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DNA Methylation Profiling as a Model for Neuro-oncology Discovery and Precise Diagnostics

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Introduction

For the classification of tumors in the Central Nervous System (CNS), more objective and biologically driven approaches have emerged in recent years. As a response to the plethora of evidence that key molecular alterations define distinct tumor types and are clinically meaningful, the 2016 WHO classification update (the "blue book") included molecular diagnostic criteria in the definitions of specific entities. DNA methylation arrays have emerged in recent years to provide an effective framework for the discovery of new tumor types and to improve diagnostic precision. In the past, such diagnostic alterations included specific mutations, copy number changes, or gene fusions. DNA methylation signatures frequently have a close connection to these mutations and fusions. The development of a machine learning-based classifier that is freely available and the availability of technology that is compatible with clinical diagnostics have greatly facilitated the incorporation of methylation data into neuro-oncology nosology. In this review, we discuss how DNA methylation profiling can be used to classify CNS tumors, with a focus on novel and rare tumor types that have only recently been described and how it can help refine existing types [1].

The most prevalent type of malignant primary brain tumor, glioblastomas is a significant cause of morbidity and mortality. Lately there have been significant advances in figuring out the atomic pathogenesis and science of these cancers, yet this has not converted into fundamentally further developed results for patients. The current treatment of Isocitrate Dehydrogenase wild type (IDHwt) glioblastomas will be discussed in this consensus review from the European Association of Neuro-Oncology (EANO) [2]. In addition, new treatments like targeted molecular therapies, agents that target DNA damage response and metabolism, immunotherapies, and viral treatments will be looked at, as well as the problems that researcher's face right now and where they should go in the future.

Description

Significant T-cell dysfunction, which can be attributed to inadequate T-cell infiltration into the tumor and the TME's highly immunosuppressive nature, is one of the obstacles to successful immunotherapy. T-cell defects can be caused by exhaustion (a hypofunctional state caused by the sustained expression of inhibitory receptors), ignorance (the absence of a response due to either anatomical barriers or insufficient antigen presentation), anergy (an inactive state after an antigen encounter), tolerance (programmed induction of unresponsiveness or the deletion of T- cell clones to prevent autoimmunity), and senescence (a hypo- functional state caused by shortened telomeres) [3].

The publication of neuro-oncology was made possible only with the assistance of Duke University press and a generous $250,000 grant from the pediatric brain tumor foundation launching any new journal is a costly endeavor. With the initial funding in place, an editorial board with representatives from all neuro- oncology specialties and international locations was established. Manuscripts were received and accepted for publication in its inaugural year. In January 1999, the first issue was published. Dr. Bigner contributed greatly to the success of neuro-oncology over the next seven years, elevating it to the level of some of the world's leading oncology and neurology titles and increasing its impact factor. The adoption of neuro-oncology as their official journal by the Japan society of neuro-oncology and the European society of neuro-oncology was a key factor in the success [4].

It is appropriate that the neuro-oncology community will return to Texas, specifically the Austin convention center, for this year's annual scientific meeting. This year's meeting marks the transition from a hotel based model to a convention center model, which is also noteworthy due to the exponential growth in attendance over the past 25 years. The society's silver anniversary will be commemorated at the meeting through a number of planned activities, all of which will revolve around the theme "20/20 vision for the future." Neuro-oncology will host a series of articles in preparation to highlight the Society's development and educate the growing membership about the many facets of SNO. Future issues will cover a variety of topics, including:

When Dr. W.K. Alfred Yung took over as the editor-in-chief of neuro-oncology in 2006, he introduced a number of new initiatives to enhance the publication, such as the publication of review articles written by invited well-known experts and special topic issues. The journal's appearance was also improved with a new cover and improved graphics [5]. The journal's publication frequency increased under Dr. Yung's direction, reaching six issues per year by 2008. With its new affiliation with Oxford University Press (OUP), the world's largest university press, and an impact factor of 6.776, the journal took on an even bolder agenda in 2010, doubling its publication frequency to monthly.

Conclusion

In order to appropriately manage these AYA patients, this report emphasizes not only the need for the development of specialists specializing in this distinct population but also the need for collaboration between pediatric and adult neuro- oncologists. It is evident that additional research is required to describe the biology of this population and its clinical outcomes, but experts in the field must also invest in the planning and execution of clinical trials to improve outcomes. AYAs' distinct clinical and psychosocial needs necessitate clinical programs.

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Conflict of Interest

None.

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