# BENIGN BRAIN TUMORS: EVALUATION AND TREATMENT PARADIGMS

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# Disclosures:

- **NO RELEVANT FINANCIAL DICLOSURES OR CONFLICTS OF INTEREST IN REGARDS TO THIS PRESENTATION**

# J K ROWLING:

- **"It is impossible to live without failing at something, unless you live so cautiously that you might as well not have lived at all – in which case, you fail by default."**

# BENIGN BRAIN TUMOR TYPES - A PERTINENT SELECT GROUP:



- Meningioma
- Acoustic Neuroma
- Pineal Tumors
- Choroid Plexus Tumors
- Pituitary Tumors
- Hemangioblastoma

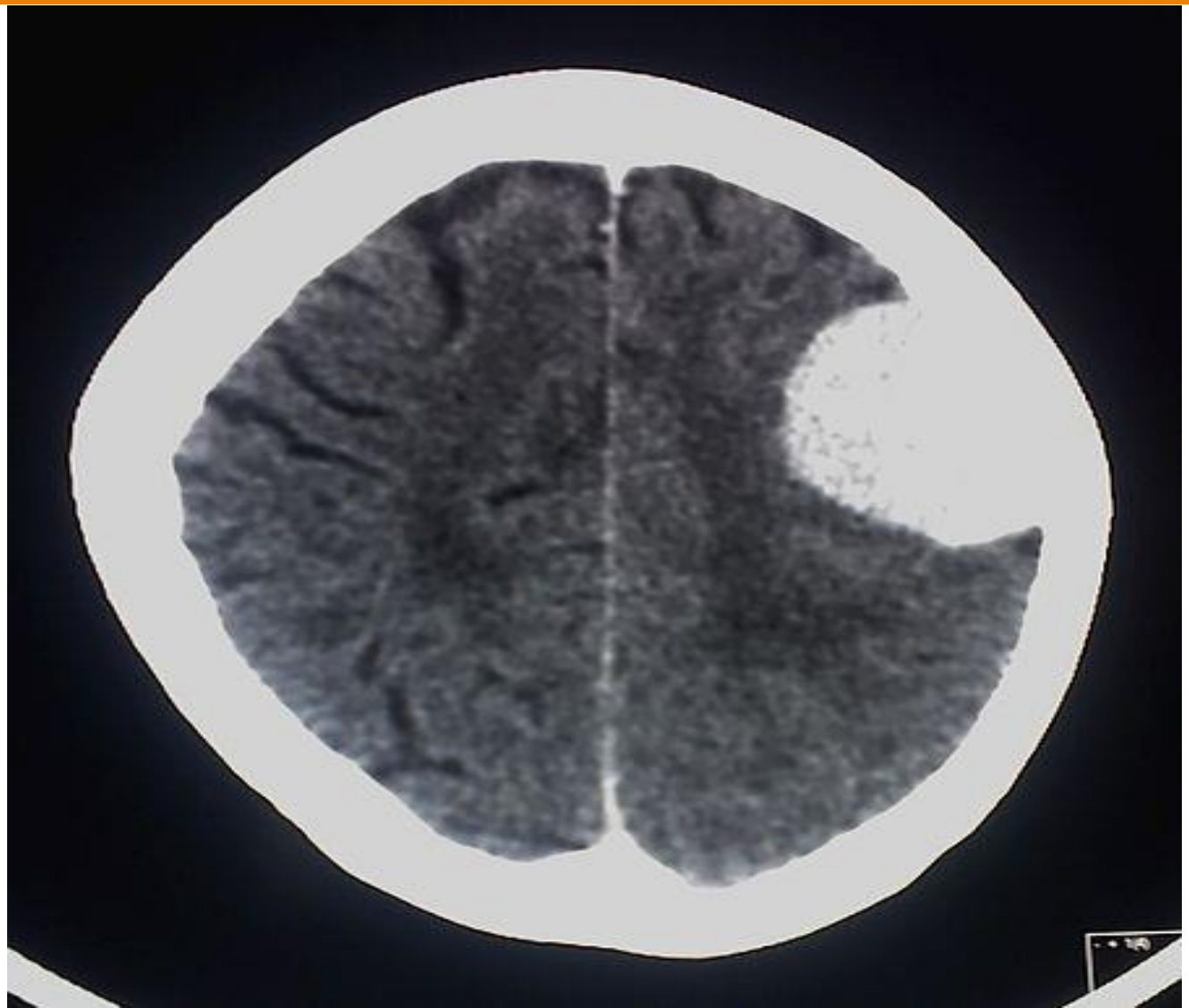
# MENINGIOMA:



- WHO Grade I Meningioma: ~ 90%
- WHO Grade II Meningioma
  - (Atypical): ~ 7%
- WHO Grade III Meningioma
  - (Anaplastic): ~ 3%

# CT BRAIN NON CONTRAST: CALCIFIED MENINGIOMA:





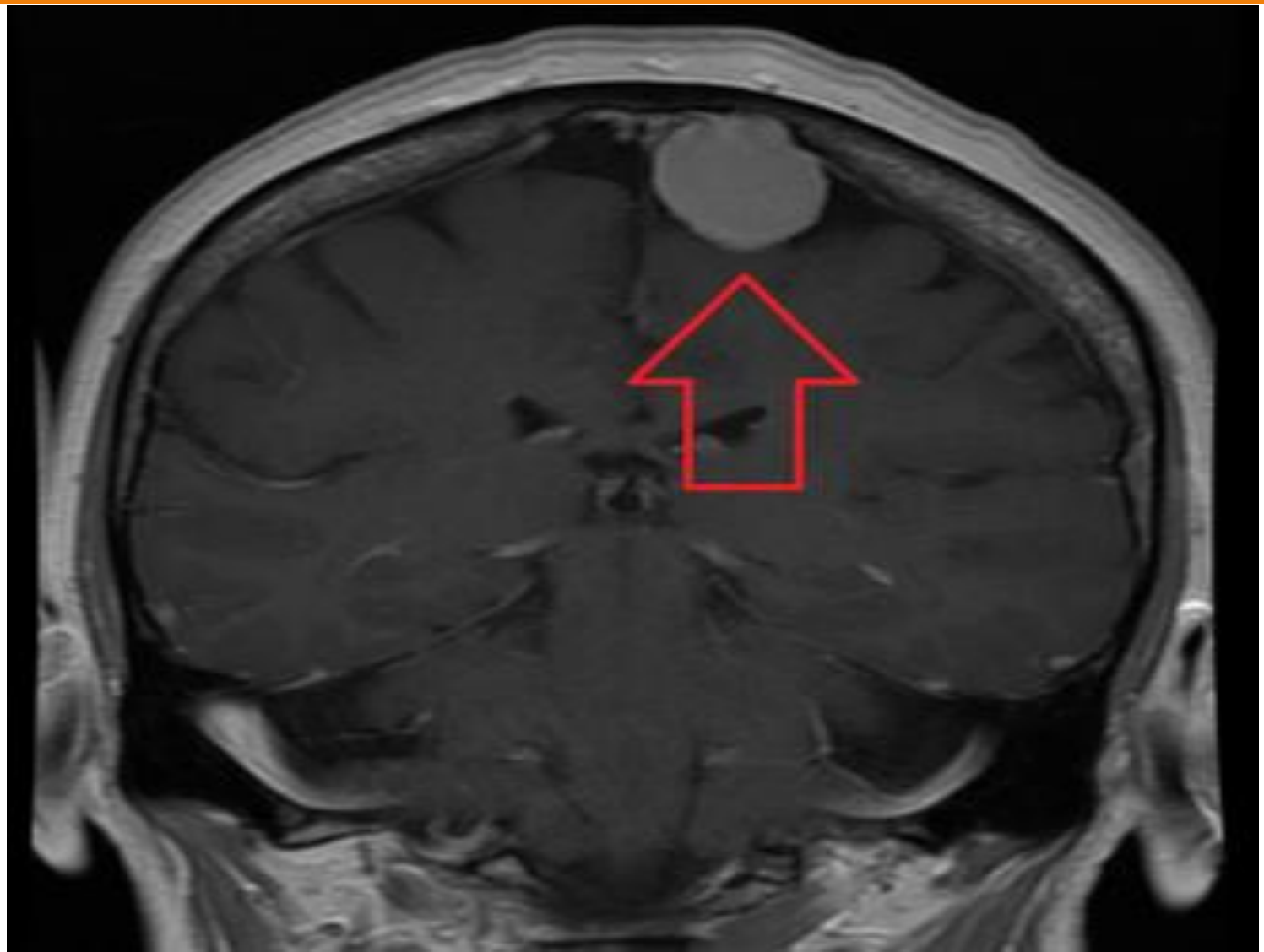
# CLINIC CASE 1 PRESENTATION:



- Pleasant lady in her 80's, right handed
- Had a slip and fall at a New Years Eve party at her house
- 4 days later presented to the ED with some ongoing headaches
- Subsequent MRI Brain with contrast revealed a meningioma

# MRI BRAIN WITH CONTRAST: PARASAGITTAL MENINGIOMA





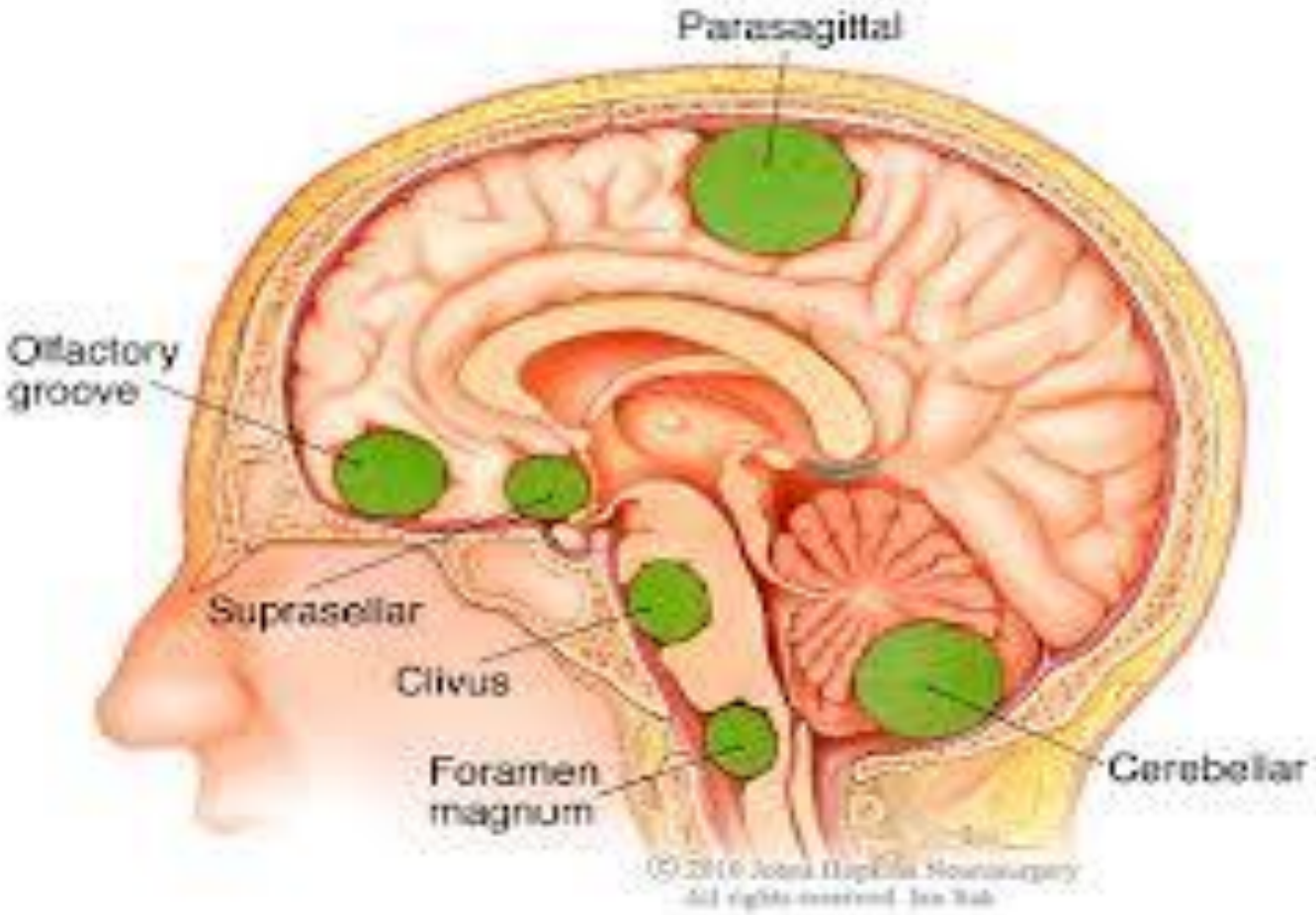
# ADVISABLE TREATMENT STRATEGY FOR CASE 1:



- **Do all meningiomas need to be treated?**
- **Low risk stratification for meningiomas:**
  - **Tumor Size**
  - **Surrounding Edema**
  - **No Acute Impending Complication risk (hydrocephalus risk, proximity to the optic apparatus, brain stem compression, spinal cord compression)**

# MENINGIOMA COMMON LOCATIONS:





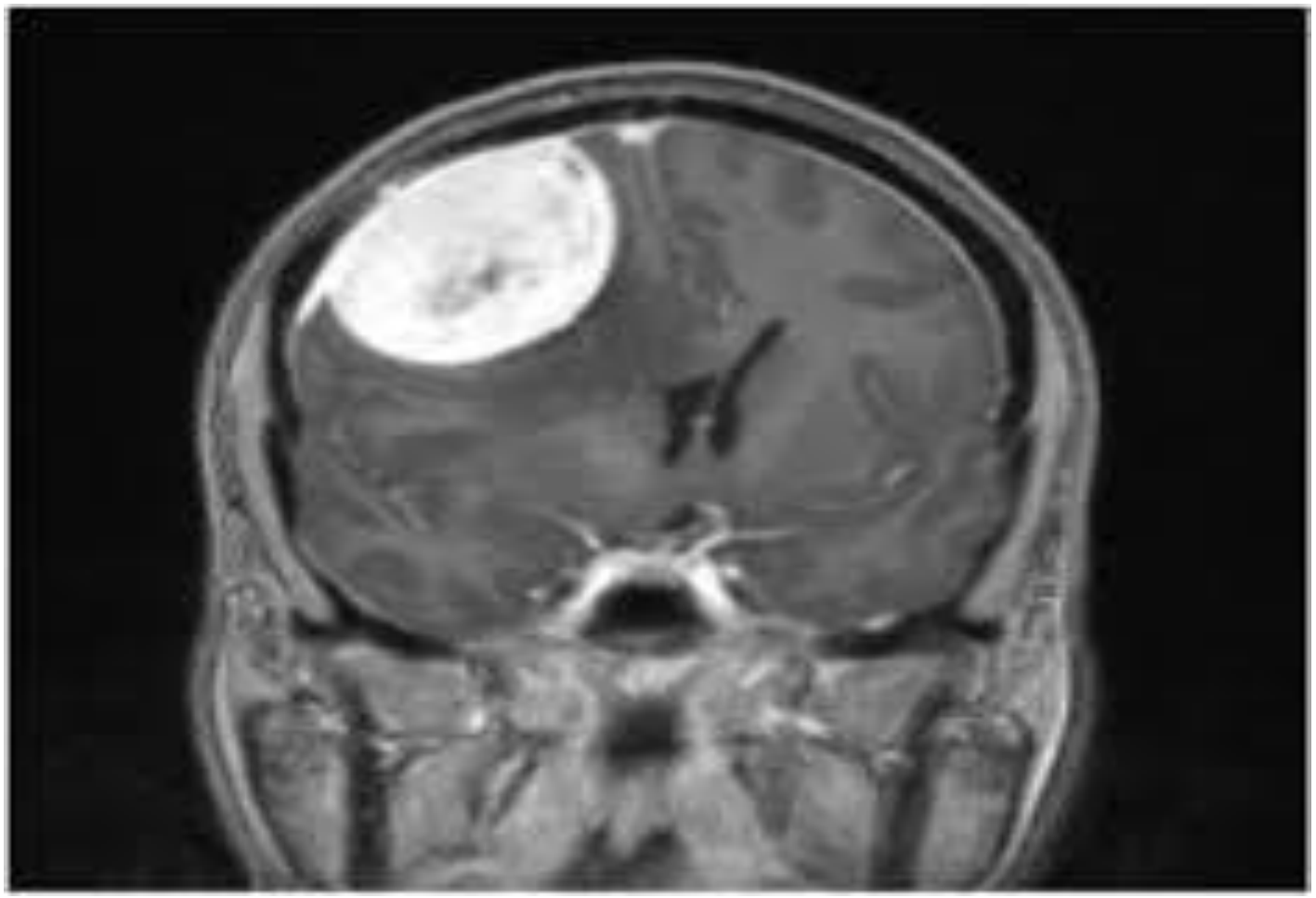
# CLINIC CASE 2 PRESENTATION:



- Nice lady around 75 years of age left handed
- On line college professor and an avid swimmer
- Recognized some left hemi body weakness
- Evaluated by a Neurologist, left sided upper motor neuron signs
- MRI Brain with contrast completed

# MRI BRAIN + CONTRAST: MENINGIOMA





# ADVISABLE TREATMENT STRATEGY FOR CASE 2:



- High risk stratification for meningiomas:
  - Large size
  - Mass effect
  - Vasogenic edema and midline shift
  - Symptomatic patient
  - If patient is a good surgical candidate, Maximal safe surgical resection would be ideal
  - Further recommendation based on WHO Grade of the meningioma

# SURGICAL OPTIONS FOR MENINGIOMA:



- Maximal Safe Resections
- "Supra Maximal" Resections
- Intra – operative MRI capability
- MR Spectroscopy Guided Surgery
- MR Perfusion Guided Surgery
- Fluorescence Guided Surgery, 5 ALA ( 5 aminolevulinic acid ) Protoporphyrin PP IX
  - Better delineation of tumor margins with 5 ALA versus conventional "white light microscopy"

# RADIATION OPTIONS FOR MENINGIOMA:



- Radiation still has a major role in meningioma treatment with / without surgical resections
- Photon based Intensity Modulated RT (IMRT)
- Stereotactic Radio Surgery (SRS, Cyberknife, Gamma Knife)

# RADIATION OPTIONS FOR MENINGIOMA:



- **Does Proton Beam Radiation have superiority?**
- **Not clear at the moment?**
- **Gamma Tile (Brachytherapy)**
- **NRG and ALLIANCE conducting clinical trials**

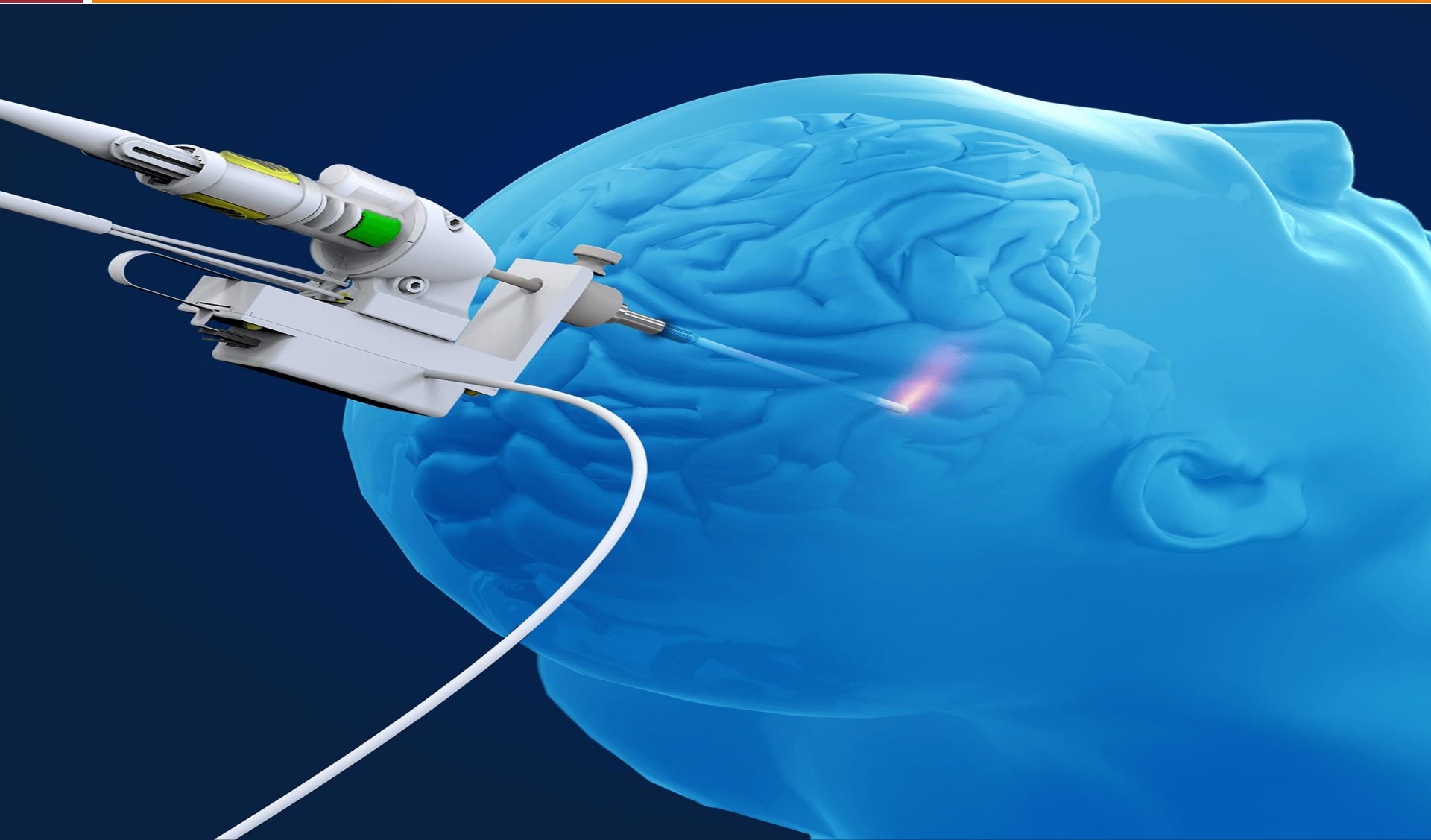
# NEWLY DIAGNOSED AND RECURRENT MENINGIOMA:



- **Laser Interstitial Thermal Therapy (LITT)**
  - **Thermal ablation**
  - **Intra operative MRI guidance (could be without too)**
  - **Multiple tumor types can be treated as Gliomas, Meningiomas and CNS metastasis**
  - **Necrosis (as post RT necrosis) can also be treated successfully**

# NEWLY DIAGNOSED AND RECURRENT MENINGIOMA:





# NEWLY DIAGNOSED AND RECURRENT MENINGIOMA:



- Gamma Tiles
  - Surgically Targeted Radio Therapy (STaRT)
  - Surgically implanted local RT delivery system

# NEWLY DIAGNOSED AND RECURRENT MENINGIOMA:



# NEWLY DIAGNOSED AND RECURRENT MENINGIOMA:



- Clinical Trials in the "Meningioma Space"
  - NRG BN 003, WHO Grade II Atypical Meningioma, ?is upfront radiation needed, based on the "Simpson Grading System" of the extent of meningioma resection (Grade I,II, III, IV, V, VI)
  - ALLIANCE A071401, SMO / AKT / NF2 / CDK mutated meningiomas and targeting agents for each mutation

# NEWLY DIAGNOSED AND RECURRENT MENINGIOMA:



- Tumor Treating Fields
  - Disrupts mitosis
  - Impairs microtubular assembly
  - Impedes midline localization of the cytokinetic band
  - Induction of intracellular dielectrophoresis
  - Mitotic failure
  - Apoptosis

# NEWLY DIAGNOSED AND RECURRENT MENINGIOMA:



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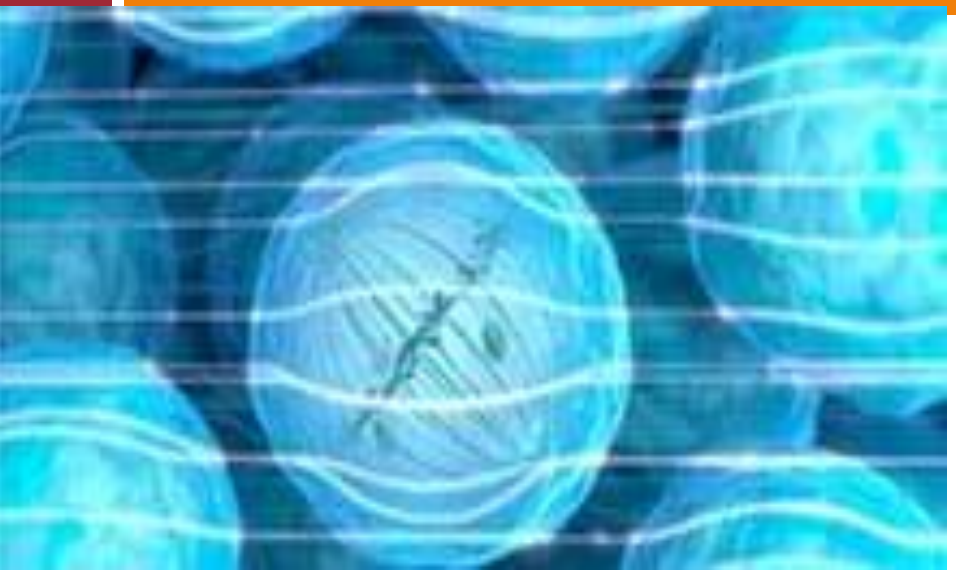

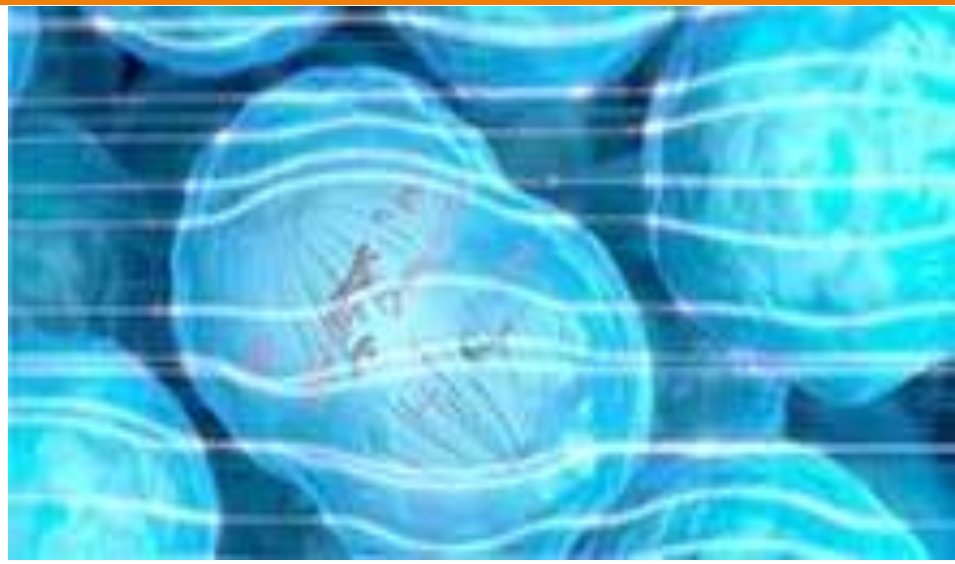

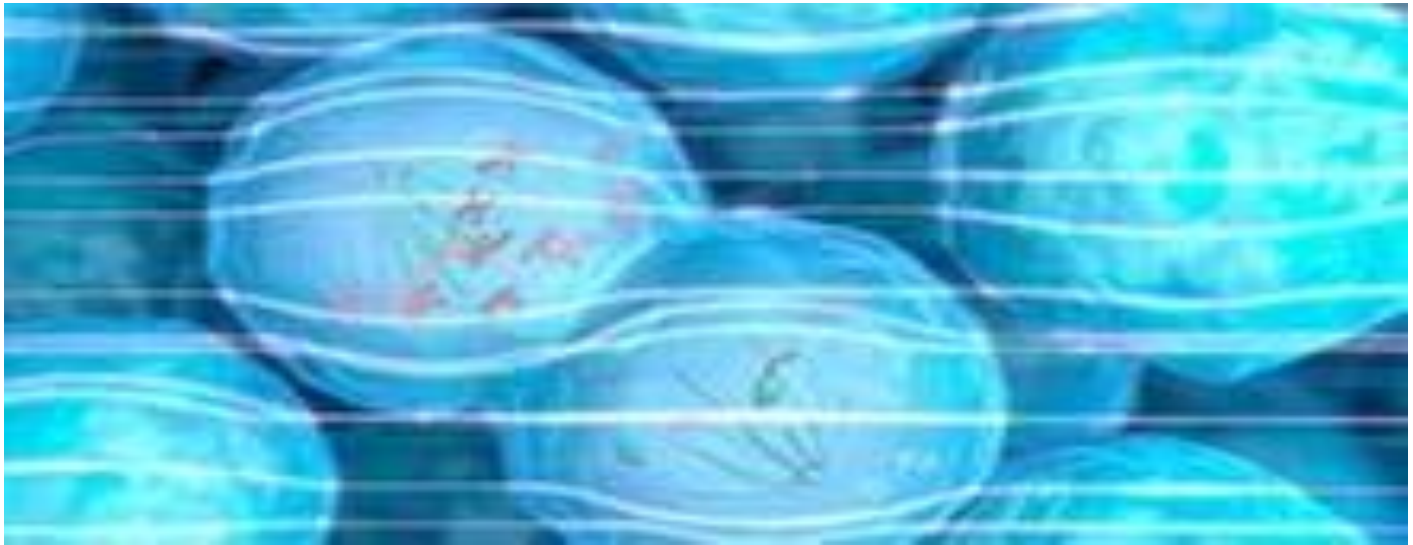

# Acoustic Neuroma:



- 8% of Skull base tumors
- 100,000 cases per year in the US
- Generally are WHO Grade I Tumors
- Koo's Grading System of Vestibular Schwannoma's
- Treatment:
  - Observation (serial audiometry)
  - Surgery
  - Radiation (SRS, Cyberknife, Gammaknife)

# Acoustic Neuroma:



## KOOS GRADING

**Table 23.3** Koos acoustic schwannoma tumor size grading criteria

| | |
|---|---|
| Koos Grade I | Purely intracanalicular tumor limited to the internal auditory canal only |
| Koos Grade II | < 2 cm extracanalicular/CPA extension without brainstem compression |
| Koos Grade III | Extracanalicular/CPA extension >2 cm, with no brainstem compression |
| Koos Grade IV | Extracanalicular/CPA extension with any degree of brainstem compression |

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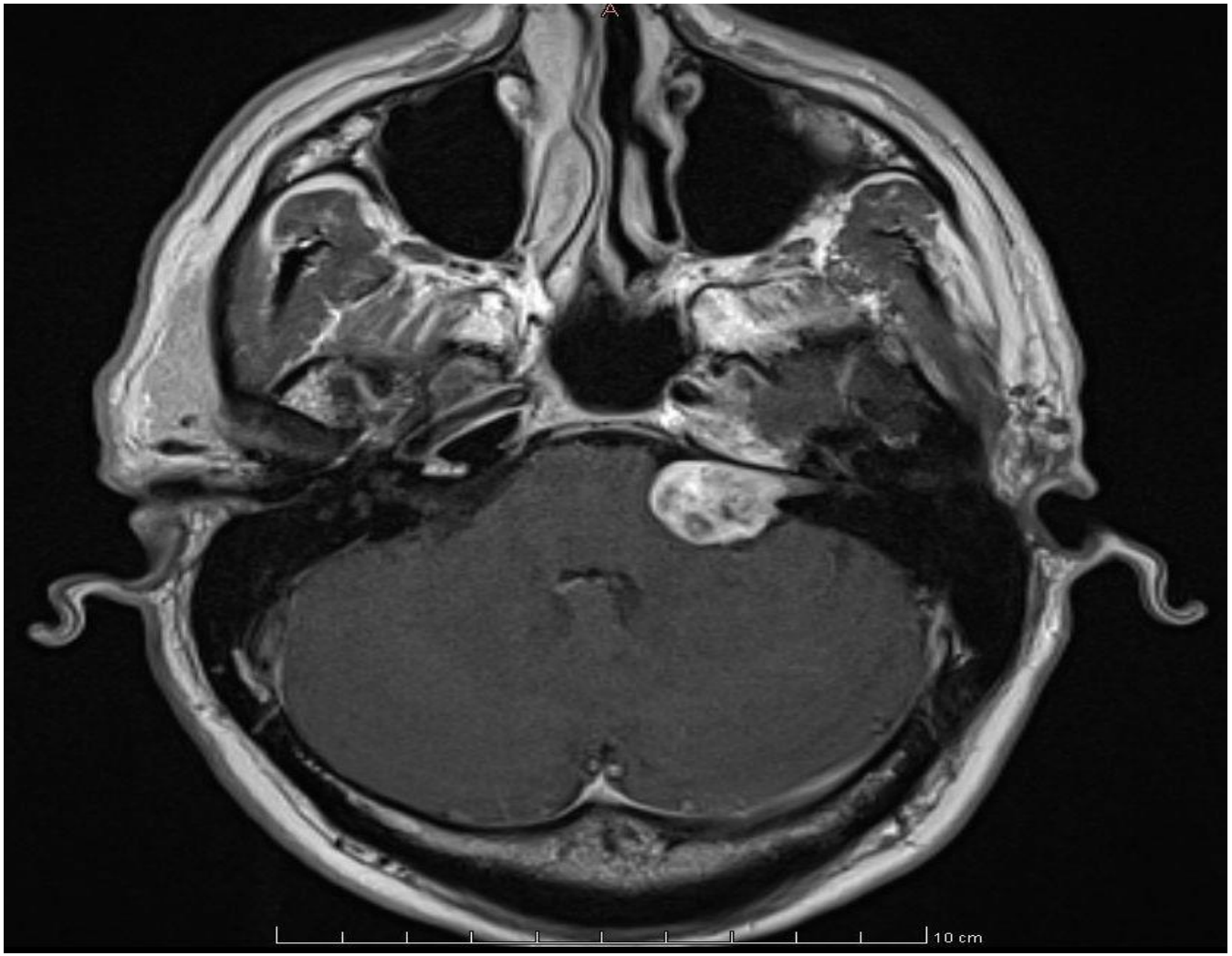

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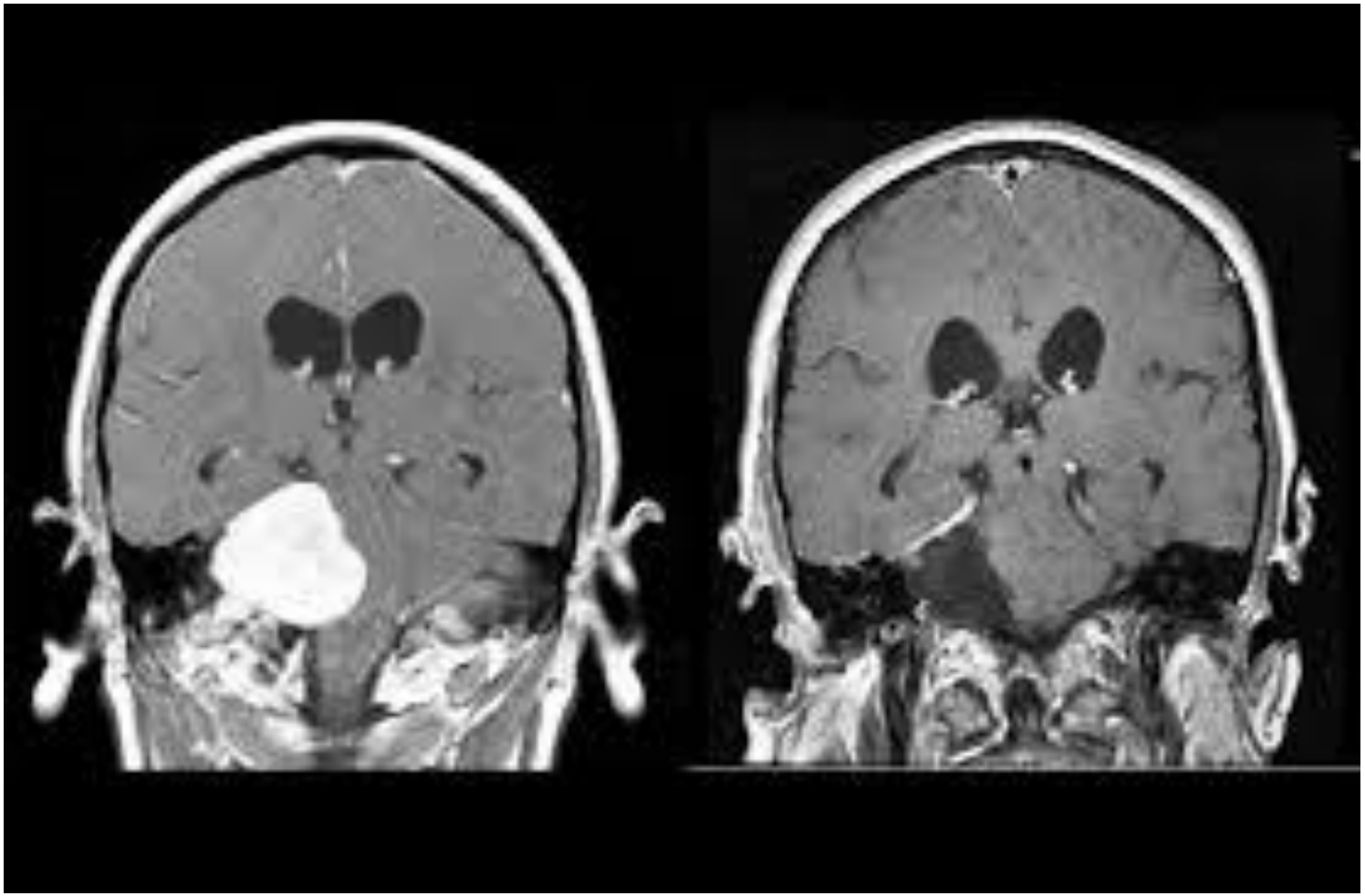

# ARE WE REALLY WINNING?

# J K ROWLING:

- "Failure is so important. We speak about success all the time. It is the ability to resist failure or use failure that often leads to greater success."

# HOW CAN WE DO BETTER IN THE MENINGIOMA / BENIGN CNS TUMOR SPACE:



- What is new out there?
- What are the new promising therapies being explored?
- New clinical trials with "real" promise?
- Why is the Brain Tumor "space" so convoluted?
- How can we use genomic profiling and next generation sequencing (NGS) in our favor?

# CURRENT CHALLENGES IN NEURO – ONCOLOGY:

- INTRA-TUMORAL HETEROGENEITY
- INTER-TUMORAL HETEROGENEITY
- “TEMPORAL” HETEROGENEITY
- DRIVER MUTATIONS

# CURRENT CHALLENGES IN NEURO – ONCOLOGY:

- DRUG
- TARGET
- DRUG DELIVERY (?DOES IT CROSS THE BLOOD BRAIN BARRIER)
- BLOOD BRAIN BARRIER DISRUPTION (?Focused Ultrasound)
- BETTER DESIGNED CLINICAL TRIALS
- "FREE SPIRITED" THINKING

# Upcoming important meetings:

- **ALLIANCE MEETING: MAY, 2021 (CHICAGO)**
- **NRG MEETING: JULY 2021 (VIRTUAL MEETING)**
- **SOCIETY FOR NEURO-ONCOLOGY (SNO) MEETING: NOVEMBER 2021 (BOSTON)**

# Discussion