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Molecular Biology, Pathobiology, and Genetics

Spinal Glioma: Platelet-Derived Growth Factor B-Mediated Oncogenesis in the Spinal Cord

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Human platelet-derived growth factor B (hPDGFB) has been characterized *in vitro* and shown to mediate numerous cellular responses including glial proliferation and differentiation. Expression of PDGFB is thought to be important in the pathogenesis of glioma and several animal models of cerebral glioma based on PDGF expression have been described. To examine whether PDGF could contribute to the pathogenesis of spinal cord glioma, we developed transgenic mice that express hPDGFB under the control of a tetracycline-responsive element (TRE/hPDGFB). These TRE/hPDGFB mice were mated with transgenic mice expressing the tetracycline transcriptional activator (tet-off), tTA, regulated by the human glial fibrillary acidic protein (GFAP) promoter and exhibiting uniquely strong promoter activity in the spinal cord. These transgenic mice

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(GFAP/tTA:TRE/hPDGFB) expressed hPDGFB in GFAP-expressing glia in a manner responsive to doxycycline administration. Without doxycycline, almost all GFAP/tTA:TRE/hPDGFB mice developed spinal cord neoplasms resembling human mixed oligoastrocytoma. Tumorigenesis in these animals was suppressed by doxycycline. To further examine the importance of PDGFB in mouse primary intramedullary spinal cord tumors, we also created transgenic mice expressing hPDGFB under the control of the human GFAP promoter (GFAP/hPDGFB). These GFAP/hPDGFB mice also developed spinal oligoastrocytoma. PDGFB can mediate the development of mouse spinal tumors that are histologically and pathologically indistinguishable from primary intramedullary spinal tumors of humans and may provide opportunities for both novel insights into the pathogenesis of these tumors and the development of new therapeutics. [Cancer Res 2008;68(20):8507–15]

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