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Cancer Cell. 2010 Apr 13;17(4):362-75.

### A hierarchy of self-renewing tumor-initiating cell types in glioblastoma.

Chen R, Nishimura MC, Bumbaca SM, Kharbanda S, Forrest WF, Kasman IM, Greve JM, Soriano RH, Gilmour LL, Rivers CS, Modrusan Z, Nacu S, Guerrero S, Edgar KA, Wallin JJ, Lamszus K, Westphal M, Heim S, James CD, Vandenberg SR, Costello JF, Moorefield S, Cowdrey CJ, Prados M, Phillips HS.

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#### Abstract

The neural stem cell marker CD133 is reported to identify cells within glioblastoma (GBM) that can initiate neurosphere growth and tumor formation; however, instances of CD133(-) cells exhibiting similar properties have also been reported. Here, we show that some PTEN-deficient GBM tumors produce a series of CD133(+) and CD133(-) self-renewing tumor-initiating cell types and provide evidence that these cell types constitute a lineage hierarchy. Our results show that the capacities for self-renewal and tumor initiation in GBM need not be restricted to a uniform population of stemlike cells, but can be shared by a lineage of self-renewing cell types expressing a range of markers of forebrain lineage. Copyright 2010 Elsevier Inc. All rights reserved.

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