Challenges & Triumphs in NEURO-ONCOLOGY

Rajiv Sarin
rsarin@actrec.gov.in

Challenges…… for whom

Family

Doctors

PATIENT

Society

Scientist

Triumphs …… for whom

Family

Doctors

PATIENT

Society

Industry

Scientist

Challenges ..... for the victims

- Fear for life
- Struggling to move
- Striving to connect
- Braving *Men at WORK*, their machines & chemicals
- Finding the means
- A dignified EXISTENCE
- Or a peaceful EXIT

Challenges ….. for the medical team

- Answering patients who ask why did I develop this?
- Uncertainties of diagnosis & outcome
- Harms we may inflict on their minds & bodies
- Gathering evidence – hard to do clinical trials with fewer patients & difficult to assess outcomes
- Practicing evidence based medicine
- No Stage Grouping Systems (TNM redundant)
- Frustration (& sometimes apathy) from failure to significantly change outcome for common tumours

Medulloblastoma

Maximizing Cure

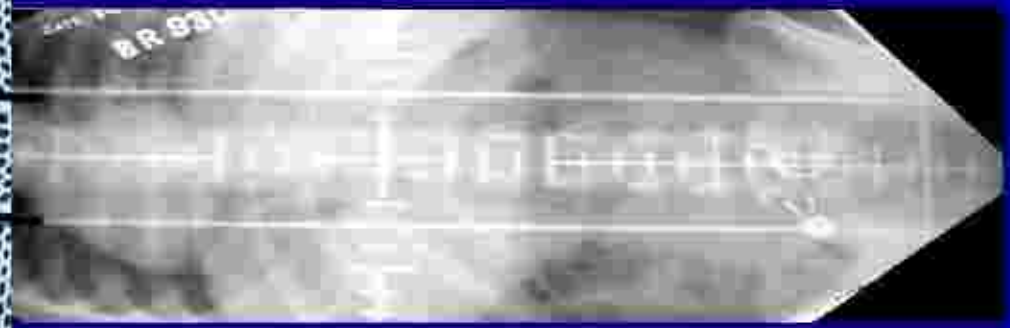
Minimizing Sequelae

Challenges Galore

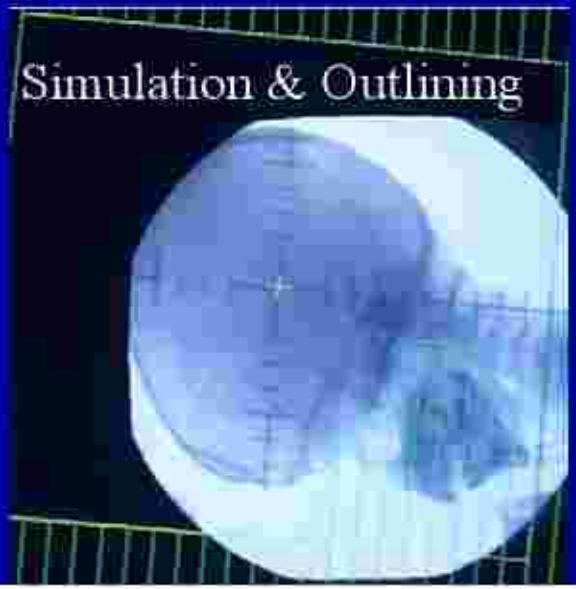
- ✓ Better risk categorization and Risk Adapted Therapy
- ✓ Improve cure rates
- ✓ Further reduce Rx sequelae

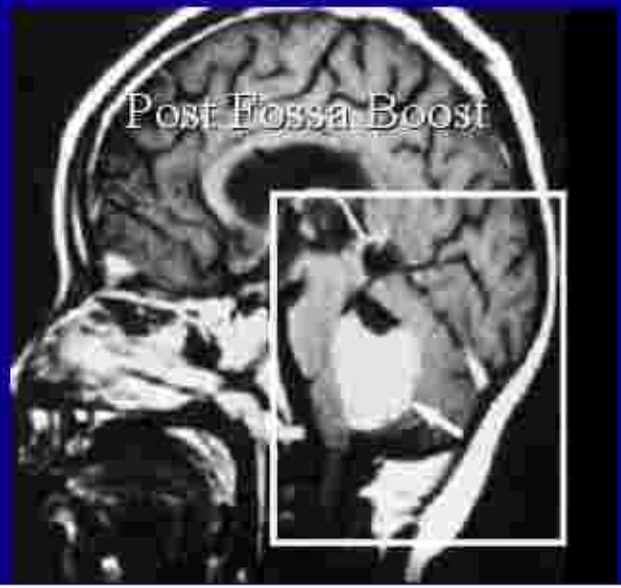
Irradiating Cranio Spinal Axis: Always a challenge

CSI 24-36 Gy (1.7-1.8 Gy / # and Post Fossa boost. Total 50-55 Gy over 6-7 weeks



Avoid Overdose (and gross under dose) at the Cranio-Spinal junction by Table & Collimator angle AND Junction Shift

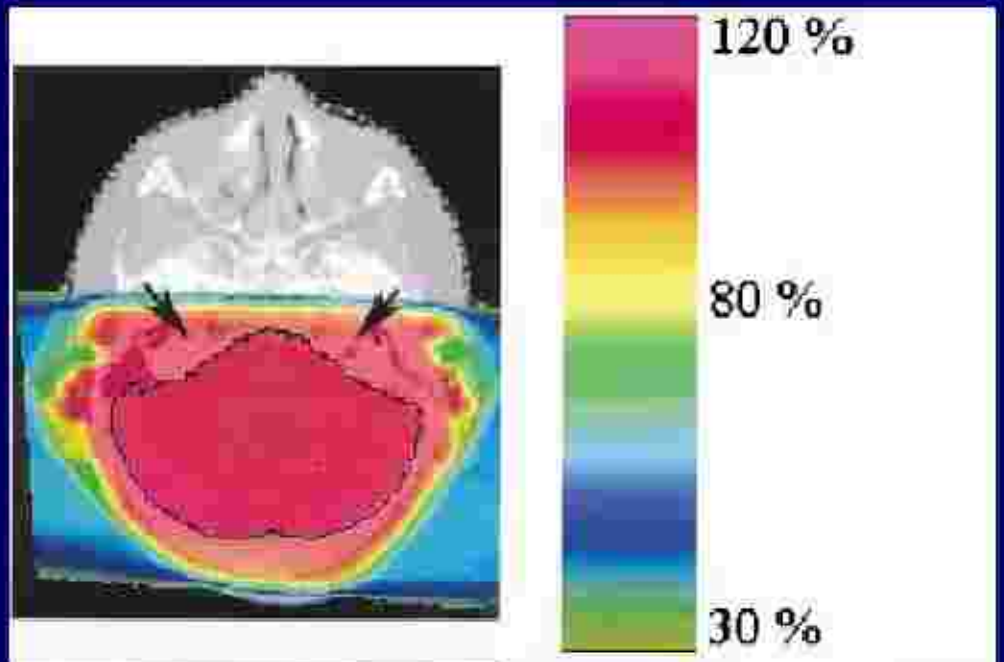




Proton Beam Therapy: The ultimate in conformal therapy *(St Clair, IJROBP '04)*

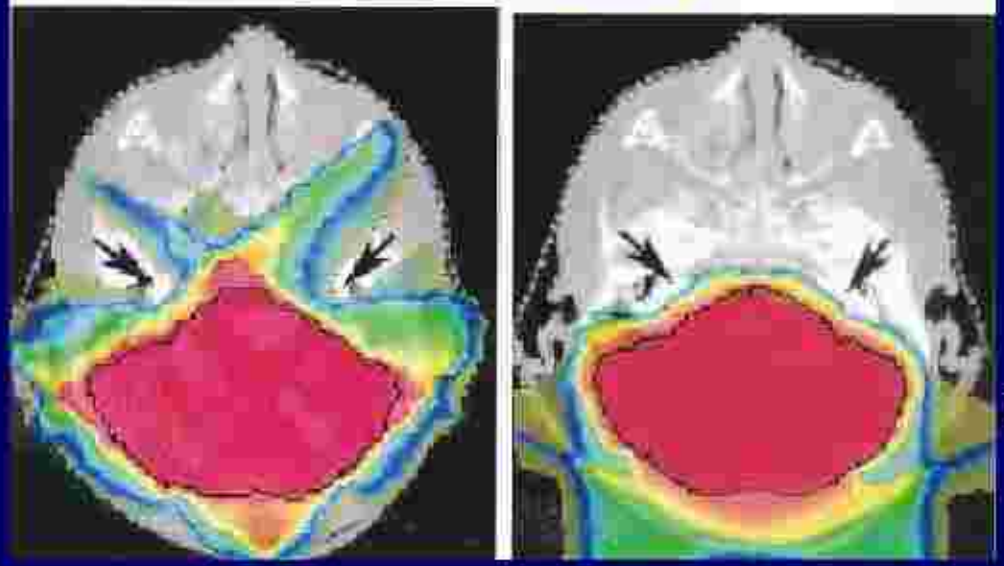
Conventional

Bilateral Photons



Dose to Cochlea, Pituitary Hypoth. axis etc significantly less with Protons

IMRT Photons



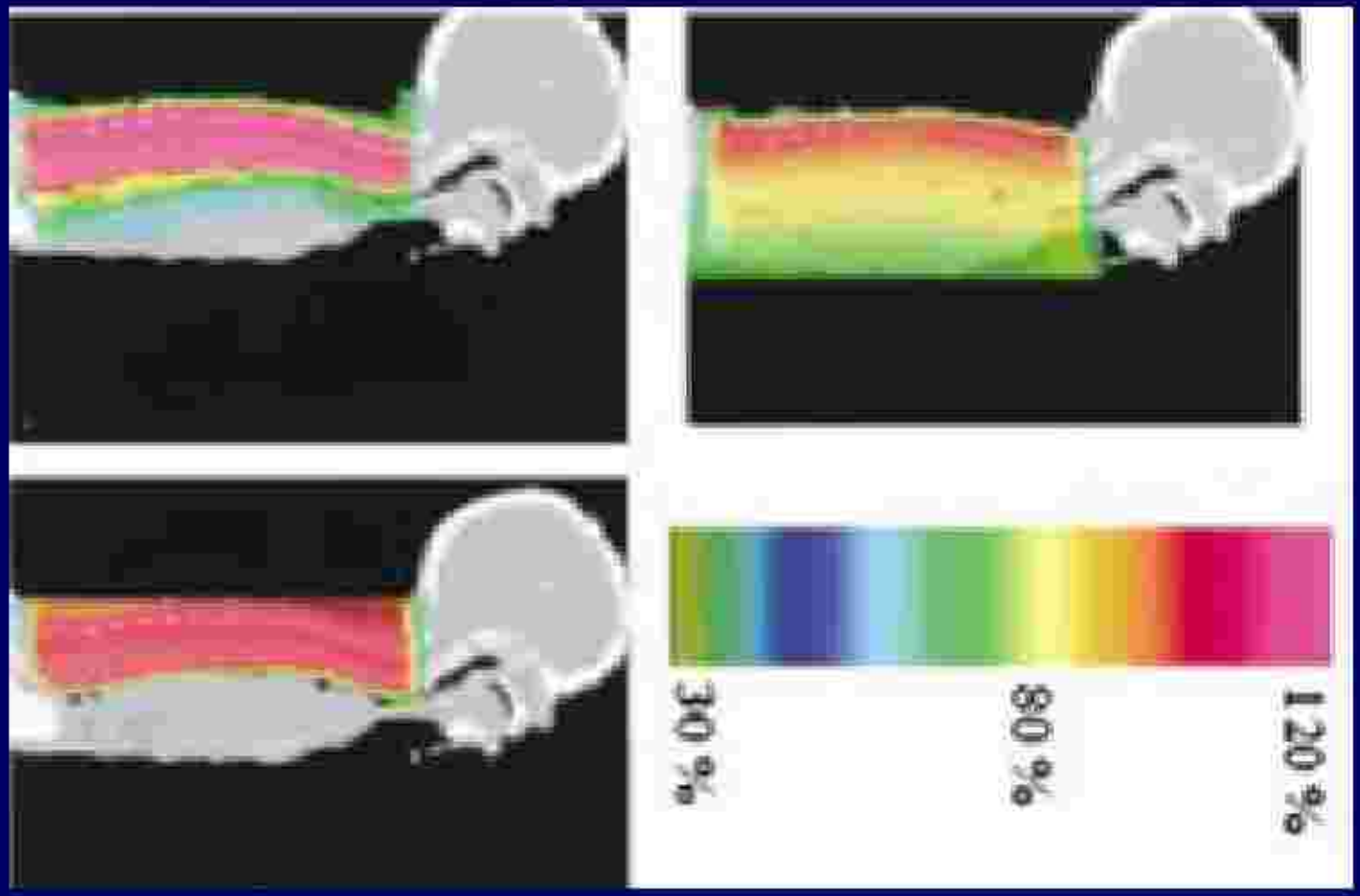
3 Field

PROTONS

IMRT Photons

Conventional

Direct Posterior Photons



PROTONS

Dose to thyroid, heart, kidney etc significantly less with Protons

Sellar / Supra / Para Sellar Region Unique Anatomy & Challenges

- Cranial nerves II-V
- Vessels- Internal carotids,
- Pituitary, Hypothalamus, Pituitary stalk
- Thalamus, Temporal / Frontal lobes, 3rd ventricle and eyes are in close relationship

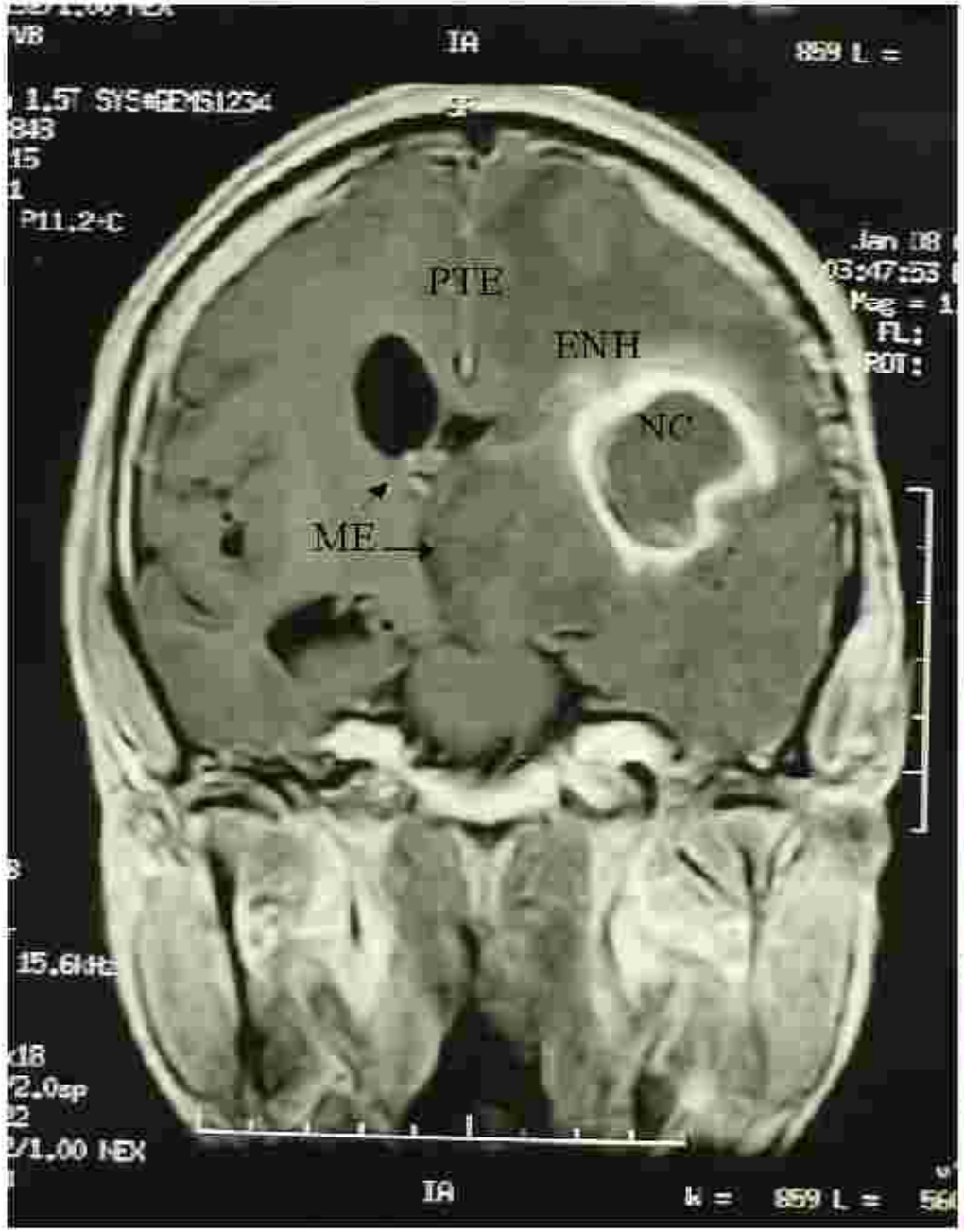
Gateway to

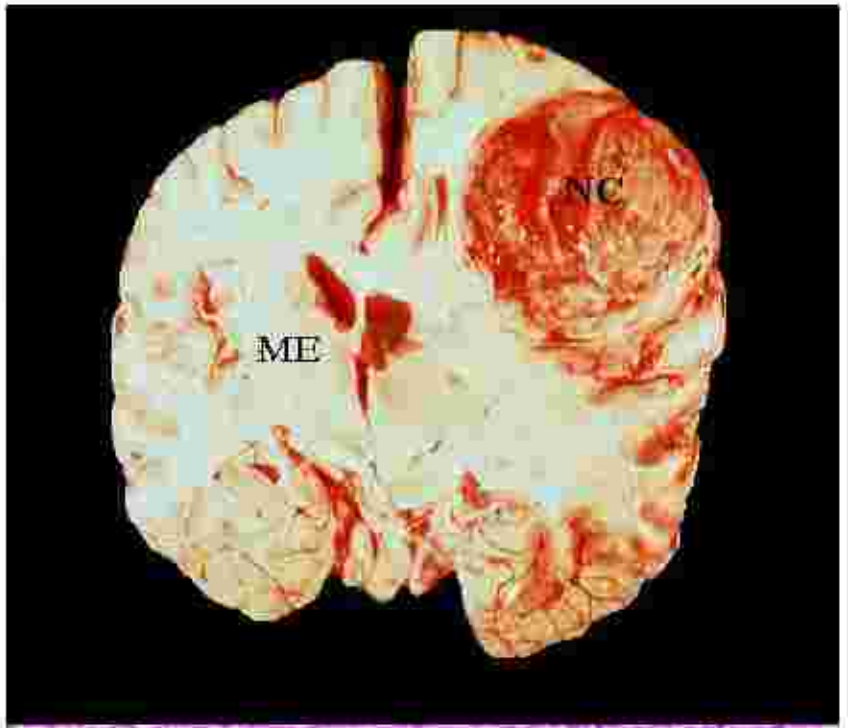
*Brain's blood supply

*Body's hormonal supply

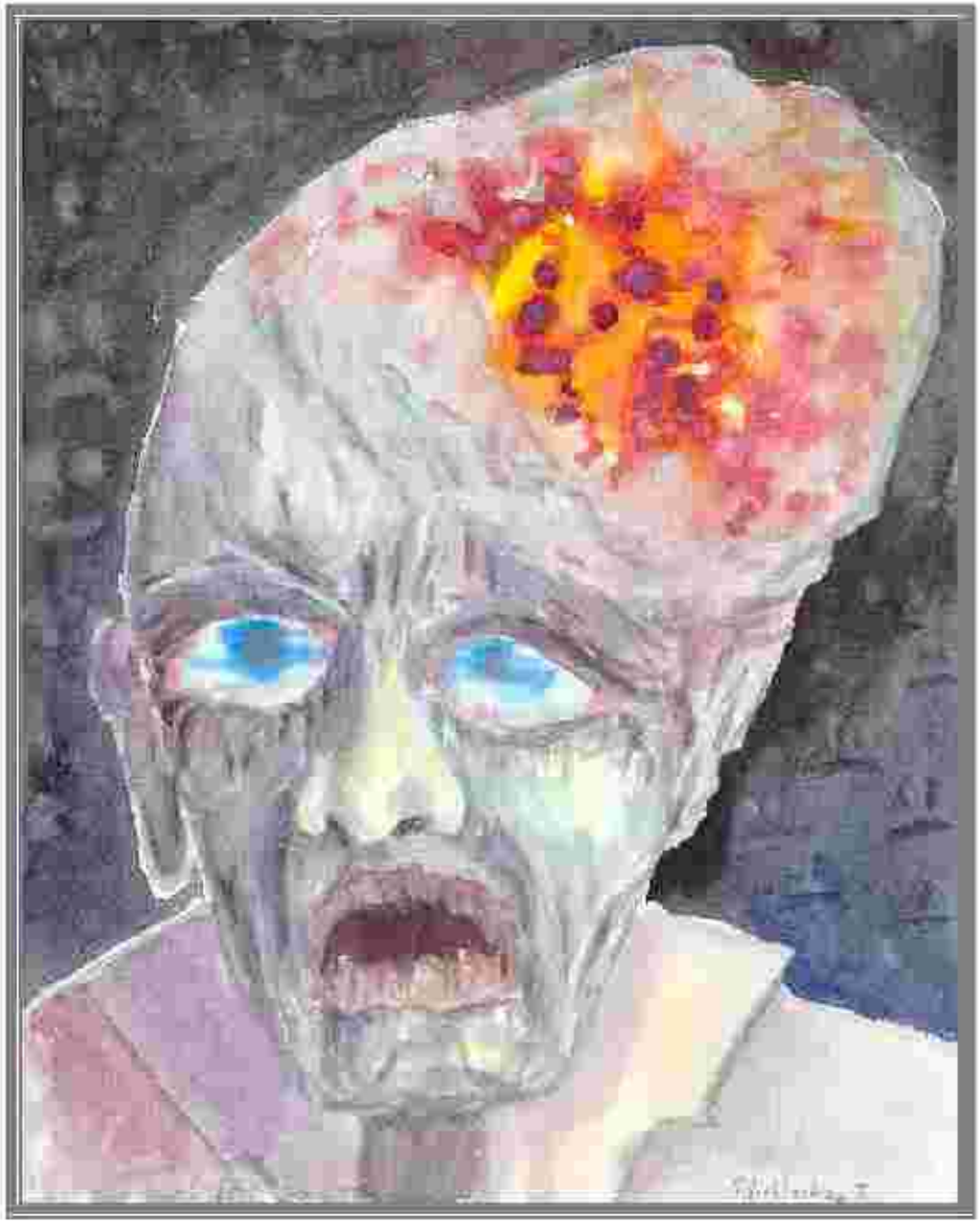
*Vision

GlioBlastoma- The Disease



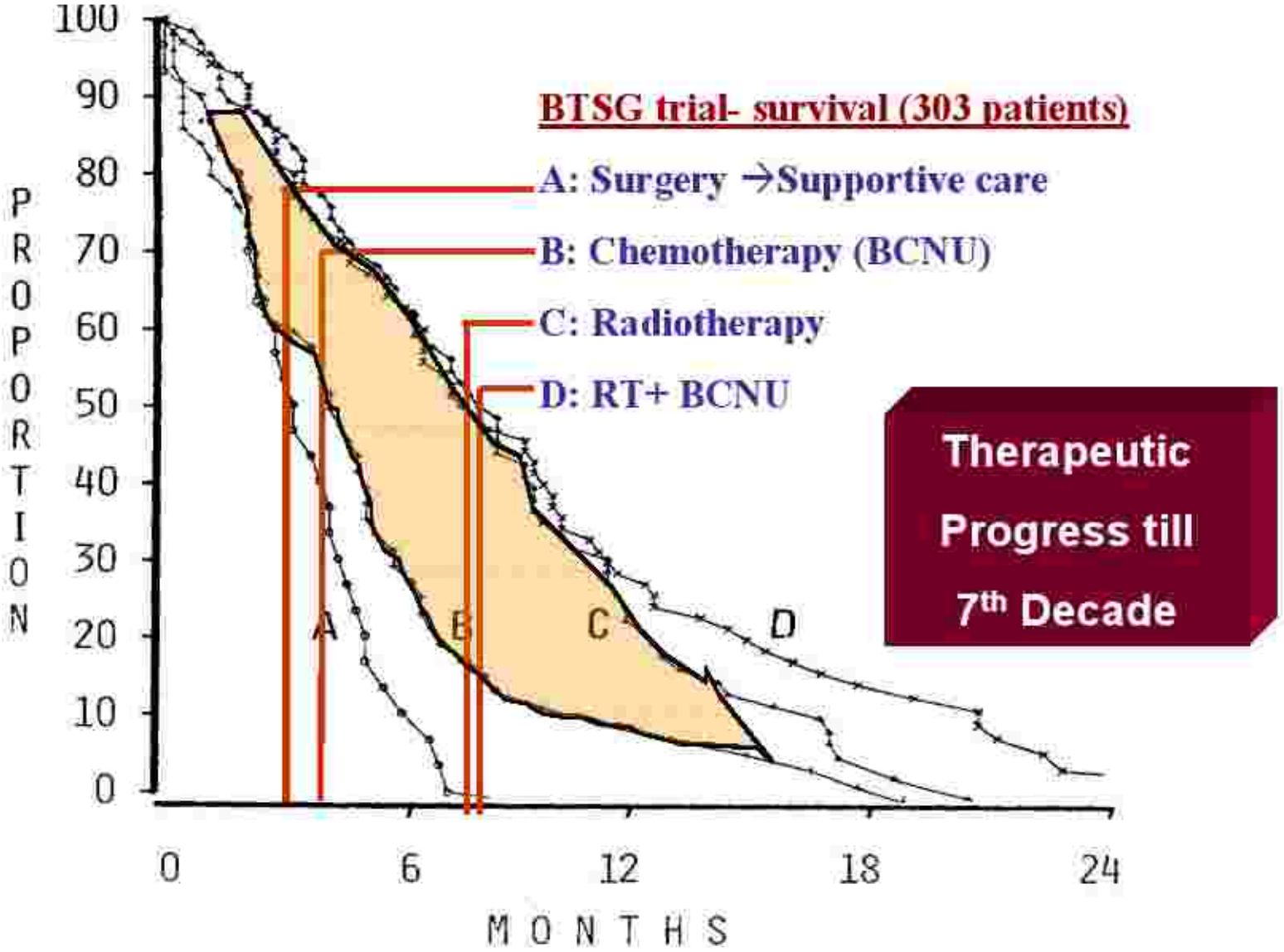


And its manifestations

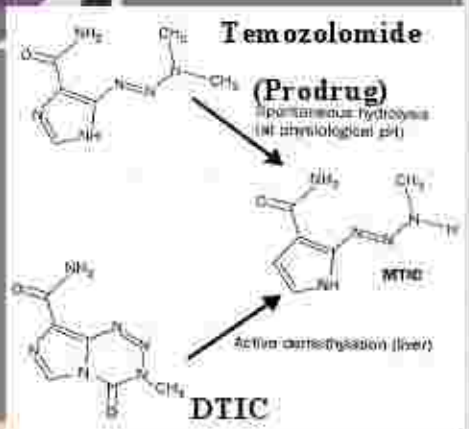


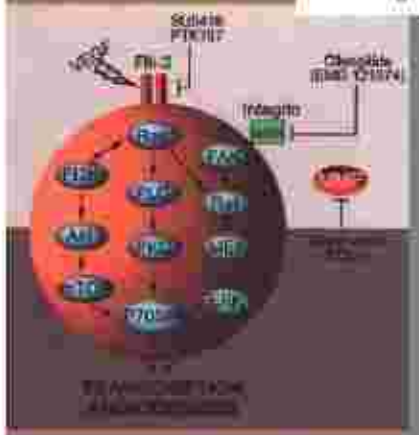
Surgery, RT, Chemotherapy

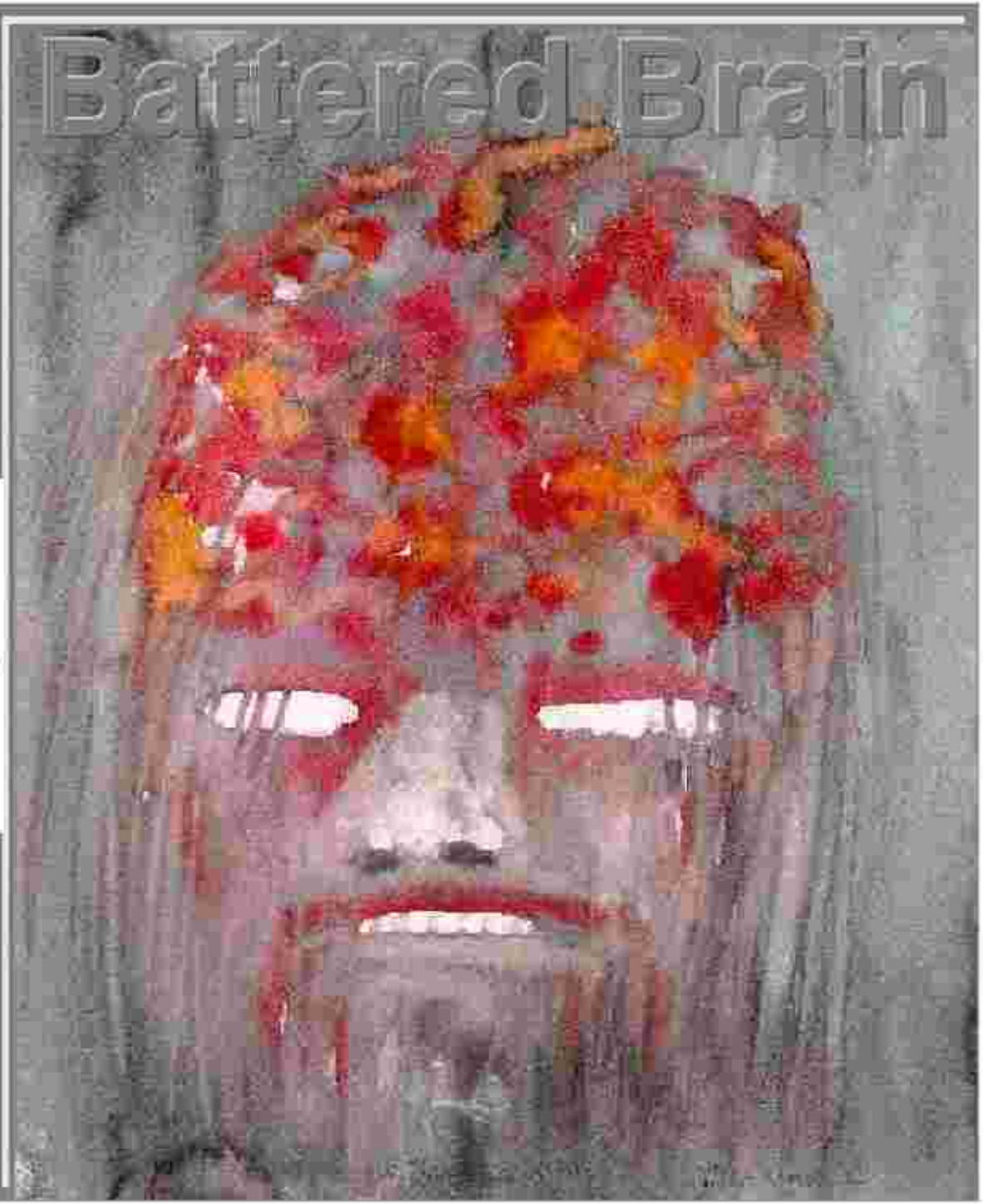
Who is benefited with what and when?



The Battered Brain







Challenges ….. for the scientists

- Few & Small tumour tissues for research
- Getting ‘normal’ ante-mortem brain tissues
- No surrogate biomarkers in CSF or Blood
- The PLETHORA of Pathologies & Tumours
- Clinician – Biologist - Technologist Disconnect

FASCINATION OF **SCIENCE** WITH THE **BRAIN**

&

THE BURDEN OF EXPECTATION

Structure-Function-Biology & Pathology of BRAIN is considered to be the

THE FINAL FRONTIER OF SCIENCE

- Blood Brain Barrier seems big now
- Bigger Barriers ahead
  - **A**natomy of **C**ognition
  - **C**ognition over **A**ge
  - **A**ge versus Neural Maturation & Degeneration
  - **N**euro-Plasticity and Neuro-Genesis
  - **B**iology of Neural Pathology

TRIUMPHS

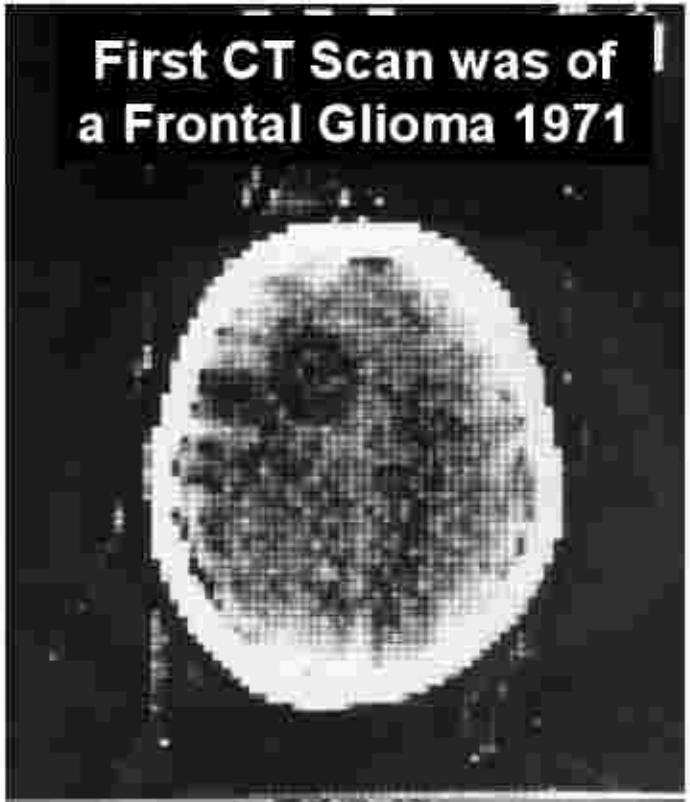
- Better diagnosis
- More lives saved
- Life with better quality

TRIUMPHS


The 'Lathe Bed'

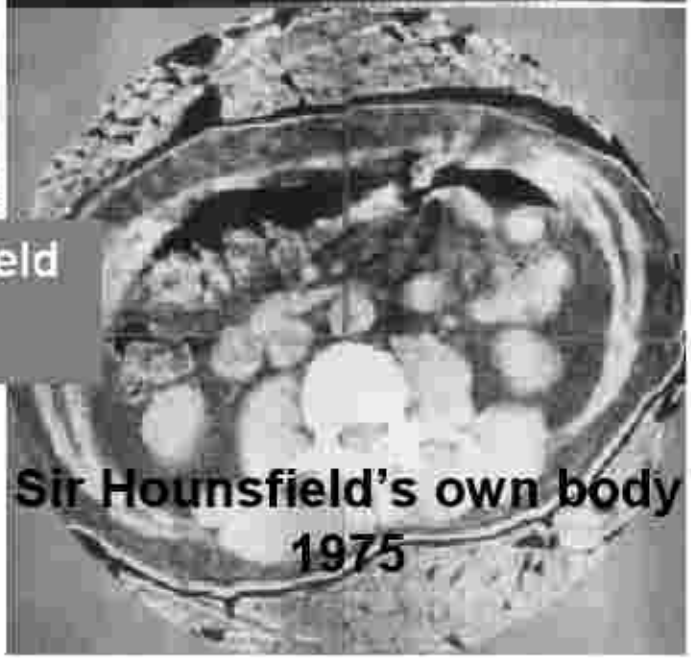

Sir Godfrey Hounsfield

Nobel Prize 1979


First CT Scan was of a Frontal Glioma 1971


EMI Scanner

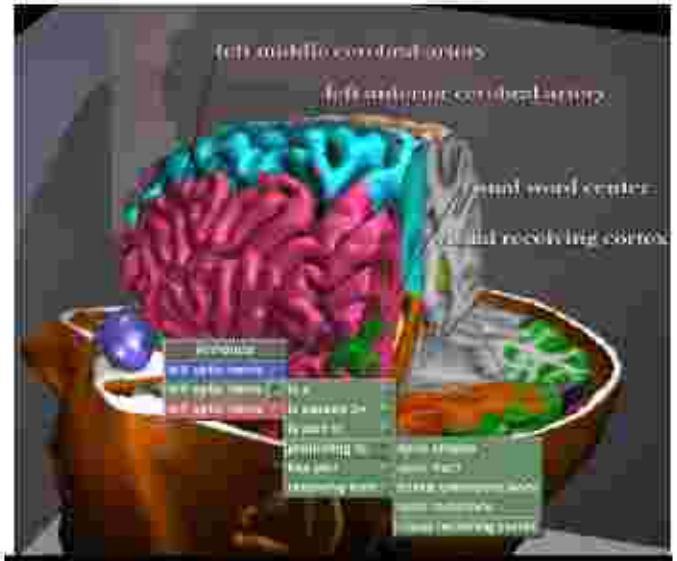
Atkinson Morley Hosp


Sir Hounsfield's own body 1975

1952: Nobel for NMR (Physics)

Felix Bloch

Sir Edward Purcell

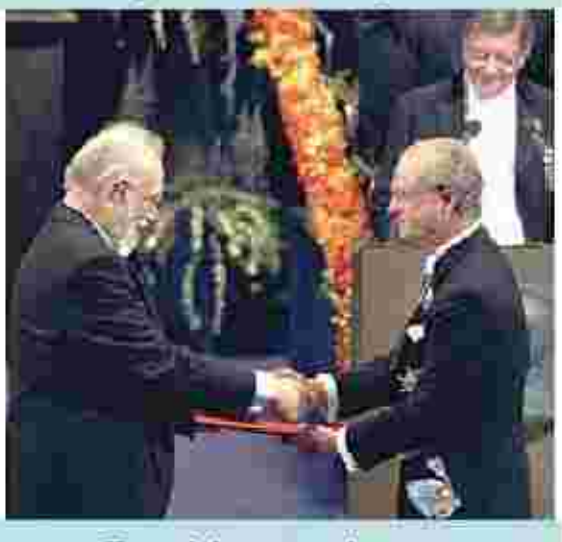


Brain Anatomy & Function
MRI Development

2003: Nobel for MRI (Medicine)

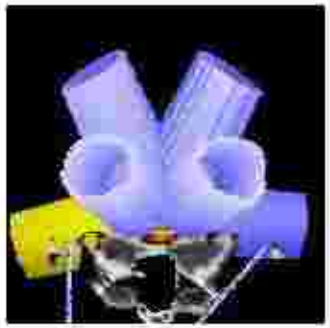
Another Triumph
spurred by the need to study the Brain Anatomy & Function and Brain Tumours

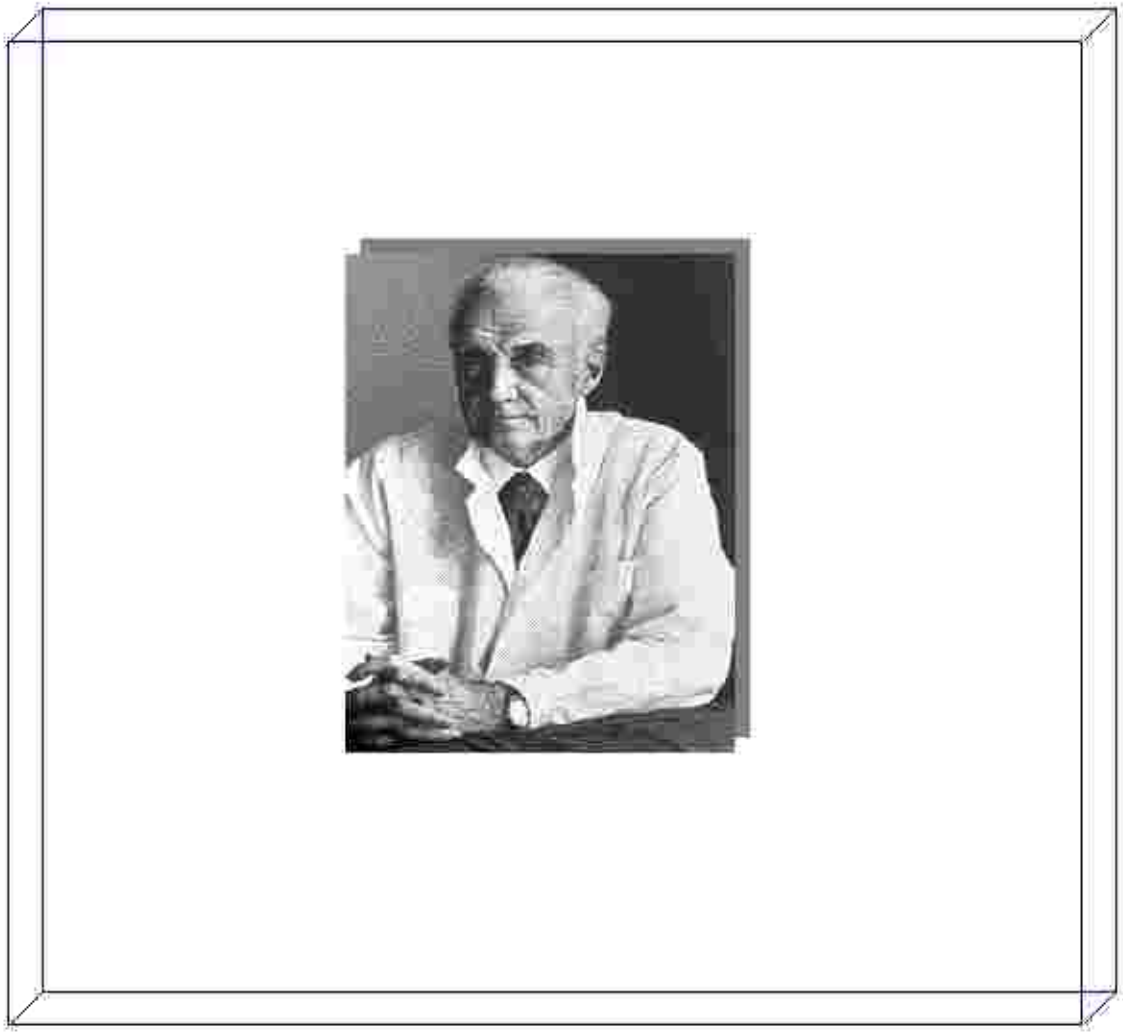
Sir Peter Mansfield



Paul Lauterbar

Doing it Stereotactically





TRIUMPHS THUS FAR
Shared by all

- **Neuro-Surgery**
- **Neuro-Radiology**
- **Radiation Oncology**
- Chemotherapy & modifiers
- Rehabilitation
- Neuro-Pathology
- Medical Decompressive Therapy
- Tumour Biology & Genetics


STEVIE
NICKS
Long Way To Go

Harvey Cushing on Medulloblastoma - 1930

".. in the course of our growing acquaintance with these baffling tumours, we suspected from their peculiar cytology that they might be susceptible to radiation and the first of the cases so treated both by the X-rays and radium was in December, 1919. Here at least was a new therapeutic recourse and we began with renewed encouragement to attack the problem with greater vigour"