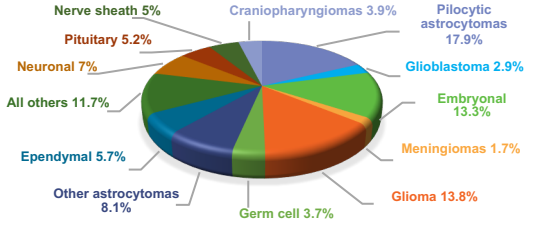




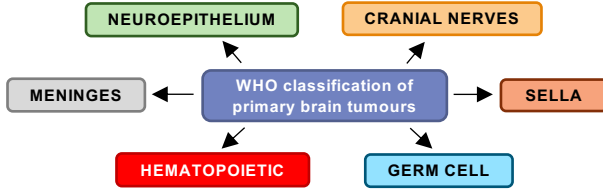
BACKGROUND

- Although rare, brain tumours are the **leading cause of cancer related death** in children.
- Childhood brain tumours have the **second highest incidence** of any pediatric cancer after leukemia. Among childhood solid tumours, brain tumours are the **most common**.
- It is crucial for clinicians to appreciate the signs and symptoms of brain tumours in children, as a **delayed diagnosis can worsen prognosis**.

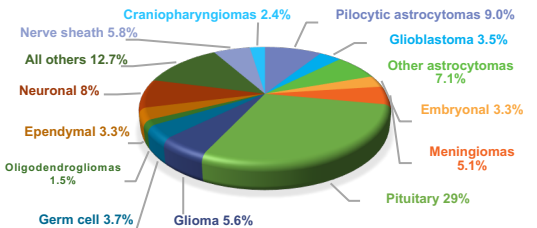
Distribution of 1° Brain Tumours (0-14 years)



Brain tumours are classified according to the **cell of origin**:



Distribution of 1° Brain Tumours (15-19 years)



SIGNS & SYMPTOMS

Symptoms are **diverse** and arise based on which **neuroanatomic pathway is disrupted** by the tumour.

Common presenting triad:



- Symptoms develop **progressively** over **weeks to months**
- Slow steady decline in school performance

The above triad may suggest **cerebrospinal fluid obstruction** secondary to a brain mass.

SIGNS & SYMPTOMS

Recurrent vomiting including early morning; head tilt; enlarged head

Visual changes (double vision, vision loss); nystagmus; cranial nerve palsy

Delayed puberty, anorexia, failure to thrive

Early handedness (< 1 years old)

Tics, tremor, movement disorder

TUMOUR LOCATION

Posterior fossa
Ventricular system

Optic pathway, suprasellar, brainstem, posterior fossa

Hypothalamic-pituitary axis

Cortex, subcortical, brainstem, spinal cord

Basal ganglia, thalamus, midbrain

NEURO EXAM

FINDINGS SUGGESTIVE OF A BRAIN TUMOUR

MENTAL STATUS	Progressive neurocognitive decline, encephalopathic
GAIT	Wide-based, unsteady, unable to walk in tandem straight-line
CN II	Visual field deficits, papilledema
CN III, IV, VI	Abnormal extraocular movements, nystagmus (particularly upgaze), gaze paralysis, poorly reactive pupils
CN VIII	Hearing deficits, vertigo
CN IX, X, XII	Dysphagia, drooling
MOTOR EXAM	Early handedness, delayed motor milestones, pronator drift, muscle atrophy associated with focal changes in tone
REFLEXES	Hyperreflexia, positive Babinski sign
COORDINATION	Dysmetria, overshoot on mirror testing, marked asymmetry of finger and/or toe tapping
SENSORY	Focal sensory deficits depending on tumour location

The majority of children with brain tumours will have an **abnormal neurologic exam**.



LATE EFFECTS FROM CANCER THERAPY

- Learning disability, memory problems, lower IQ
- 2° neoplasms
- Endocrinopathy (GH deficiency, precocious puberty, delayed puberty, hypothyroidism)
- Depression/anxiety
- Epilepsy
- Auditory impairment
- Cataracts

INVESTIGATIONS

Neuroimaging: MRI of the brain and spine with and without gadolinium

Preoperative laboratory tests: CBC, electrolytes, creatinine, coagulation studies, blood type and cross-matching

Other investigations to consider:

- **Endocrine laboratory tests:** growth hormone (GH), prolactin, LH, FSH, cortisol, ACTH, and TSH.
- **Ophthalmologic exam:** establish baseline visual field deficits prior to surgery.
- **Tumour markers:** alpha fetoprotein (AFP) and beta-human chorionic gonadotropin (β -HCG).

MANAGEMENT STRATEGY

- **ABCs** – airway, breathing, circulation
- Multidisciplinary approach: **neurosurgery, pediatric oncology, social work, child life specialists, and neuropsychologists**
- Intravenous **steroids** with acid suppression
- Consider **seizure prophylaxis** for patients at high risk for seizures
- While in the ED, the patient can be worked up for any concurrent illnesses
- **Neurosurgery** – maximal safe surgical resection of the tumour
- **Chemotherapy and radiation therapy**