

450K Methylation Arrays for Classification of Brain Tumor Types

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Technology description

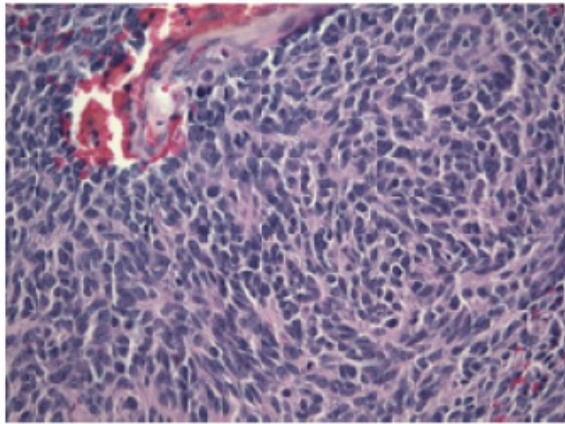
The method allows very consistent classification of tumor entities (especially brain tumor sub-types) by analyzing the methylation pattern of genome wide CpG positions.

There are more than 100 brain tumor entities listed in the World Health Organisation classification. Many of these show complex patterns of potentially overlapping histological features. Moreover, even histologically identical tumors can belong to different molecular groups with very different treatment requirements and prognosis. In order to tackle those challenges DKFZ and Heidelberg University Hospital researchers developed a method for classifying tumorous diseases based on their specific genomic DNA methylation profile.

Solutions

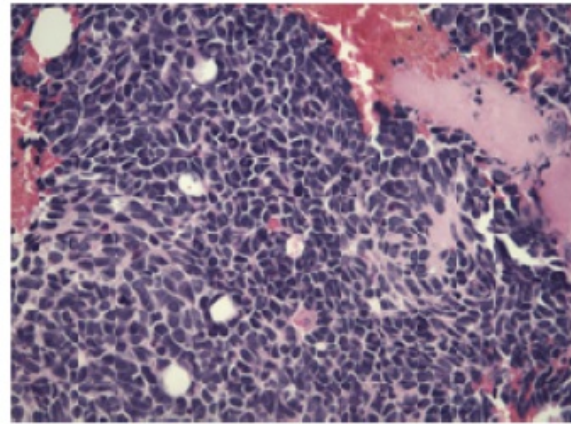
The method enables classification of a tumor sample by analyzing the methylation pattern of genome wide CpG positions. The acquired data are compared to a self-learning classification rule derived from a worldwide unique and highly sophisticated set of methylation data acquired from pre-classified tumor species. The method is especially useful for classifying brain tumors due to the fact that brain tumor sub-types comprise distinct and extremely stable methylation patterns, thus enabling discrimination of histologically indistinguishable tumor species (see figure). Furthermore, the method allows generating copy number profiles of the individual tumor entities.

Histologically indistinguishable...



WNT Medulloblastoma

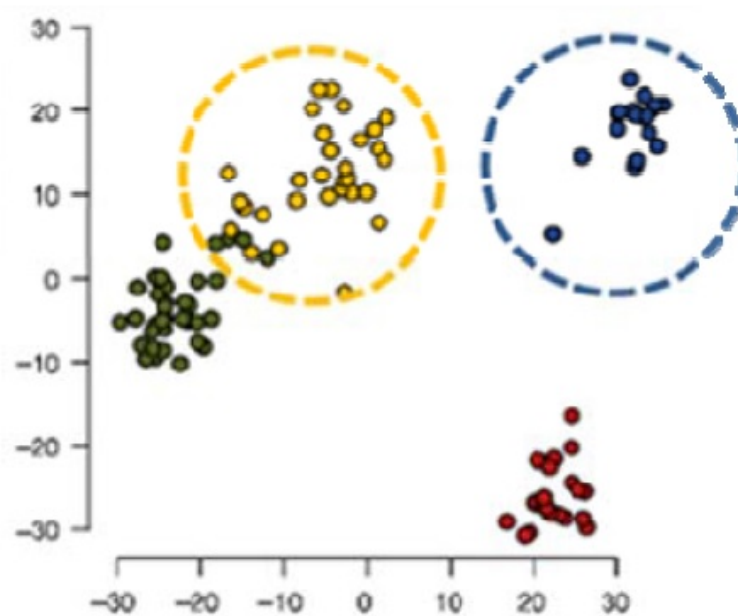
~100% 5-yr OS



Grp3 Medulloblastoma

~40% 5-yr OS

...molecularly distinct



The histology of a WNT medulloblastoma and a Group 3 medulloblastoma are not distinguishable. The lower section of the panel shows a multidimensional scaling (MDS) analysis of 107 medulloblastoma samples of all molecular subtypes using the 21,092 most variable CpG probes. WNT medulloblastoma are colored in blue, SHH medulloblastoma in red, Group 3 medulloblastoma in yellow and Group 4 medulloblastoma in green.

Application area

Due to the sublime performance and consistency of the classification rule algorithm the presented technology has the potential to become the standard diagnostic tool for the differentiation of brain tumors and other tumor species.

Institution

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