ROUTINE MRI PROTOCOLS:

I. Abdomen Plus Post Gadolinium Screening Pelvis

Sequence	Coverage	Slice/Gap	Notes
COR T2 ssFSE	32-40	6/-1	• Coverage from all sequences is above the liver dome, through the kidneys. • Use the smallest FOV possible • No FAT SAT
AX 3D T1 LAVA FLEX OR mDIXON	ABD		• Through abdomen • Verify that IP/OP and water (FS) is selected • Please subtract in phase minus out of phase
AX T2 ssFSE FS	ABD	6/-1	• With FAT SAT
AX DWI	ABD	6/0	• B=0, 50 and 600; ADC MAPS for both 50 & 600
COR 3D LAVA-FLEX PRE	32-40	3-4	
PRE AX 3D LAVA-FLEX PLUS 5 DYN PHASES	32-40		• Run each phase such that timing closely matches below • Pre and post must match for auto subtraction • Early & late arterial portal venous 21s, 42s, 90s, 2min & 5min
GAD AX 3D LAVA-FLEX PELVIS	PELVIS		• Gad single phase through pelvis
AX T2 FSE PROPELLER	PELVIS	4-5	• No FAT SAT
Options			
PRE AX 3D LAVA-FLEX PELVIS	PELVIS	5/0-1	

II. Brain Metastases:

Sequence	Coverage	Slice/Gap	Notes
AX DWI	Cover Whole Brain	2/0 3T 3/0 1.5T	b=1000
AX T1		5/0	
AX 3D ISI			

GAD AX T2 FLAIR		5/0	Not CUBE; Single Dose GAD
GAD AX T1		5/0	
GAD COR 3D T1 BRAVO		1/0	If patient moves, do not repeat: try shorter 2D COR T1 GAD
Options			
GAD COR T1		5/0	Salvage sequence, if the patient moves on BRAVO.

III. Brain Tumor: Diagnosis or follow-up of known brain tumor

Sequence	**Coverage**	**Slice/Gap**	**Notes**
COR 3D T1 BRAVO PRE	Cover Whole Brain	1/0	-TI time should be 450ms -Reformat additional planes
AX DWI		2/0 3T 3/0 1.5T	b=1000
AX SWAN ISI		5/0	
SAG 3D CUBE T2 FLAIR		1.2/0	-Reformat additional planes
AX ASL			
GAD AX T2 FSE		3/0	
GAD COR 3D T1 BRAVO		1/0	-Must be scanned 4-5min post contrast injection -Same as pre; reformat needed -TI time should be 45oms
GAD COR T1		5/0	

ROUTINE CT PROTOCOLS:

IV. Routine Abdomen/Pelvis

Oral	PO omnipaque if looking for cancer (20ml Omni + 1L water), otherwise PO water
SFOV	Large
IV/Rate	150ml Omni; 3ml/s injection rate
IV/Phase/Delay	80s (venous)
Coverage	Dome of liver through ischia
Scan Type	0.4s Helical
Thick/Speed/Interval	1.25mm
Mode/Pitch	0.984:1
Speed (mm/rot)	39.38

V. Routine Chest (with or without contrast):

If scanning with Abdomen/Pelvis, use 80s delay and 150ml contrast.

Oral	N/A
SFOV	Large
IV/Rate	120ml Omni; 3ml/s injection rate
IV/Phase/Delay	60s (venous)
Coverage	Lung Apex through lung base
Scan Type	0.4s Helical
Thick/Speed/Interval	1.25mm
Mode/Pitch	0.984:1
Speed (mm/rot)	39.38

VI. Routine Brain (with or without contrast):

Oral	N/A
SFOV	Head
IV/Rate	70ml Omni; 2ml/s injection rate
IV/Phase/Delay	120s (venous)
Coverage	C1-Vertex
Scan Type	1s Helical
Thick/Speed/Interval	3.75mm
Mode/Pitch	0.969:1
Speed (mm/rot)	19.37

The only contrast we use is Omnipaque 350 for both IV and oral administration

ROUTINE NM PROTOCOLS:

1. WB FDG PETCT:

I. Purpose

To differentiate between benign and malignant disease, staging and grading of malignant disease, differentiate recurrent or residual disease from therapy induced changes, monitor the response of therapy.

II. Indications

A. Differentiation of benign from malignant lesions
B. Staging of malignant disease
C. Grading of malignant brain lesions
D. Differentiation of recurrent or residual malignant disease from therapy-induced changes
E. Monitoring the response to therapy

Preparation	Patients will be instructed to be fasting with the exception of water, for at least 6 hours prior to PET/CT scan. Diabetic patients will be requested to follow a low carbohydrate diet the evening before their exam, and to withhold all insulin for the 4 hours preceding their PET/CT exam.
Radiopharmaceutical	^{18}FDG (F-18 Fluoro-2-Deoxyglucose)
Dose	7.7 mCi / 70 kg man (0.11mCi/kg) maximum 12mCi
Procedure	A. **Test patient's blood glucose level and document on the patient's requisition as well as the log-book. Documentation on the patient's requisition should include the ranges for normal fasting glucose.** B. **Test patient's creatinine/eGFR if required.** C. Inject **7.7mCi / 70 kg ^{18}FDG**. Flush with at least 10cc normal saline. D. Give the patient 8-16oz of water, and instruct them to drink the water as within 10-15 minutes. E. The patient should rest comfortably, without speaking, for a minimum of 50 minutes. F. Following a minimum incubation period of at least 50 minutes, instruct the patient to void, to minimize activity within the bladder. G. Position the patient on the PHS, head first, supine, with the arms secured above the patient's head. Patient should be positioned as flat as possible, through the torso. Place support under the patient's knees and shoulders. H. Load 150cc Omnipaque 350 into power injector. Standard injection will be at 300psi, 3ml/sec.

<table>
<tr><td></td><td>(pressure/rate variable depending on size/placement of IV); volume given varies by patient weight (adult 1cc/lb; pediatric 2cc/kg – max 150cc). *technologist will adhere to UCSF contrast guidelines after reviewing the “patient screening form for iodinated contrast”
I. 60” Extension tubing should be securely fastened to the contrast syringe.
J. Test IV patency with 10cc NaCl bolus prior to securing contrast extension tubing.</td></tr>
<tr><td><u>Acquisition</u></td><td>A. Utilizing the lateral laser, make sure the patient is positioned isocenter to the gantry.
B. Standard whole body scan should be from vertex to mid-thigh
C. Extended view is vertex to toes for melanoma, sarcoma, or as directed by the physician protocol.

Parameters:
<table>
<tr><td>ROI</td><td>mAs / kV</td><td>Coll / slice thickness</td><td>Kernal</td><td>Window</td></tr>
<tr><td>Topogram</td><td>50 / 120</td><td>AP - 1mm</td><td></td><td></td></tr>
<tr><td>1</td><td>240 / 120</td><td>1.5 – 5mm</td><td>B31f medSmo+</td><td>ABD (EFOV recon for attn. only)</td></tr>
<tr><td>1a</td><td>240/ 120</td><td>1.5 – 2mm</td><td>B41f medSmo+</td><td>ABD – CT WB</td></tr>
<tr><td>1b</td><td>240 / 120</td><td>1.5 – 5mm</td><td>B60f Sharp</td><td>LUNG – CT LUNG</td></tr>
<tr><td>1c</td><td>240 / 120</td><td>1.5 – 5mm</td><td>B41f medSmo+</td><td>ABD – CT LUNG</td></tr>
<tr><td>1d</td><td>240/ 120</td><td>1.5 – 2mm</td><td>B41f medSmo+</td><td>ABD – CT WB COR</td></tr>
<tr><td>1e</td><td>240/ 120</td><td>1.5 – 2mm</td><td>B41f medSmo+</td><td>ABD – CT WB SAG</td></tr>
<tr><td>PET Parameters</td><td colspan="4">3 –5 min / bed; 168 x 168; 7.0 - 9.0 FWHM; Gaussian filter XYZ; Iterative Reconstruction 4i / 14s; scatter correction; attenuation correction only</td></tr>
</table></td></tr>
<tr><td><u>Data Processing, Archive and Transfer</u></td><td>A. Create and save fused data sets in all three planes (axial, sagittal and coronal), create and save PET MIP
B. Fused PETCT Axial, SAG and COR WB; PET MIP; CT WB…ABD; CT WB…LUNG; PET WB; Topogram;</td></tr>
</table>

2. BONE IMAGING

I. Indications
- A. Evaluation of bone metastases.
- B. Diagnosis and follow-up of primary and metastatic tumors.
- C. Diagnosis and follow-up of osteomyelitis and infected joints.
- D. Diagnosis of bone infarction (sickle cell disease).
- E. Diagnosis of aseptic necrosis of femoral and humeral heads (steroid therapy, sickle cell disease).
- F. Determination of vascularity of femoral head, as aid in diagnosis and Leff-Perthes Disease.
- G. Evaluation of painful hip and knee prostheses.
- H. Diagnosis and evaluation of occult fractures or stress fractures.

Preparation	none
Radiopharmaceutical	Tc-99m Hydroxymethylene Diphosphonate (HDP)
Dose	Adult: 15mCi. If SPECT/CT is ordered and preapproved, give 20-23mCi. Pediatric: Dose based on weight, but not <1.8mCi.
Procedure	A. Place a 20-22 g angiocath per normal protocol. Do not inject into IV tubing containing dextrose and/or heparin unless flushed before and after injection with nonbacteriostatic saline. B. Inject patient with 15mCi Tc^{99m}-HDP and instruct them to return in approximately 3 hours. Patient should drink at least 2 (8 ounce) cups of water between injection and scan. C. Have patient remove any metal from their clothing and ask them to void immediately prior to scan. D. Position the patient FFS, placing a band around the feet (pigeon-toed) to visualize both the fibula and tibia. Make sure to include the entire skeleton in the FOV.
Acquisition	A. Acquire the whole-body scan at 200 sec per pixel (12cm/min), continuous. B. Spot views: Acquire lateral spot views of the head for 300 sec (5 min). All other requested spot views should also be acquired for five minutes each. C. Show images to physician for review prior to releasing patient. D. SPECT/CT: If SPECT/CT is indicated and prior physicians order and insurance authorization have been obtained, acquire using the Bone Tomo HWK Evol or 2 View Bone Tomo protocol.
Data Processing,	A. Make screen captures of the following: 1. Whole body (b&w, inverse); SS_WB_B&W,

	SS_WB_INV 2. Spot views (b&w, inverse); SS_SPOTS_B&W, SS_SPOTS_INV B. SPECT/CT Processing: 2-View and/or One-View: