



Louisiana

Hematopoietic Cell Transplantation for Central Nervous System Embryonal Tumors and Ependymoma

Policy # 00063

Original Effective Date: 01/28/2002

Current Effective Date: 07/12/2021

Applies to all products administered or underwritten by Blue Cross and Blue Shield of Louisiana and its subsidiary, HMO Louisiana, Inc. (collectively referred to as the "Company"), unless otherwise provided in the applicable contract. Medical technology is constantly evolving, and we reserve the right to review and update Medical Policy periodically.

Note: Autologous Hematopoietic Cell Transplantation for Malignant Astrocytomas and Gliomas is addressed separately in medical policy 00058.

Note: Hematopoietic Cell Transplantation for Solid Tumors of Childhood is addressed separately in medical policy 00064.

When Services Are Eligible for Coverage

Coverage for eligible medical treatments or procedures, drugs, devices or biological products may be provided only if:

- *Benefits are available in the member's contract/certificate, and*
- *Medical necessity criteria and guidelines are met.*

Autologous Hematopoietic Cell Transplantation

Based on review of available data, the Company may consider autologous hematopoietic cell transplantation (HCT) as consolidation therapy for previously untreated embryonal tumors of the central nervous system (CNS) that show partial or complete response (PR or CR) to induction chemotherapy, or stable disease after induction therapy to be **eligible for coverage**** (See *Note* below).

Based on review of available data, the Company may consider autologous hematopoietic cell transplantation (HCT) to treat recurrent embryonal tumors of the central nervous system (CNS) to be **eligible for coverage.****

Note: In general, use of autologous HCT for previously untreated medulloblastoma has shown no

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When Services Are Considered Investigational

Coverage is not available for investigational medical treatments or procedures, drugs, devices or biological products.

Autologous Hematopoietic Cell Transplantation

Based on review of available data, the Company considers tandem autologous hematopoietic cell transplantation (HCT) to treat embryonal tumors of the central nervous system (CNS) to be **investigational**.*

Allogeneic Hematopoietic Cell Transplantation

Based on review of available data, the Company considers allogeneic hematopoietic cell transplantation (HCT) to treat embryonal tumors of the central nervous system (CNS) to be **investigational**.*

Ependymoma

Based on review of available data, the Company considers autologous, tandem autologous and allogeneic hematopoietic cell transplantation (HCT) to treat ependymoma to be **investigational**.*

Background/Overview

Central Nervous System Embryonal Tumors

Classification of brain tumors is based on both histopathologic characteristics of the tumor and location in the brain. Central nervous system (CNS) embryonal tumors are more common in children and are the most common brain tumor in childhood. Medulloblastomas account for 20% of all childhood CNS tumors.

Recurrent childhood CNS embryonal tumor is not uncommon and, depending on which type of treatment the patient initially received, autologous hematopoietic cell transplantation (HCT) may be an option. For patients who receive high-dose chemotherapy and autologous HCT for recurrent embryonal tumors, the objective response is 50% to 75%; however, long-term disease control is obtained in fewer than 30% of patients and is primarily seen in patients with a first relapse of localized disease at the time of the relapse.

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Ependymoma

Ependymoma is a neuroepithelial tumor that arises from the ependymal lining cell of the ventricles and is, therefore, usually contiguous with the ventricular system. An ependymoma tumor typically arises intracranially in children, while in adults a spinal cord location is more common. Ependymomas have access to the cerebrospinal fluid and may spread throughout the entire neuroaxis. Ependymomas are distinct from ependymoblastomas due to their more mature histologic differentiation.

Hematopoietic Cell Transplantation

Hematopoietic cell transplantation (HCT) is a procedure in which hematopoietic stem cells are intravenously infused to restore bone marrow and immune function in cancer patients who receive bone marrow-toxic doses of cytotoxic drugs with or without whole-body radiotherapy. Hematopoietic stem cells may be obtained from the transplant recipient (autologous HCT) or a donor (allogeneic HCT [allo-HCT]). These cells can be harvested from bone marrow, peripheral blood, or umbilical cord blood shortly after delivery of neonates.

Immunologic compatibility between infused hematopoietic stem cells and the recipient is not an issue in autologous HCT. In allogeneic stem cell transplantation, immunologic compatibility between donor and patient is a critical factor for achieving a successful outcome. Compatibility is established by typing of human leukocyte antigens (HLA) using cellular, serologic, or molecular techniques. HLA refers to the gene complex expressed at the HLA-A, -B, and -DR (antigen-D related) loci on each arm of chromosome 6. An acceptable donor will match the patient at all or most of the HLA loci.

Conditioning for Hematopoietic Cell Transplantation

Conventional Conditioning

The conventional (“classical”) practice of allo-HCT involves administration of cytotoxic agents (e.g., cyclophosphamide, busulfan) with or without total body irradiation at doses sufficient to cause bone marrow ablation in the recipient. The beneficial treatment effect of this procedure is due to a combination of the initial eradication of malignant cells and subsequent graft-versus-malignancy effect mediated by non-self-immunologic effector cells. While the slower graft-versus-malignancy effect is considered the potentially curative component, it may be overwhelmed by existing disease

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in the absence of pretransplant conditioning. Intense conditioning regimens are limited to patients who are sufficiently medically fit to tolerate substantial adverse effects. These include opportunistic infections secondary to loss of endogenous bone marrow function and organ damage or failure caused by cytotoxic drugs. Subsequent to graft infusion in allo-HCT, immunosuppressant drugs are required to minimize graft rejection and graft-versus-host disease (GVHD), which increases susceptibility to opportunistic infections.

The success of autologous HCT is predicated on the potential of cytotoxic chemotherapy, with or without radiotherapy, to eradicate cancerous cells from the blood and bone marrow. This permits subsequent engraftment and repopulation of the bone marrow with presumably normal hematopoietic stem cells obtained from the patient before undergoing bone marrow ablation. Therefore, autologous HCT is typically performed as consolidation therapy when the patient's disease is in complete remission. Patients who undergo autologous HCT are also susceptible to chemotherapy-related toxicities and opportunistic infections before engraftment, but not GVHD.

Reduced-Intensity Conditioning Allogeneic Hematopoietic Cell Transplantation

Reduced-intensity conditioning refers to the pretransplant use of lower doses of cytotoxic drugs or less intense regimens of radiotherapy than are used in traditional full-dose myeloablative conditioning treatments. Although the definition of Reduced-intensity conditioning is variable, with numerous versions employed, all regimens seek to balance the competing effects of relapse due to residual disease and non-relapse mortality. The goal of Reduced-intensity conditioning is to reduce disease burden and to minimize associated treatment-related morbidity and non-relapse mortality in the period during which the beneficial graft-versus-malignancy effect of allogeneic transplantation develops. Reduced-intensity conditioning regimens range from nearly total myeloablative to minimally myeloablative with lymphoablation, with intensity tailored to specific diseases and patient condition. Patients who undergo Reduced-intensity conditioning with allo-HCT initially demonstrate donor cell engraftment and bone marrow mixed chimerism. Most will subsequently convert to full-donor chimerism. In this review, the term reduced-intensity conditioning will refer to all conditioning regimens intended to be nonmyeloablative.

Autologous HCT allows for the escalation of chemotherapy doses above those limited by myeloablation and has been tried in patients with high-risk brain tumors in an attempt to eradicate residual tumor cells and improve cure rates. The use of allo-HCT for solid tumors does not rely on

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the escalation of chemotherapy intensity and tumor reduction but rather on a graft-versus-tumor effect. Allo-HCT is not commonly used in solid tumors and may be used if an autologous source cannot be cleared of a tumor or cannot be harvested.

FDA or Other Governmental Regulatory Approval

U.S. Food and Drug Administration (FDA)

The U.S. Food and Drug Administration regulates human cells and tissues intended for implantation, transplantation, or infusion through the Center for Biologics Evaluation and Research, under Code of Federal Regulation, Title 21, parts 1270 and 1271. Hematopoietic stem cells are included in these regulations.

Rationale/Source

Description

High-dose chemotherapy with hematopoietic cell transplantation (HCT) has been investigated as a possible therapy in pediatric patients with brain tumors, particularly in those with high-risk disease. The use of HCT has allowed for a reduction in the dose of radiation needed to treat both average- and high-risk disease with a goal of preserving the quality of life and intellectual functioning.

Summary of Evidence

For individuals who have newly diagnosed central nervous system (CNS) embryonal tumors who receive autologous HCT, the evidence includes prospective and retrospective studies. Relevant outcomes are overall survival (OS), disease-specific survival (DSS), and treatment-related mortality and morbidity. For pediatric CNS embryonal tumors, an important consideration is whether the use of HCT may allow for a reduction in radiation dose. Data from single-arm studies using high-dose chemotherapy with autologous HCT to treat newly diagnosed CNS embryonal tumors have shown comparable or improved survival (both event-free survival and OS) compared with historical controls treated with conventional therapy, with or without radiotherapy, particularly in patients with a disease considered high-risk. In a retrospective comparative study, survival in patients receiving high-dose chemotherapy with HCT and delayed craniospinal irradiation was comparable with survival in those receiving upfront craniospinal irradiation. Overall, data from these observational studies have suggested HCT may allow reduced doses of craniospinal irradiation without worsening

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survival outcomes. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have recurrent or relapsed CNS embryonal tumors who receive autologous HCT, the evidence includes prospective and retrospective single-arm studies and a systematic review of these studies. Relevant outcomes are OS, DSS, and treatment-related mortality and morbidity. For recurrent/relapsed CNS embryonal tumors, survival outcomes after HCT vary, and survival is generally very poor for tumors other than medulloblastoma. Data from some single-arm studies using autologous HCT to treat recurrent CNS embryonal tumors have shown comparable or improved survival compared with historical controls treated with conventional therapy for certain patients. The results of a 2012 systematic review of observational studies in patients with relapsed supratentorial primitive neuroectodermal tumor suggested that a subgroup of infants with the chemosensitive disease might benefit from autologous HCT, achieving survival without the use of radiotherapy, whereas outcomes in older children and/or in the pineal location are poor with this modality. However, a relatively large prospective multicenter study has reported that HCT was not associated with improved survival outcomes in patients who had a good response to therapy. Overall, data from these single-arm studies have suggested HCT may be associated with improved survival outcomes in select patients, although data for some tumor types are limited (eg, atypical teratoid/rhabdoid tumors). The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have CNS embryonal tumors who receive tandem autologous HCT, the evidence includes prospective and retrospective single-arm studies. Relevant outcomes are OS, DSS, and treatment-related mortality and morbidity. Less evidence specifically addresses the use of tandem autologous HCT for CNS embryonal tumors. The available single-arm studies are very small but appear to report OS and event-free survival rates comparable with single autologous HCT. Tandem transplants might allow reduced doses of craniospinal irradiation, with the goal of avoiding long-term radiation damage. However, most studies used standard-dose irradiation, making the relative benefit of tandem autologous HCT uncertain. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have CNS embryonal tumors who receive allogeneic HCT, the evidence includes case reports. Relevant outcomes are OS, DSS, and treatment-related mortality and

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morbidity. The available evidence is limited. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have ependymoma who receive autologous HCT, the evidence includes relatively small case series. Relevant outcomes are OS, DSS, and treatment-related mortality and morbidity. The available case series do not report higher survival rates for patients with ependymoma treated with HCT compared with standard therapies. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

Supplemental Information

Practice Guidelines and Position Statements

National Comprehensive Cancer Network

Current National Comprehensive Cancer Network (v.3. 2020) guidelines on treating central nervous system tumors make the following recommendations about hematopoietic cell transplant (HCT):

- For medulloblastoma and supratentorial primitive neuroectodermal tumor, autologous HCT for localized recurrent disease with maximum safe resection is a category 2A recommendation.

American Society for Blood and Marrow Transplantation

In 2015, the American Society for Blood and Marrow Transplantation published consensus guidelines on the use of HCT to treat specific conditions, in both clinical trial and clinical practice settings. Per this review, clinical evidence is available to support autologous HCT in pediatric patients (<18 years) with medulloblastoma. Stem cell transplantation is not generally recommended using allogeneic HCT for medulloblastomas. The guidelines did not address HCT in treating ependymomas.

U.S. Preventive Services Task Force Recommendations

Not applicable.

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Medicare National Coverage

There is no national coverage determination. In the absence of a national coverage determination, coverage decisions are left to the discretion of local Medicare carriers.

Ongoing and Unpublished Clinical Trials

Some currently ongoing and unpublished trials that might influence this review are listed in Table 1.

Table 1. Summary of Key Trials

NCT No.	Trial Name	Planned Enrollment	Completion Date
<i>Ongoing</i>			
NCT00085202	Treatment of Patients With Newly Diagnosed Medulloblastoma, Supratentorial Primitive Neuroectodermal Tumor, or Atypical Teratoid Rhabdoid Tumor	416	Jan 2023
NCT00653068	Combination Chemotherapy, Radiation Therapy, and an Autologous Peripheral Blood Stem Cell Transplant in Treating Young Patients With Atypical Teratoid/Rhabdoid Tumor of the Central Nervous System	70	Aug 2023
<i>Unpublished</i>			
NCT00336024	A Phase III Randomized Trial for the Treatment of Newly Diagnosed Supratentorial PNET and High-Risk Medulloblastoma in Children < 36 Months Old With Intensive Induction Chemotherapy With Methotrexate Followed by Consolidation With Stem Cell Rescue Versus the Same Therapy Without Methotrexate	96	Dec 2016 (completed)

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NCT No.	Trial Name	Planned Enrollment	Completion Date
NCT02653196	A Multi-Institutional Phase II Feasibility Study of Allogeneic Hematopoietic Stem Cell Transplantation for Patients With Malignant Neuro-Epithelial and Other Solid Tumors	30	Aug 2017 (terminated; the principal investigator left the institution)

NCT: national clinical trial.

References

1. Blue Cross and Blue Shield Association, Medical Policy Reference Manual, “Hematopoietic Cell Transplantation for Central Nervous System Embryonal Tumors and Ependymoma”, 8.01.28. February 2021.
2. Mueller S, Chang S. Pediatric brain tumors: current treatment strategies and future therapeutic approaches. *Neurotherapeutics*. Jul 2009; 6(3): 570-86. PMID 19560746
3. Fangusaro J, Finlay J, Sposto R, et al. Intensive chemotherapy followed by consolidative myeloablative chemotherapy with autologous hematopoietic cell rescue (AuHCR) in young children with newly diagnosed supratentorial primitive neuroectodermal tumors (sPNETs): report of the Head Start I and II experience. *Pediatr Blood Cancer*. Feb 2008; 50(2): 312-8. PMID 17668858
4. National Cancer Institute Physician Data Query (PDQ). Childhood Medulloblastoma and Other Central Nervous System Embryonal Tumor Treatments (last modified October 5, 2020). <http://www.cancer.gov/cancertopics/pdq/treatment/childCNSembryonal/healthprofessional>.
5. Odagiri K, Omura M, Hata M, et al. Treatment outcomes and late toxicities in patients with embryonal central nervous system tumors. *Radiat Oncol*. Sep 11 2014; 9: 201. PMID 25209395
6. Alsultan A, Alharbi M, Al-Dandan S, et al. High-dose Chemotherapy With Autologous Stem Cell Rescue in Saudi Children Less Than 3 Years of Age With Embryonal Brain Tumors. *J Pediatr Hematol Oncol*. Apr 2015; 37(3): 204-8. PMID 25551668
7. Raleigh DR, Tomlin B, Buono BD, et al. Survival after chemotherapy and stem cell transplant followed by delayed craniospinal irradiation is comparable to upfront craniospinal irradiation in

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- pediatric embryonal brain tumor patients. *J Neurooncol.* Jan 2017; 131(2): 359-368. PMID 27778212
8. Chintagumpala M, Hassall T, Palmer S, et al. A pilot study of risk-adapted radiotherapy and chemotherapy in patients with supratentorial PNET. *Neuro Oncol.* Feb 2009; 11(1): 33-40. PMID 18796696
 9. Massimino M, Gandola L, Biassoni V, et al. Evolving of therapeutic strategies for CNS-PNET. *Pediatr Blood Cancer.* Dec 2013; 60(12): 2031-5. PMID 23852767
 10. Lester RA, Brown LC, Eckel LJ, et al. Clinical outcomes of children and adults with central nervous system primitive neuroectodermal tumor. *J Neurooncol.* Nov 2014; 120(2): 371-9. PMID 25115737
 11. Dhall G, Grodman H, Ji L, et al. Outcome of children less than three years old at diagnosis with non-metastatic medulloblastoma treated with chemotherapy on the Head Start I and II protocols. *Pediatr Blood Cancer.* Jun 2008; 50(6): 1169-75. PMID 18293379
 12. Gajjar A, Chintagumpala M, Ashley D, et al. Risk-adapted craniospinal radiotherapy followed by high-dose chemotherapy and stem-cell rescue in children with newly diagnosed medulloblastoma (St Jude Medulloblastoma-96): long-term results from a prospective, multicentre trial. *Lancet Oncol.* Oct 2006; 7(10): 813-20. PMID 17012043
 13. Bergthold G, El Kababri M, Varlet P, et al. High-dose busulfan-thiotepa with autologous stem cell transplantation followed by posterior fossa irradiation in young children with classical or incompletely resected medulloblastoma. *Pediatr Blood Cancer.* May 2014; 61(5): 907-12. PMID 24470384
 14. Lee JY, Kim IK, Phi JH, et al. Atypical teratoid/rhabdoid tumors: the need for more active therapeutic measures in younger patients. *J Neurooncol.* Apr 2012; 107(2): 413-9. PMID 22134767
 15. Raghuram CP, Moreno L, Zacharoulis S. Is there a role for high dose chemotherapy with hematopoietic stem cell rescue in patients with relapsed supratentorial PNET?. *J Neurooncol.* Feb 2012; 106(3): 441-7. PMID 21850536
 16. Dunkel IJ, Gardner SL, Garvin JH, et al. High-dose carboplatin, thiotepa, and etoposide with autologous stem cell rescue for patients with previously irradiated recurrent medulloblastoma. *Neuro Oncol.* Mar 2010; 12(3): 297-303. PMID 20167818
 17. Dunkel IJ, Boyett JM, Yates A, et al. High-dose carboplatin, thiotepa, and etoposide with autologous stem-cell rescue for patients with recurrent medulloblastoma. *Children's Cancer Group. J Clin Oncol.* Jan 1998; 16(1): 222-8. PMID 9440746

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18. Grodman H, Wolfe L, Kretschmar C. Outcome of patients with recurrent medulloblastoma or central nervous system germinoma treated with low dose continuous intravenous etoposide along with dose-intensive chemotherapy followed by autologous hematopoietic stem cell rescue. *Pediatr Blood Cancer*. Jul 2009; 53(1): 33-6. PMID 19326417
19. Kostaras X, Easaw JC. Management of recurrent medulloblastoma in adult patients: a systematic review and recommendations. *J Neurooncol*. Oct 2013; 115(1): 1-8. PMID 23877361
20. Bode U, Zimmermann M, Moser O, et al. Treatment of recurrent primitive neuroectodermal tumors (PNET) in children and adolescents with high-dose chemotherapy (HDC) and stem cell support: results of the HITREZ 97 multicentre trial. *J Neurooncol*. Dec 2014; 120(3): 635-42. PMID 25179451
21. Gill P, Litzow M, Buckner J, et al. High-dose chemotherapy with autologous stem cell transplantation in adults with recurrent embryonal tumors of the central nervous system. *Cancer*. Apr 15 2008; 112(8): 1805-11. PMID 18300237
22. Kim H, Kang HJ, Lee JW, et al. Irinotecan, vincristine, cisplatin, cyclophosphamide, and etoposide for refractory or relapsed medulloblastoma/PNET in pediatric patients. *Childs Nerv Syst*. Oct 2013; 29(10): 1851-8. PMID 23748464
23. Egan G, Cervone KA, Philips PC, et al. Phase I study of temozolomide in combination with thiotepa and carboplatin with autologous hematopoietic cell rescue in patients with malignant brain tumors with minimal residual disease. *Bone Marrow Transplant*. Apr 2016; 51(4): 542-5. PMID 26726947
24. Sung KW, Lim DH, Yi ES, et al. Tandem High-Dose Chemotherapy and Autologous Stem Cell Transplantation for Atypical Teratoid/Rhabdoid Tumor. *Cancer Res Treat*. Oct 2016; 48(4): 1408-1419. PMID 27034140
25. Dufour C, Kieffer V, Varlet P, et al. Tandem high-dose chemotherapy and autologous stem cell rescue in children with newly diagnosed high-risk medulloblastoma or supratentorial primitive neuro-ectodermic tumors. *Pediatr Blood Cancer*. Aug 2014; 61(8): 1398-402. PMID 24664937
26. Sung KW, Lim DH, Son MH, et al. Reduced-dose craniospinal radiotherapy followed by tandem high-dose chemotherapy and autologous stem cell transplantation in patients with high-risk medulloblastoma. *Neuro Oncol*. Mar 2013; 15(3): 352-9. PMID 23258845
27. Friedrich C, von Bueren AO, von Hoff K, et al. Treatment of young children with CNS-primitive neuroectodermal tumors/pineoblastomas in the prospective multicenter trial HIT 2000 using different chemotherapy regimens and radiotherapy. *Neuro Oncol*. Feb 2013; 15(2): 224-34. PMID 23223339

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28. Park ES, Sung KW, Baek HJ, et al. Tandem high-dose chemotherapy and autologous stem cell transplantation in young children with atypical teratoid/rhabdoid tumor of the central nervous system. *J Korean Med Sci.* Feb 2012; 27(2): 135-40. PMID 22323859
29. Sung KW, Yoo KH, Cho EJ, et al. High-dose chemotherapy and autologous stem cell rescue in children with newly diagnosed high-risk or relapsed medulloblastoma or supratentorial primitive neuroectodermal tumor. *Pediatr Blood Cancer.* Apr 2007; 48(4): 408-15. PMID 17066462
30. Lundberg JH, Weissman DE, Beatty PA, et al. Treatment of recurrent metastatic medulloblastoma with intensive chemotherapy and allogeneic bone marrow transplantation. *J Neurooncol.* Jun 1992; 13(2): 151-5. PMID 1432032
31. Matsuda Y, Hara J, Osugi Y, et al. Allogeneic peripheral stem cell transplantation using positively selected CD34+ cells from HLA-mismatched donors. *Bone Marrow Transplant.* Feb 1998; 21(4): 355-60. PMID 9509968
32. Secondino S, Pedrazzoli P, Schiavetto I, et al. Antitumor effect of allogeneic hematopoietic SCT in metastatic medulloblastoma. *Bone Marrow Transplant.* Jul 2008; 42(2): 131-3. PMID 18372908
33. Sung KW, Lim DH, Lee SH, et al. Tandem high-dose chemotherapy and autologous stem cell transplantation for anaplastic ependymoma in children younger than 3 years of age. *J Neurooncol.* Apr 2012; 107(2): 335-42. PMID 22081297
34. Mason WP, Goldman S, Yates AJ, et al. Survival following intensive chemotherapy with bone marrow reconstitution for children with recurrent intracranial ependymoma--a report of the Children's Cancer Group. *J Neurooncol.* Apr 1998; 37(2): 135-43. PMID 9524092
35. Grill J, Kalifa C, Doz F, et al. A high-dose busulfan-thiotepa combination followed by autologous bone marrow transplantation in childhood recurrent ependymoma. A phase-II study. *Pediatr Neurosurg.* Jul 1996; 25(1): 7-12. PMID 9055328
36. Zacharoulis S, Levy A, Chi SN, et al. Outcome for young children newly diagnosed with ependymoma, treated with intensive induction chemotherapy followed by myeloablative chemotherapy and autologous stem cell rescue. *Pediatr Blood Cancer.* Jul 2007; 49(1): 34-40. PMID 16874765
37. National Comprehensive Cancer Network (NCCN). NCCN clinical practice guidelines in oncology: central nervous system cancers. Version 3.2020.
http://www.nccn.org/professionals/physician_gls/PDF/cns.pdf.
38. Majhail NS, Farnia SH, Carpenter PA, et al. Indications for Autologous and Allogeneic Hematopoietic Cell Transplantation: Guidelines from the American Society for Blood and

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Marrow Transplantation. Biol Blood Marrow Transplant. Nov 2015; 21(11): 1863-1869. PMID 26256941

Policy History

Original Effective Date: 01/28/2002

Current Effective Date: 07/12/2021

12/06/2001 Medical Policy Committee review

01/28/2002 Managed Care Advisory Council approval

05/07/2004 Medical Director review

05/18/2004 Medical Policy Committee review. Format revision. High-Dose Chemotherapy with Hematopoietic Stem-cell Support for Primitive Neuroectodermal policy developed separately from current HDC with Hematopoietic Stem-cell Support policy. No substance change to policy.

06/28/2004 Managed Care Advisory Council approval

05/03/2005 Medical Director review

05/17/2005 Medical Policy Committee review. Patient Selection criteria added to policy.

05/23/2005 Managed Care Advisory Council approval

08/03/2005 Medical Director review

08/16/2005 Medical Policy Committee review. Coverage eligibility changes: autologous BMT to consolidate a remission after initial therapy in high-risk patients with PNETs, excluding medulloblastoma and ependymoma is considered to be eligible for coverage.

08/24/2005 Managed Care Advisory Council approval

07/12/2006 Medical Director review

07/19/2006 Medical Policy Committee review. Format changes. FDA information added. Additional rationale/source was added.

07/10/2007 Medical Director review

07/18/2007 Medical Policy Committee approval. Statement added to deny investigational when patient selection criteria is not met.

11/07/2007 Medical Director review

11/15/2007 Medical Policy Committee approval. Coverage eligibility unchanged. Investigational policy statement added for tandem transplants.

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Louisiana

Hematopoietic Cell Transplantation for Central Nervous System Embryonal Tumors and Ependymoma

Policy # 00063

Original Effective Date: 01/28/2002

Current Effective Date: 07/12/2021

11/05/2008	Medical Director review
11/18/2008	Medical Policy Committee approval. Coverage eligibility unchanged
11/12/2009	Medical Policy Committee approval
11/18/2009	Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
11/04/2010	Medical Policy Committee review
11/16/2010	Medical Policy Implementation Committee approval. Policy title changed to remove “high-dose chemotherapy” and to change PNET to embryonal tumors. Policy statements reworded and separated to address ependymoma and embryonal CNS tumors specifically; however the intent of the policy remains the same.
11/03/2011	Medical Policy Committee approval
11/16/2011	Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
11/01/2012	Medical Policy Committee review
11/28/2012	Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
03/04/2013	Coding update
01/09/2014	Medical Policy Committee review
01/15/2014	Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
01/08/2015	Medical Policy Committee review
01/21/2015	Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
08/03/2015	Coding update: ICD10 Diagnosis code section added; ICD9 Procedure code section removed.
04/07/2016	Medical Policy Committee review
04/20/2016	Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
01/01/2017	Coding update: Removing ICD-9 Diagnosis Codes
04/07/2017	Medical Policy Committee review
04/19/2017	Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
06/07/2018	Medical Policy Committee review

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- 06/20/2018 Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
- 06/06/2019 Medical Policy Committee review
- 06/19/2019 Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
- 06/04/2020 Medical Policy Committee review
- 06/10/2020 Medical Policy Implementation Committee approval. Coverage eligibility unchanged.
- 06/03/2021 Medical Policy Committee review
- 06/09/2021 Medical Policy Implementation Committee approval. Coverage eligibility unchanged.

Next Scheduled Review Date: 06/2022

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 by the American Medical Association (AMA). CPT is developed by the AMA as a listing of descriptive terms and five character identifying codes and modifiers for reporting medical services and procedures performed by physician.

The responsibility for the content of Blue Cross Blue Shield of Louisiana Medical Policy Coverage Guidelines is with Blue Cross and Blue Shield of Louisiana and no endorsement by the AMA is intended or should be implied. The AMA disclaims responsibility for any consequences or liability attributable or related to any use, nonuse or interpretation of information contained in Blue Cross Blue Shield of Louisiana Medical Policy Coverage Guidelines. Fee schedules, relative value units, conversion factors and/or related components are not assigned by the AMA, are not part of CPT, and the AMA is not recommending their use. The AMA does not directly or indirectly practice medicine or dispense medical services. The AMA assumes no liability for data contained or not contained herein. Any use of CPT outside of Blue Cross Blue Shield of Louisiana Medical Policy Coverage Guidelines should refer to the most current Current Procedural Terminology which contains the complete and most current listing of CPT codes and descriptive terms. Applicable FARS/DFARS apply.

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CPT is a registered trademark of the American Medical Association.

Codes used to identify services associated with this policy may include (but may not be limited to) the following:

Code Type	Code
CPT	38204, 38205, 38206, 38207, 38208, 38209, 38210, 38211, 38212, 38213, 38214, 38215, 38230, 38240, 38241, 38242, 38243
HCPCS	S2140, S2142, 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:

- A. Whether the medical treatment, procedure, drug, device, or biological product can be lawfully marketed without approval of the U.S. Food and Drug Administration (FDA) and whether such approval has been granted at the time the medical treatment, procedure, drug, device, or biological product is sought to be furnished; or
- B. Whether the medical treatment, procedure, drug, device, or biological product requires further studies or clinical trials to determine its maximum tolerated dose, toxicity, safety, effectiveness, or effectiveness as compared with the standard means of treatment or diagnosis, must improve health outcomes, according to the consensus of opinion among experts as shown by reliable evidence, including:
 - 1. Consultation with the Blue Cross and Blue Shield Association technology assessment program (TEC) or other nonaffiliated technology evaluation center(s);
 - 2. Credible scientific evidence published in peer-reviewed medical literature generally recognized by the relevant medical community; or
 - 3. Reference to federal regulations.

****Medically Necessary (or “Medical Necessity”)** - Health care services, treatment, procedures, equipment, drugs, devices, items or supplies that a Provider, exercising prudent clinical judgment,

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would provide to a patient for the purpose of preventing, evaluating, diagnosing or treating an illness, injury, disease or its symptoms, and that are:

- A. In accordance with nationally accepted standards of medical practice;
- B. Clinically appropriate, in terms of type, frequency, extent, level of care, site and duration, and considered effective for the patient's illness, injury or disease; and
- C. Not primarily for the personal comfort or convenience of the patient, physician or other health care provider, and not more costly than an alternative service or sequence of services at least as likely to produce equivalent therapeutic or diagnostic results as to the diagnosis or treatment of that patient's illness, injury or disease.

For these purposes, “nationally accepted standards of medical practice” means standards that are based on credible scientific evidence published in peer-reviewed medical literature generally recognized by the relevant medical community, Physician Specialty Society recommendations and the views of Physicians practicing in relevant clinical areas and any other relevant factors.

‡ Indicated trademarks are the registered trademarks of their respective owners.

NOTICE: If the Patient’s health insurance contract contains language that differs from the BCBSLA Medical Policy definition noted above, the definition in the health insurance contract will be relied upon for specific coverage determinations.

NOTICE: Medical Policies are scientific based opinions, provided solely for coverage and informational purposes. Medical Policies should not be construed to suggest that the Company recommends, advocates, requires, encourages, or discourages any particular treatment, procedure, or service, or any particular course of treatment, procedure, or service.

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