



# Louisiana

## **Autologous Hematopoietic Cell Transplantation for Malignant Astrocytomas and Gliomas**

**Policy #** 00058

Original Effective Date: 01/28/2002

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### **Services Are Considered Investigational**

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Based on review of available data, the Company considers autologous hematopoietic cell transplantation (HCT) as a treatment of malignant astrocytomas and gliomas to be **investigational**.\* (The latter diagnosis includes both glioblastoma multiforme and oligodendroglioma.)

### **Background/Overview**

Malignant glial tumors are usually resistant to conventional treatment approaches. Autologous HCT has been investigated as a treatment for malignant astrocytomas and gliomas.

#### **Hematopoietic Cell Transplantation**

HCT refers to a procedure in which hematopoietic cells are infused to restore bone marrow function in cancer patients who receive bone-marrow-toxic doses of cytotoxic drugs with or without whole-body radiation therapy. Bone marrow cells may be obtained from the transplant recipient (autologous HCT) and can be harvested from bone marrow, peripheral blood, or umbilical cord blood and placenta shortly after delivery of neonates. Although cord blood is an allogeneic source, the cells in it are antigenically "naïve" and thus are associated with a lower incidence of rejection or graft-versus-host disease.

#### **Preparative Conditioning for Hematopoietic Cell Transplantation**

Autologous HCT necessitates myeloablative chemotherapy to eradicate cancerous cells from the blood and bone marrow, thus permitting subsequent engraftment and repopulation of bone marrow

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space with presumably normal hematopoietic progenitor cells. As a consequence, autologous HCT is typically performed as consolidation therapy when the patient's disease is in complete remission. Patients who undergo autologous HCT are susceptible to chemotherapy-related toxicities and opportunistic infections prior to engraftment but not graft-versus-host disease.

### **Astrocytomas and Gliomas**

Diffuse fibrillary astrocytomas are the most common type of brain tumor in adults. These tumors are classified histologically into 3 grades of malignancy: grade II astrocytoma, grade III anaplastic astrocytoma, and grade IV glioblastoma multiforme. Oligodendrogliomas are diffuse neoplasms that are clinically and biologically most closely related to diffuse fibrillary astrocytomas. However, these tumors generally have better prognoses than diffuse astrocytomas, with mean survival times of 10 years versus 2–3 years, respectively. In addition, oligodendrogliomas appear to be more chemosensitive than other types of astrocytomas. Glioblastoma multiforme is the most malignant stage of astrocytoma, with survival times of less than 2 years for most patients.

Treatment of primary brain tumors focuses on surgery, either with curative intent or optimal tumor debulking. Surgery may be followed by radiation therapy and/or chemotherapy. Survival after chemoradiotherapy is largely dependent on the extent of residual tumor after surgical debulking. Therefore, tumors arising in the midline, basal ganglia, or corpus callosum or those arising in the eloquent speech or motor areas of the cortex, which typically cannot be extensively resected, have a particularly poor outcome. Treatment of children younger than 3 years is complicated by the long-term effects of radiation therapy on physical and intellectual function. Therefore, in young children, radiation of the central nervous system (CNS) is avoided whenever possible.

**Note:** Astrocytomas and gliomas arise from the glial cells. Tumors arising from the neuroepithelium constitute a separate category of malignancies that include CNS neuroblastoma, medulloblastoma, ependymoblastomas, and pinealoblastomas. Collectively these tumors may be referred to as primitive neuroectodermal tumors (PNETs). Ependymomas also arise from the neuroepithelium but, because of their more mature histologic appearance, are not considered a member of the PNET family.

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### **Rationale/Source**

The published literature consists primarily of single-institution case series.

Bouffet and colleagues reported on a series of 22 children and young adults with high-grade gliomas treated with autologous HCT. The response rate was 29% with 1 complete and 3 partial responses. However, the authors concluded that survival with this procedure was no better than that reported with conventional treatments. Heideman and colleagues reported on a case series of 13 pediatric patients with bulky disease or recurrent disease treated with HCT plus radiotherapy. While the overall response rate was 31%, the authors similarly concluded that overall survival was no better than conventional treatment regimens. Finlay and colleagues reported on a 1996 case series of 45 children and young adults with a variety of recurrent CNS tumors, including gliomas, medulloblastomas, ependymomas, and primitive neuroectodermal tumors. Of the 18 patients with high-grade gliomas, the response rate was 29%. The median survival of this group was 12.7 months. Of the 5 long-term survivors, all had high-grade glioma with minimal residual disease at the time of transplantation. Based in part on these results, the authors recommended aggressive surgical debulking before this procedure is even considered. Studies focusing on the use of autologous HCT in adults with glioblastoma multiforme reported results similar to those in children, being most successful in those with minimal disease at the time of treatment, with an occasional long-term survivor.

A review by Brandes and colleagues concluded that the high drug doses used in this treatment caused excessive toxicity that was not balanced by a significant improvement in survival. Additional reports on small, uncontrolled series of patients with pontine gliomas, recurrent oligodendrogliomas, or those undergoing radiation therapy for high-grade gliomas also did not suggest that this treatment improves survival. In a Phase II study, Abrey and colleagues evaluated hematopoietic cell transplantation in 39 patients with newly diagnosed oligodendroglioma. The authors reported the median follow-up of surviving patients was 80.5 months, with 78 months progression-free survival. The overall survival median had not been reached, and 18 patients (46%) had relapsed.

A nonrandomized study compared survival outcomes of 27 children (age, 0.4–22 years) with recurrent malignant astrocytomas who underwent myeloablative chemotherapy and autologous HCT

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with outcomes in a matched historical cohort (n=56) that received standard chemotherapy regimens following tumor recurrence. Among the 27 children who received myeloablative chemotherapy and autologous HSCT, 5 (18%) succumbed to treatment-related toxicities within approximately 2 months of transplantation, 17 (63%) had disease progression, while 5 survived and were alive a median of 11 years (range: 8–13 years) after transplantation. Overall survival rates at 4 years were  $40 \pm 14\%$  for transplant patients versus  $7 \pm 4\%$  with conventional chemotherapy (p=0.018, hazard ratio [HR]: 1.9; 95% confidence interval [CI]: 1.1–3.2). The results of this study suggest myeloablative chemotherapy with autologous HSCT can produce long-term survival among children with recurrent malignant astrocytoma. However, lack of a contemporaneous treatment comparison group precludes conclusions as to the relative efficacy of this approach.

A comprehensive review article identified in the search did not report any evidence for the role of HCT in this disease.

### Summary

The data on the use of autologous hematopoietic cell transplantation for malignant astrocytomas and gliomas, consisting of case series, has, in general, shown no survival benefit compared to conventional therapy with increased treatment-related toxicity. Therefore, this is considered investigational for this indication.

### National Cancer Institute Physician Data Query (PDQ) Clinical Trials Database

#### Ongoing and Unpublished Clinical Trials

Some currently ongoing trials that might influence this review is listed in Table below.

#### Summary of Key Trials

NCT Number	Trial Name	Planned Enrollment	Completion Date
Ongoing			

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NCT00669669	O6-Benzylguanine-Mediated Tumor Sensitization with Chemo protected Autologous Stem Cell in Treating Patients with Malignant Gliomas	24	Dec 2017
NCT01505569	Auto Transplant for High-Risk or Relapsed Solid or CNS Tumors	20	Jan 2019
NCT00638898	Busulfan, Melphalan, Topotecan Hydrochloride, and Stem-Cell Transplant in Treating Newly Diagnosed or Relapsed Solid Tumor	25	Apr 2019

*Table Key:*

NCT: National Clinical Trial.

### **National Comprehensive Cancer Network (NCCN) Guidelines on Central Nervous System Cancers**

The 2019 NCCN Guidelines on Central Nervous System Tumors (v.2.2018) do not list hematopoietic HSCT as a treatment option for patients with astrocytomas or gliomas.

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3. Heideman RL, Douglass EC, Krance RA et al. High-dose chemotherapy and autologous bone marrow rescue followed by interstitial and external-beam radiotherapy in newly diagnosed pediatric malignant gliomas. *J Clin Oncol* 1993; 11(8):1458-65.

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12/06/2001 Medical Policy Committee review

01/28/2002 Managed Care Advisory Council approval

06/24/2002 Format revision. Coverage eligibility unchanged.

03/31/2004 Medical Director review

04/20/2004 Medical Policy Committee review. High-dose chemotherapy and hematopoietic stem cell support for treatment of malignant astrocytomas and gliomas policy developed separately from current HDC with Hematopoietic Stem cell Support policy. Coverage eligibility unchanged.

04/26/2004 Managed Care Advisory Council approval

04/05/2006 Medical Director review

04/19/2006 Medical Policy Committee review. Format revision, including addition of FDA and or other governmental regulatory approval and rationale/ source.

04/04/2007 Medical Director review

04/18/2007 Medical Policy Committee approval. No change to coverage eligibility.

04/02/2009 Medical Director review

04/15/2009 Medical Policy Committee approval. Changed title to "Autologous Hematopoietic Stem Cell Transplantation for Malignant Astrocytomas and Gliomas". Clarified investigational coverage statement by adding the phrase, "including glioblastoma multiforme and oligodendroglioma". No change to coverage eligibility.

04/08/2010 Medical Policy Committee approval

04/21/2010 Medical Policy Implementation Committee approval. Coverage eligibility unchanged.

04/07/2011 Medical Policy Committee review

04/13/2011 Medical Policy Implementation Committee approval. Coverage eligibility unchanged.

04/12/2012 Medical Policy Committee review

04/25/2012 Medical Policy Implementation Committee approval. Coverage eligibility unchanged.

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- 02/19/2013 coding updated
- 04/04/2013 Medical Policy Committee review
- 04/24/2013 Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
- 04/03/2014 Medical Policy Committee review
- 04/23/2014 Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
- 08/03/2015 Coding update: ICD10 Diagnosis code section added; ICD9 Procedure code section removed.
- 09/03/2015 Medical Policy Committee review
- 09/23/2015 Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
- 09/08/2016 Medical Policy Committee review
- 09/21/2016 Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
- 01/01/2017 Coding update: Removing ICD-9 Diagnosis Codes
- 09/07/2017 Medical Policy Committee review. Recommend archiving policy.
- 09/20/2017 Medical Policy Implementation Committee approval. Archived
- 03/07/2019 Medical Policy Committee review.
- 03/20/2019 Medical Policy Implementation Committee approval. Brought back to active status.
- 03/05/2020 Medical Policy Committee review.
- 03/11/2020 Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
- 03/04/2021 Medical Policy Committee review.
- 03/10/2021 Medical Policy Implementation Committee approval. Coverage eligibility unchanged.

Next Scheduled Review Date: 03/2022

### **Coding**

*The five character codes included in the Blue Cross Blue Shield of Louisiana Medical Policy Coverage Guidelines are obtained from Current Procedural Terminology (CPT®)‡, copyright 2020*

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HCPCS	S2150
ICD-10 Diagnosis	C71.0-C71.9

\*Investigational – A medical treatment, procedure, drug, device, or biological product is Investigational if the effectiveness has not been clearly tested and it has not been incorporated into standard medical practice. Any determination we make that a medical treatment, procedure, drug, device, or biological product is Investigational will be based on a consideration of the following:

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  - 3. Reference to federal regulations.

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