**Literature review of brain tumor and its variations**

**2.1 What is brain tumor?**

According to the World Health Organization, cancer is the second greatest cause of mortality worldwide (WHO) Cancer deaths can sometimes be avoided by detecting the disease early. A tumor, in contrast to cancer, may be benign, pre-cancerous, or malignant. Benign tumors can be surgically removed and, unlike malignant ones, usually do not spread to other tissues or organs.[1]

**2.2 The variation of brain tumor**

Gliomas, meningiomas, and pituitary tumors represent several types of primary brain tumors. Gliomas encompass tumors originating from brain structures other than nerve cells and blood vessels [1]. Conversely, pituitary tumors manifest as lumps within the skull, while meningiomas arise from the membranes surrounding the central nervous system and covering the brain [2-5].

The study conducted by [3] categorizes brain tumors into two major groups: Primary tumors of the brain and Metastatic brain tumors and carcinomatous meningitis. Each category contains its own subcategories, each of which we will list and provide a brief explanation.

**2.2.1 The primary brain tumors:**

Primary brain tumors originate within the brain or its surrounding tissues. They develop from abnormal growth of cells within the brain itself and are classified based on the type of cells from which they originate.

In this research, we are going to discuss on few of the most Commonly occurring primary brain tumors discovered by researchers and scientists include:

***Acoustic schwannoma***

Vestibular schwannoma, acoustic neurinoma, vestibular neuroma, and acoustic neurofibroma are other names for acoustic neuromas. These tumors can be extra-axial or intracranial, and they develop from the Schwann cell sheath. They typically appear close to the vestibular or cochlear nerves. Acoustic neuromas typically lie near the cerebellopontine angle anatomically. Meningiomas are internal carotid artery (ICA) tumors that make up about 20% of cases and can develop anywhere in the brain. Moreover, type 2 neurofibromatosis patients typically only have bilateral auditory neuromas [6]. Individuals experiencing unilateral hearing loss are commonly affected and may also experience symptoms such as tinnitus. Treatment options for this benign tumor include radiosurgery or surgery, and it progresses slowly [3].

**Anaplastic astrocytoma**

This tumor is a devastating, locally aggressive variant of astrocytoma. When it "infiltrates" the normal brain, it spreads and is deemed cancerous. It could happen any place in the CNS, the central nervous system. Surgery and radiation therapy are examples of conventional therapeutic options. It might return even with these therapies. One can anticipate that about half of the patients will respond to chemotherapy just partially. In cases where the tumor progresses in spite of normal therapy, experimental therapies are frequently advised [3]. Anaplastic Astrocytoma (AA - WHO grade III) is a cancerous primary brain tumor that diffusely invades the brain and arises from the neoplastic transformation of astrocytic cells. It typically progresses to WHO grade IV [7].

***Glioma butterfly***

Glioma butterfly, also known as butterfly glioblastomas (bGBM), refers to a glial cell tumor that has progressed to affect both cerebral hemispheres through the corpus callosum, the structure that links the two sides of the brain. Surgery is rarely beneficial, except in cases of diagnosis [3]. WHO grade IV gliomas that invade the corpus callosum and spread to both cerebral hemispheres are referred to as butterfly glioblastomas. The prognosis for these uncommon tumors is very bad since invasion of the corpus callosum greatly raises the chance of malignant dispersion [8].

Others primary brain tumors includes: Arachnoid cyst, Astrocytoma, Brain stem glioma, Chondroma, Choroid plexus carcinoma, Choroid plexus papilloma, Dermoid or epidermoid cyst among others [3].

**2.2.2 the metastatic brain tumors:**

One in four cancer patients will experience malignancies that spread to the central nervous system (CNS), usually to the brain through the bloodstream. Melanoma and tumors originating in the lung, kidney, or breast are among the common cancers that metastasize to the brain. All cancers, nevertheless, have this potential. Metastatic tumors usually develop at the interface of the brain's white and gray matter. Depending on how the damaged brain region functions, the symptoms may include headaches, seizures, or, in the case of a diagnosis, no symptoms at all [3].

Brain metastasis presents unique clinical issues and is linked to poor survival results in individuals with lung cancer, breast cancer, and melanoma. The microenvironment of the brain is very different from that of extracranial lesions due to its distinct cell types, anatomical structures, metabolic constraints, and immune environment. As a result, tumor cells face a profound and unique selection pressure that influences the metastatic process and treatment responses. In order to meet this unmet clinical need, research on brain metastasis may provide new therapeutic targets and creative treatment strategies [9].

In conclusion, the primary distinction between primary brain tumors and metastases lies in their origin. Primary brain tumors arise directly from the brain or its surrounding tissues, categorized based on their cell type (e.g., gliomas). In contrast, metastatic brain tumors, also known as brain metastases, originate from cancer cells that spread from other parts of the body through the bloodstream or lymphatic system. While both types involve abnormal growths within the brain, their distinct origins necessitate different management strategies due to variations in location, treatment options, and overall prognosis [10].

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**References**

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