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Evolution of Brain Tumor along Metastatic Progression

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INTRODUCTION

Brain tissue is known to have elevated levels of citrate, which is necessary for regulating ion chelation and neuronal excitability, and is also required to provide neurons with the energy substrate they need. Importantly, citrate also functions as an important substrate for cancer metabolism. The available literature describing changes in citrate levels in brain tissue, blood, cerebrospinal fluid, and intracellular changes during tumor development before and after metastatic progression. Extracellular citrate uptake and potential citrate synthesis and release mechanisms by the surrounding stroma may provide new targets for cancer therapy in primary brain tumors and brain metastases.

DESCRIPTION

Brain tumors are the most common solid tumors in children and cause significant cancer-related mortality. Some inherited syndromes associated with brain tumors are not familial. Ionizing radiation is a recognized risk factor for brain tumors. Several industrial exposures have been investigated for their causal relationship with brain tumorigenesis, but the results are inconclusive. A chance association of tobacco, alcohol, or dietary factors with common mutagens has not yet been established. There is no clear evidence that brain tumor incidence has changed over time. It is well known that cancer cells acquire energy through the Warburg effect and oxidative phosphorylation. Citrate is produced from glutamine in the reverse Krebs cycle and is thought to play an important role in cancer metabolism. We investigate different mechanisms by which pathways involved in maintaining redox balance respond to the need for intracellular citrate synthesis under different extracellular metabolic conditions.

With the progressive understanding of tumorigenesis, many tumor therapies have been invented and applied in clinical research, and immunotherapy has been widely promoted as an emerging hot topic in the last decade. It is worth noting that today's immunotherapy is used under harsh conditions, and many tumors are defined as 'cold tumours' that are not susceptible to immunotherapy, brain tumors being a typical example. However, there is plenty of evidence linking DNA damage repair mechanisms to immunotherapy. This could be a breakthrough for the use of immunotherapy in brain tumors. It has been or could be used to evaluate immunotherapy in brain tumors that can provide progenitor scores for rational implementation of immunotherapy in brain tumors. The useful combination of immunotherapy with other therapeutic approaches that affect DNA damage repair processes, opening new avenues for the application of immunotherapy in brain tumors.

Among brain-related diseases, segmentation of brain tumors by magnetic resonance imaging scans is one of the hottest research areas in the medical community. Segmentation of brain tumors is challenging due to their asymmetric shape and uncertain boundaries. This process separates the tumor area into active tumor, necrosis and edema from normal brain tissue such as white matter, gray matter and cerebrospinal fluid [1-4].

CONCLUSION

The state-of-the-art methods of these three technologies and discuss their strengths and weaknesses. The main purpose of this article is to motivate young researchers to develop efficient brain tumor segmentation techniques using conventional and new techniques. The proposed analysis concluded that conventional machine learning methods are mainly applied to brain tumor detection, while deep learning methods are suitable for tumor substructure segmentation.

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CONFLICT OF INTEREST

The author's declared that they have no conflict of interest.

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