
CT Procedures and Anatomy

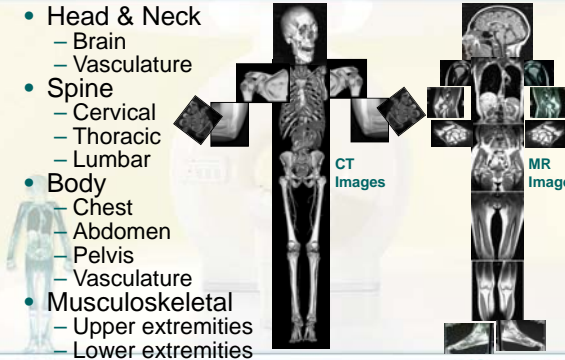
Cross Sectional Anatomy – Overview & CT imaging Procedures - Introduction

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Overview Cross-Sectional Anatomy


- Head & Neck
 - Brain
 - Vasculature
- Spine
 - Cervical
 - Thoracic
 - Lumbar
- Body
 - Chest
 - Abdomen
 - Pelvis
 - Vasculature
- Musculoskeletal
 - Upper extremities
 - Lower extremities

 CT Images MR Images


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Head

CT Images



MR Images

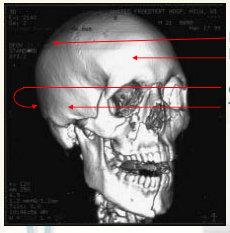





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Cranial Bones & Brain Lobes

Cranial Bones



Brain Lobes

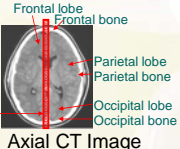


The 5th lobe of the brain is known as the Insula
It is located "inside" the Sylvian (Lateral) Fissure

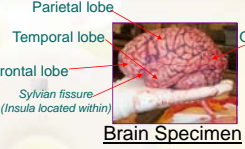
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Brain Anatomy: Mid-Sagittal

Axial CT Image

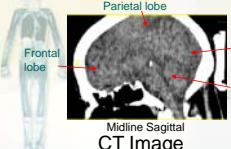


Brain Specimen

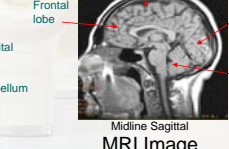


The red line (box) indicates the approximate location of the midline sagittal slice

Midline Sagittal CT Image



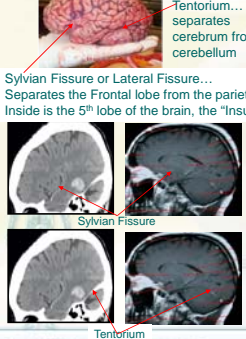
Midline Sagittal MRI Image



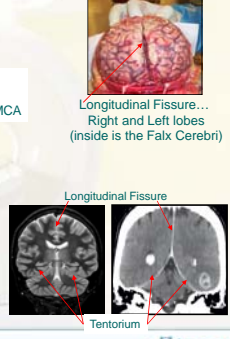
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What separates the lobes?

Sylvian Fissure or Lateral Fissure...
Separates the Frontal lobe from the parietal lobe
Inside is the 5th lobe of the brain, the "Insula" & the MCA

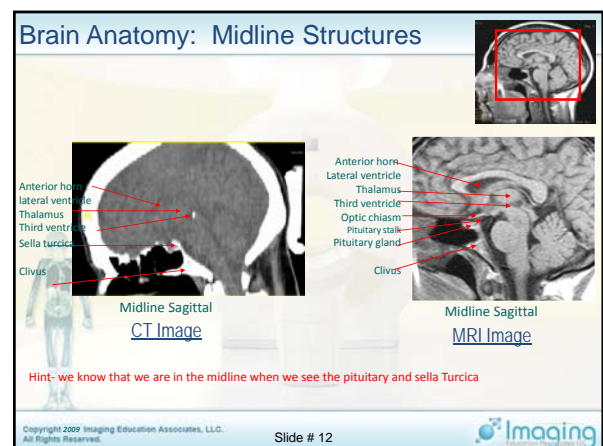
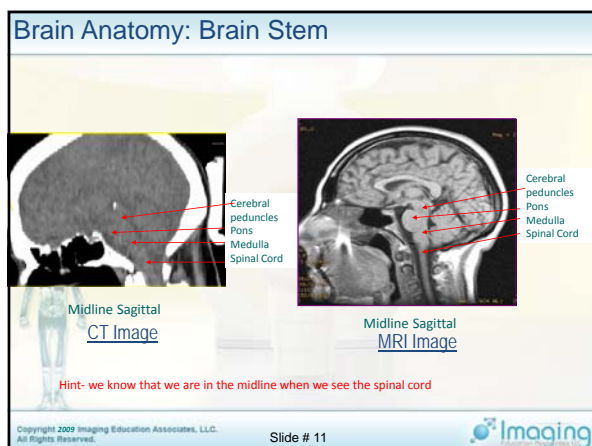
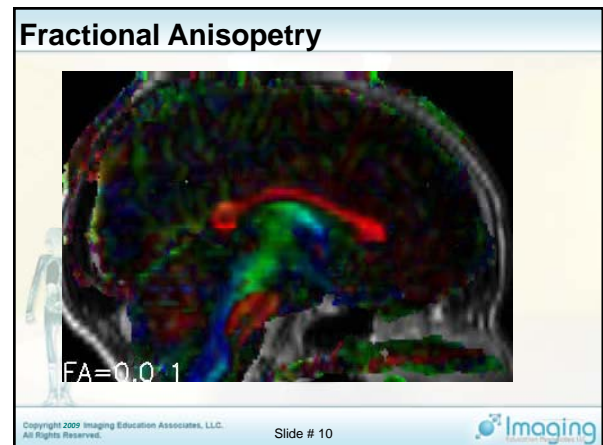
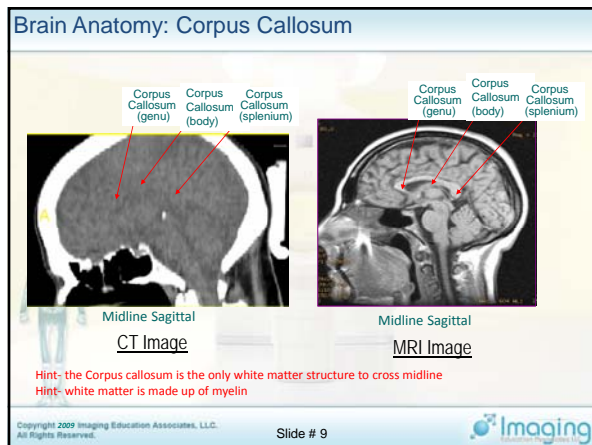
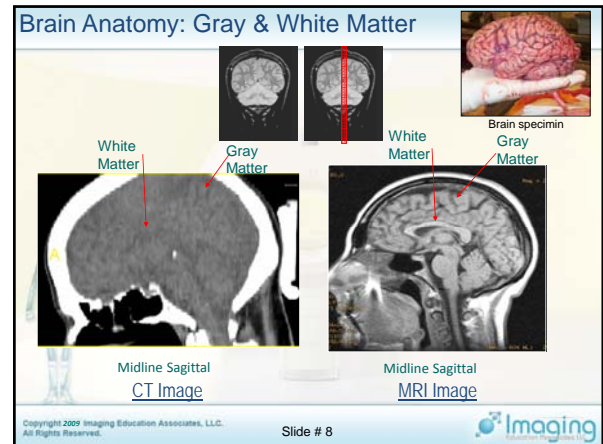
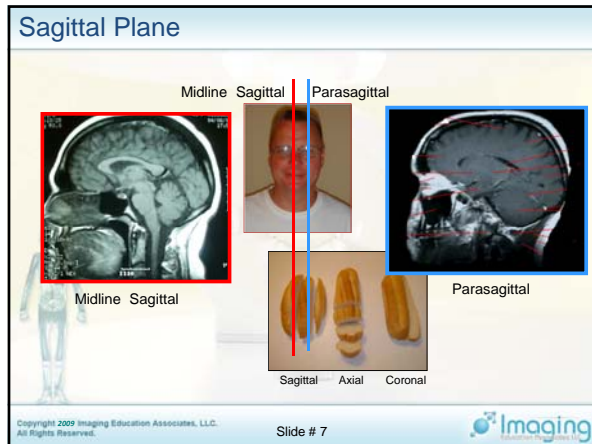


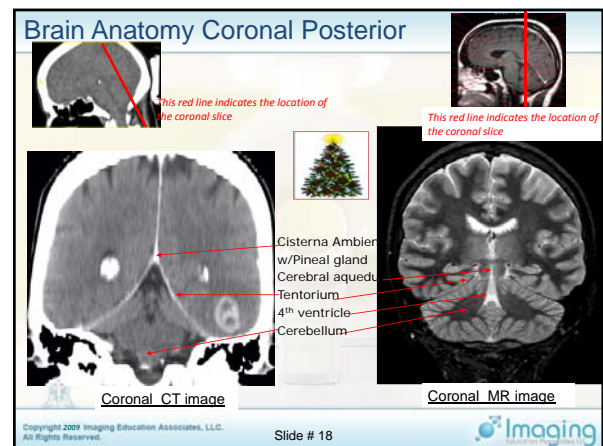
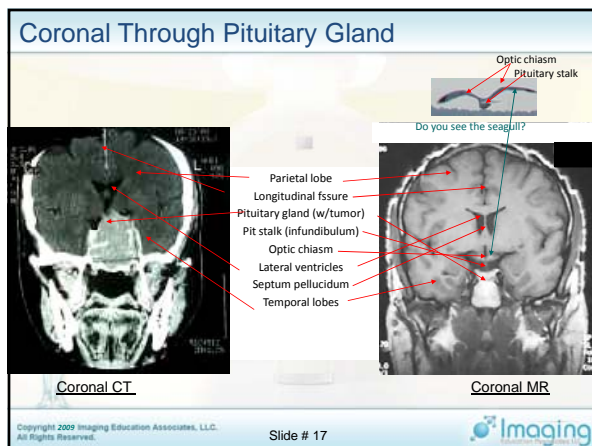
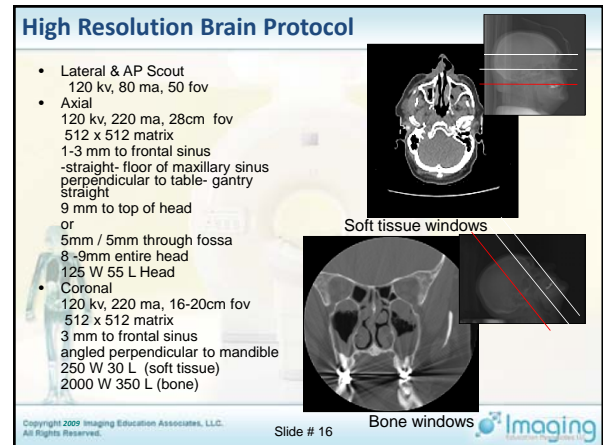
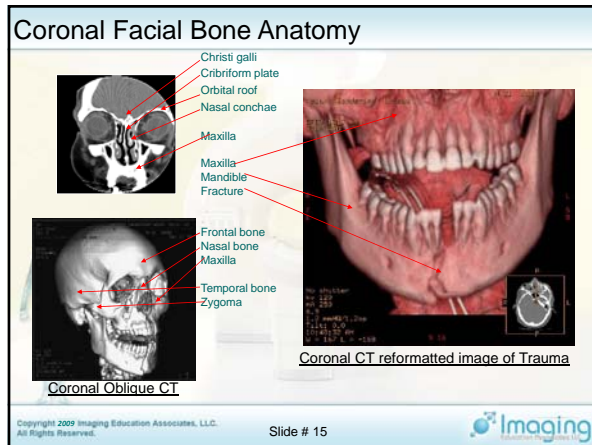
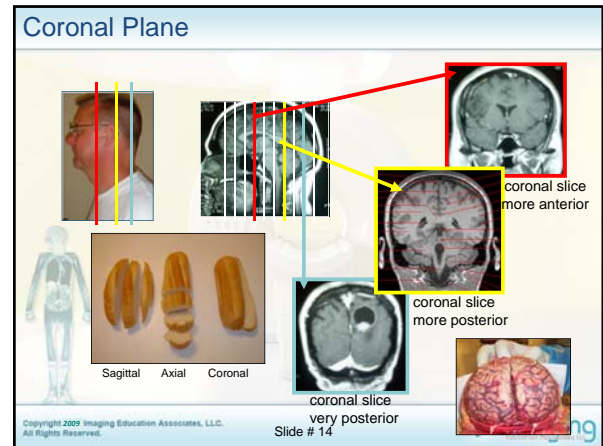
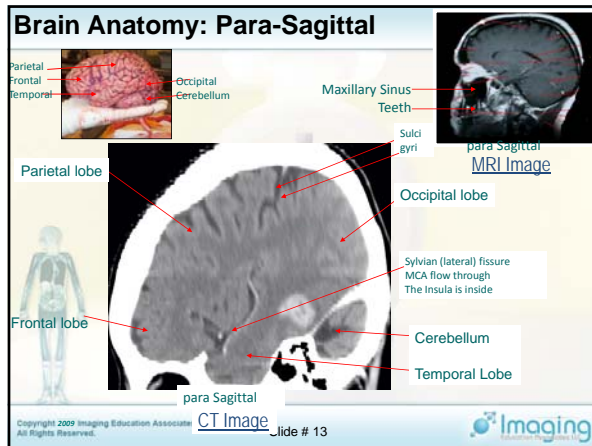
Longitudinal Fissure...
Right and Left lobes (inside is the Falx Cerebri)



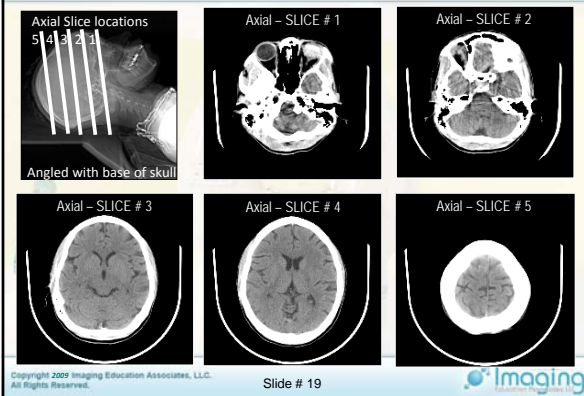
Tentorium... separates cerebrum from cerebellum

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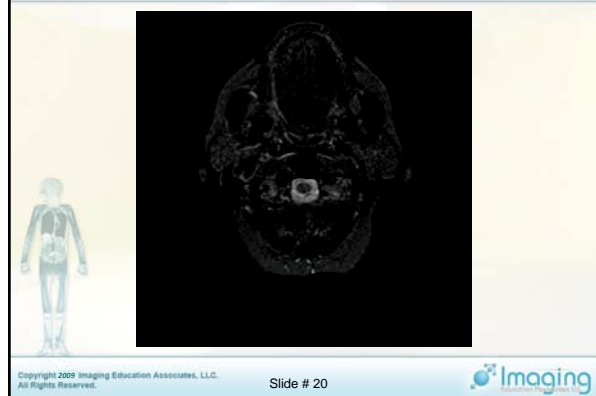




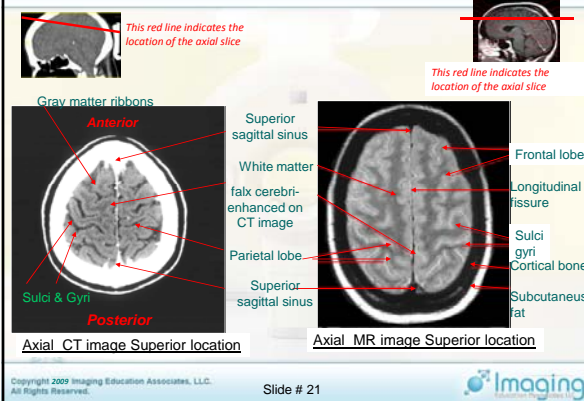
Imaging Planes



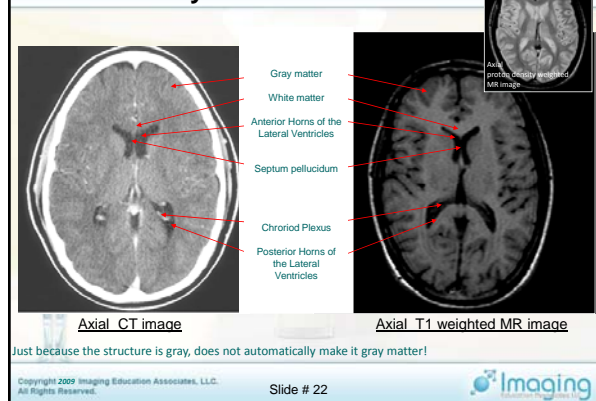
Axial Slice Locations



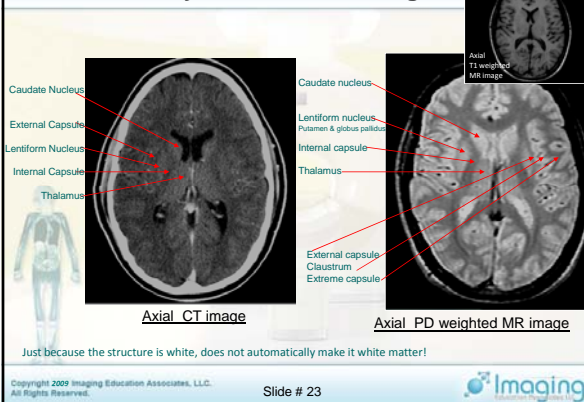
Brain Anatomy: Axial Superior



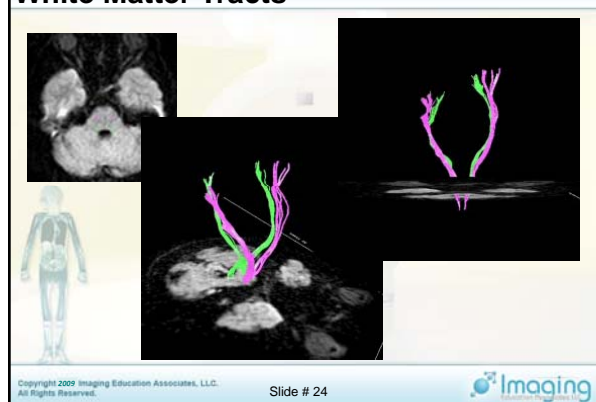
Brain Anatomy: Axial @ Ventricles

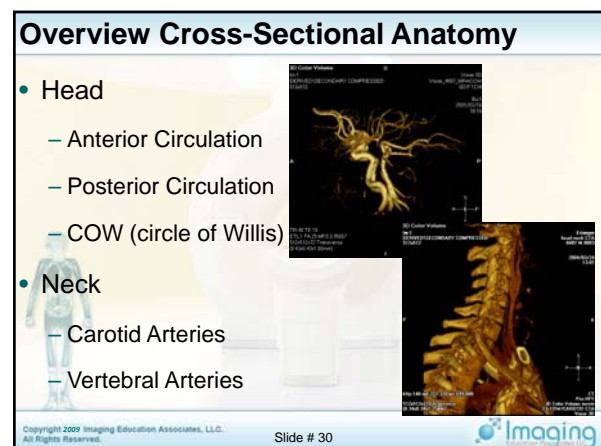
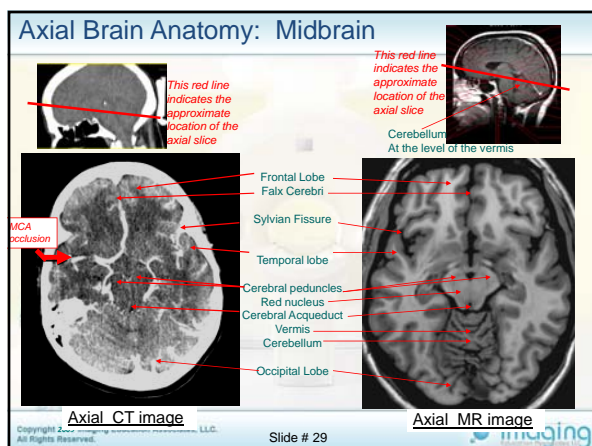
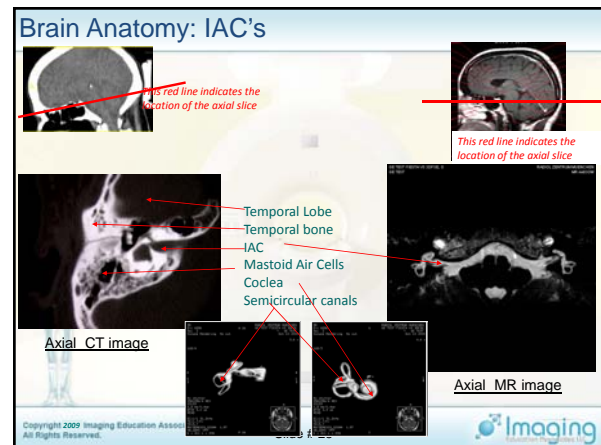
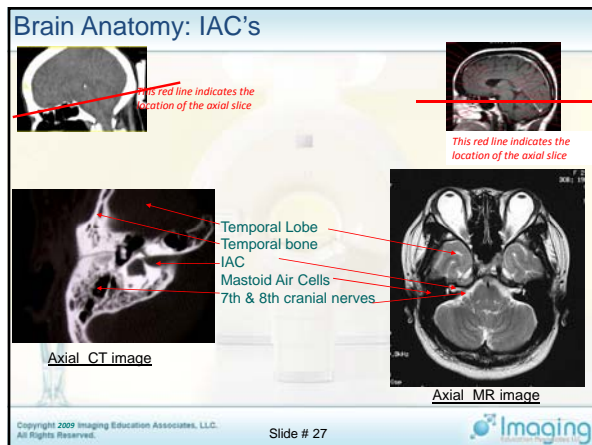
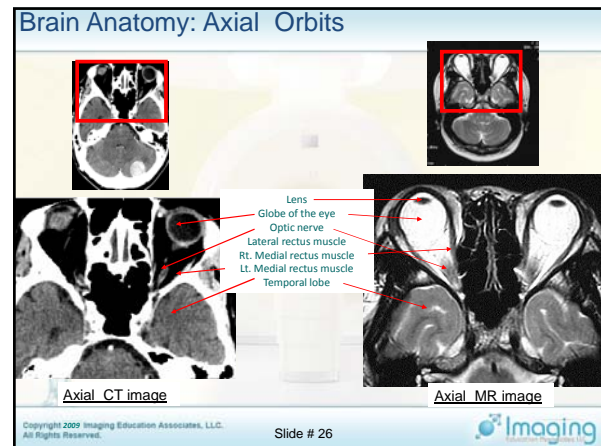
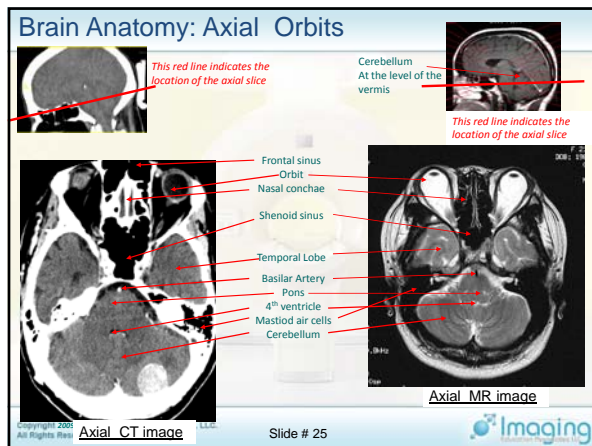


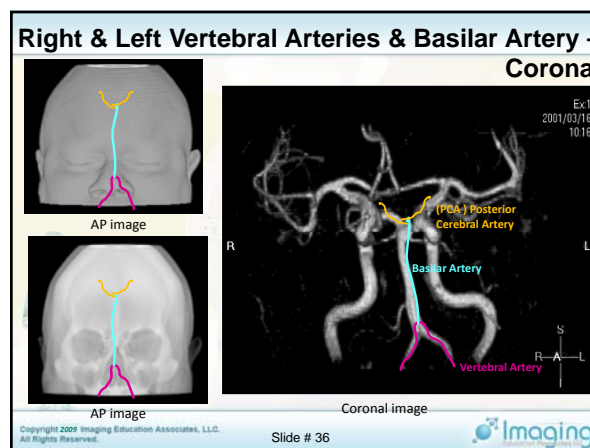
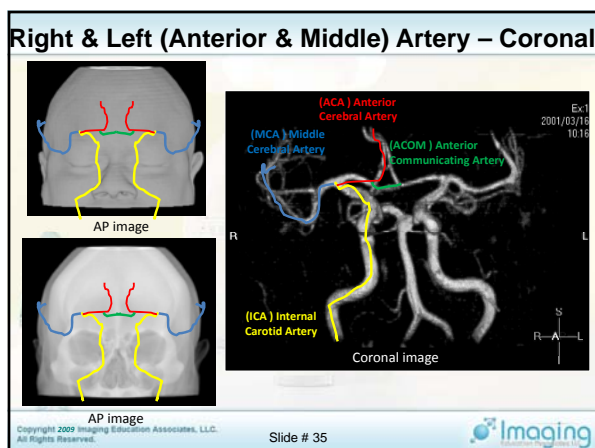
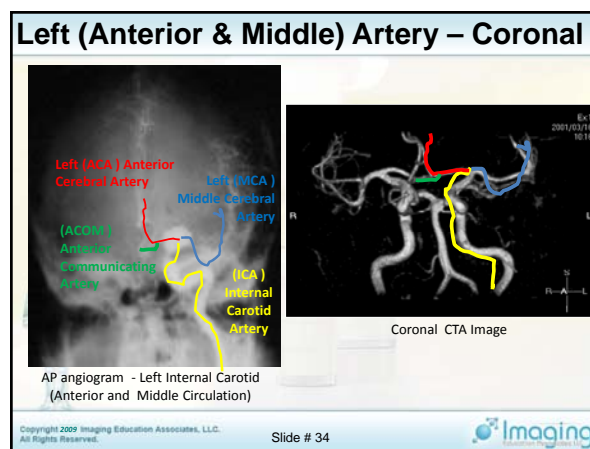
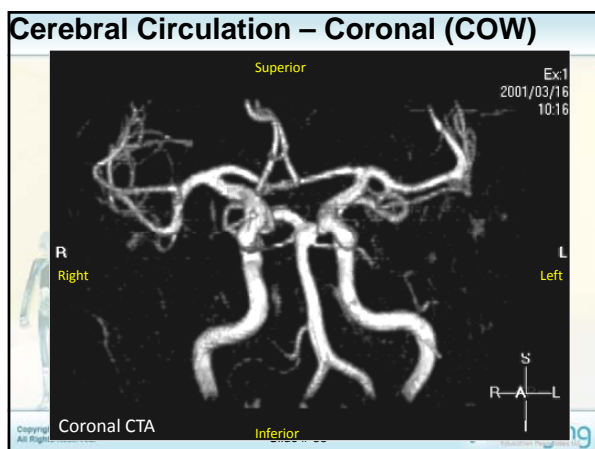
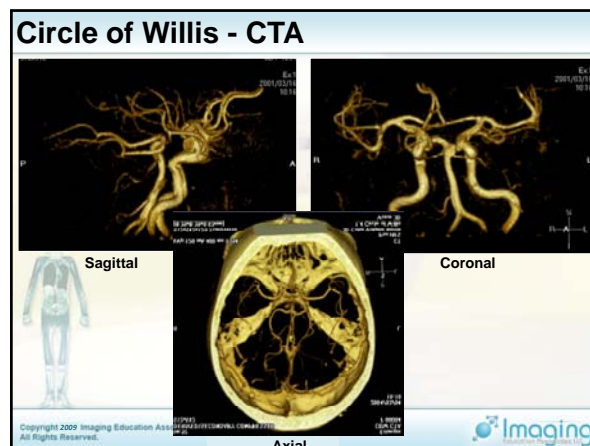
Brain Anatomy: Axial Basal Ganglia

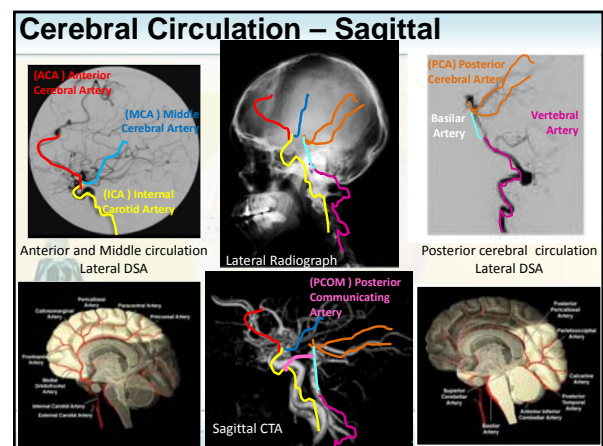
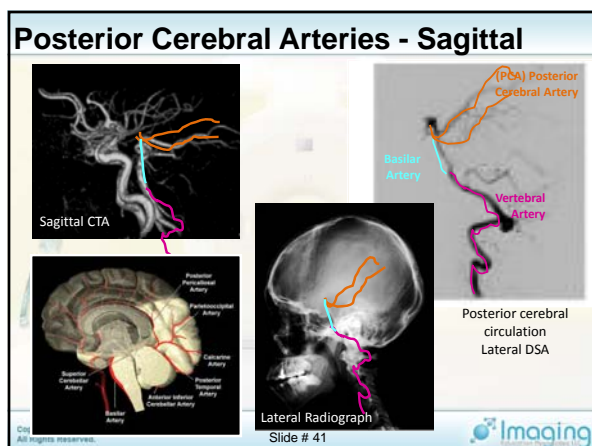
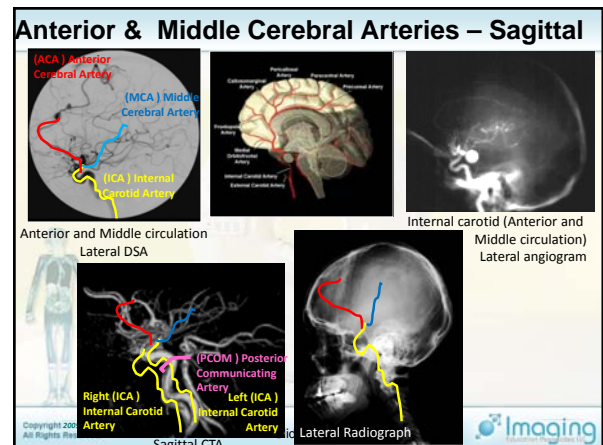
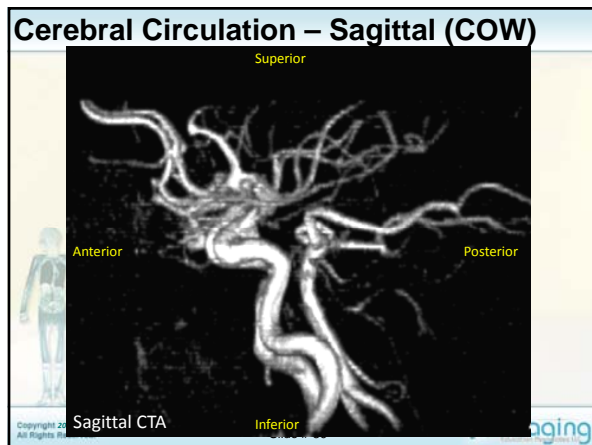
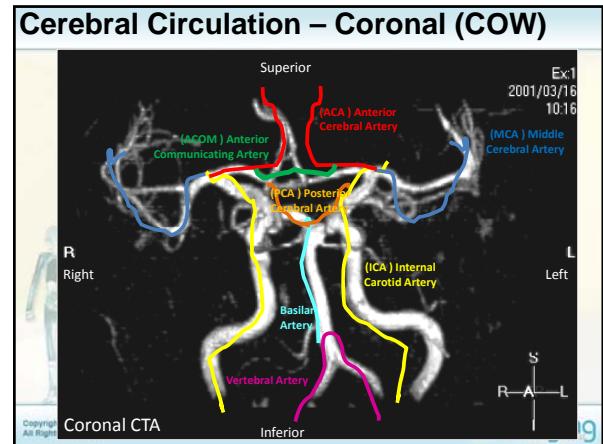
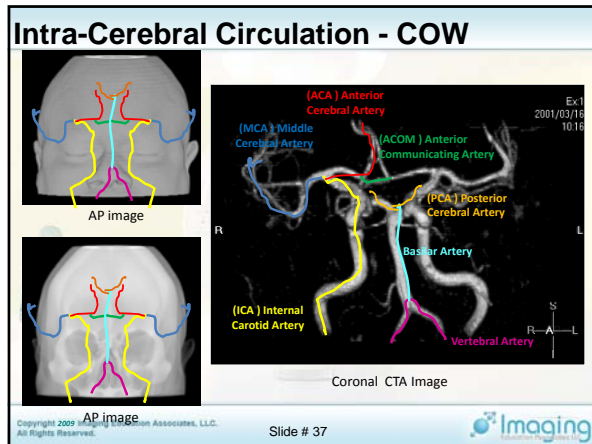


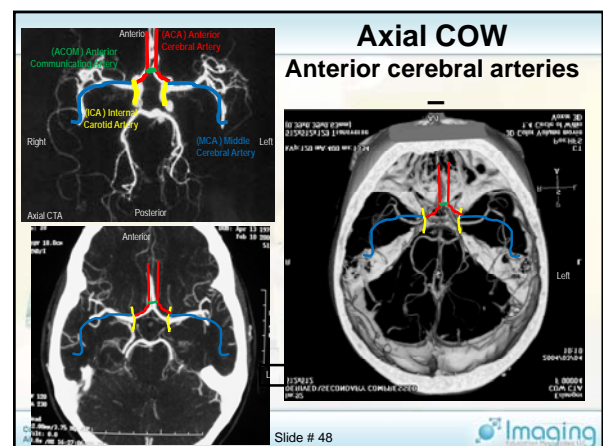
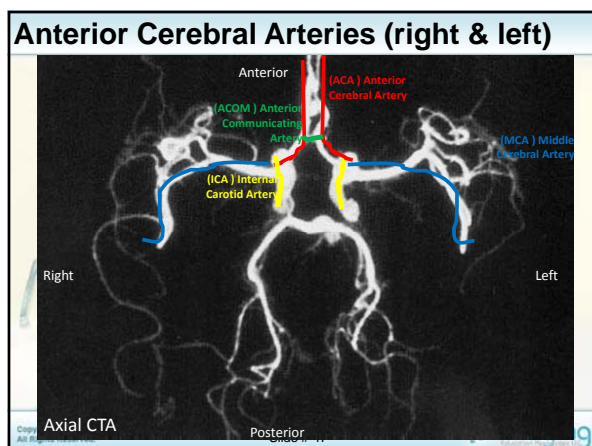
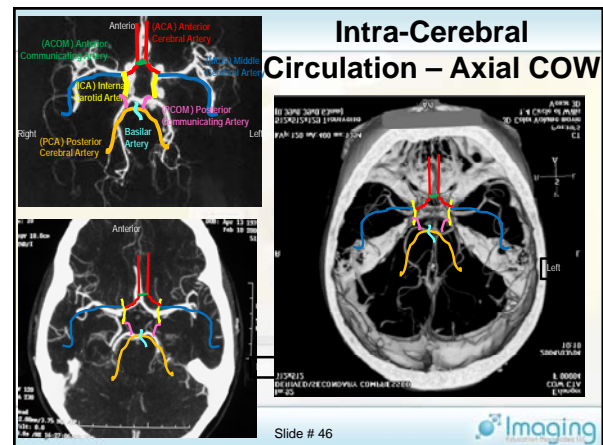
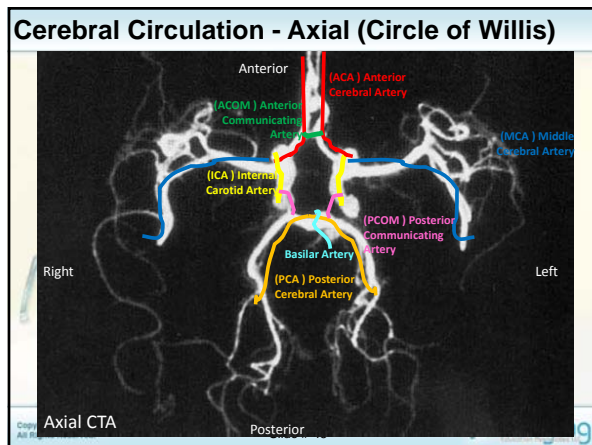
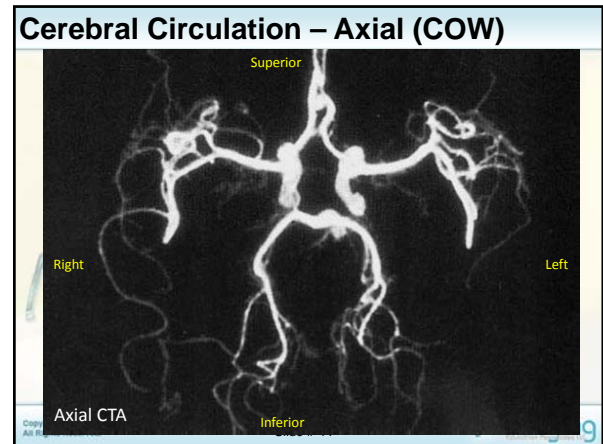
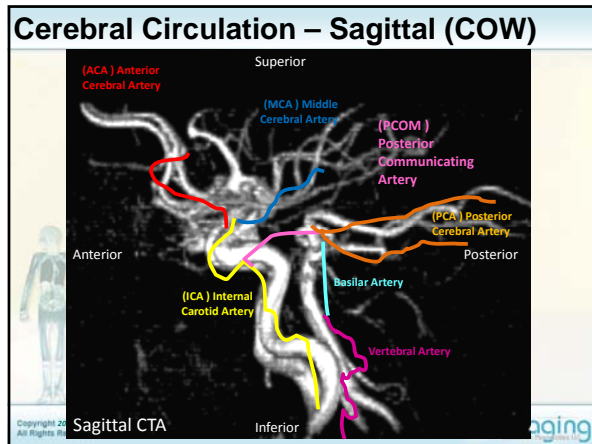
White Matter Tracts

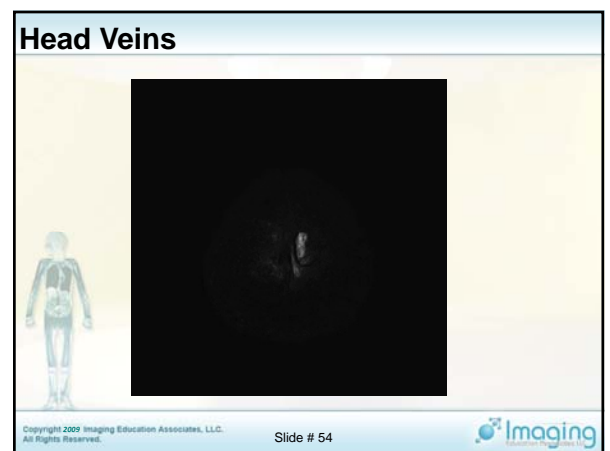
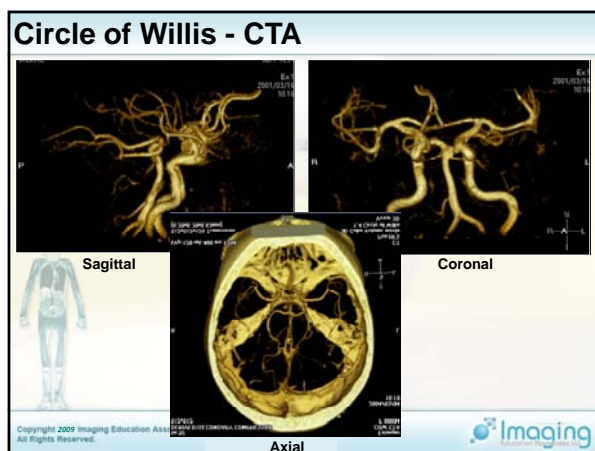
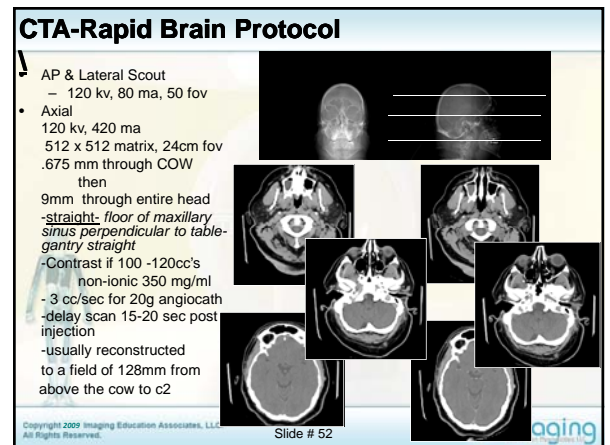
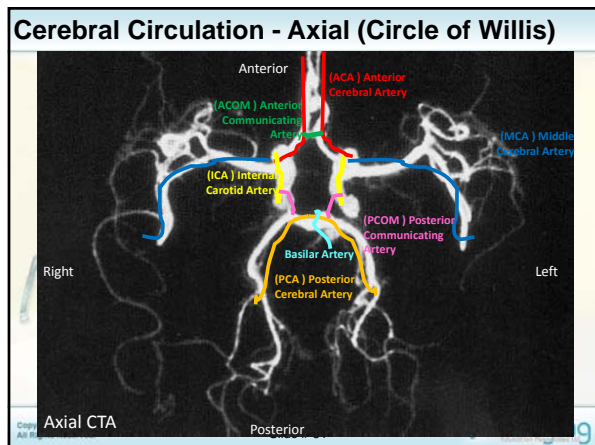
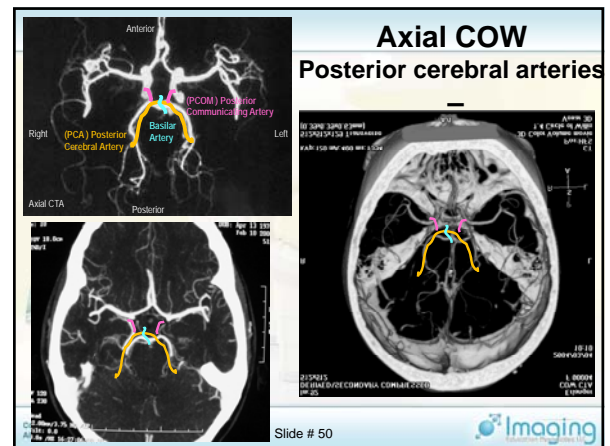
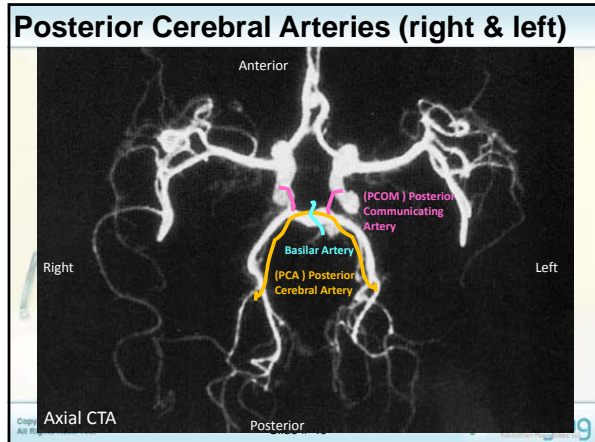












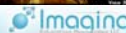
Overview Cross-Sectional Anatomy

- Head
 - Anterior Circulation
 - Posterior Circulation
 - COW (circle of Willis)
- Neck
 - Carotid Arteries
 - Vertebral Arteries

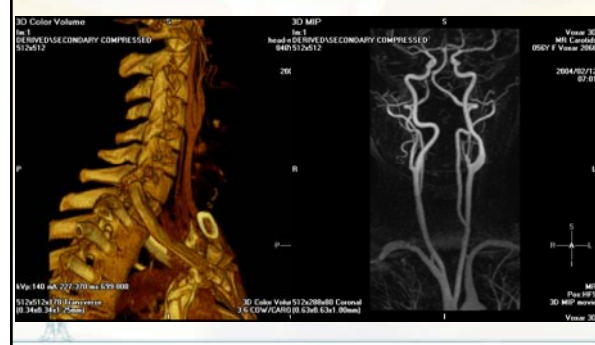


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Neck Vasculature

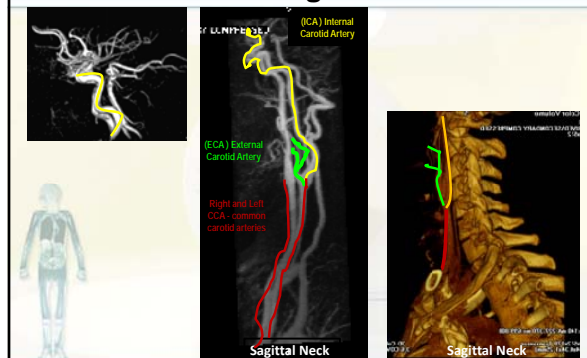


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Carotid Arteries – Sagittal

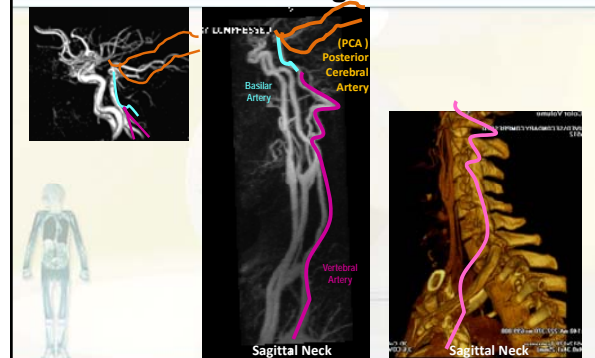


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Vertebral Arteries – Sagittal

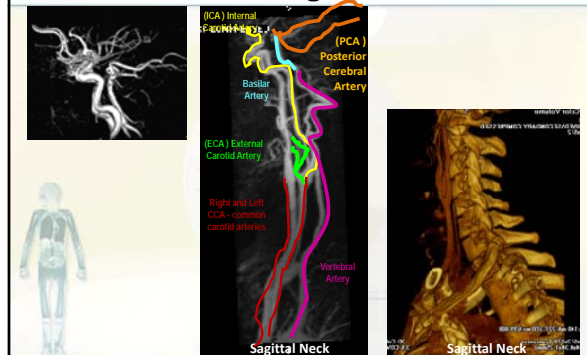


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Carotid Arteries – Sagittal



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Carotid Arteries – Sagittal



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Overview Cross-Sectional Anatomy

- Head
 - Anterior Circulation
 - Posterior Circulation
 - COW (circle of Willis)
- Neck
 - Carotid Arteries
 - Vertebral Arteries



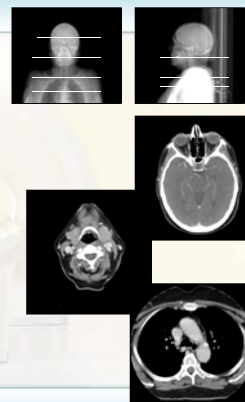
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Protocol for Neck

- AP & Lat scout
120 kv, 80 ma, 50cm FOV
- Axial
120 kv 280 ma
5/5 mm, 23 cm FOV
512 x 512 matrix
- Scan frontal sinus to carina-include mandible
- Contrast
100 cc's non-ionic 240-300 mg/ml
-2 cc/sec for 20g cath
-delay scan 70 second post injection
-250 W 30 L (soft tissue)
-2000 W 350 L (bone)

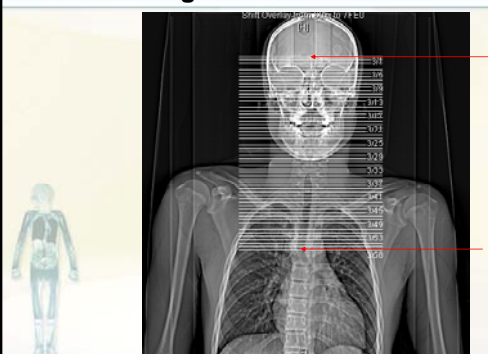


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Scan Planning



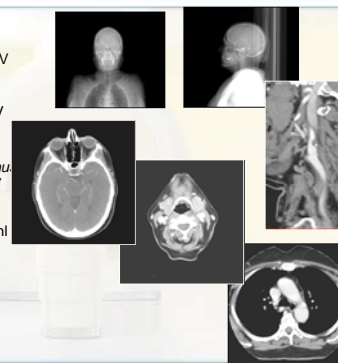
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CTA-Rapid Neck Protocol

- AP & Lateral Scout
– 120 kv, 80 ma, 50 cm FOV
- Axial
120 kv, 420 ma
512 x 512 matrix, 24cm FOV
1 mm from the arch to above the frontal sinuses
-straight- floor of maxillary sinus perpendicular to table- gantry straight
-Contrast if 100 -120cc's non-ionic 300-350 mg/ml
-3 cc/sec for 20g angiograph
-delay scan 15-20 sec post injection
-usually reconstructed to a field of 128mm

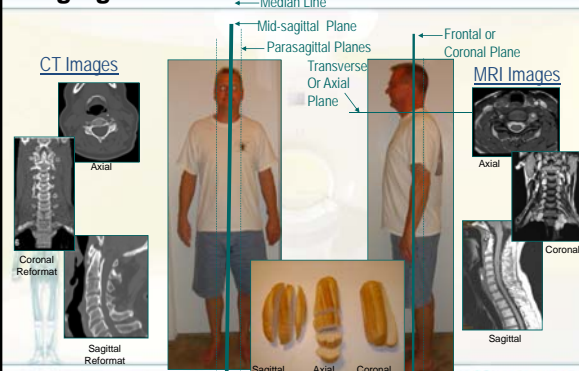


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Imaging Planes

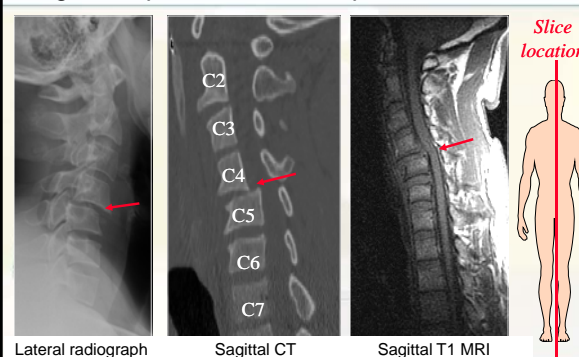


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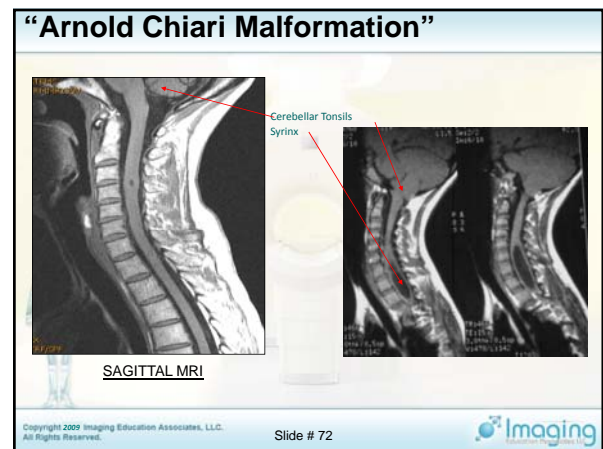
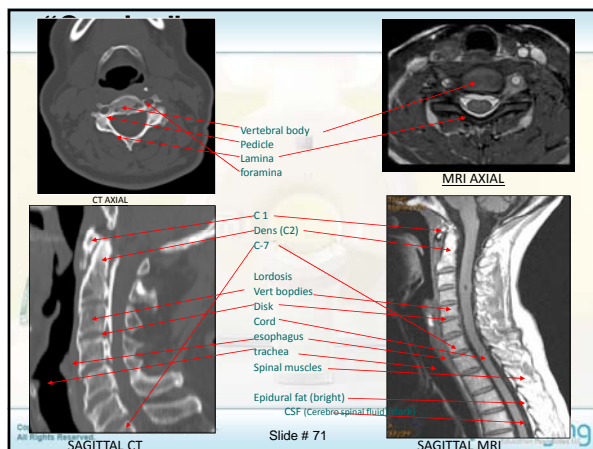
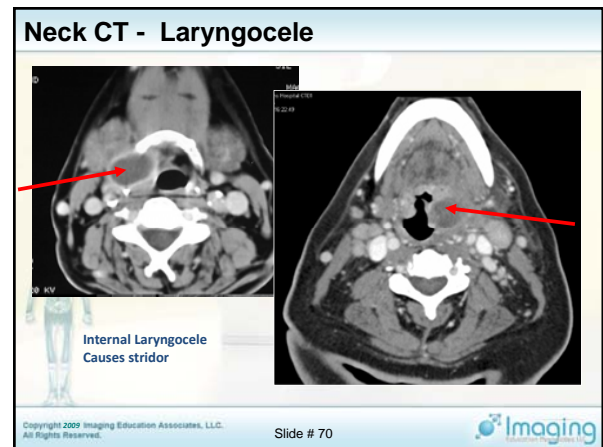
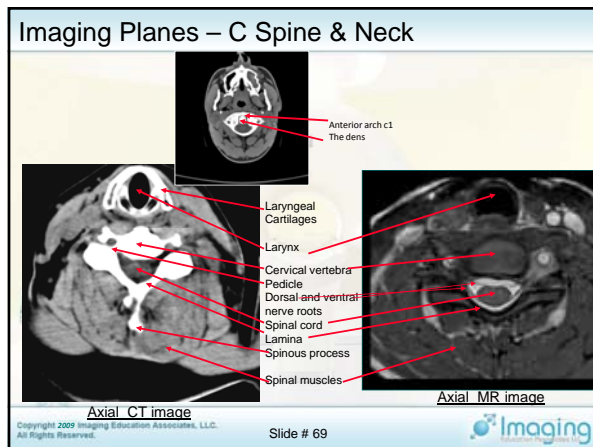
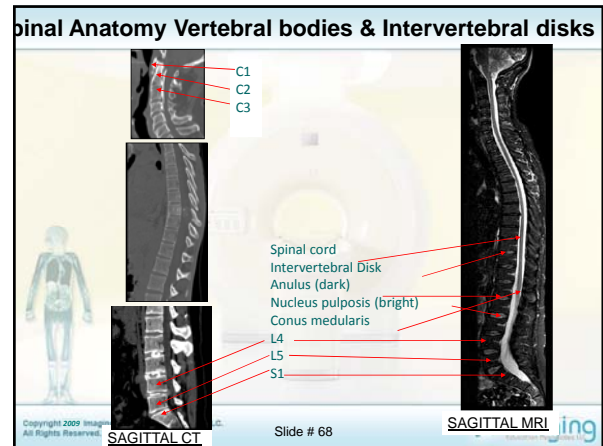
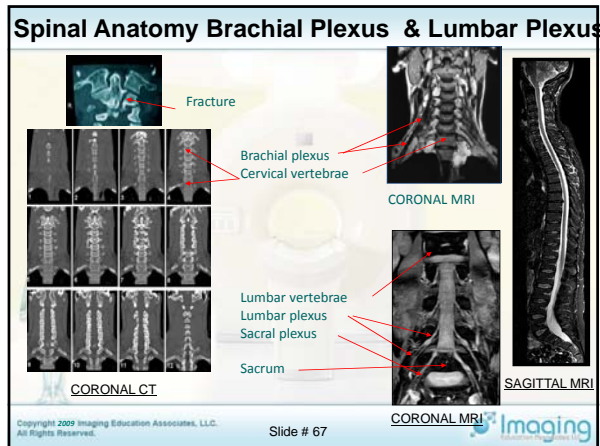
Image Comparison in the C-spine

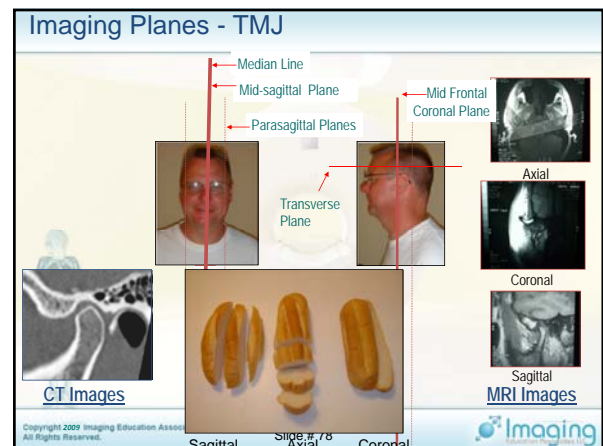
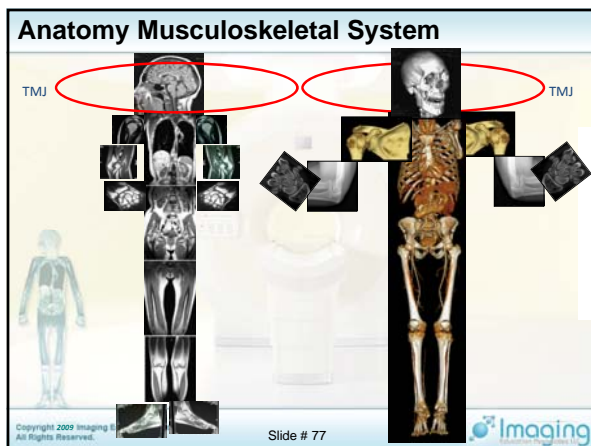
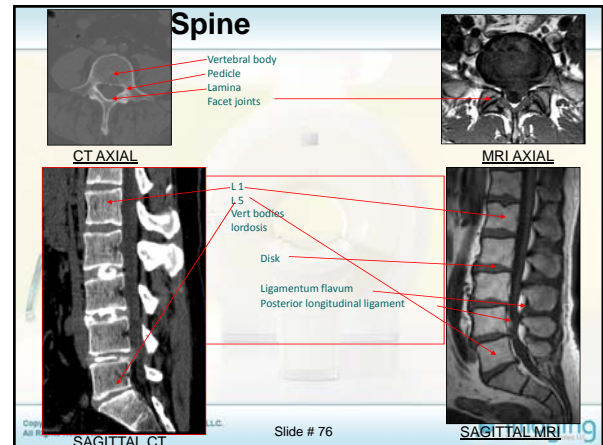
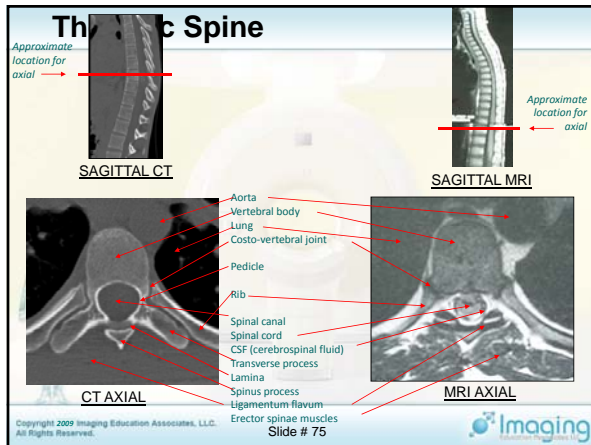
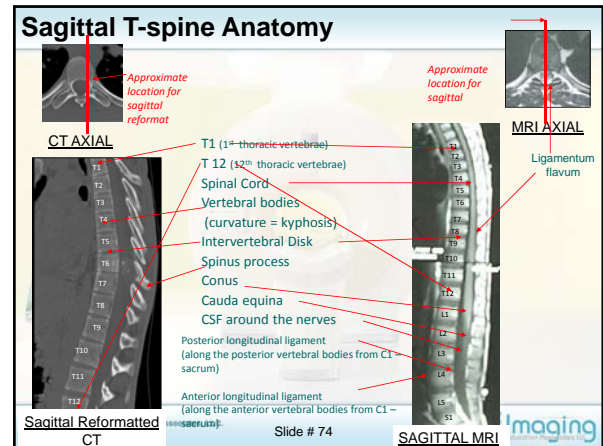
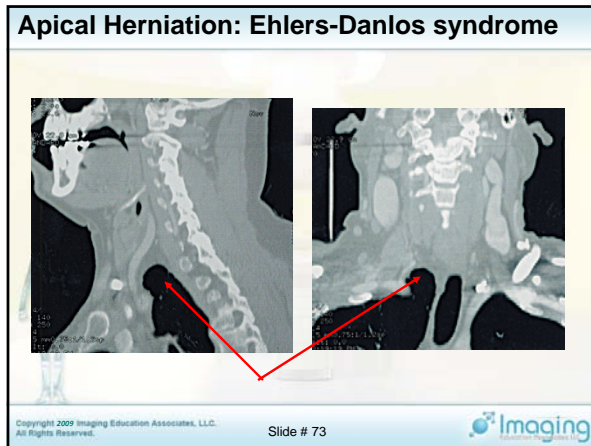


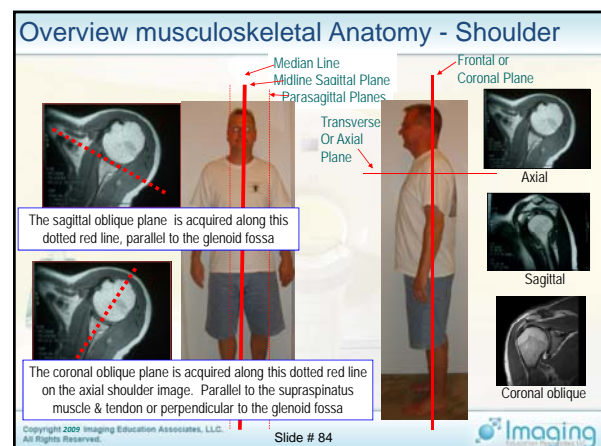
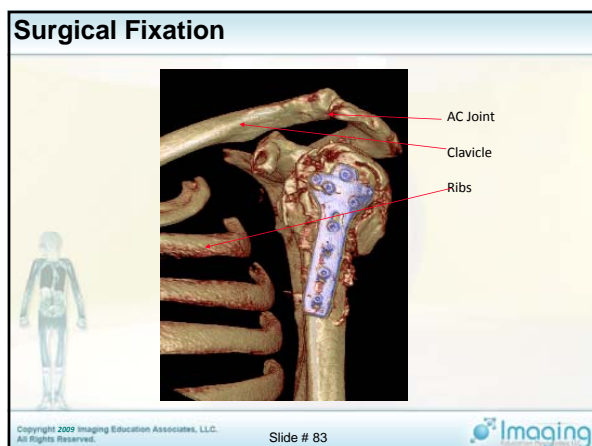
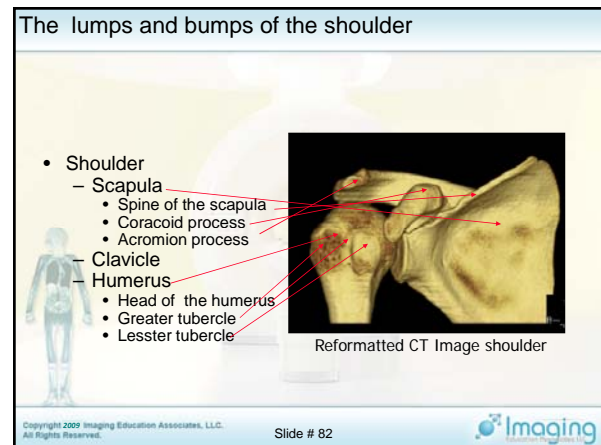
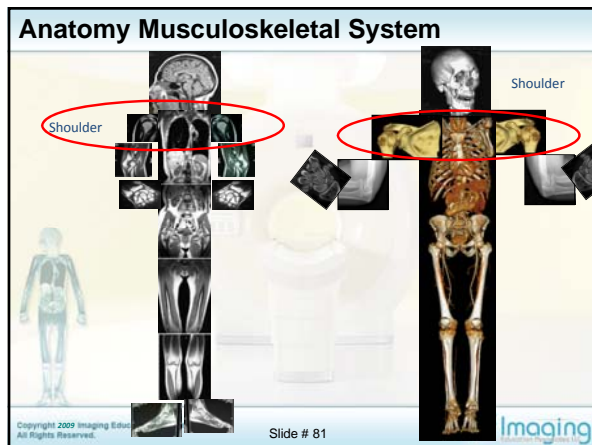
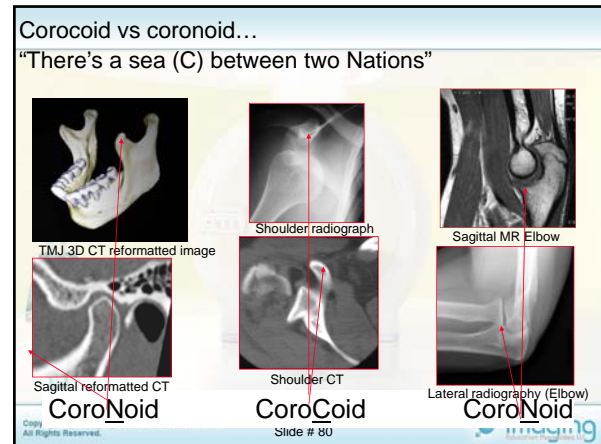
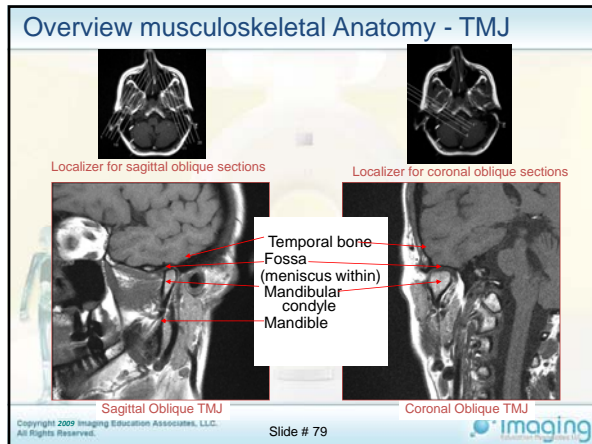
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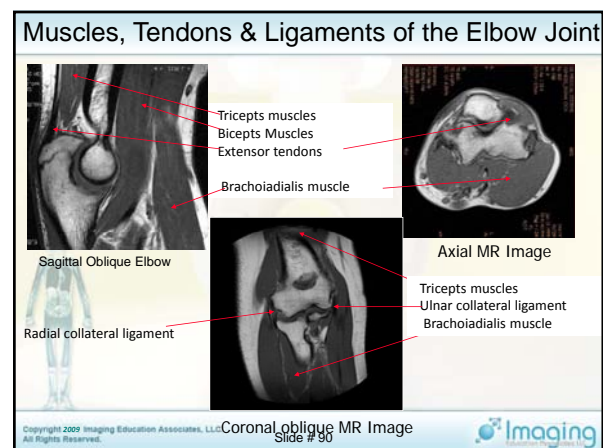
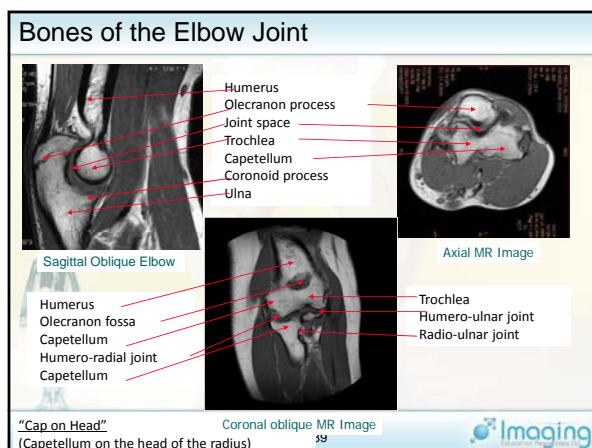
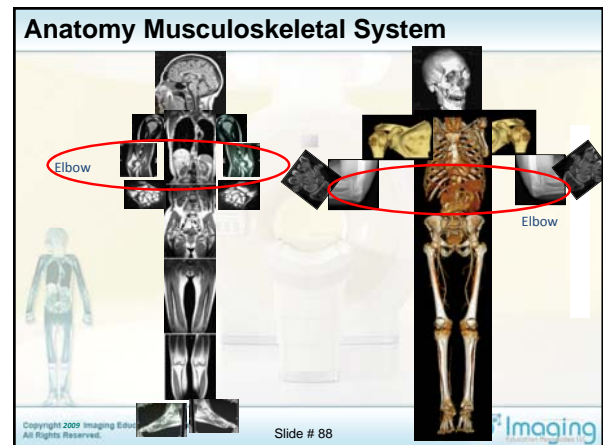
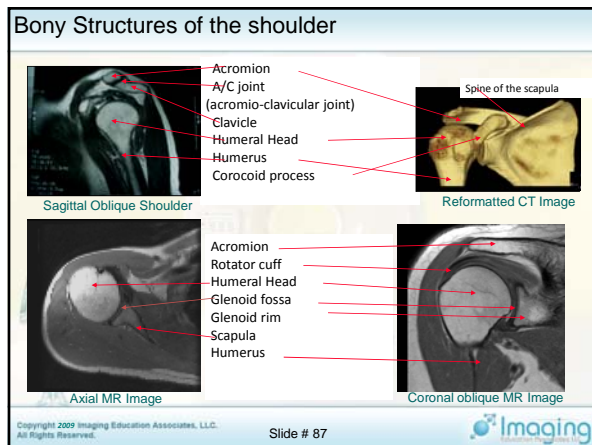
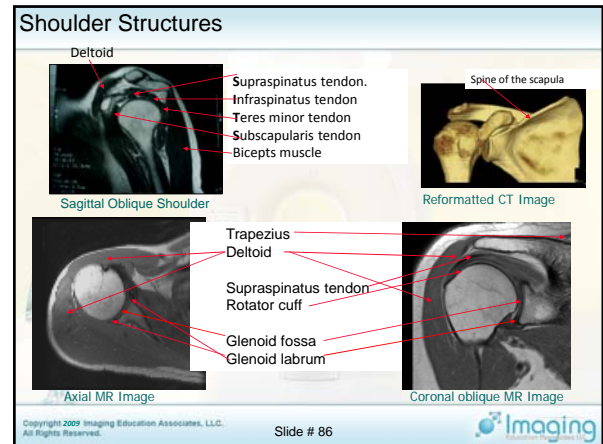
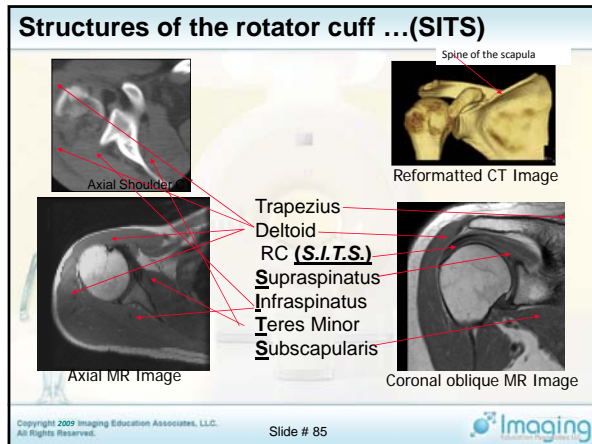
Slide # 66

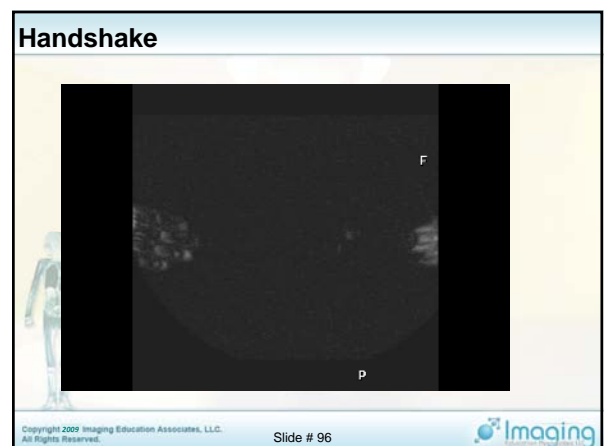
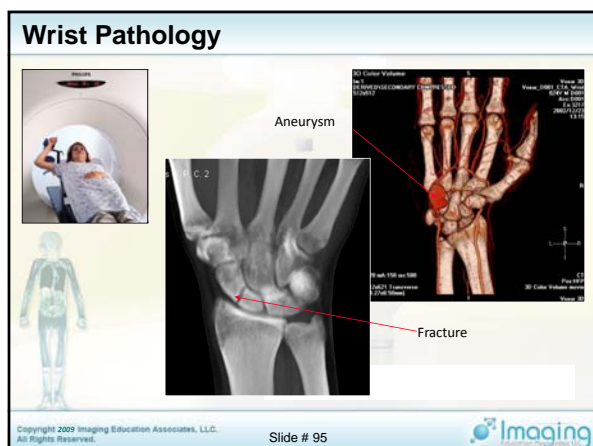
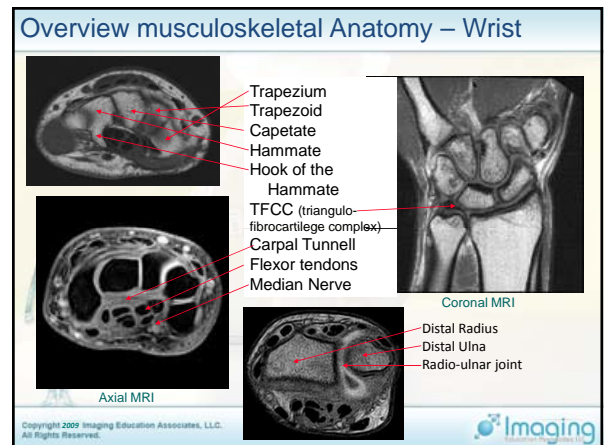
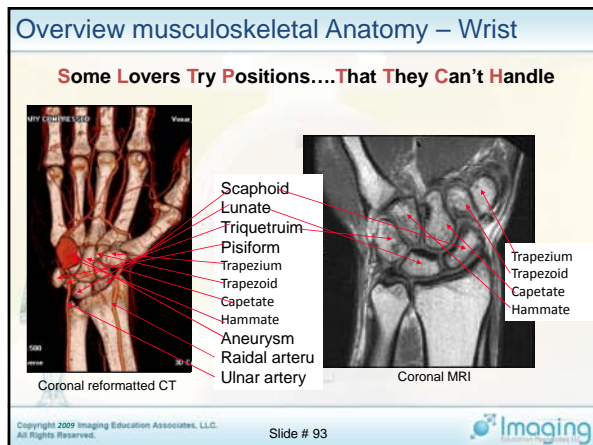
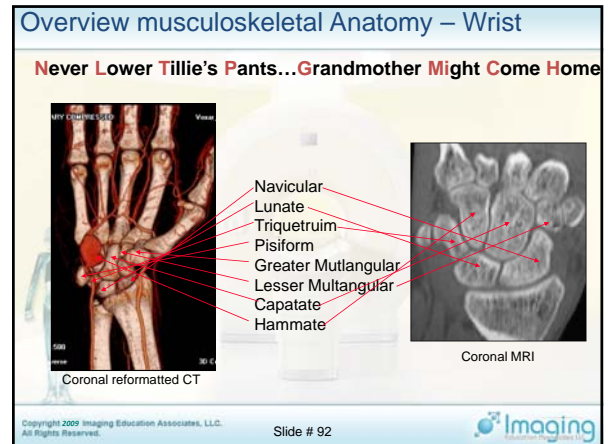
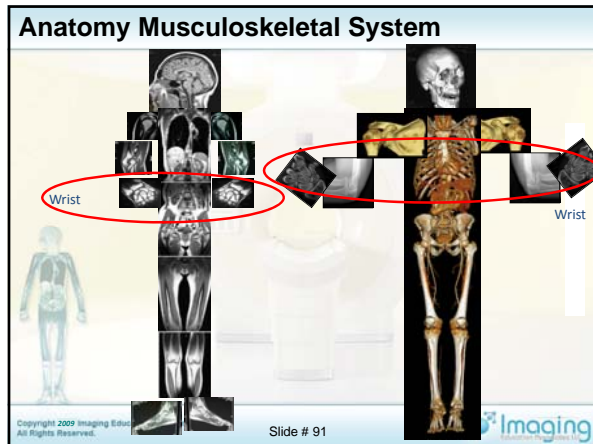


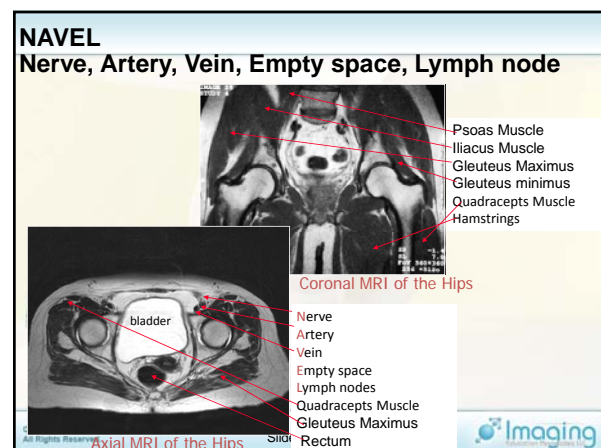
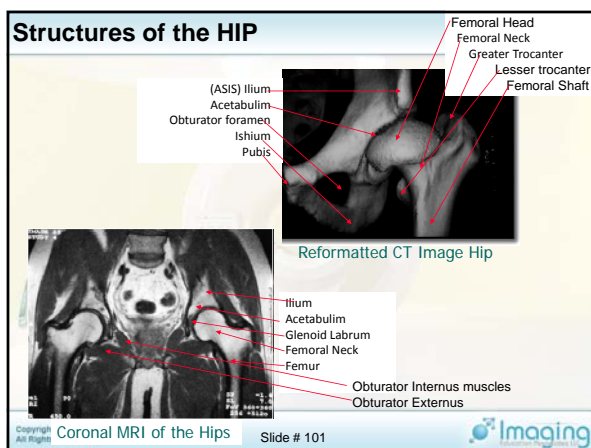
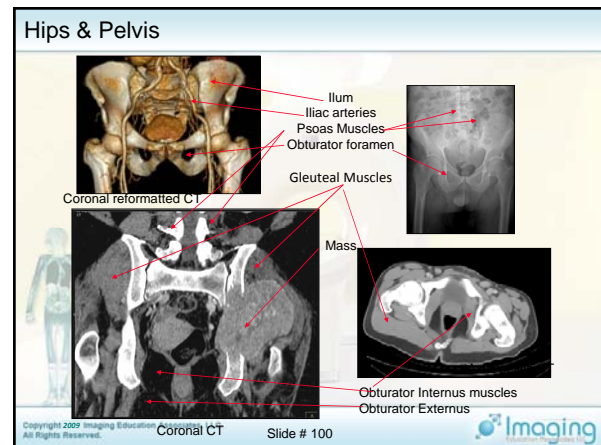
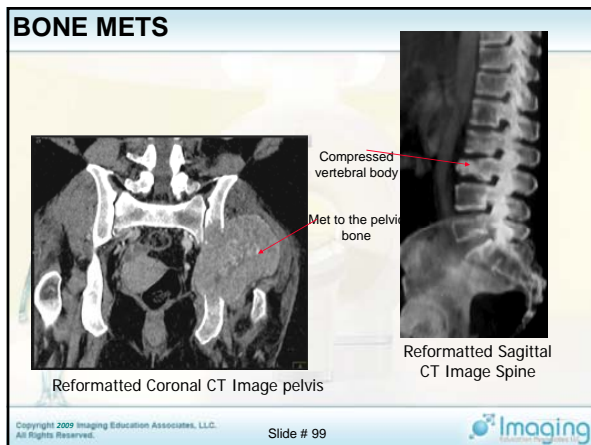
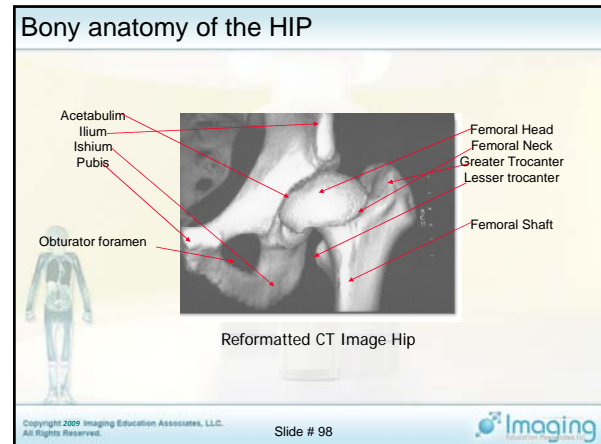
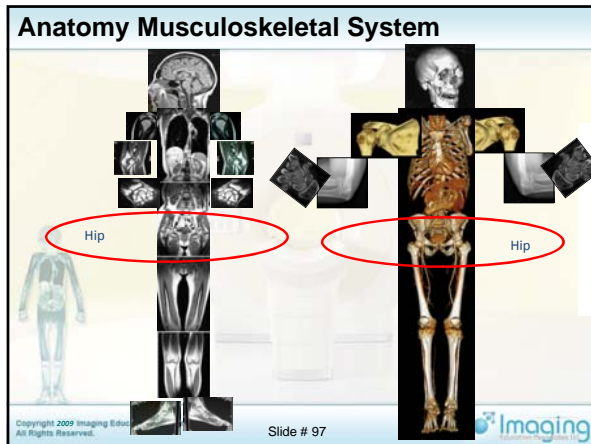


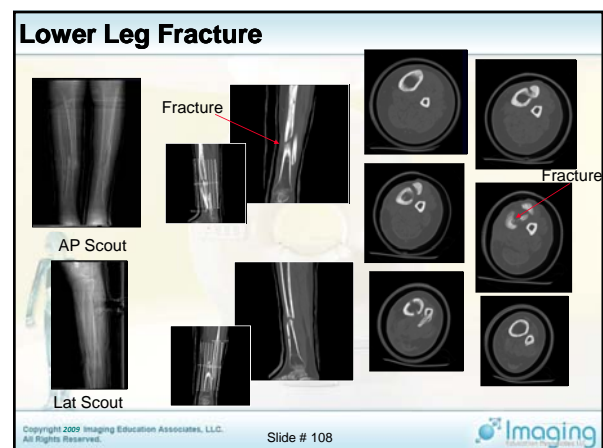
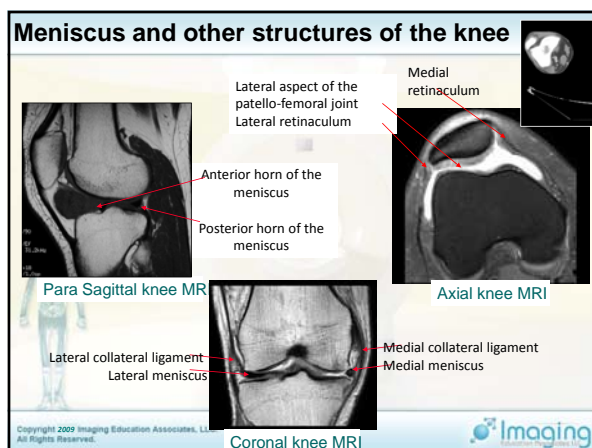
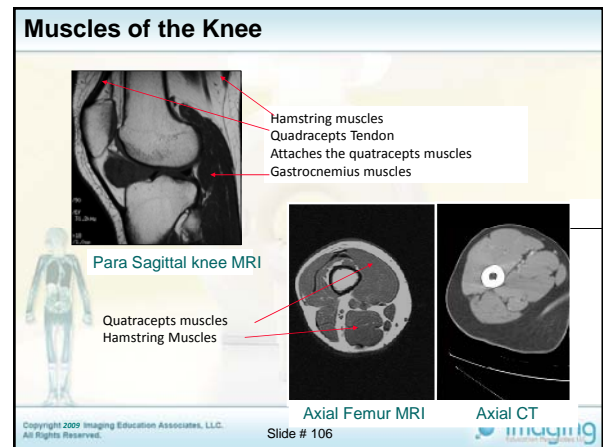
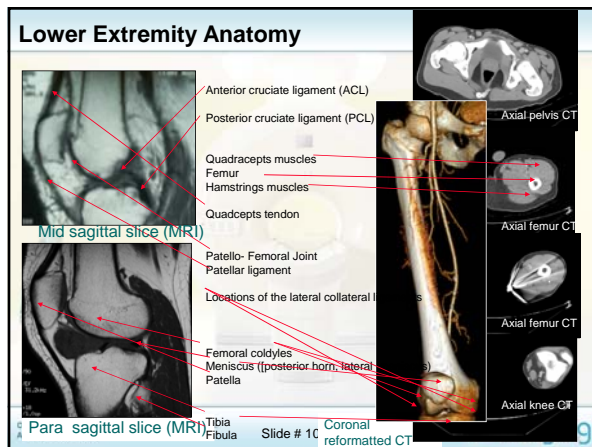
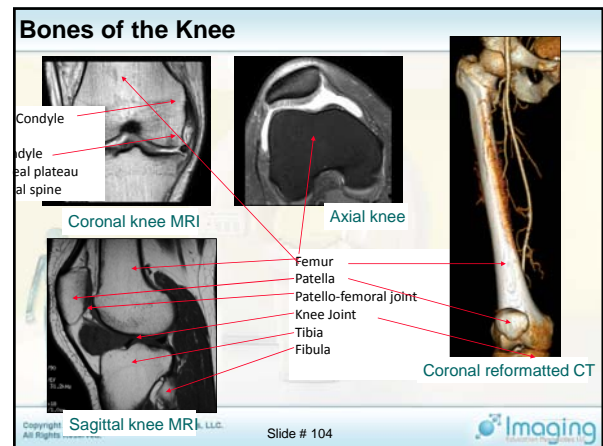
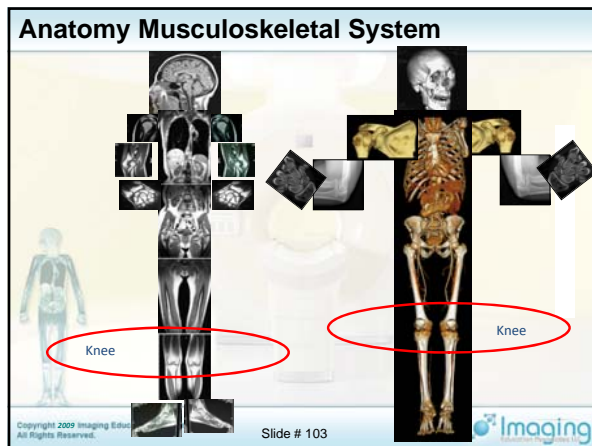


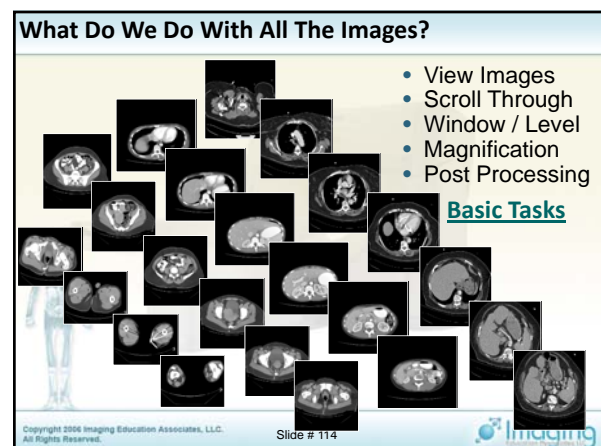
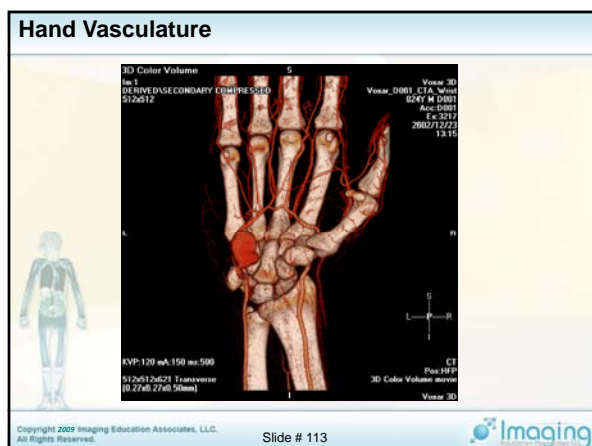
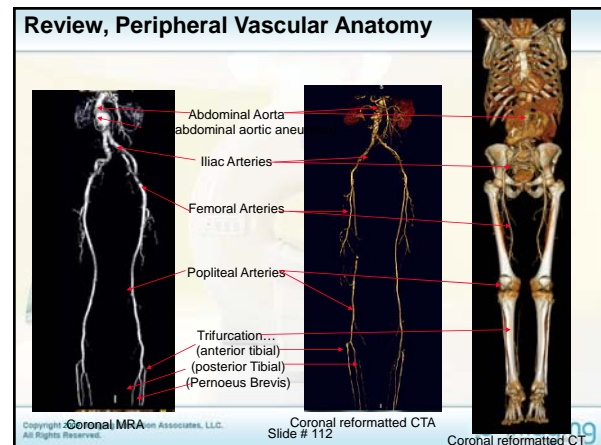
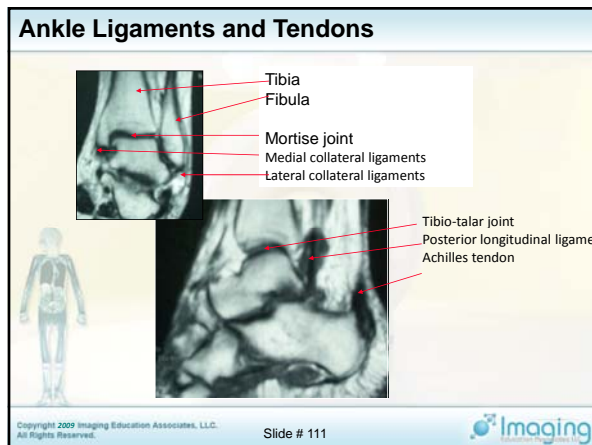
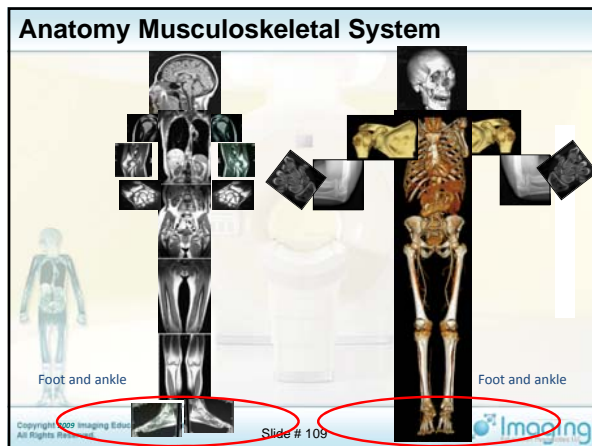


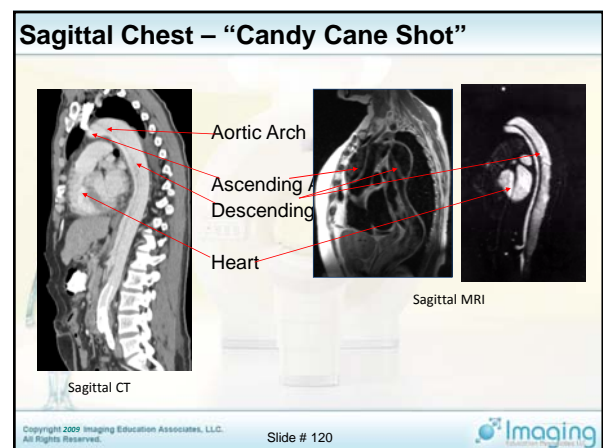
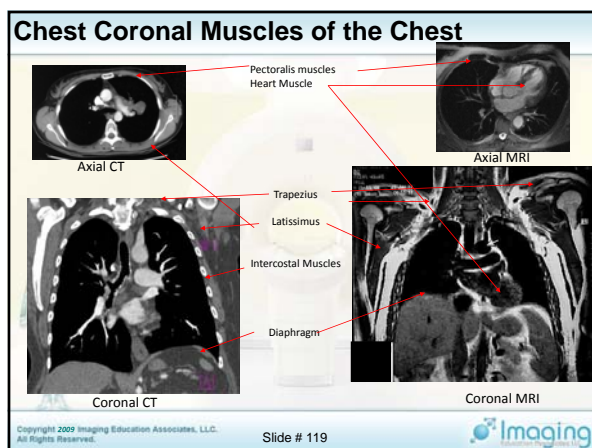
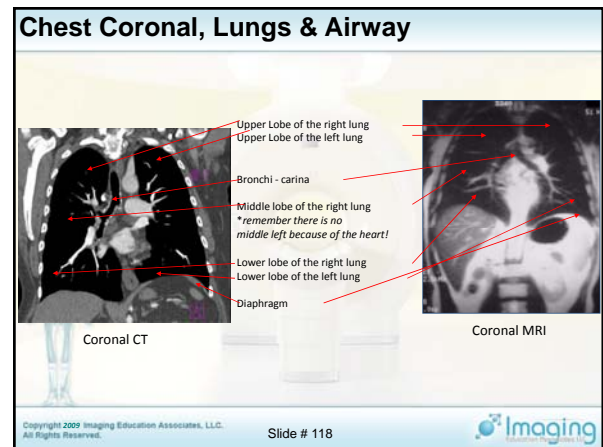
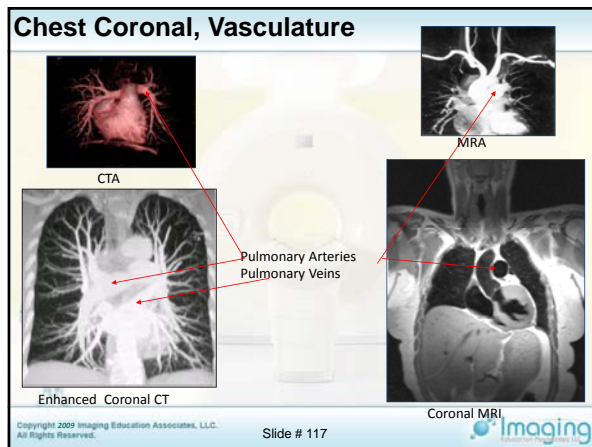
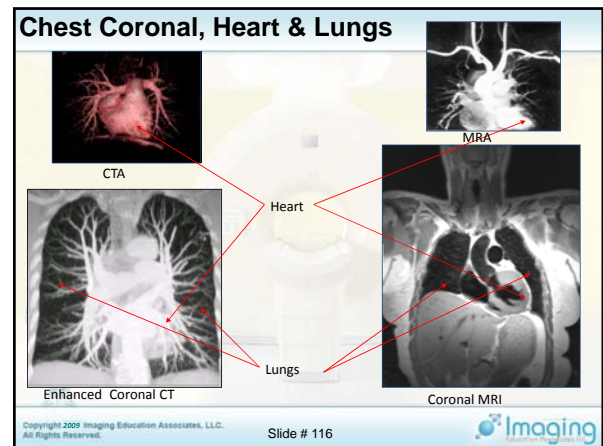
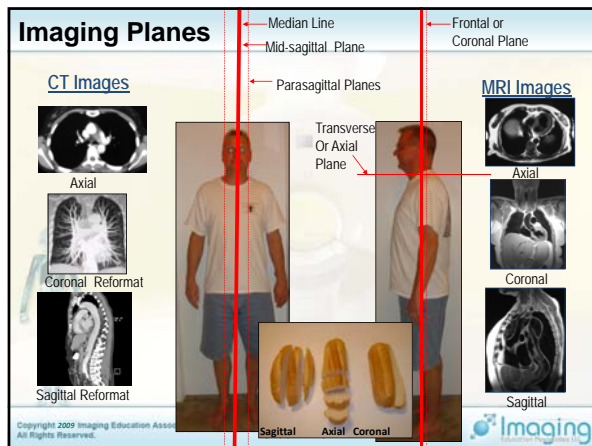


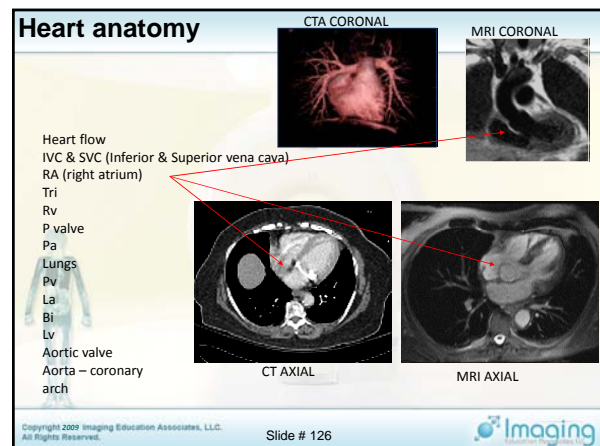
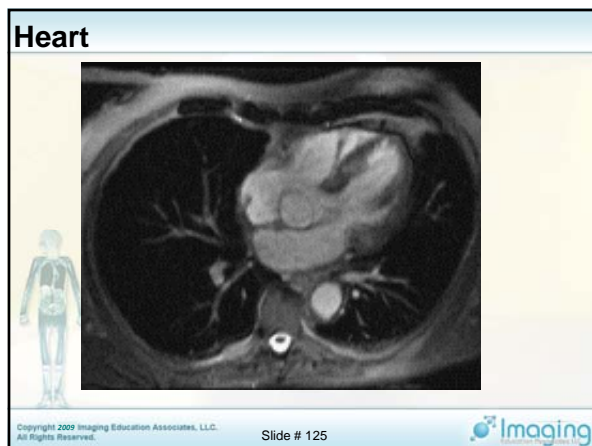
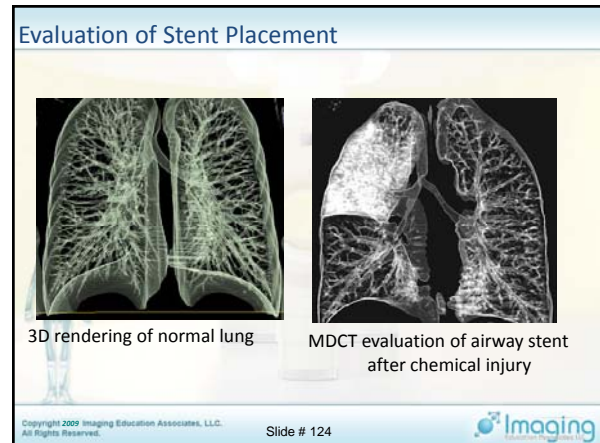
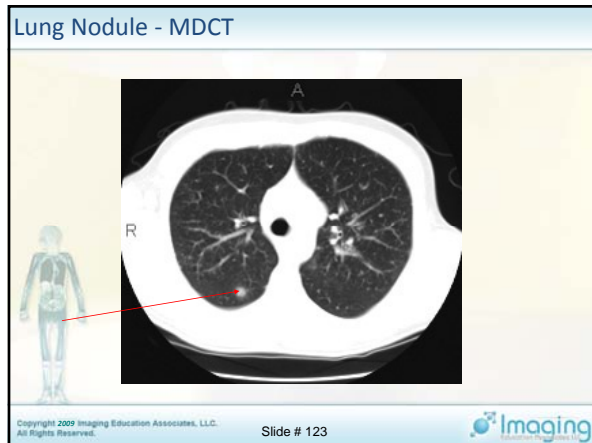
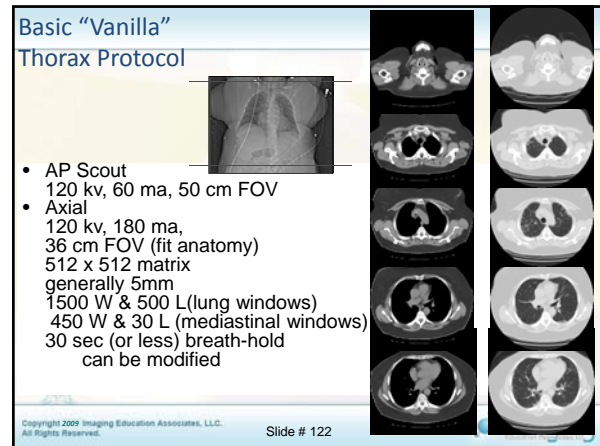
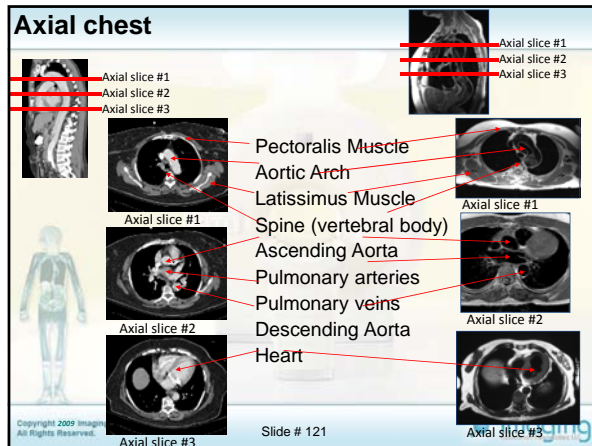


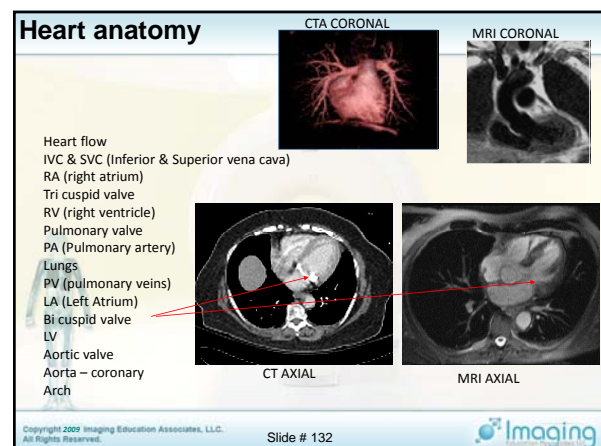
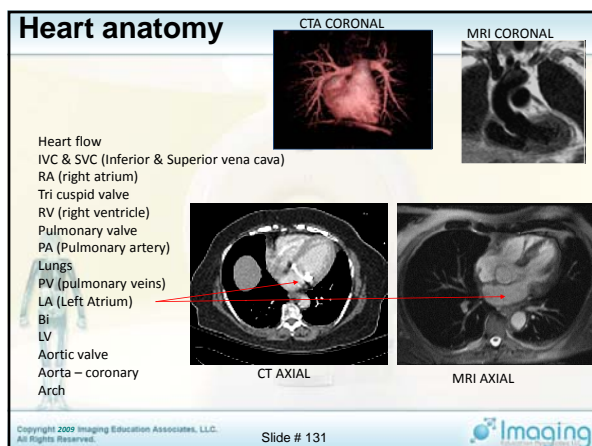
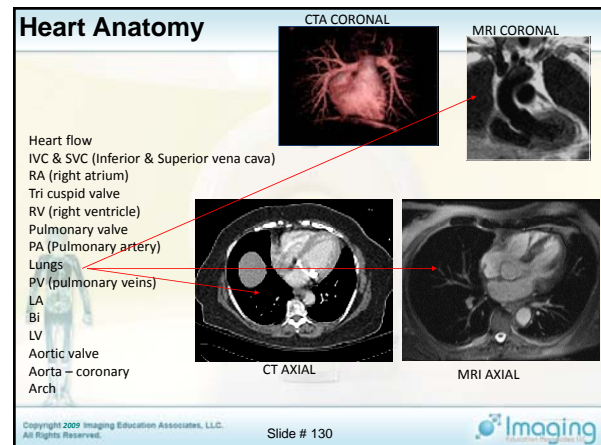
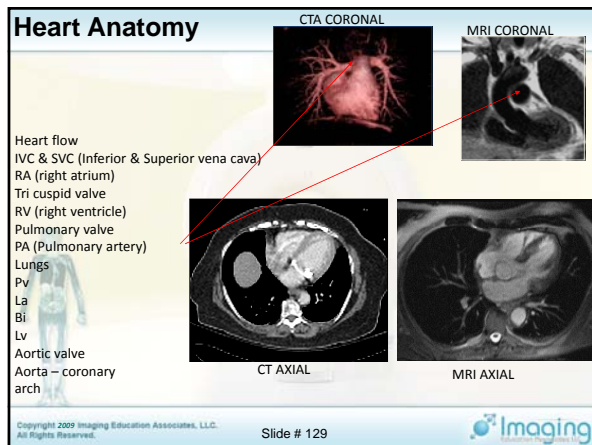
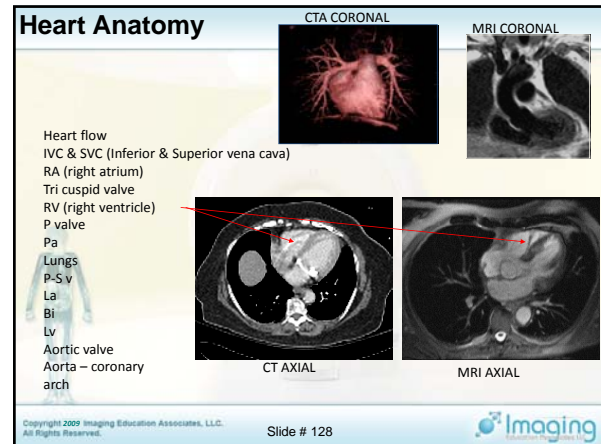
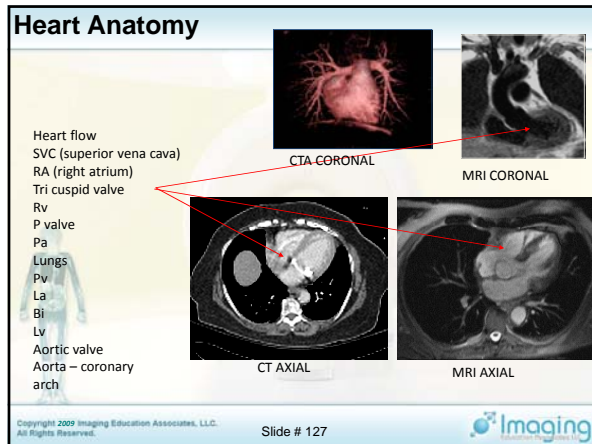









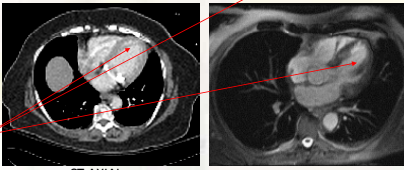




Heart anatomy



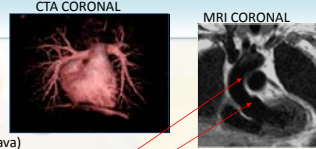
Heart flow
IVC & SVC (Inferior & Superior vena cava)
RA (right atrium)
Tri cuspid valve
RV (right ventricle)
Pulmonary valve
PA (Pulmonary artery)
Lungs
PV (pulmonary veins)
LA (Left Atrium)
Bi cuspid valve
LV (Left Ventricle)
Aortic valve
Aorta – coronary Arch



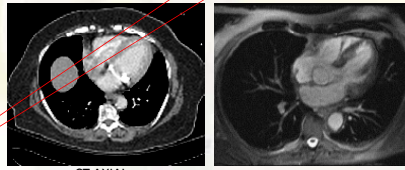
CT AXIAL MRI AXIAL

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Heart anatomy




Heart flow
IVC & SVC (Inferior & Superior vena cava)
RA (right atrium)
Tri cuspid valve
RV (right ventricle)
Pulmonary valve
PA (Pulmonary artery)
Lungs
PV (pulmonary veins)
LA (Left Atrium)
Bi cuspid valve
LV (Left Ventricle)
Aortic valve
Aorta – coronary Arch



CT AXIAL MRI AXIAL

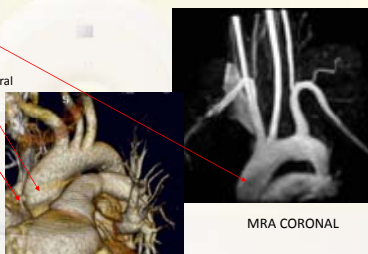
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Heart and Pulmonary Arteries



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Aortic Arch – the “A, B, C’s”

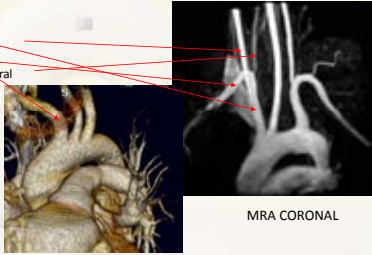


Ascending aorta
Coronaries
Brachiocephalic (aka Innominate)
right common carotid
right subclavian
right vertebral
Left common carotid
Left Subclavian
Left vertebral

CTA CORONAL MRA CORONAL

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Aortic Arch – the “A, B, C’s”




Ascending aorta
Coronaries
Brachiocephalic (aka Innominate)
right common carotid
right subclavian
right vertebral
Left common carotid
Left Subclavian
Left vertebral

CTA CORONAL MRA CORONAL

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Aortic Arch – the “A, B, C’s”

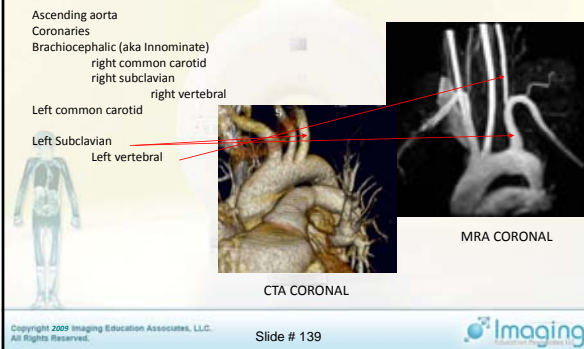


Ascending aorta
Coronaries
Brachiocephalic (aka Innominate)
right common carotid
right subclavian
right vertebral
Left common carotid
Left Subclavian
Left vertebral

CTA CORONAL MRA CORONAL

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Aortic Arch – the “A, B, C’s”



Coronary Calcifications

- Calcium is an indicator for a disease artery (CAD)
- Calcification in the coronary artery reveals the condition of coronary arteriosclerosis
- Leads to heart attacks

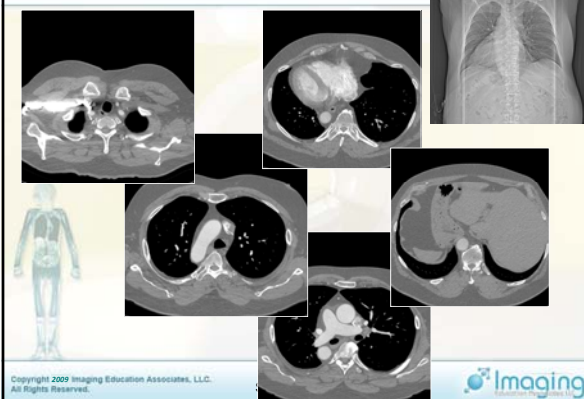


Grossly calcified left coronary artery

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Situs Inversus



Cross Sectional Abdomen

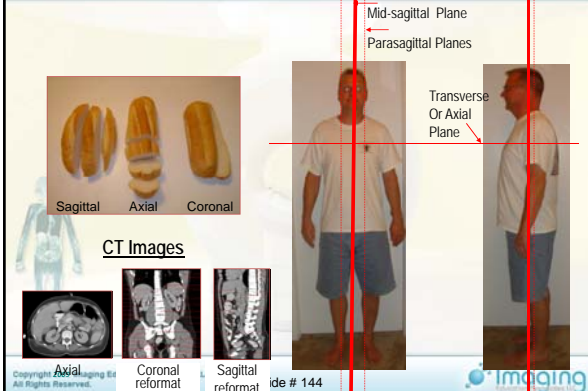


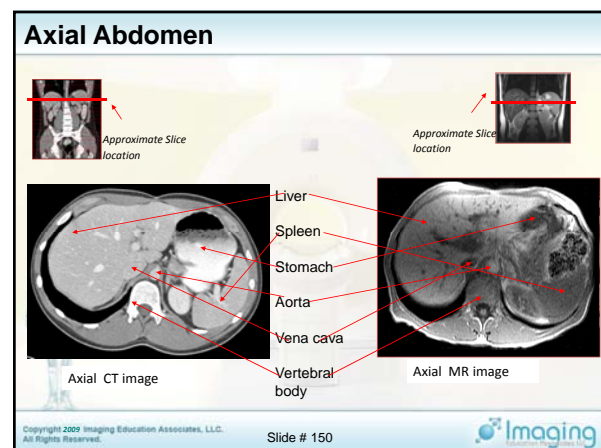
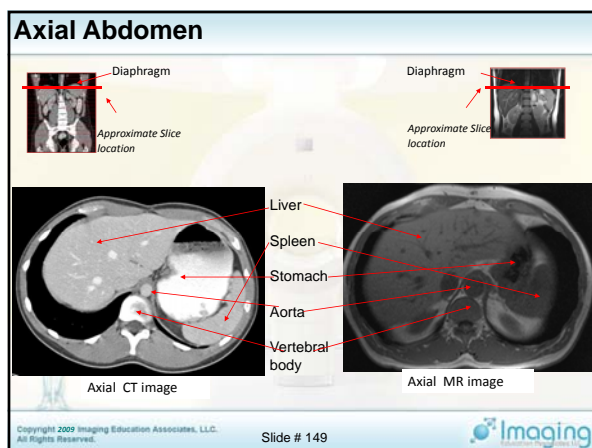
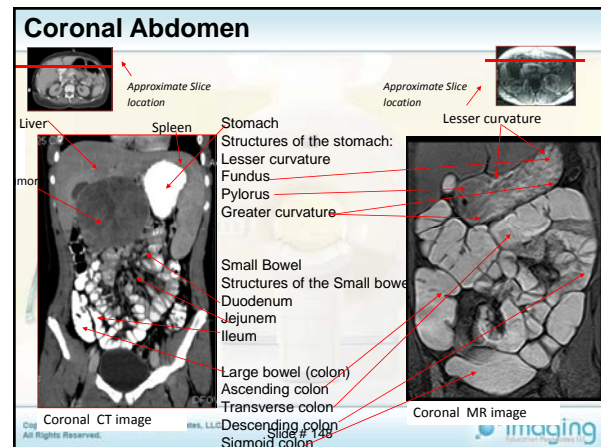
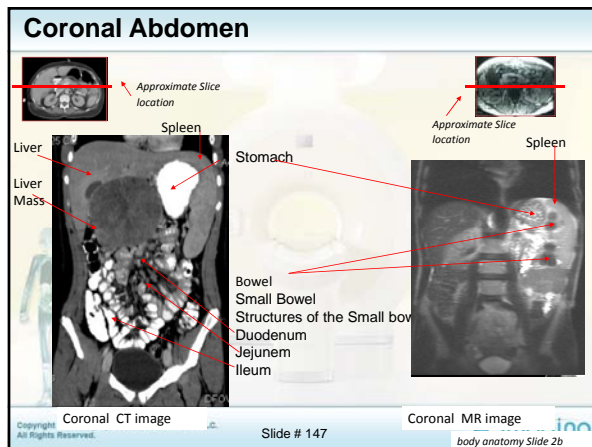
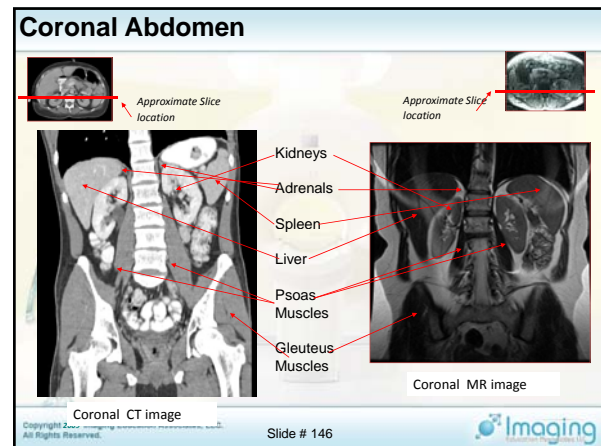
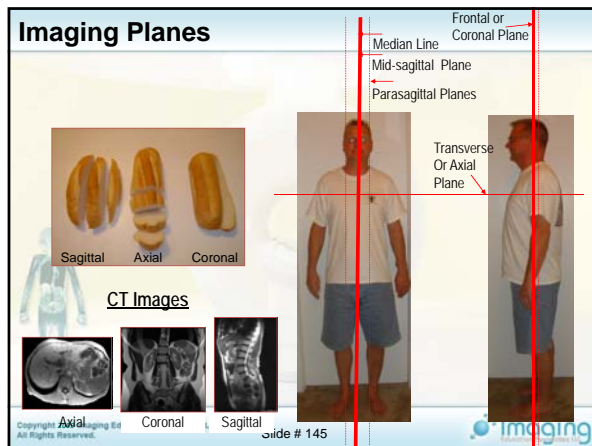
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Abdomen Images

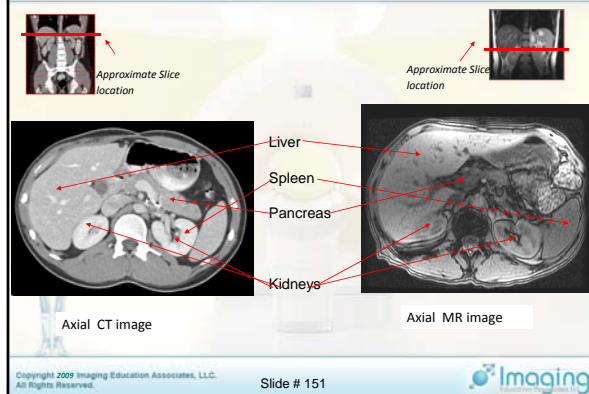


Imaging Planes

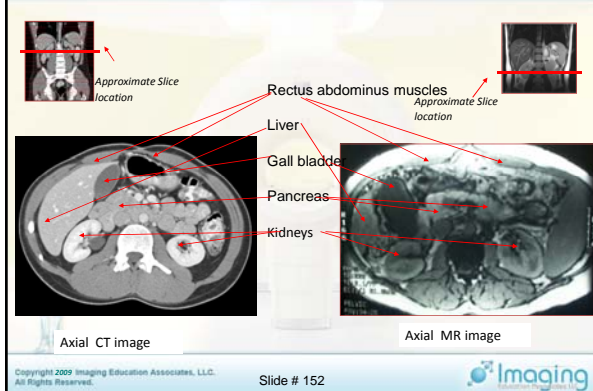




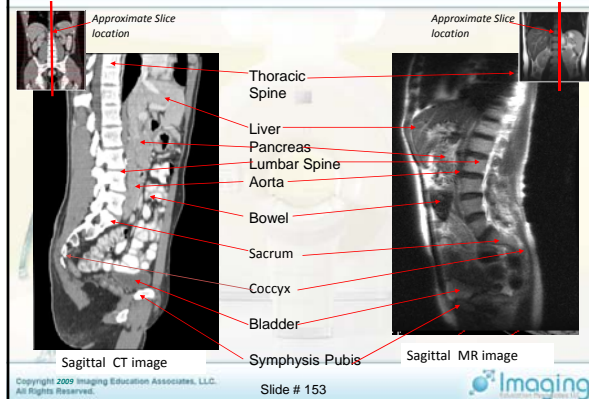
Axial Abdomen



Axial Abdomen



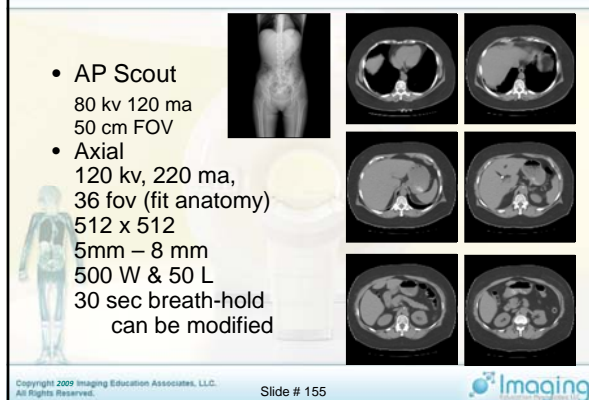
Sagittal Abdomen



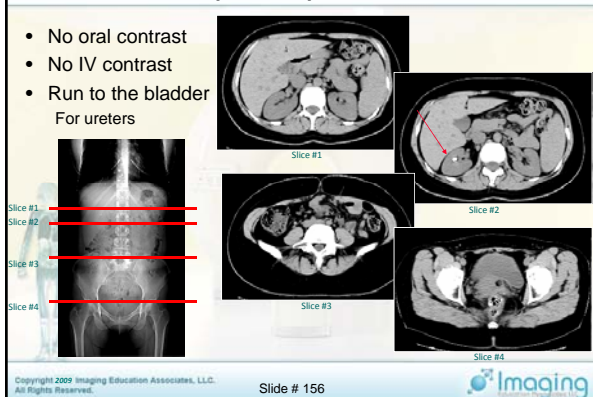
Sagittal Abdomen



Basic "Vanilla" Abdomen & Pelvis Protocol

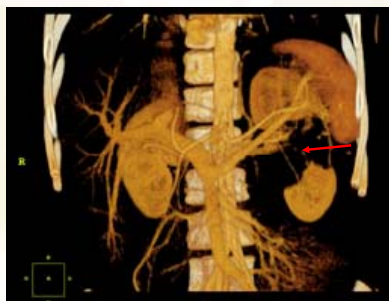


Renal Calculus (Stones)



Non-Contrast Pathology

Trauma



3D Reconstruction of Kidney Fracture

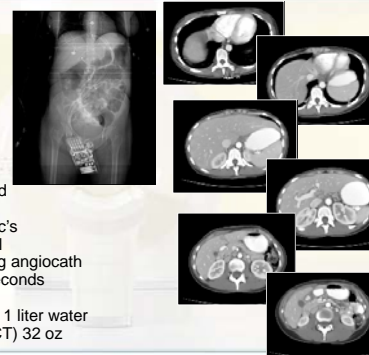
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Basic "Vanilla" Abdomen & Pelvis Protocol with sprinkles

- AP Scout
- Axial
 - 120 kv, 220 ma,
 - 36 fov (fit anatomy)
 - 512 x 512
 - generally 5mm
 - 500 W & 50 L
 - 30 sec breath-hold
 - can be modified
- Post contrast
 - IV- Contrast if 100 cc's
 - non-ionic 300 mg/ml
 - 2 cc/sec for 20g angiocath
 - delay scan 60-70 seconds
 - Oral –
 - gastrografin 30 per 1 liter water
 - Barium (dilute for CT) 32 oz



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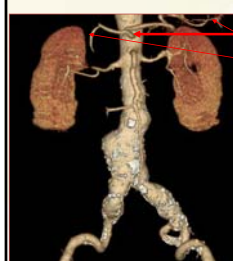
Slide # 158



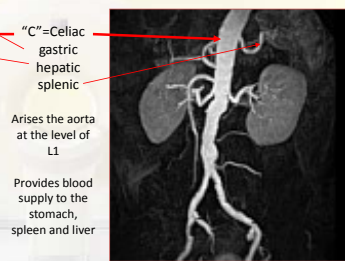
Abdominal Vasculature

"See Spot Run In.."

"C" not see) Celiac, SMA, Renals (right & Left), IMA



Coronal CTA Image



Coronal MRA image

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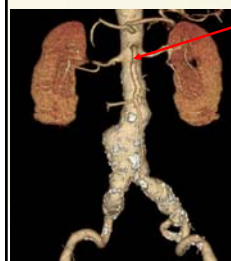
Slide # 159



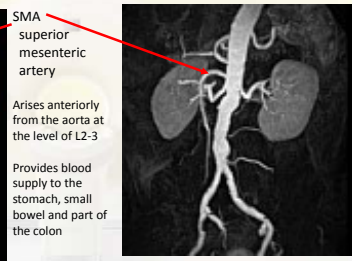
Abdominal Vasculature

"See Spot Run In.."

"C" not see) Celiac, SMA, Renals (right & Left), IMA



Coronal CTA Image



Coronal MRA image

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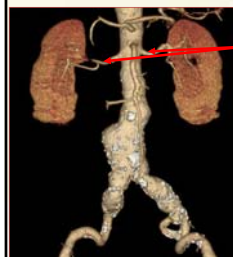
Slide # 160



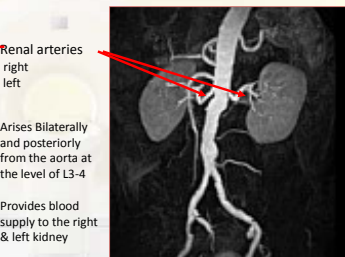
Abdominal Vasculature

"See Spot Run In.."

"C" not see) Celiac, SMA, Renals (right & Left), IMA



Coronal CTA Image



Coronal MRA image

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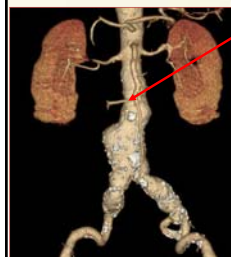
Slide # 161



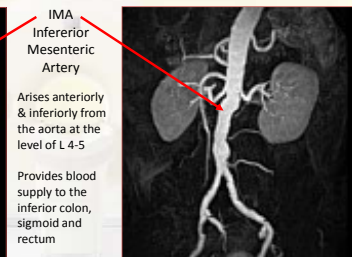
Abdominal Vasculature

"See Spot Run In.."

"C" not see) Celiac, SMA, Renals (right & Left), IMA



Coronal CTA Image



Coronal MRA image

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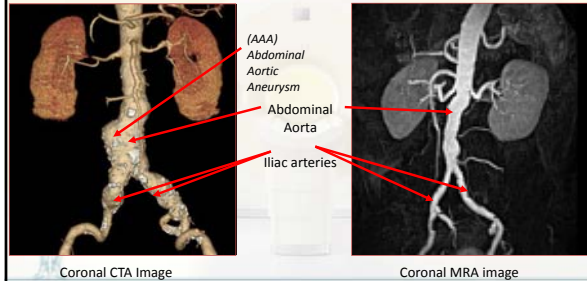
Slide # 162



Abdominal Vasculature

"See Spot Run In.."

"C" not see) Celiac, SMA, Renals (right & Left), IMA



Coronal CTA Image

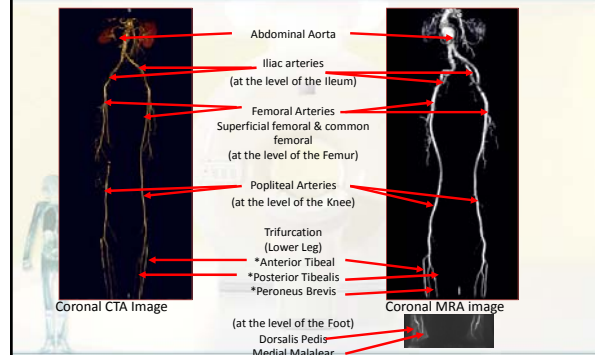
Coronal MRA image

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Slide # 163



Peripheral Vasculature "Run-off's



Coronal CTA Image

Coronal MRA image

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Slide # 164



Abdominal Vasculature



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Slide # 165



Abdominal Veins

Review Vasculature...

Almost ALL Arteries:

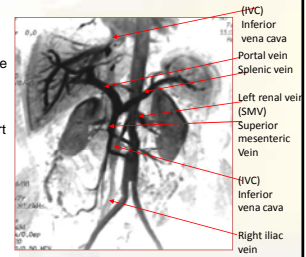
- Carry oxygenated blood away from the heart
- Carry oxyhemoglobin blood to organs

Almost ALL Veins:

- Carry deoxygenated blood to the heart
- Carry deoxyhemoglobin away from organs

Exceptions:

- Portal vein-
 - Carries deoxyhemoglobin to the liver
- Pulmonary veins-
 - Carries deoxyhemoglobin to the lungs
- Pulmonary arteries-
 - Carries oxyhemoglobin to the heart



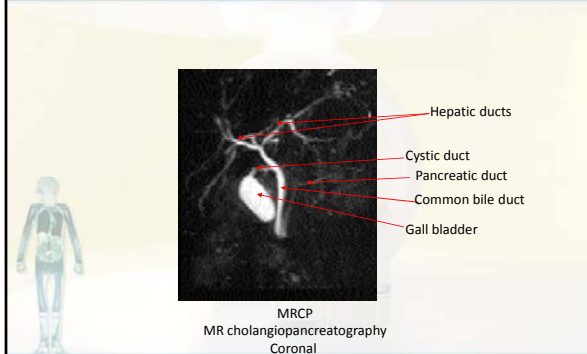
Coronal abdominal venogram

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Slide # 166



Biliary ducts



MRCP
MR cholangiopancreatography
Coronal

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Biliary System



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APPENDICITIS

- INFLAMMATION OF THE APPENDIX
- TYPICALLY APPEARS PUS/AIR FILLED



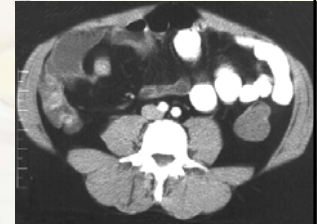
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CROHNS DISEASE

- REGIONAL ILEITIS
- ETIOLOGY



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DIVERTICULITIS

- INFLAMED DIVERTICULUM
- CT PRESENTATION

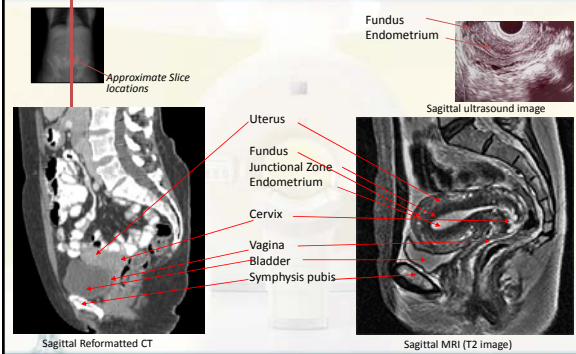


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Female Pelvis Anatomy

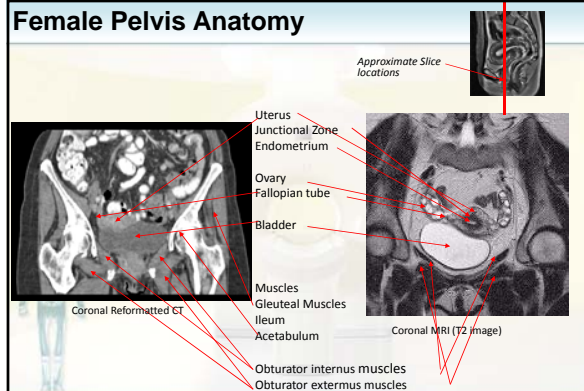


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Female Pelvis Anatomy

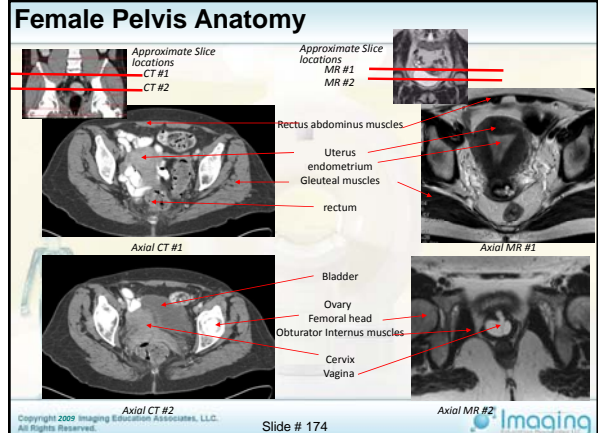


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Female Pelvis Anatomy

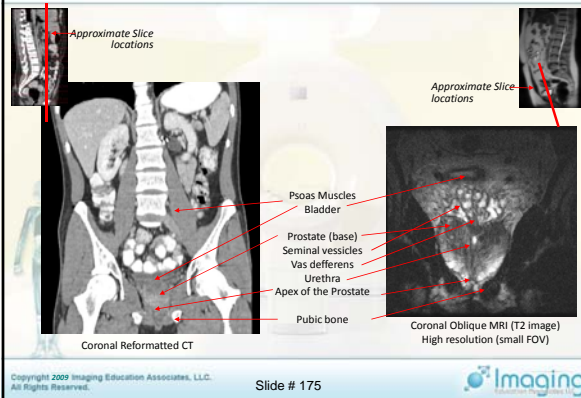


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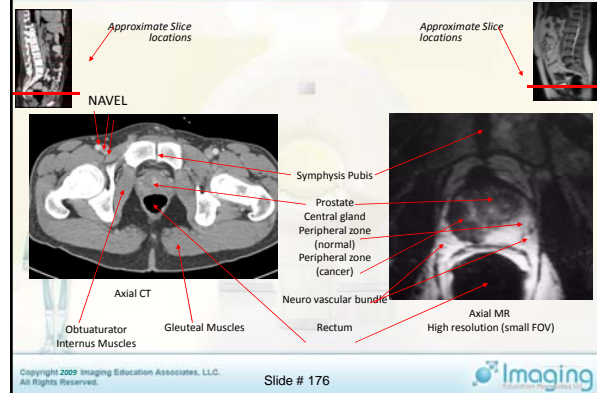
Male Pelvis Anatomy



Slide # 175



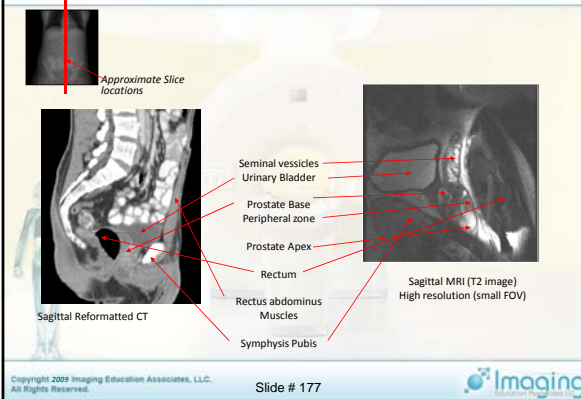
Male Pelvis Anatomy



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Male Pelvis Anatomy



Slide # 177

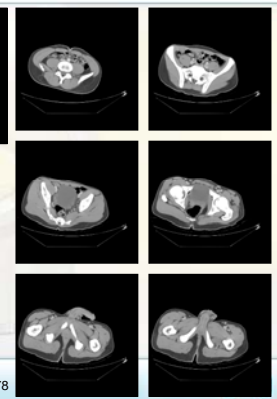


Basic Pelvis Protocol

- AP Scout
80 kv 120 ma
- Axial
-120 kv, 220 ma,
-36 fov (fit anatomy)
-512 x 512
-generally 5mm
-500 W & 50 L
-30 sec breath-hold
can be modified
- If contrast
 - Post contrast
 - Contrast if 100 cc's
non-ionic 300 mg/ml
3 cc/sec for 20g
angiocath
delay scan 25-30
seconds min post
injection to peak
enhancement

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Male Pelvis



Slide # 179



Male and Female Pelvis



Slide # 180

