Challenges & Triumphs in NEURO-ONCOLOGY

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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

Prone Immobilization & Simulation

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

Simulation & Outlining

Customized shielding (MLC) & Verification

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

Conventional Bilateral Photons

IMRT Photons

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

3 Field 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?

BTSG trial- survival (303 patients)

A: Surgery → Supportive care
B: Chemotherapy (BCNU)
C: Radiotherapy
D: RT + BCNU

Therapeutic Progress till 7th Decade
The Battered Brain

Temozolomide (Prodrug)

Spontaneous hydrolysis at physiological pH

Active deamination liver

DTIC
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
  - Anatomy of Cognition
  - Cognition over Age
  - Age versus Neural Maturation & Degeneration
  - Neuro-Plasticity and Neuro-Genesis
  - Biology of Neural Pathology
TRIUMPHS

• Better diagnosis
• More lives saved
• Life with better quality
TRIUMPHS

First CT Scan was of a Frontal Glioma 1971

Sir Godfrey Hounsfield
Nobel Prize 1979

Sir Hounsfield’s own body 1975

The ‘Lathe Bed’

EMI Scanner
Atkinson Morley Hosp
Another Triumph spurred by the need to study the Brain Anatomy & Function and Brain Tumours
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
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”