Introduction
Brain tumours are highly heterogeneous, both phenotypically and genotypically. Still there are existing gaps in our knowledge and understanding of the involved genes, genetic changes and pathways in the genesis, progression, biology and clinical behavior of brain tumour. Because of the complex environment of the brain, we are still unable to fully understand the complete biology of brain tumours; namely,

We need to overcome many challenges and answer many questions for the complete elimination of brain tumours: What are the genetic changes and pathways of oncogenesis and progression that account for the heterogeneity of brain tumours and how well can these be studied? Which genes, genetic changes and pathways are important for the initiation, maintenance and progression of brain tumours?

Are the genetic changes and pathways that are required for initiation, the same as those required for maintenance of the neoplastic phenotype and its biological behaviours?

How does the spatial-anatomical site of the tumour against its specific genetic background determine the gene expression pattern and contribute to tumours heterogeneity, biological and clinical behaviours and therapeutic outcome?

Are there genetic changes and pathways that are common to different brain tumour subtypes?

What pathways, such as signaling, cell cycle, apoptosis are involved in the response of brain tumours to intra and extracellular stimuli such as growth factors or redox changes?

What are the stem cells and progenitor cells of the different brain tumour subtypes?

For getting rid off these challenges and problems, we need to think in combinational approach like:

Define the multigenetic changes and pathways involved in oncogenesis, progression, and maintenance of brain tumours, with particular attention to their heterogeneity.

Identify the genes and pathways that are differently involved in tumour initiation and maintenance (Source: Brain Tumour Progress Review, www.ninds.nih.gov).

The similarity between stem cells and cancer cells of self-renewal led to new concept of cancer progression. There has been reported, cancer stem cells in Leukemia, multiple myeloma and breast cancer which show the self-renewal cells for the progression of these tumour and are very much similar in characteristic to stem cells. So they are named as cancer stem cells.

Brain tumours have also been reported to possess a subpopulation of cancer stem like cells that have ability to proliferate, self-renew and be multipotent. Brain tumours are phenotypically heterogeneous because they are composed of cells expressing both the
markers of differentiation and non-differentiation. Populations of proliferating tumour stem cells differentiates into more mature cell types that characterize the tumour.

Singh et al 1994 for the first time isolated stem cells from brain tumours and showed the characteristic of self-renewable, proliferation and differentiation. They were able to differentiate these cells from others cells with the marker CD133+, a five transmembrane protein used as a stem cell marker which have capacity to grow in vitro and showed resemblance to patients of tumour cells (Tunici et al., 2006).

The cellular heterogeneity of brain tumour suggested that only a small fraction of cancer cells are able to regenerate tumours and that targeting these cells could be an innovative approach to eliminating the tumour.

In these studies, we have chosen two major brain tumours comprising medulloblastoma and astrocytoma. We have checked possible role of sonic hedgehog signaling pathway in these tumours. However, people have investigated and shown significant contribution of Shh pathway in medulloblastoma development though this Shh signaling pathway is not well studied in astrocytoma. Since sonic hedgehog pathway is responsible for stem cell renewable, state it can cause cancer. We have checked genetic heterogeneity of Shh pathway and tried to understand the difference at molecular level in the mechanism of downstream Shh pathway downstream action in these tumours.