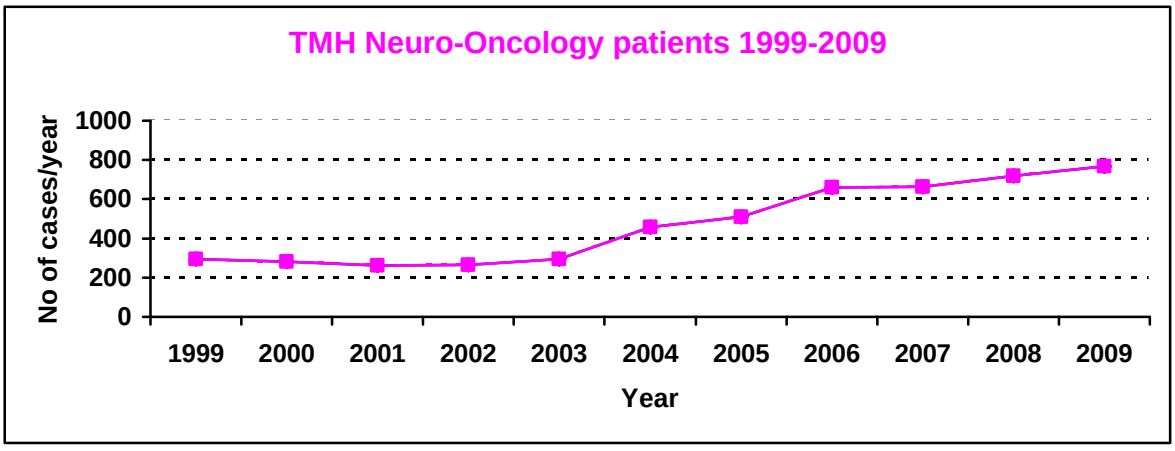
(A) INTRODUCTION

Central Nervous System (CNS) tumours, though uncommon are not a rare entity in clinical practice. These tumours are quite diverse in neurosurgical and neuro-oncological practice ranging from benign to malignant tumour and affecting all age groups right from the very young to the very old. Management of these tumours poses several challenges from therapeutic modalities to ancillary care including rehabilitation and support services. Several newer surgical innovations, chemotherapeutic agents and radiation therapy delivery techniques are being studied with emerging evidences, which mandates a critical appraisal of current evidences in the management of such tumour. One of the primary aims of this conference and book would be to sift the evidence critically, particularly to address its applicability in the Indian scenario and evolve management guidelines as per the best available evidence appropriate.

There is no organized brain tumour registry in India; hence, robust epidemiologic data is not available for the country. All currently quoted data is based on hospital-based cancer registries under the National Cancer Registry Program. The situation is compounded by the fact that major academic neurosurgical centers are not affiliated to comprehensive cancer centers and as such are not obliged to report their data to the national cancer registry.

The crude incidence of primary brain tumour in India is 3.4 per 100,000 populations for males and 1.2 per 100,000 populations for females. It represents < 1% of new cancer cases detected every year in the country. However, there has been a steady increase in the incidence of primary brain tumours over the last decade or so primarily due to higher detection rates due to more widespread availability of diagnostic imaging.

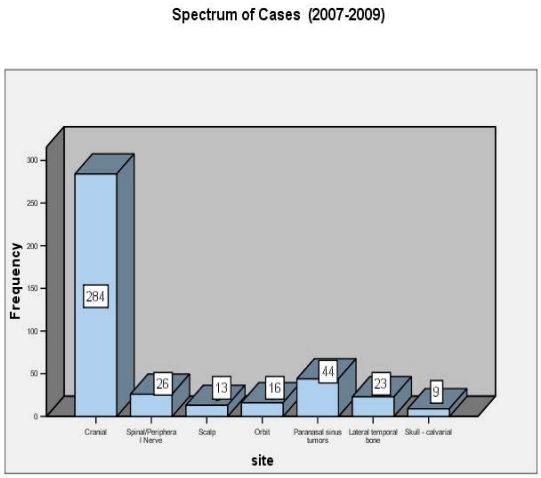
Tata Memorial Hospital has witnessed an increasing trend of primary brain tumours over the years and currently registers over 800 patients annually, which are being enrolled on a prospective Neuro-oncology database.

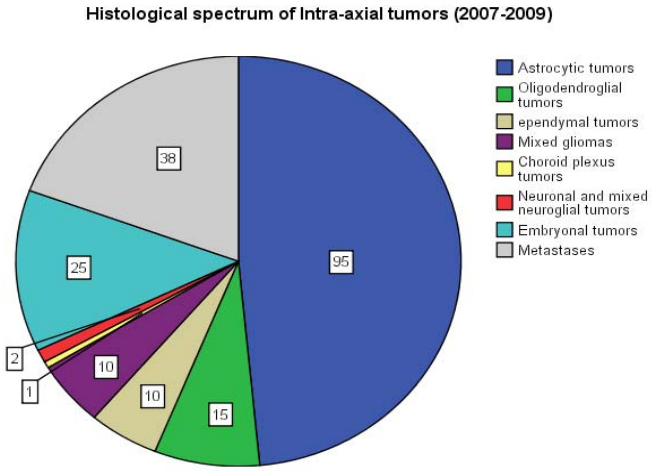


Total No of Patients till April 2010: 338

Neurosurgery in TMC: Census of 2007-2009

- Total 415 cases operated
- Spectrum of cases (see bar chart)
- Included 196 intra-axial tumors
- Spectrum of histology of intra-axial tumors (see pie diagram)





BRAIN TUMOUR: Brain tumours can be *benign* or *malignant*

A. **Benign** brain tumours **do not** contain cancer cells: Usually, benign tumours can be removed, and they seldom grow back.
   a) The border or edge of a benign brain tumour can be clearly seen. Cells from benign tumours do not invade tissues around them or spread to other parts of the body. However, benign tumours can press on sensitive areas of the brain and cause serious health problems.
   b) Unlike benign tumours in most other parts of the body, benign brain tumours are sometimes life threatening.
   c) Very rarely, a benign brain tumour may become malignant.

B. **Malignant** brain tumours **contain cancer cells**:
   a) Malignant brain tumour is generally more serious and often is life threatening.
   b) They are likely to grow rapidly and crowd or invade the surrounding healthy brain tissue.
   c) Very rarely, cancer cells may break away from a malignant brain tumour and spread to other parts of the brain, to the spinal cord, or even to other parts of the body. The spread of cancer is called *metastasis*.

Primary brain tumour: Tumours that begin in brain tissue are known as *primary tumour* of the brain. The most common primary brain tumours are *gliomas*. They begin in glial cells. There are many types of gliomas:

- **Astrocytoma** - The tumour arises from star-shaped glial cells called *astrocytes*. In adults, astrocytomas most often arise in the cerebrum. In children, they occur in the brain stem, the cerebrum, and the cerebellum. A grade III astrocytoma is sometimes called an *anaplastic* astrocytoma. A grade IV astrocytoma is usually called a *glioblastoma mulmultiform.*

- **Brain stem glioma** - The tumour occurs in the lowest part of the brain. Brain stem gliomas most often are diagnosed in young children and middle-aged adults.
- **Ependymoma** - The tumour arises from cells that line the ventricles or the central canal of the spinal cord. They are most commonly found in children and young adults.
- **Oligodendroglioma** - This rare tumour arises from cells that make the fatty substance that covers and protects nerves. These tumours usually occur in the cerebrum. They grow slowly and usually do not spread into surrounding brain tissue. They are most common in middle-aged adults.

Some types of brain tumours do not begin in glial cells. The most common of these are:

- **Medulloblastoma** - This tumour usually arises in the cerebellum. It is the most common brain tumour in children. It is sometimes called a *primitive neuroectodermal tumour*.
- **Meningioma** - This tumour arises in the meninges. It usually grows slowly.
- **Schwannoma** - A tumour that arises from a *Schwann cell*. These cells line the nerve that controls balance and hearing. This nerve is in the inner ear. The tumour is also called an acoustic *neuroma*.
- **Craniopharyngioma** - The tumour grows at the base of the brain, near the *pituitary gland*. This type of tumour most often occurs in children.
- **Germ cell tumour** of the brain - The tumour arises from a *germ cell*. Most germ cell tumours that arise in the brain occur in people younger than 30. The most common type of germ cell tumour of the brain is a *germinoma*.
- **Pineal region tumour** - This rare brain tumour arises in or near the *pineal gland*. The pineal gland is located between the cerebrum and the cerebellum.

Secondary brain tumours:

When cancer spreads from its original place to another part of the body, the new tumour has the same kind of abnormal cells and the same name as the primary tumour. Cancer that spreads to the brain from another part of the body is different from a primary brain tumour. When cancer cells spread to the brain from another organ (such as the lung or breast) doctors may call the tumour in the brain a *secondary tumour* or *metastasis* tumour. Secondary tumours in the brain are ***far more common*** than primary brain tumours.

DIAGNOSIS OF A BRAIN TUMOUR: *POSSIBLE SYMPTOMS*

- A new seizure in an adult
- Gradual loss of movement or sensation in an arm or leg
- Unsteadiness or imbalance, especially if it is associated with headache
- Loss of vision in one or both eyes, especially if the vision loss is more peripheral
- Double vision, especially if it is associated with headache
- Hearing loss with or without dizziness
- Speech difficulty of gradual onset
- Nausea or vomiting that is most severe in the morning, confusion and disorientation, and memory loss.
- The following symptoms are usually not caused by a brain tumour, but may sometimes be as a headache, abnormal change in behavior, infertility or amenorrhea.

Based on the above mentioned symptomatology which is always backed up with a sound history taking, the next eminent step is the diagnostic imaging techniques that have evolved immensely over the past years and have become a valuable adjunct to the sphere of Neuro-oncology.

DIAGNOSTIC IMAGING: Contemporary imaging modalities

Imaging	**Remarks**	**Pros**	**Cons**
CT scan	First line imaging modality	Good anatomic visualization Cheaper & Faster More widely available Can be used with metal objects	Limited reconstruction ability Exposure to ionizing radiation Poor resolution Contrast reaction
MRI	Gold standard imaging modality	Unparalleled resolution True multiplanar imaging No exposure to ionizing radiation	Susceptible to motion artifacts Cannot be used with metal objects Claustrophobic, noisy, long times Expensive
MR Spectroscopy	Assesses tumour metabolites	Useful for discriminating radiation necrosis from tumour	Limited utility near bone, vessels or air spaces Wide variability in interpretation
MR Perfusion	Assesses blood flow & volume	Generally correlates with grade Useful to distinguish radiation necrosis from tumour progression	Limited utility near bone, vessels