Metachronous, multicentric glioma of pilocytic astrocytoma with oligodendroglioma-like component and oligodendroglioma through distinct genetic aberrations.

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Abstract
This patient presented with a rare case of metachronous, multicentric gliomas first manifesting as headache and nausea in 1983 when he was an 8-year-old boy. Computed tomography revealed a cerebellar tumor and the tumor was subtotally resected. The histological diagnosis was pilocytic astrocytoma, and radiation therapy to the posterior fossa and chemotherapy consisting of nimustine hydrochloride and fluorouracil were performed. In 1989, at age 14 years, the patient presented with local recurrence. He underwent gross-total resection of the tumor, and histological examination revealed that the tumor consisted of classic pilocytic astrocytoma with a biphasic pattern and a small oligodendroglioma-like component. In 2011, at age 36 years, he presented with seizure. Magnetic resonance imaging revealed a mass lesion in the right middle frontal gyrus. Gross-total resection of the tumor was performed, and the histological diagnosis was oligodendroglioma. Genetic analyses revealed amplification of the BRAF gene in both the primary cerebellar pilocytic astrocytoma and the recurrent tumor with biphasic features, as well as a BRAF V600E missense mutation in the oligodendroglioma-like component. On the other hand, the IDH1 R132H mutation, instead of aberrations of the BRAF gene, was identified in the oligodendroglioma arising in the right frontal lobe. Different types of aberrations of the BRAF gene in the classic and oligodendroglioma-like component in the recurrent pilocytic astrocytoma suggest that they had different cell origins or that amplification of BRAF was negatively selected under the de novo BRAF V600E mutation. In addition, the aberration profiles of IDH1 and BRAF suggest that the oligodendroglioma arose independent of cerebellar pilocytic astrocytoma.

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