneys)

* Following sequences are through kidneys only.
T1 Axial (4x0)
T2 FS Axial
T2 HASTE Axial
T2 HASTE Cor
T1 FS 3D Axial vibe pre (3x0)
BOLUS FULL DOSE
T1 FS 3D Axial vibe immediate post
T1 FS 3D Cor vibe post
T1 FS 3D Axial vibe delayed post

**NOTE:**
- Subtract the T1 FS 3D Axial vibe pre from each post. Send the resulting sequences to synapse.
- Send Care Bolus to PACS.
- Perform routine abdomen protocol for post nephrectomy exams.
**LIVER HEMANGIOMA/LESION**
T2 HASTE Cor
T1 Axial in & out of phase (7x2)
T2 HASTE Axial
T2 FS Axial
T1 FS 3D Axial vibe pre
BOLUS FULL DOSE
T1 FS 3D Axial vibe immediate post
T1 FS 3D Axial vibe 2 min post
T1 FS 3D Axial vibe delayed post

**NOTE:**
- Subtract the T1 FS 3D Axial vibe pre from each post. Send the resulting sequences to synapse.
- Send Care Bolus to PACS.

**LIVER WITH EOVI$T$ IV CONTRAST**
- Consult appropriate Body Radiologist for approval, as needed.

T2 HASTE Axial (must be done pre)
T1 Axial in & out of phase (7x2)
T1 FS 3D Axial vibe pre
T1 3D Axial Dynamic pre (1 measurement)
BOLUS DOSE 0.1ml/kg body weight
T1 3D Axial Dynamic post (3 measurements)
T1 FS 3D Axial vibe post immediate post
T1 FS 3D Axial vibe post 2 min post
T1 FS 3D Axial vibe post 5 min post
T1 FS 3D Axial vibe post 10 min post
T2 HASTE FS Cor post
T2 FS Axial post (repeat with navigator triggered Blade for motion artifact)
T1 FS 3D Axial vibe post 20 min post
T1 FS 3D Cor vibe 20 min post

**NOTE:** Subtract the T1 3D Axial dynamic vibe from each T1 FS 3D Axial vibe post. Send the resulting 7 sequences to Synapse.

**LIVER GAUCHER DISEASE OR LIPIDOSIS**
T1 Cor (8x2mm)
T2 HASTE Cor
T1 Axial in & out of phase (7x2mm)
T2 FS Axial
Heavy T2 Axial (>200 TE)
T2 Axial
T2 HASTE FS Axial (10x0, use this sequence for volume measurement)
LIVER HEMOCHROMATOSIS 1.5T ONLY (iron disorders)

- Do not perform on GE.

T2 HASTE Cor
T1 Axial in & out of phase (7x2)
T1 Axial (TE 2.38) - 7mm thickness, 2mm gap - entire liver
T1 Axial (TE 4.76) - 7mm thickness, 2mm gap - entire liver
T1 Axial (TE 7.14) - 7mm thickness, 2mm gap - entire liver
T2 HASTE Axial (7x2)
T2 FS Axial
T1 FS 3D Axial vibe pre
BOLUS FULL DOSE
T1 FS 3D Axial vibe immediate post
T1 FS 3D Axial vibe 2 min post
T1 FS 3D Axial vibe delayed post

NOTE:
- Subtract the T1 FS 3D Axial vibe pre from each post. Send the resulting sequences to Synapse.
- Send Care Bolus to PACS.

MRCP / ABDOMEN WITH & WITHOUT CONTRAST
T1 Axial in & out of phase (7x2)
T2 HASTE Axial
T2 FS Axial
T2 HASTE Cor
Haste IR Cor (80mm thick slice, radial projection through biliary system. See picture protocol for locations.)
Haste IR hires Cor (3mm, through biliary system)
Haste IR hires Axial (4mm, biliary system through kidneys)
T2 3D Cor (through biliary system)
T1 FS 3D Axial vibe pre
BOLUS FULL DOSE
T1 FS 3D Axial vibe immediate post
T1 FS 3D Axial vibe 2 min post
T1 FS 3D Axial vibe delayed post

NOTE:
- Specific imaging for evaluation of pancreatic or biliary ducts.
- Have the patient drink 12oz. of Pineapple or Blueberry (diabetic) juice 10-15 minutes prior to scanning. Do not provide if sedating.
- Subtract the T1 FS 3D Axial vibe pre from each post. Send the resulting sequences to Synapse.
- Send Care Bolus to PACS.
- Create Lateral & Tumble cut MIPs off T2 3D Cor trigger.
MRCP WITHOUT CONTRAST
T2 HASTE Cor
T1 Axial in & out of phase (7x2)
T2 HASTE Axial
T2 FS Axial
T1 FS 3D Axial vibe
Haste IR Cor (80mm thick slice, radial projection through biliary system. See picture protocol for locations.)
Haste IR hires Cor (3mm, through biliary system)
Haste IR hires Axial (4mm, biliary system through kidneys)
T2 3D Cor (through biliary system)

NOTE:
• Specific imaging for evaluation of pancreatic or biliary ducts.
• Have the patient drink 12oz. of Pineapple or Blueberry (diabetic) juice 10-15 minutes prior to scanning. Do not provide if sedating.
• Create Lateral & Tumble cut MIPs off T2 3D Cor trigger.

PANCREAS
T2 HASTE Cor
T1 Axial in & out of phase
T2 FS Axial
T2 HASTE Axial
T1 Axial (5x1)
T1 FS 3D Axial vibe pre
BOLUS FULL DOSE
T1 FS 3D Axial vibe immediate post
T1 FS 3D Axial vibe 2 min post
T1 FS 3D Axial vibe delayed post

NOTE:
• Subtract the T1 FS 3D Axial vibe pre from each post. Send the resulting sequences to Synapse.
• Send Care Bolus to PACS.

MALE PELVIS
T1 Axial (minimum FOV to include entire boney pelvis)
T2 HASTE Axial (240 FOV)
T2 FS Axial
T2 FS Cor (240 FOV)
T2 Sag (240 FOV)
T1 FS Axial pre (include entire boney pelvis)
T1 FS Axial post 2 minute post delay

FEMALE PELVIS VAGINAL / CERVICAL CA & RTP, DR. CATHERINE WU, REFERENCE 3T PROTOCOLS

FEMALE PELVIS CERVICAL CA, REFERENCE 3T PROTOCOLS

FEMALE PELVIS UTERINE / ENDOMETRIAL CA, REFERENCE 3T PROTOCOLS

PELVIS URETHRAL DIVERTICULUM, 3T ONLY, REFERENCE 3T PROTOCOLS
**FEMALE PELVIS**
- With empty bladder.

T1 Axial (minimum FOV to include entire boney pelvis)
T2 FS Axial (240 FOV)
HASTE Axial BH (240 FOV)
T2 Sag (240 FOV)
HASTE Sag BH (240 FOV)
T2 FS Cor (240 FOV)
T1 FS Axial pre (FOV to include entire boney pelvis)
T1 FS Axial post

NOTE: Subtract the T1 FS Axial pre from T1 FS Axial post. Send the resulting sequence to synapse).

**FEMALE PELVIS RTP WITHOUT CONTRAST**
- Include patient’s entire anatomy in the FOV, skin to skin.

T1 Axial 3 x 0
T1 FS Axial 3 x 0
T2 FS Axial 3 x 0
T2 3D Axial 3 x 0

**FEMALE PELVIS MULLERIAN DUCT ANOMALIES**
- Unicorunate, Arcuate, Bicornuate, Septate, or Didelphic
- Infertility
- With empty bladder.

HASTE Cor Abd (~360 FOV, 8x2mm, ~26 slices)
T1 Axial (240 FOV)
T2 FS Axial (240 FOV)
HASTE Axial BH (240 FOV)
T2 Sag (24 cm FOV)
HASTE Sag BH (240 FOV)
T2 FS Cor (240 FOV)
T2 Cor/Axial Obl (parallel to the long axis of the uterus, 240 FOV)

*See picture protocol, Radiologist must approve sequence prior to getting patient off the table.*
PRE OR POST UFE FEMALE PELVIS
- With empty bladder.

T1 Axial (minimum FOV to include entire boney pelvis)
T2 FS Axial (240 FOV)
HASTE Axial BH (240 FOV)
T2 FS Cor (240 FOV)
T2 Sag (24 cm FOV)
HASTE Sag BH (240 FOV)
T1 FS Axial (minimum FOV to include entire boney pelvis)
T1 FS Axial post (minimum FOV to include entire boney pelvis)
T1 Sag post (240 FOV)

NOTE:
- If the patient has a fibroid that extends superiorly out of the pelvic cavity, increase the FOV and/or slice coverage to include in on all sequences.
- Subtract pre from post & send all to Synapse.

FEMALE PELVIS PLACENTA ACCRETA **1.5T ONLY
T2 Haste Axial BH
T2 Haste Sag BH
T2 FS Haste Sag BH
TrueFisp Sag BH
T2 Haste Cor BH
T1 Axial In Phase
T1 Axial Out of Phase

NOTE:
- Encourage a full bladder to accurately assess for placenta percreta.
- FOV & slice coverage to include entire uterus to below the bladder.
- Must be performed during daytime hours, QRY Radiologist to monitor & approve exam prior to removing patient from table.
- Need for IV contrast will be determined by the Radiologist on a case by case basis.
PELVIS DEFECOGRAPHY

- Position patient with knees bent as much as bore space allows within the magnet.

T2 Cor Localizer
T2 Sag Localizer
T2 Sag
T2 Axial full pelvis
T2 TruFisp Sag (midline/1 slice, patient at rest, & ensure good view of the rectal canal before proceeding)
T2 TruFisp Midline Sag 1 Slice (Repeat x3) – Instruct patient to constrict their anal sphincter as much as possible. Resting between each run.
T2 TruFisp Midline Sag 1 Slice (Repeat x3) – Instruct patient to strain, but not enough to defecate KY Jelly. Resting between each run.

Instructions for the next sequence: Likely the patient will already have the urge to defecate due to the presence of the KY jelly in the rectum. Do not tell the patient to strain in order to defecate, just simply to defecate out the jelly. After the series is done & the patient was not able to defecate, repeat again with a minimum of 3 attempts. Confirm with patient if defecation occurred & if straining to defecate was done. In theory, a normal patient should not need to strain to defecate out the jelly, rather the patient should be able to just relax & defecate. Be sure to document in Tech Notes if the patient strained to defecate.

T2 TruFisp Midline Sag 25 Slice Dynamic (Repeat x3, minimum) – Instruct patient to relax for the first 5 slices, defecate over the next 15 slices & relax for the remaining 5 slices.
T2 TruFisp Cor 25 Slice Dynamic – Instruct patient to relax for the first 5 slices, strain with maximal effort & defecate over the next 15 slices & relax for the remaining 5 slices. Position the slice through the rectum & anus.

NOTE:
- Explain every step of the exam to the patient before beginning; cooperation is a key factor for this exam.
- We should not be sedating patients who are undergoing this exam as they will not be able to complete the required functions of the procedure while under sedation.
- Position the patient with their knees bent as much as the space within the magnet bore allows.
- All patients should have 240cc KY jelly in the rectum. Use a 60cc catheter tip syringe connected to 4-6” clear tube connected to enema tip to place KY jelly in rectum.
- Do not sedate.

PROSTATE ACC THERAPY STAGING WITHOUT CONTRAST

- Include patient’s entire anatomy in the FOV, skin to skin.

T1 Axial 3 x 0
T1 FS Axial 3 x 0
T2 FS Axial 3 x 0
T2 3D Axial 3 x 0

PROSTATE CYBERKNIFE THERAPY PLANNING DR GHAFOORI

- Feet first supine, tape feet together. Include entire anatomy, 100% FOV, skin to skin, no angles. No contrast

T1 FS Axial (2x0, ~54 slices)
T2 FS Axial (2x0, ~54 slices)
PROSTATE THERAPY PLANNING DR. RUFUS MARK

- No Contrast or Endorectal coil, Include patient’s entire anatomy in the FOV, skin to skin.

T1 Axial (3x0, 10cm above prostate to 6cm below prostate)
T1 FS Axial (3x0, 10cm above prostate to 6cm below prostate)
T2 FS Axial (3x0, 10cm above prostate to 6cm below prostate)
T2 3D Axial (3x0, 10cm above prostate to 6cm below prostate)
T2 Axial 14 cm FOV, 3 x 0, Scan from top of seminal vesicles through urogenital diaphragm
Add the following sequence if the patient is post prostatectomy
T2 FS Axial 14 cm FOV, 3 x 0, Scan from top of seminal vesicles through urogenital diaphragm

PROSTATE DIAGNOSTIC, REFERENCE 3T PROTOCOLS

PROSTATE POST PROSTATECTOMY, REFERENCE 3T PROTOCOLS

RECTUM RECTAL CANCER, REFERENCE 3T PROTOCOLS

RECTUM PAIN/MASS/ABCESS/FISTULA (DX OTHER THAN CA), REFERENCE 3T PROTOCOLS

UROGRAM

- Do not scan on an Espree due to the limited Cor FOV. See the picture protocol for more detailed scanning instructions. Give 20mg Lasix IV & 1mg Glucagon IV prior to scanning.

T1 Axial (8x0, above kidneys through bladder)
T2 FS Axial (8x0, above kidneys through bladder)
HASTE Axial (5x0, kidneys only)
HASTE FS Cor (5x0)
T1 FS 3D Axial vibe pre (3x0)
BOLUS - Instruct patient hold breath & start arterial/immediate post when contrast reaches kidneys.
T1 FS 3D Axial vibe immediate post (3x0)
T1 FS 3D Sag vibe urogram 5 minute post (4x0)
T1 FS 3D Cor vibe urogram 15 minute post (2.5x0)

NOTE: If you have any question whether enough contrast is seen in the Kidneys, Ureters, & Bladder, Check with a Radiologist prior to getting the patient off the table.
ANGIOGRAM & VENOGRAM

AORTIC DISSECTION MRA
- Include from above aortic arch through bifurcation.

T1 Axial
T1 FS Axial
T2 HASTE Axial
T2 HASTE Cor
3D Sag Volume pre
BOLUS FULL DOSE
3D Sag Volume post (arterial phase)
3D Cor Volume post
3D Axial Volume Post

IVC
T1 Cor
T2 FS Axial
T1 Axial
T2 FS Axial
2D TOF Axial
T1 Sag localizer
BOLUS FULL DOSE
3D Volume post (arterial phase)
3D Volume post x3 (3 venous phases)

NOTE: Subtract the arterial phase from the best venous phase. Subtract pre images from first subtraction & use resulting subtraction for MIP's.

RENAL MRA
T1 Cor (include entire kidneys)
T2 FS Axial (include entire kidneys)
T1 Sag Aorta localizer
3D Sag Volume pre
BOLUS FULL DOSE
3D Volume post

NOTE:
- Subtract pre from post, use resulting subtraction for post processing.
  - Cut Lateral MIP
  - Cut Tumble MIP
  - Axial 2x0mm MPR, ~220 FOV
**POPLITEAL ARTERY ENTRAPMENT MRA**
- Perform entire exam non-contrast if using 3T MRI.
- See the picture protocol for more detailed scanning instructions, all sequences include mid-thigh to mid-calf.

RT T1 Axial  
LT T1 Axial  
T1 Cor bilateral  
T2 FS Cor bilateral  
2D TOF Axial Bilateral (non-symptom causing position)  
3D Cor Angiogram (symptom causing position)  
3D Cor Angiogram (neutral position)

**UPPER EXTREMITY MRA**
- Confirm coverage with referring and/or INTV radiologist.

T1 Cor  
T2 FS Axial  
T1 Sag Aorta localizer  
3D Volume Cor pre  
BOLUS FULL DOSE – start scan when contrast is seen in descending aorta at level of aortic arch  
3D Volume Cor post  

*NOTE:*  
- Humerus: must include arch through elbow joint.  
- Entire upper extremity: must include arch through wrist joint, if possible include through finger tips, multi station (approx. 20 seconds each), two bolus injections. For example 20ml @ 1.5ml/sec, second injection 10ml @ 1.5ml/sec followed by 20ml saline.  
- Subtract 3D Volume pre from post; use resulting subtraction for MIP’s.

**LOWER EXTREMITY VENOGRAM**
- FSPGR / Turbo-Flash Axial  
- T1 Axial  
- T2 FS Axial  
- 2D TOF Axial  
- 3D Volume Cor pre  
- BOLUS FULL DOSE  
- 3D Volume Cor 30 second post delay (run 3 times consecutively)  

*NOTE:* Subtract the arterial phase from the best venous phase. Subtract pre images from first subtraction & use resulting subtraction for MIP’s.

**PELVIS MRV**
- FSPGR / Turbo-Flash Axial  
- T1 Axial  
- T2 FS Axial  
- 2D TOF Axial (above bifurcation to femoral heads)  
- Pre 3D Volume  
- Contrast Enhanced 3D Volume  
- 30 Second delay 3D Volume (run 3 times consecutively)  

*NOTE:* Subtract the arterial phase from the best venous phase & use resulting subtraction for MIP’s.