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Perspective

Recent Advances in the Treatment of Metastatic Brain Tumor

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DESCRIPTION

A brain metastasis is a malignancy that has spread to the brain from another part of the body and is thus classified as a secondary brain tumor. A cancer cell type is usually shared by metastasis and the primary site of the malignancy. Metastatic brain tumors are cancers that spread to the brain from a primary neoplasm in another organ of the body. They are among the most frequent intracranial brain tumors seen by doctors. These tumors are a common consequence of systemic malignancies and a significant source of morbidity (disease rate) and mortality (death) in patients. Each year, around 200,000 new cases of brain metastases are diagnosed in the United States, with the number perhaps increasing due to increased awareness and improved diagnostic techniques. Furthermore, improved chemotherapy therapies for systemic tumors, or malignancies, are allowing patients to live longer; yet, these drugs fail to protect the brain, leaving it vulnerable to tumor spread. Because primary brain tumors are uncommon, metastasis is the most common cause of brain cancer.

DIAGNOSIS

Brain imaging (such as CT or MRI) is required to detect the presence of brain metastases. Contrast-enhanced MRI, in particular, is the best means of diagnosing brain metastases, albeit CT is the primary method of detection. A biopsy is frequently recommended to confirm a diagnosis.

Brain metastases are often diagnosed after a diagnosis of systemic malignancy. Brain metastases are occasionally identified concurrently with or before the underlying tumor are discovered. If the presence of a metastatic tumor is suspected, the treating neuro-oncologist or neurosurgeon may request additional tests. Additional body imaging may be needed and is typically performed in the form of a CT with contrast of the chest, abdomen, and pelvis, as well as a bone scan. These tests can detect a primary neoplasm anywhere in the body. Additional testing may be recommended at times, but this is the basic test palette.

TREATMENT METHODS

Nano-oncology

Biotechnologies are being employed more and more in cancer research. The use of nanotechnology in cancer research is known as Nano-oncology, and it has produced intriguing alternatives to our current constraints in brain tumor imaging and treatment. Doxil (liposomal doxorubicin) and Abraxane, two nanotechnology-based cancer treatments, are currently approved (nanoparticle formulated paclitaxel). From microscopic carbon nanotubes and polymeric nanoparticles to large-scale thermal therapies like magnetic nanoparticle-based hyperthermia, novel cancer medicines are being developed. This field of study is fast expanding, with over 150 medications incorporating nanotechnology currently under development. This section's goal is to introduce you to the field of nano-oncology and showcase some interesting materials.

Radiotherapy

Radiotherapy, which includes whole-brain irradiation, fractional radiotherapy, and radiosurgery, is essential in the treatment of brain metastases. Whole brain irradiation is utilized as a primary therapy strategy in patients with many lesions, as well as in combination with surgical excision in patients with single, accessible tumors.

Gene therapy

Gene therapy for the nervous system is currently a widely used tool all over the world. Gene therapy, which is widely used to develop preclinical models, is now proving clinical results for both safety and efficacy in the treatment of congenital blindness and neurodegenerative illnesses. Vectors, a type of delivery method, are an important component of gene therapies. Vectors are typically classified as viral or non-viral. By preferentially reproducing within cancer cells, adenoviral vectors have proven useful in the creation of anticancer medicines. Retroviral vectors are another effective cancer treatment delivery mechanism.

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