

C41: 3 PATHOLOGIES

COMPARING CT AND MRI

OBJECTIVE

- Discussing the Similarities between CT and MRI
- Discussing the Differences between CT and MRI
- Show 3 Pathologies in which CT and MRI have correlation
 - Brain Bleeds
 - Pre-op Knees
 - Tumors

CT

- 360 view of anatomy
- Postprocessing Recons
- Use of Axial, sagittal, coronal plains

MRI

- 360 view of anatomy
- Postprocessing Recon
- Use of Axial, Sagittal, coronal plains

TALKING ABOUT THE SIMILARITIES IN CT AND MRI

TALKING ABOUT DIFFERENCES IN CT AND MRI

CT

- Uses Xray to obtain images
- Best for bone, stones, bleeds, organs, cancer staging, and vascular/tissue.
- Potential for radiation exposure
- Exam duration for CT close to 5 to 10 minutes depending on the exam

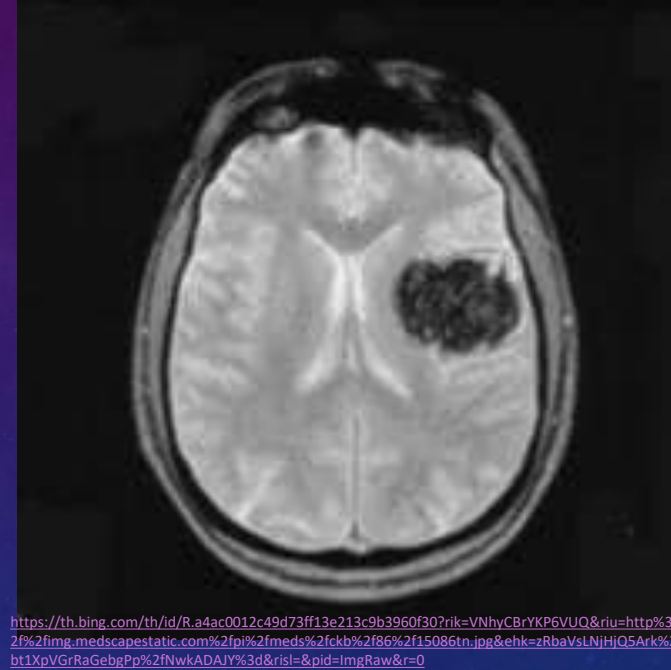
MRI

- Magnets and radio waves
- Able to see Joint, nerves, brain and masses
- Not for people with metal implants or that have issues holding still for long period of time.
- Exam can last up to 20 to 50 minutes and patient must hold still for the duration of the exam.

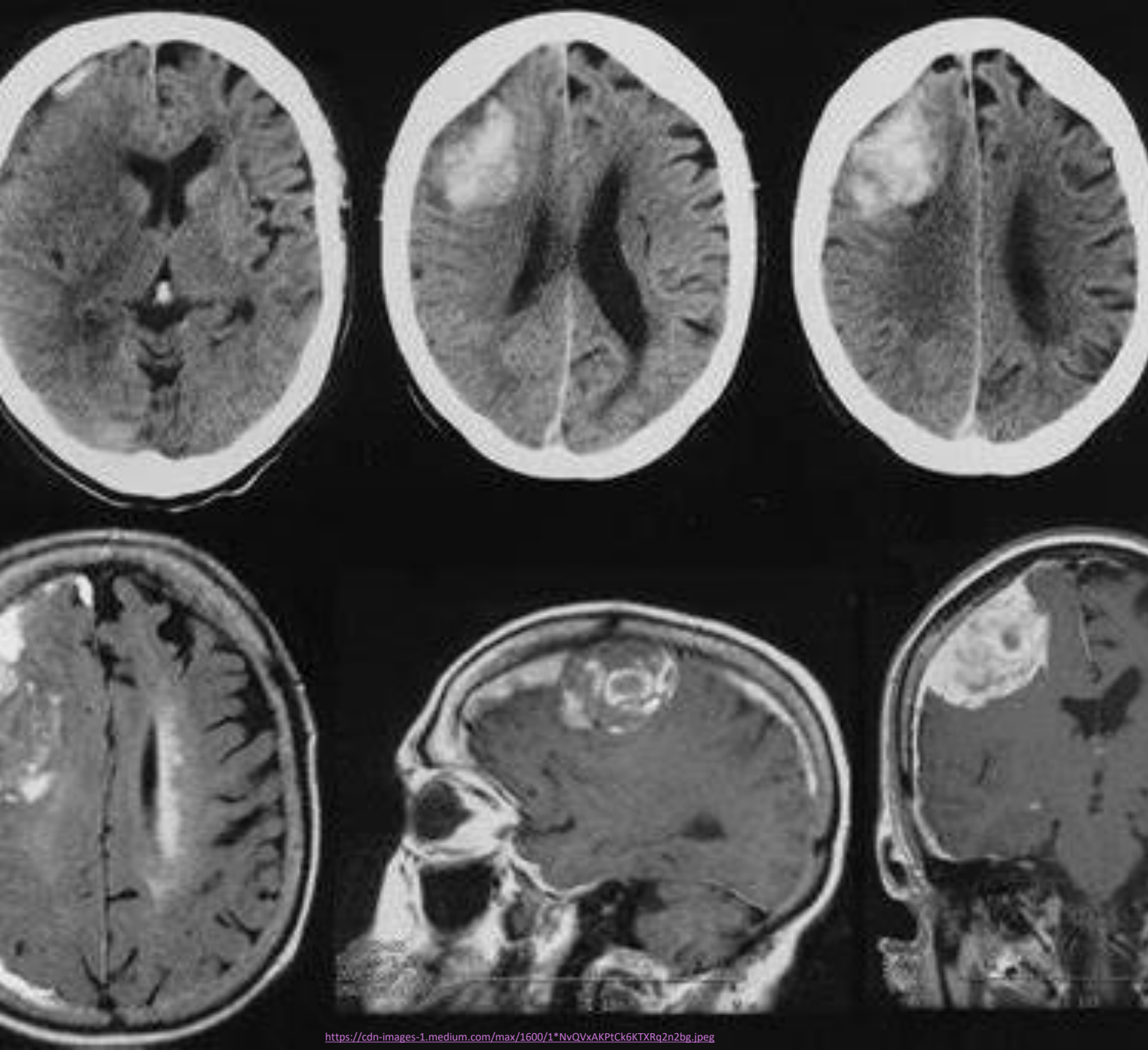
CT



MRI



BRAIN BLEEDS



MORE INDEPTH OF CT BRAIN BLEEDS

- CT subdural hemorrhaging, bleeding within the subdural space that can happen in any aging.
- Caused by some sort of trauma to the head.
- Acute subdural hematoma is a crescent-shaped homogeneously hyperdense extra-axial collection that spreads diffusely over the affected hemisphere.

MORE INDEPTH WITH MRI BRAIN BLEEDS

Subdural hematoma is a collection of blood accumulating in the subdural space, the potential space between the dura and arachnoid mater of the meninges around the brain.

Occasionally spontaneous acute subdural hematomas are seen in patients with an underlying bleeding disorder or structural abnormality such as dura arteriovenous fistula. They appear as crescentic collections on MRI.

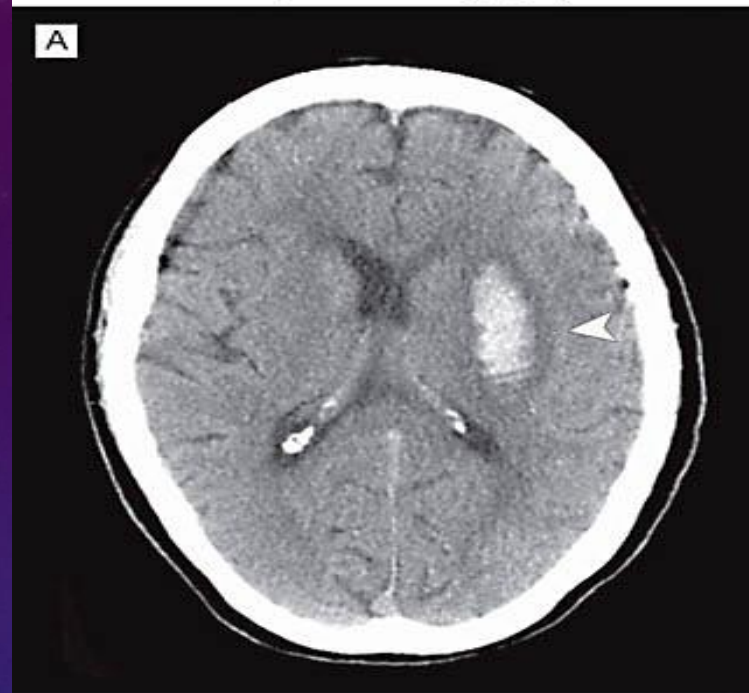
Subacute subdural hemorrhages may appear biconvex-shaped on the coronal plane rather than crescent-shaped which is a typical appearance on the axial plane.

COMPARING CT AND MRI WITH BRAIN BLEEDS

Similarities

- Both are very good finding/ diagnosing subdural bleeds
- Both modalities are noninvasive
- Both provide images with measurements for sizing and staging of bleed

Computed Tomography



Magnetic Resonance Imaging (GRE)



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Differences

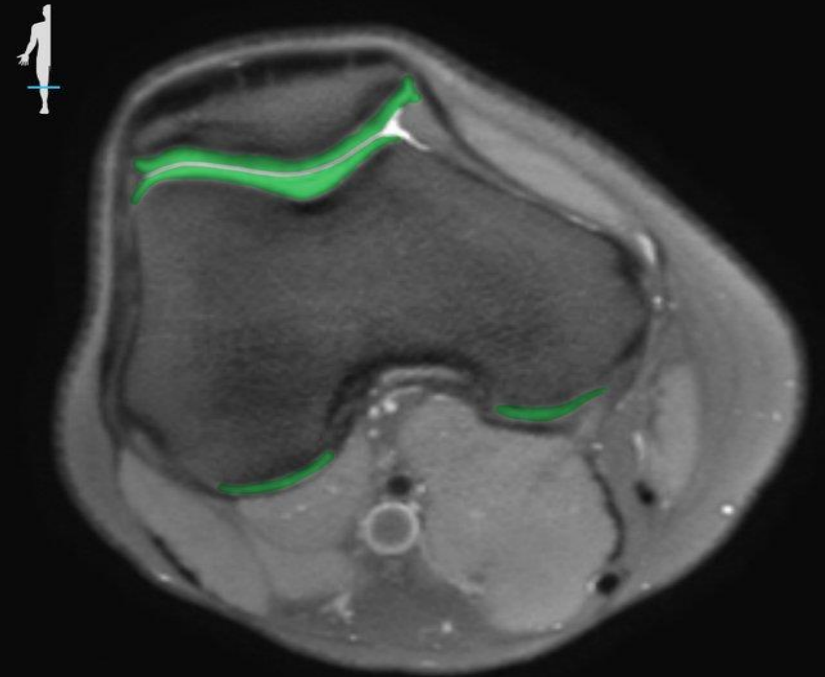
- MRI gives a better detailed view of the surrounding tissues.
- CT is better at showing the vascularity of the surrounding area.
- CT needs contrast to view the full extent of damaged.
- MRI has a longer Acquisition time.

PRE-OP KNEES

CT



MRI



PRE-OP KNEES CT

- A CT scan provides your doctor with more detailed images of the inside of your knee than traditional X-rays do. It gives your doctor an internal view of your knee without making an incision and performing exploratory surgery.
 - Some scans use special equipment such as an aluminum rod that extends from hip through ankle, to help make proper 3D reconstructions and measurements for surgery planning.
- A typical CT scan of the knee takes between 30 and 45 minutes to complete.



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PRE-OP KNEES MRI

- A knee MRI is common for pre-operative planning in the case of advanced arthritis which could require a total knee replacement.
- It is common to uncover significant and unexpected findings through an MRI.
 - It can alter treatment plans and MRIs are essential for orthopedic surgeons to determine the need for surgery.

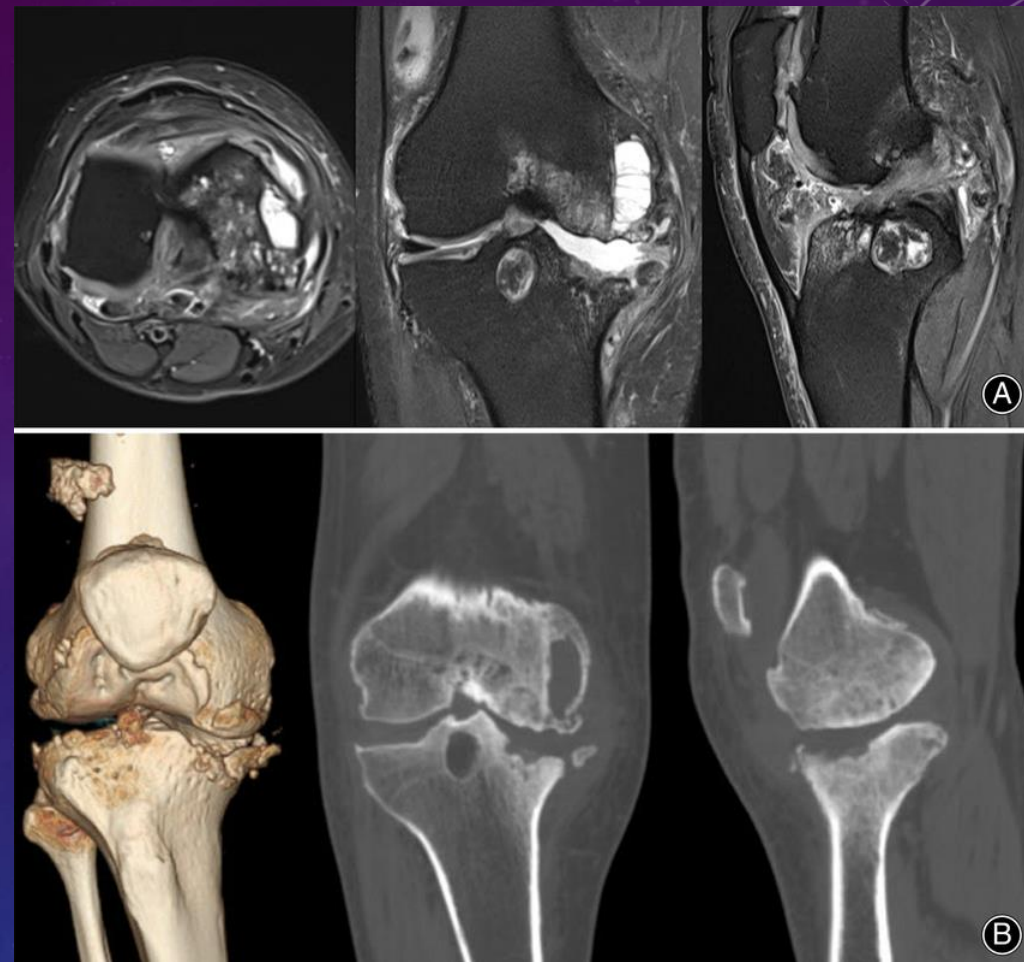


Similarities:

- Both take very detail Imaging of the knee for pre surgical planning.
- Both modalities are minimally invasive.

Differences:

- CT is focused more to the bony structures of the knee to make its 3D recons
- MRI is more used to see in what state the knee is in seeing soft tissue muscle and bone health (arthritis).

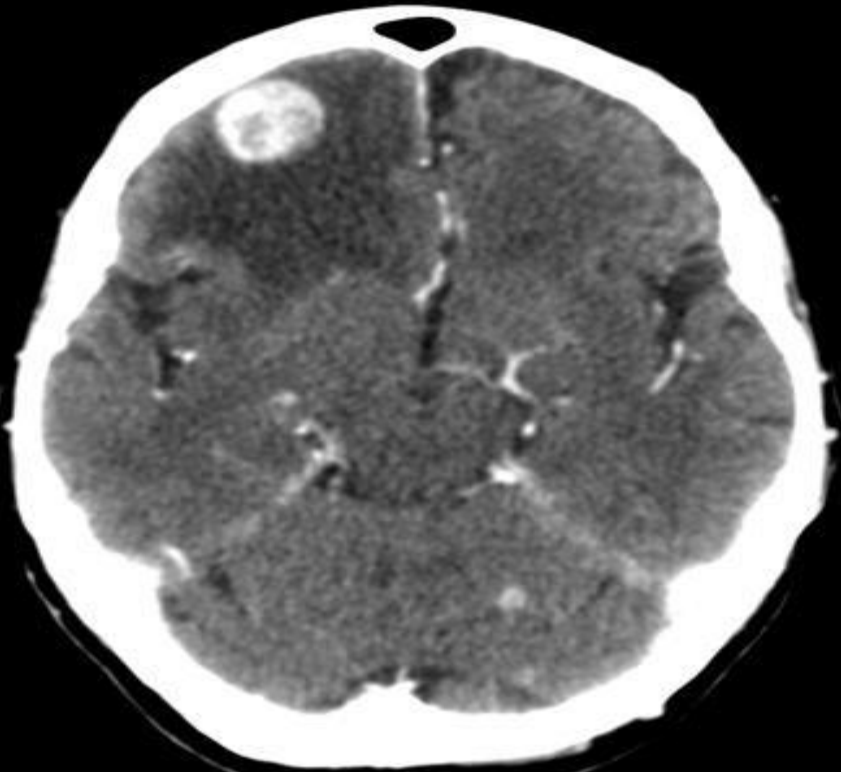


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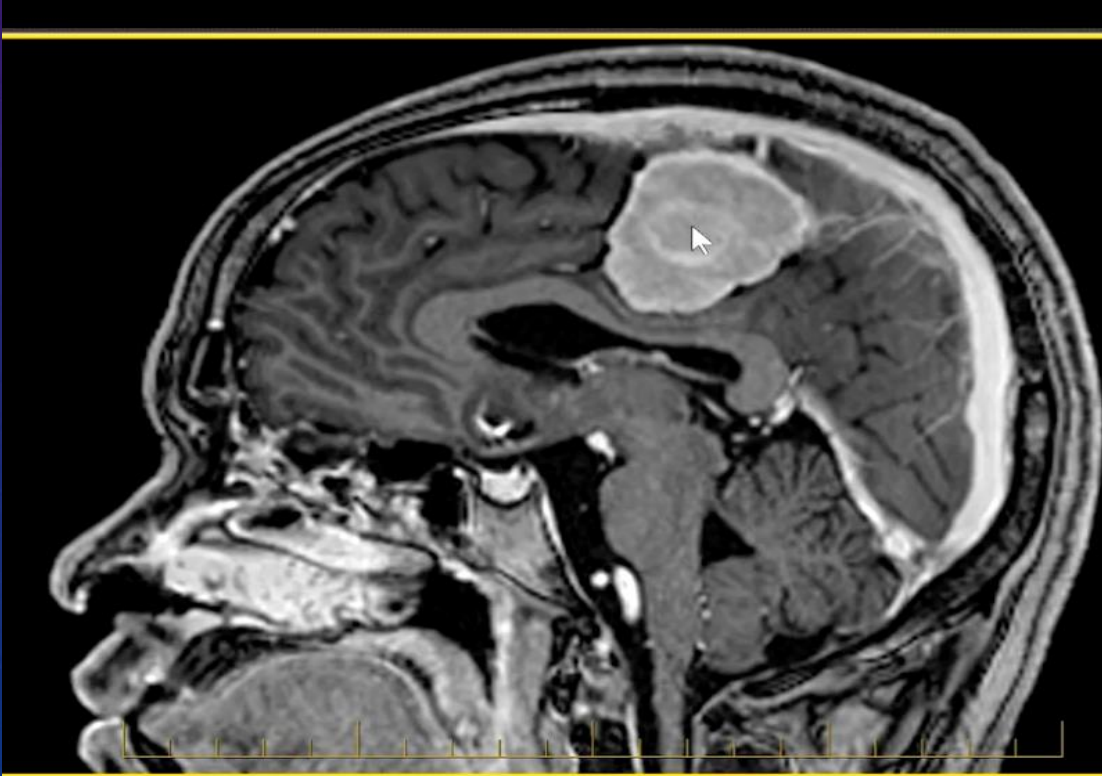
COMPARING CT AND MRI WITH PRE-OP KNEES

TUMORS

CT

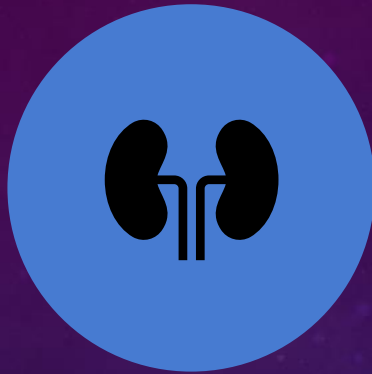


MRI

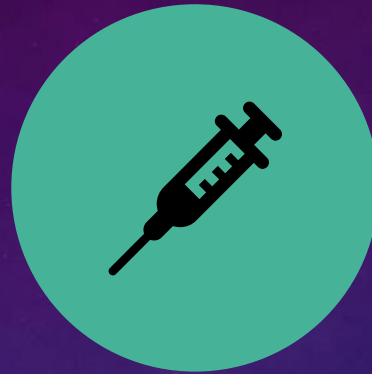


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CT SCANS CAN SHOW A TUMOR'S SHAPE, SIZE, AND LOCATION. THEY CAN EVEN SHOW THE BLOOD VESSELS THAT FEED THE TUMOR – ALL WITHOUT HAVING TO CUT INTO THE PATIENT.



DOCTORS OFTEN USE CT SCANS TO HELP THEM GUIDE A NEEDLE TO REMOVE A SMALL PIECE OF TISSUE. THIS IS CALLED A CT-GUIDED BIOPSY.

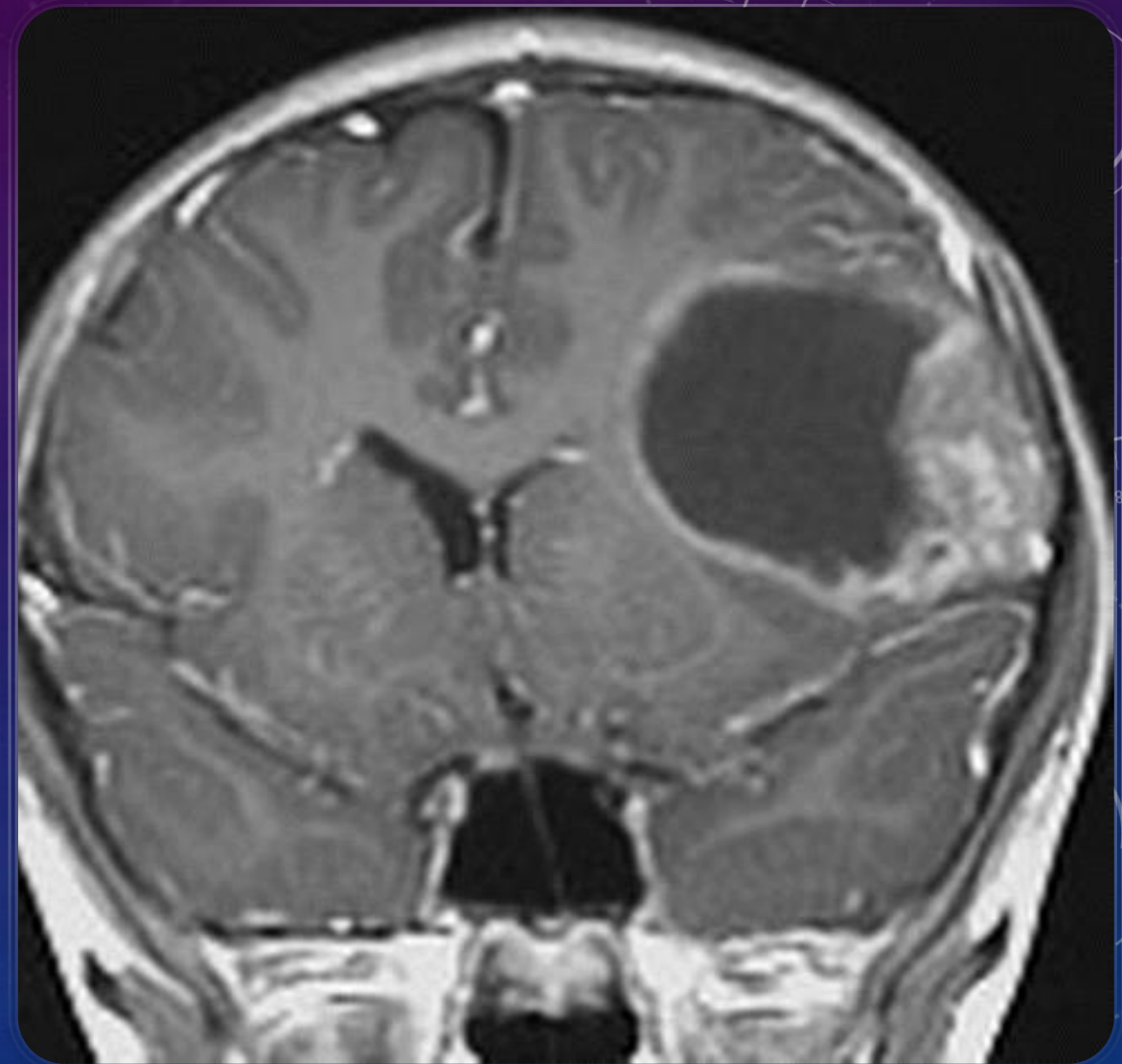


CT SCANS CAN ALSO BE USED TO GUIDE NEEDLES INTO TUMORS FOR SOME TYPES OF CANCER TREATMENTS, SUCH AS RADIOFREQUENCY ABLATION, WHICH USES HEAT TO DESTROY A TUMOR.

TUMORS CT

TUMORS MRI

- MRI helps doctors find problems, including cancer. It can find tumors that may or may not be cancer and is very good at finding and pinpointing certain types of cancer.
 - But other tests (such as a biopsy) might be needed to confirm if a tumor is cancer or not.
- MRI can also look for signs that a cancer has spread from its original area in the body.
- Looking at MRI results also helps doctors know how to plan cancer treatment, like surgery or radiation.



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COMPARING CT AND MRI TUMORS

Similarities

- Both are very good at finding and analyzing tumors.
- Both are relatively minimally invasive
- Both provide staging & measurements condition of tumor

Differences

- CT scans can show a tumor's shape, size, and location. They can even show the blood vessels that feed the tumor
- MRI helps doctors find problems, including cancer. It can find tumors that may or may not be cancer and is very good at finding and pinpointing certain types of cancer.
- CT can be more invasive when looking at tumors Ex CT tumor biopsy
- MRI Can detect stages/ condition of a tumor

CONCLUSION

We discussed how...

- Both CT and MRI are used together for diagnosing and planning.
- Their similarities and differences for CT and MRI.
- The combination of both modality helps give accurate representation of pathology.
 - This does not just mean the three we discussed but all pathologies.
- Each one views anatomy in different detail which makes them unique using the strengths and abilities that they possess.

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