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# MEDICAL POLICY – 8.01.28

# Hematopoietic Cell Transplantation for Central Nervous System Embryonal Tumors and Ependymoma

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|---|---|
| BCBSA Ref. Policy: | 8.01.28 |
| Effective Date: | Apr. 1, 2026 |
| Last Revised: | Mar. 9, 2026 |
| Replaces: | N/A |

RELATED MEDICAL POLICIES:

8.01.511 Hematopoietic Cell Transplantation for Solid Tumors of Childhood

**Select a hyperlink below to be directed to that section.**

POLICY CRITERIA | DOCUMENTATION REQUIREMENTS | CODING
RELATED INFORMATION | EVIDENCE REVIEW | REFERENCES | HISTORY

Clicking this icon returns you to the hyperlinks menu above.

## Introduction

Some tumors form within the brain and spinal cord, which are both part of the central nervous system (CNS). Treatment for these tumors may include surgery, chemotherapy, and radiation. High dose chemotherapy may damage a person's bone marrow, which is important in making different types of blood cells. In order to restore bone marrow function, a hematopoietic stem cell transplant may be done.

Hematopoietic stem cells are cells that form within the bone marrow and can become many different types of blood cells. In a hematopoietic stem cell transplant (HSCT), stem cells can be taken from a donor's bone marrow, peripheral blood, or from a newborn baby's umbilical cord blood or placenta shortly after the baby was delivered. The stem cells can also be harvested from an individual if they are given any high dose chemotherapy. In all of these cases, the harvested stem cells are then given to the individual, just like in a transfusion. It is hoped that these new stem cells will then settle into the bone marrow and start producing normal blood cells.

If the hematopoietic stem cells are harvested from another person, it is called an allogeneic transplant. If the cells come from the individual themselves before high dose chemotherapy is given, it is called an autologous stem cell transplant. This policy discusses when different types of hematopoietic stem cell transplants might be medically necessary to treat CNS tumors.

**Note:** The Introduction section is for your general knowledge and is not to be taken as policy coverage criteria. The rest of the policy uses specific words and concepts familiar to medical professionals. It is intended for providers. A provider can be a person, such as a doctor, nurse, psychologist, or dentist. A provider also can be a place where medical care is given, like a hospital, clinic, or lab. This policy informs them about when a service may be covered.

## Policy Coverage Criteria

| Transplant | Medical Necessity |
|---|---|
| **Autologous hematopoietic cell transplantation** | **Autologous hematopoietic cell transplantation may be considered medically necessary as consolidation therapy for previously untreated embryonal tumors of the central nervous system (CNS) that show partial or complete response to induction chemotherapy, or stable disease after induction therapy (see Additional Information below).**<br><br>**Autologous hematopoietic cell transplantation may be considered medically necessary to treat recurrent embryonal tumors of the CNS.** |

| Transplant | Investigational |
|---|---|
| **Tandem autologous hematopoietic cell transplantation** | **Tandem autologous hematopoietic cell transplant is investigational to treat embryonal tumors of the CNS.** |
| **Allogeneic hematopoietic cell transplantation** | **Allogeneic hematopoietic cell transplantation is investigational to treat embryonal tumors of the CNS.** |
| **Autologous, tandem autologous, and allogeneic hematopoietic cell transplant** | **Autologous, tandem autologous, and allogeneic hematopoietic cell transplant is investigational to treat ependymoma.** |

| Additional Information |
|---|
| **In general, the use of autologous hematopoietic cell transplantation for previously untreated medulloblastoma has shown no survival benefit for those individuals considered** |

## Additional Information

**to be at average risk (i.e., individuals older than 3 years of age, without metastatic disease, and with total or near total surgical resection [less than 1.5 $cm^2$ residual tumor]) compared with conventional therapies.**

**Other central nervous system (CNS) tumors include astrocytoma, oligodendroglioma, and glioblastoma multiforme. These tumors arise from glial cells, not neuroepithelial cells.**

**Due to their neuroepithelial origin, peripheral neuroblastoma and Ewing sarcoma may be considered primitive neuroectodermal tumors.**

## Documentation Requirements

**The individual's medical records submitted for review should document that medical necessity criteria are met. The record should include clinical documentation of:**

- Diagnosis/condition
- History and physical examination documenting the severity of the condition
- Prior treatment (if any) individual has received

# Coding

| Code | Description |
|---|---|
| **CPT** | |
| 38230 | Bone marrow harvesting for transplantation; allogeneic |
| 38232 | Bone marrow harvesting for transplantation; autologous |
| 38240 | Hematopoietic progenitor cell (HPC); allogeneic transplantation per donor |
| 38241 | Hematopoietic progenitor cell (HPC); autologous transplantation |
| **HCPCS** | |
| S2150 | Bone marrow or blood-derived stem cells (peripheral or umbilical), allogeneic or autologous, harvesting, transplantation, and related complications; including: pheresis and cell preparation/storage; marrow ablative therapy; drugs, supplies, hospitalization with outpatient follow-up; medical/surgical, diagnostic, emergency, and rehabilitative services; and the number of days of pre and post-transplant care in the global definition |

**Note**: CPT codes, descriptions and materials are copyrighted by the American Medical Association (AMA). HCPCS codes, descriptions and materials are copyrighted by Centers for Medicare Services (CMS).

# Related Information

## Consideration of Age

The age stated in this policy for which autologous HSCT may be considered medically necessary as consolidation therapy for previously untreated embryonal tumors of the central nervous system that show partial or complete response to induction chemotherapy, or stable disease after induction therapy is age 3 or younger. This is based on scientific evidence that has shown no survival benefit for individuals considered to be at average risk (older than 3 years) without metastatic disease and with total or near total surgical resection when compared with conventional therapies. The treatment protocols are based on risk stratification as average or high risk. The average-risk group at 3 years, without metastatic disease, and with tumors that are totally or near totally resected. The high-risk group includes children aged 3 years or younger, or with metastatic disease, and/or subtotal resection.

## Benefit Application

The following considerations may supersede this policy:

- State mandates requiring coverage for autologous hematopoietic bone marrow transplantation offered as part of clinical trials of autologous bone marrow transplantation approved by the National Institutes of Health.
- Some plans may participate in voluntary programs offering coverage for individuals participating in National Institutes of Health-approved clinical trials of cancer chemotherapies, including autologous hematopoietic bone marrow transplantation.
- Some contracts or certificates of coverage may include specific conditions in which autologous hematopoietic bone marrow transplantation would be considered eligible for coverage.

## Evidence Review

### Description

High-dose chemotherapy with hematopoietic cell transplantation (HCT) has been investigated as a possible therapy in pediatric individuals 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.

### Background

#### *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 are not uncommon and, depending on which type of treatment the individual initially received, autologous hematopoietic cell transplantation (HCT) may be an option. For individuals who receive high-dose chemotherapy and autologous HCT for recurrent embryonal tumors, objective response is 50% to 75%; however, long-term disease control is obtained in fewer than 30% of individuals and is primarily seen in individuals with a first relapse of localized disease at the time of the relapse.[1]

#### *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*

HCT is a procedure in which hematopoietic stem cells are intravenously infused to restore bone marrow and immune function in patients with cancer 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]). They 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 allo-HCT, immunologic compatibility between donor and recipient 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 six. An acceptable donor will match the individual 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 in the absence of pretransplant conditioning. Intense conditioning regimens are limited to individuals 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 individual before undergoing bone marrow ablation. Therefore, autologous HCT is typically performed as consolidation therapy when the individual's disease is in complete remission. Individuals 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 (RIC) 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 RIC 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 RIC 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. RIC regimens range from nearly total myeloablative to minimally myeloablative with lymphoablation, with intensity tailored to specific diseases and patient condition. Individuals who undergo RIC with allo-HCT initially demonstrate donor cell engraftment and bone marrow mixed chimerism. Most will subsequently convert to full-donor chimerism. In this policy, 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 individuals 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 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.

## 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. The relevant outcomes are overall survival, disease-specific survival, 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 (HDC) with autologous HCT to treat newly diagnosed CNS embryonal

tumors have shown comparable or improved survival (both event-free survival and overall survival) compared with historical controls treated with conventional therapy, with or without radiotherapy, particularly in individuals with a disease considered high risk. In a retrospective comparative study, survival in individuals receiving HDC with HCT and delayed craniospinal irradiation (CSI) was comparable with survival in those receiving upfront CSI. Overall, data from these observational studies have suggested HCT may allow reduced doses of craniospinal irradiation without worsening 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. The relevant outcomes are overall survival, disease-specific survival, 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 individuals. The results of a 2012 systematic review of observational studies in individuals with relapsed supratentorial primitive neuroectodermal tumor (PNET) suggested that a subgroup of infants with chemosensitive disease might benefit from autologous HCT, achieving survival without the use of radiotherapy, whereas outcomes in older children and/or in 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 individuals 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 individuals, although data for some tumor types are limited (e.g., 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. The relevant outcomes are overall survival, disease-specific survival, 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 overall survival and event-free survival rates comparable with single autologous HCT. Tandem transplants might allow reduced doses of CSI, 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. The relevant outcomes are overall survival, disease-specific survival, and treatment-related mortality and 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. The relevant outcomes are overall survival, disease-specific survival, 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.

## 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 |
|---|---|---|---|
| **Unpublished** | | | |
| 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 | 91 | Sep 2025 |

NCT: national clinical trial.

## Practice Guidelines and Position Statements

The purpose of the following information is to provide reference material. Inclusion does not imply endorsement or alignment with the policy conclusions.

Guidelines or position statements will be considered for inclusion if they were issued by, or jointly by, a US professional society, an international society with US representation, or National Institute for Health and Care Excellence (NICE). Priority will be given to guidelines that are informed by a systematic review, include strength of evidence ratings, and include a description of management of conflict of interest.

### *American Society for Blood and Marrow Transplantation*

In 2015, the American Society for Blood and Marrow Transplantation (now referred to as the American Society for Transplantation and Cellular Therapy) published consensus guidelines on the use of HCT to treat specific conditions, in both clinical trial and clinical practice settings.[40] These guidelines were updated in 2020.[41] Neither the 2015 nor the 2020 guidelines address HCT in treatment of ependymomas. The tumors addressed in this review for which the Society has provided recommendations are listed in **Table 2**.

## Table 2. Recommendations for Use of Autologous and Allogeneic Hematopoietic Cell Transplantation in Pediatric patients (<18 years)

| Condition | Treatment Option | 2015 Recommendation | 2020 Recommendation |
|---|---|---|---|
| Neuroblastoma, high-risk or relapse | Allogeneic HCT | Developmental | Developmental |
| | Autologous HCT | Standard of care | Standard of care; tandem autologous HCT recommended over single transplant |
| Medulloblastoma, high-risk | Allogeneic HCT | Not generally recommended | Not generally recommended |
| | Autologous HCT | Standard of care, clinical evidence available | Standard of care, clinical evidence available |
| Other malignant brain tumors | Allogeneic HCT | Not generally recommended | Not generally recommended |
| | Autologous | Standard of care, clinical evidence available | Standard of care, clinical evidence available |

HCT: hematopoietic cell transplantation

### *National Comprehensive Cancer Network*

Current National Comprehensive Cancer Network (v.3.2025) guidelines on treating central nervous system tumors make the following recommendations about hematopoietic cell transplant (HCT)[42]:

- For medulloblastoma and supratentorial primitive neuroectodermal tumor, high-dose chemotherapy with autologous HCT for localized recurrent disease with maximum safe resection is a category 2A recommendation (based upon lower-level evidence, there is uniform NCCN consensus that the intervention is appropriate).

## Medicare National Coverage

There is no national coverage determination.

## Regulatory Status

The US 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.

## References


1. Mueller S, Chang S. Pediatric brain tumors: current treatment strategies and future therapeutic approaches. Neurotherapeutics. Jul 2009; 6(3): 570-86. PMID 19560746

2. 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

3. National Cancer Institute Physician Data Query (PDQ). Childhood Medulloblastoma and Other Central Nervous System Embryonal Tumors Treatment. Updated April 11, 2025. **http://www.cancer.gov/cancertopics/pdq/treatment/childCNSembryonal/healthprofessional**. Accessed February 6, 2026.

4. 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

5. 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

6. 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 pediatric embryonal brain tumor patients. J Neurooncol. Jan 2017; 131(2): 359-368. PMID 27778212

7. 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

8. 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

9. 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

10. 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

11. 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

12. 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

13. Dufour C, Foulon S, Geoffray A, et al. Prognostic relevance of clinical and molecular risk factors in children with high-risk medulloblastoma treated in the phase II trial PNET HR+5. Neuro Oncol. Jul 01 2021; 23(7): 1163-1172. PMID 33377141

14. Zhang M, Liu C, Zhou H, et al. Meta of classical chemotherapy compared with high-dose chemotherapy and autologous stem cell rescue in newly diagnosed medulloblastoma after radiotherapy. Medicine (Baltimore). Jul 29 2022; 101(30): e29372. PMID 35905255

15. Reddy AT, Strother DR, Judkins AR, et al. Efficacy of High-Dose Chemotherapy and Three-Dimensional Conformal Radiation for Atypical Teratoid/Rhabdoid Tumor: A Report From the Children's Oncology Group Trial ACNS0333. J Clin Oncol. Apr 10 2020; 38(11): 1175-1185. PMID 32105509

16. Geyer JR, Sposto R, Jennings M, et al. Multiagent chemotherapy and deferred radiotherapy in infants with malignant brain tumors: a report from the Children's Cancer Group. J Clin Oncol. Oct 20 2005; 23(30): 7621-31. PMID 16234523

17. 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

18. 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

19. 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

20. 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

21. 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

22. 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

23. 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

24. 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

25. 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

26. 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

27. 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

28. 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

29. 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

30. 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

31. 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

32. 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

33. 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

34. 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

35. 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

36. 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

37. 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

38. 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

39. 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

40. Majhail NS, Farnia SH, Carpenter PA, et al. Indications for Autologous and Allogeneic Hematopoietic Cell Transplantation: Guidelines from the American Society for Blood and Marrow Transplantation. Biol Blood Marrow Transplant. Nov 2015; 21(11): 1863-1869. PMID 26256941

41. Kanate AS, Majhail NS, Savani BN, et al. Indications for Hematopoietic Cell Transplantation and Immune Effector Cell Therapy: Guidelines from the American Society for Transplantation and Cellular Therapy. Biol Blood Marrow Transplant. Jul 2020; 26(7): 1247-1256. PMID 32165328

42. National Comprehensive Cancer Network (NCCN). NCCN clinical practice guidelines in oncology: central nervous system cancers. Version 3.2025. **http://www.nccn.org/professionals/physician_gls/PDF/cns.pdf**. Accessed February 6, 2026.

## History

| Date | Comments |
|---|---|
| 02/01/00 | Add to Therapy Section - New Policy — replaces 8.01.15, original master policy on high-dose chemotherapy for miscellaneous malignancies. However, policy statement is unchanged. |
| 12/11/01 | Replace Policy - Policy references updated. |
| 03/11/03 | Replace Policy - Policy updated and references added; no change in policy statement. |
| 10/12/04 | Replace Policy - Policy updated with literature review; policy statement unchanged (text updated for clarification only). Approved by OAP 10/29/04, no need to go back to MPC. |
| 01/10/06 | Replace Policy - Policy updated with literature review; no change to policy statement. Reviewed by OAP 10/27/05. |
| 06/02/06 | Disclaimer and Scope update - No other changes |
| 11/14/06 | Replace Policy - Policy reviewed and recommended by OAP October 26, 2006; no changes to policy statement. |

| Date | Comments |
|---|---|
| 12/11/07 | Replace Policy - Policy updated with literature review. Policy statement added to indicate that multi-cycle high-dose chemotherapy (with or without associated radiotherapy) and autologous stem-cell support (i.e., tandem transplants) as investigational. Policy reviewed and recommended by OAP November 15, 2007. |
| 05/13/08 | Cross Reference Update - No other changes |
| 12/16/08 | Replace Policy - Policy updated with literature search; no change to the policy statement. References added. Reviewed and recommended by OAP, August 21, 2008. |
| 01/13/09 | Code Updates - Code added, J8705; effective 1/1/09. |
| 01/12/10 | Replace Policy - Policy extensively revised with literature search; policy title changed to remove "high-dose chemotherapy" and to change PNET to embryonal tumors. Policy statement changed regarding autologous consolidation therapy in patients with previously untreated embryonal tumors showing complete or partial response to, or stable disease after, induction therapy; now considered medically necessary. Other policy statements reworded and separated to address ependymoma and embryonal CNS tumors specifically; however, the intent of the statements remains the same. References added. |
| 02/09/10 | Code Update - New 2010 codes added. |
| 03/08/11 | Replace Policy - Policy updated with literature search through October 2010; references 7, 12-14 added. No change to policy statements. |
| 05/12/11 | Reviewed by OAP - No changes recommended to the policy. |
| 01/06/12 | Replace Policy – Policy updated with literature search. No references added; no change in policy statements. ICD-10 codes added. |
| 01/24/12 | Code 38232 added. |
| 02/10/12 | The CPT code 38204 was removed from the policy. |
| 06/20/12 | Minor update: Related Policies updated; 8.01.17 replaced 8.01.507 effective June 12, 2012. |
| 07/30/12 | Related Policy title updates to: 8.01.17, 8.01.22, 8.01.31, 8.01.35 and 8.01.520. Deleted 8.01.38 as it was archived. |
| 10/08/12 | Update Coding Section – ICD-10 codes are now effective 10/01/2014. |
| 01/29/13 | Replace policy. Policy updated with literature search. References 7, 8, 13 and 18 added; no change in policy statements. Removed CPT codes 38220 and 38221; they do not apply to this policy. Change title to Related Policy 8.01.21. |
| 03/20/13 | The following codes were removed from the policy, as they were not suspending and just informational: HCPCS J9000-J9999 and Q0083 – Q0085. |
| 09/30/13 | Update Related Policies. Change policy title to 8.01.31. |
| 10/18/13 | Update Related Policies. Change title to policy 8.01.17. |

| Date | Comments |
|---|---|
| 01/21/14 | Replace policy. Policy updated with literature search through October 8, 2013. References 13 and 14 added, references 3 and 24 updated; no change in policy statements. Remove CPT code 38230; it does not apply to this policy. |
| 03/21/14 | Update Related Policies. Remove 801.514 as it was deleted. |
| 04/18/14 | Update Related Policies. Remove 8.01.20 and replace with 8.01.529. |
| 06/24/14 | Update Related Policies. Remove 8.01.35, 8.01.42 and 8.01.54, then add 8.01.530, 8.01.531 and 8.01.532. |
| 12/03/14 | Update Related Policies. Remove 8.01.17 and 8.01.26. |
| 01/28/15 | Annual Review. Policy updated with literature review through September 30, 2014. References 5-6, 9, 15, and 17-19 added. Policy statements unchanged. ICD-9 and ICD-10 diagnosis codes removed; these are not utilized in policy adjudication. |
| 05/01/16 | Annual Review, approved April 12, 2016. Policy updated with literature review through October 27, 2015; references 4-6 and 9 added. Policy statements unchanged. |
| 11/04/16 | Coding update. Removed codes that are transplant benefit related. |
| 04/01/17 | Annual Review, approved March 14, 2017. Policy updated with literature review through November 7, 2016; references 6, and 22-23 added. Changed "hematopoietic stem cell transplantation" to "hematopoietic cell transplantation" per NCCN terminology change. Policy statements unchanged. |
| 11/10/17 | Policy moved to new format, no changes to policy statement. |
| 05/01/18 | Annual Review, approved April 3, 2018. Policy updated with literature review through November 2017; reference 37 added; reference 36 updated. Policy statements unchanged. |
| 09/01/18 | Minor update. Re-added Consideration of Age information, which was inadvertently removed during a previous update. |
| 04/01/19 | Annual Review, approved March 19, 2019. Policy updated with literature review through December 2018; no references added; reference 36 updated. Policy statements unchanged. |
| 04/01/20 | Annual Review, approved March 19, 2020. Policy updated with literature review through November 2019; no references added. Policy statements unchanged. |
| 04/01/21 | Annual Review, approved March 2, 2021. Policy updated with literature review through December 3, 2020; no references added. Policy statements unchanged. |
| 05/01/21 | Update Related Policies. Removed policy 7.01.50. |
| 04/01/22 | Annual Review, approved March 21, 2022. Policy updated with literature review through December 3, 2021; references added. Policy statements unchanged. |

| Date | Comments |
|---|---|
| 04/01/23 | Annual Review, approved March 6, 2023. Policy updated with literature review through November 16, 2022; references added. Policy statements unchanged. Changed the wording from "patient" to "individual" throughout the policy for standardization. |
| 04/01/24 | Annual Review, approved March 25, 2024. Policy updated with literature review through December 4, 2023; no references added, guidelines updated. Policy statements unchanged. |
| 04/01/25 | Annual Review, approved March 10, 2025. Policy updated with literature review through December 9, 2024; no references added. Policy statements unchanged. |
| 04/01/26 | Annual Review, approved March 9, 2026. Policy updated with literature review through December 10, 2025; no references added. Policy statements edited to remove reference to archived policy. Added CPT code 38230 as it aligns with policy criteria. |



**Scope**: Medical policies are systematically developed guidelines that serve as a resource for Company staff when determining coverage for specific medical procedures, drugs or devices. Coverage for medical services is subject to the limits and conditions of the member benefit plan. Members and their providers should consult the member benefit booklet or contact a customer service representative to determine whether there are any benefit limitations applicable to this service or supply. This medical policy does not apply to Medicare Advantage.