Hematopoietic Cell Transplantation for Miscellaneous Solid Tumors in Adults

Effective: July 1, 2024

Next Review: January 2025
Last Review: May 2024

IMPORTANT REMINDER

Medical Policies are developed to provide guidance for members and providers regarding coverage in accordance with contract terms. Benefit determinations are based in all cases on the applicable contract language. To the extent there may be any conflict between the Medical Policy and contract language, the contract language takes precedence.

PLEASE NOTE: Contracts exclude from coverage, among other things, services or procedures that are considered investigational or cosmetic. Providers may bill members for services or procedures that are considered investigational or cosmetic. Providers are encouraged to inform members before rendering such services that the members are likely to be financially responsible for the cost of these services.

DESCRIPTION

This policy addresses hematopoietic cell transplantation for miscellaneous solid tumors in adults. Hematopoietic cell transplantation is performed to restore normal function following chemotherapy treatment. Transplantation of cells from both autologous and allogeneic donors for a variety of solid tumors is discussed.

MEDICAL POLICY CRITERIA

Note: This policy addresses only solid tumors in adults. Solid tumors in children, and Ewing sarcoma diagnosed at any age, are considered separately in Transplant Policy, No. 45.37. See Cross References section below for tumors not specifically addressed in this policy. See Appendix I for glossary of terms.

Autologous or allogeneic hematopoietic cell transplant is considered **investigational** for all of the following malignancies in adults:

- Bile duct cancer
- Cervical cancer

- Colon cancer
- Esophageal cancer
- Fallopian tube cancer
- Gall bladder cancer
- Lung cancer, any histology
- Malignant melanoma
- Nasopharyngeal cancer
- Neuroendocrine tumors
- Osteosarcoma
- Pancreas cancer
- Paranasal sinus cancer
- Prostate cancer
- Rectal cancer
- Renal cell cancer
- Soft tissue sarcomas, except Ewing sarcoma. See Transplant Policy, No. 45.37
- Stomach cancer
- Thymus tumors
- Thyroid tumors
- Tumors of unknown primary origin
- Uterine cancer

NOTE: A summary of the supporting rationale for the policy criteria is at the end of the policy.

POLICY GUIDELINES

DEFINITIONS

- **Consolidation therapy:** Treatment that is given after cancer has disappeared following the initial therapy. Consolidation therapy is used to kill any cancer cells that may be left in the body. It may include radiation therapy, a stem cell transplant, or treatment with drugs that kill cancer cells. Also called intensification therapy and post-remission therapy.
- **Relapse:** The return of a disease or the signs and symptoms of a disease after a period of improvement.
- **Salvage therapy:** Treatment that is given after the cancer has not responded to other treatments.
- **Tandem transplant:** Refers to a planned second course of high-dose therapy and HCT within six months of the first course.

BACKGROUND

HEMATOPOIETIC CELL TRANSPLANTATION

Broadly speaking, there are two types of hematopoietic cell transplants (HCT, previously referred to in this policy as a hematopoietic stem cell transplant [HSCT]), autologous and allogeneic. The purpose of an autologous HCT is to treat a disease (e.g. lymphoma) with myeloablative doses of chemotherapy (with or without radiation) that are active against the disease. The recipient's own HCTs (collected previously) are infused after the chemotherapy in order to re-establish normal marrow function. In an allogeneic transplant, the recipient receives HCTs from a donor after myeloablative therapy or non-myeloablative therapy in order to re-establish normal marrow function as well as to use the new blood system as a platform for immunotherapy, a so called "graft versus tumor" effect. Hematopoietic cells can be harvested from bone marrow, peripheral blood, or umbilical cord blood 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 (GVHD).

Immunologic compatibility between infused hematopoietic cells and the recipient is not an issue in autologous HCT. However, immunologic compatibility between donor and patient is a critical factor for achieving a good outcome of allogeneic HCT. Compatibility is established by typing of human leukocyte antigens (HLA) using cellular, serologic, or molecular techniques. HLA refers to the tissue type expressed at the Class I and Class II gene loci on each arm of chromosome 6. Depending on the disease being treated, an acceptable donor will match the patient at all or most of the HLA loci (with the exception of umbilical cord blood).

CONVENTIONAL PREPARATIVE CONDITIONING FOR HCT

The conventional ("classical") practice of *allogeneic* HCT involves administration of cytotoxic agents (e.g., cyclophosphamide, busulfan) with or without total body irradiation at doses sufficient to destroy endogenous hematopoietic capability in the recipient. The beneficial treatment effect in this procedure is due to a combination of initial eradication of malignant cells and subsequent graft-versus-malignancy (GVM) effect that develops after engraftment of allogeneic cells within the patient's bone marrow space. While the slower GVM effect is considered to be the potentially curative component, it may be overwhelmed by extant disease without the use of pretransplant conditioning. However, intense conditioning regimens are limited to patients who are sufficiently fit medically to tolerate substantial adverse effects that include pre-engraftment opportunistic infections secondary to loss of endogenous bone marrow function and organ damage and failure caused by the cytotoxic drugs. Furthermore, in any allogeneic HCT, immunosuppressant drugs are required to minimize graft rejection and GVHD, which also increases susceptibility of the patient to opportunistic infections.

The success of *autologous* HCT is predicated on the ability of cytotoxic chemotherapy (with or without radiation) to be delivered at doses that could otherwise not be given without stem cells, which are infused to "rescue" hematopoiesis after high dose therapy. As a consequence, autologous HCT is typically performed as consolidation therapy when the patient's disease is in complete remission (CR). Patients who undergo autologous HCT are susceptible to chemotherapy-related toxicities and opportunistic infections prior to engraftment, but not GVHD.

REDUCED-INTENSITY CONDITIONING FOR ALLOGENEIC HCT

Reduced-intensity conditioning (RIC) refers to the conditioning with lower doses or less intense regimens of cytotoxic drugs or radiation than are used in conventional full-dose myeloablative conditioning treatments. The goal of RIC is to reduce disease burden, but also to minimize as much as possible associated treatment-related morbidity and non-relapse mortality (NRM) in the period during which the beneficial GVM effect of allogeneic transplantation develops. Although the definition of RIC remains arbitrary, with numerous versions employed, all seek to balance the competing effects of NRM and relapse due to residual disease. RIC regimens can be viewed as a continuum in effects, from nearly totally myeloablative, to minimally myeloablative with lymphoablation, with intensity tailored to specific diseases and patient condition. Patients who undergo RIC with allogeneic HCT initially demonstrate donor cell engraftment and bone marrow mixed chimerism. Most will subsequently convert to full-donor chimerism, which may be supplemented with donor lymphocyte infusions to eradicate residual malignant cells.

For the purposes of this Policy, the term "reduced-intensity conditioning" (RIC) will refer to all conditioning regimens intended to be non-myeloablative, as opposed to fully myeloablative (conventional) regimens.

HEMATOPOIETIC CELL TRANSPLANTATION IN SOLID TUMORS IN ADULTS

HCT is an established treatment for certain hematologic malignancies. Its use in solid tumors in adults is less well established, although it has been investigated for a variety of solid tumors. With the advent of nonmyeloablative allogeneic transplant, interest has shifted to exploring the generation of alloreactivity to metastatic solid tumors via a graft-versus-tumor effect of donor-derived T cells.[1]

MISCELLANEOUS SOLID TUMORS IN ADULTS

This policy collectively addresses other solid tumors of adults for which HCT has been investigated, including lung cancer; malignant melanoma; tumors of the gastrointestinal tract (including colon, rectum, pancreas, stomach, esophagus, gallbladder, and bile duct tumors); male and female genitourinary systems (e.g., renal cell carcinoma, cervical carcinoma, cancer of the uterus, fallopian tubes, and prostate gland); tumors of the head and neck; soft tissue sarcoma; thyroid tumors; tumors of the thymus; and tumors of unknown primary origin.

REGULATORY STATUS

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 (CFR) title 21, parts 1270 and 1271.[2] Hematopoietic cells are included in these regulations.

The principal outcomes associated with treatment of solid organ malignancies are typically measured in units of survival past treatment: disease-free survival (DFS), a period of time following treatment where the disease is undetectable; progression-free survival (PFS), the duration of time after treatment before the advancement or progression of disease; and overall survival (OS), the period of time the patient remains alive following treatment. Patient quality of life may be another primary outcome, particularly among patients living with refractory disease. In order to understand the impact of hematopoietic cell transplantation for treatment of solid tumors in adults on these outcomes, systematic reviews (SRs) of well-designed randomized controlled trials (RCTs) that compare this therapy to standard medical treatment, such as conventional standard-dose chemotherapy are needed. In indications for which RCTs are not available, non-controlled studies are considered. Further, for treatment of malignant cancers, particularly those with a poor prognosis, an understanding of any adverse treatment effects must be carefully weighed against any benefits associated with treatment to understand the net treatment effect.

AUTOLOGOUS HEMATOPOIETIC CELL TRANSPLANTATION IN SOLID TUMORS OF ADULTS

Urothelial Carcinoma

Limited data exist on the use of autologous HCT for urothelial carcinoma. To date, only a single uncontrolled pilot study on HDC with HCT for patients with refractory urothelial carcinoma has been published by Nishimura (1999).[3] This study was unable to provide evidence of improved outcomes.

Nasopharyngeal Carcinoma

A single uncontrolled pilot study by Airoldi (2001) on HDC with autologous HCT for patients with recurrent or advanced nasopharyngeal carcinoma fails to provide evidence to support the use of this treatment for this indication.[4]

Adult Soft Tissue Sarcomas

In 2017, a Cochrane systematic review (SR) evaluated the use of autologous HCT following high-dose chemotherapy for non-rhabdomyosarcoma soft tissue sarcomas.[5] The authors searched for RCTs that included children and adults in which at least 80% of participants had a non-rhabdomyosarcoma classified as malignant by current and historic World Health Organization standards. Studies involving Ewing sarcoma were excluded. One RCT with 83 patients was identified. In the study there was considerable heterogeneity among the participants who had a total of 19 different diagnoses. The RCT found that OS was not statistically significantly different between autologous HCT following high-dose chemotherapy compared with standard-dose chemotherapy (hazard ratio [HR], 1.26; 95% confidence interval [CI], 0.70 to 2.29; p=0.44), and the point estimate for survival at three years was 32.7% compared with 49.4%. The study did not address disease-free survival, event-free survival, secondary neoplasia, or health-related quality of life. Treatment-related toxicity could not be fully evaluated. The authors concluded that the use of HCT for adult soft tissue sarcoma is highly experimental, possibly inferior to standard dose chemotherapy, and it should only be offered within RCTs.

Another systematic review, published in 2008 by Verma, found three phase III RCTs involving HCT, none of which evaluated the therapy for first-line treatment of advanced or metastatic adult soft tissue sarcoma compared to conventional standard-dose chemotherapy.[6]

A 2020 registry study by Heilig retrospectively evaluated the effectiveness of autologous HCT in the treatment of soft tissue sarcoma using data from the European Society for Blood and Marrow Transplantation database between 1996 and 2016 (n=338).[7] The PFS and OS were 8.3 and 19.8 months, respectively. The PFS and OS at 5 years were 13% and 25%, respectively. Predictors of favorable benefit with HCT were younger age, better remission status before transplantation, and melphalan-based preparative regimens. The authors concluded that autologous HCT should not be performed on patients with soft tissue sarcoma in routine clinical practice without further investigation.

Hartmann (2013) published results of a phase II study of high-dose chemotherapy with ifosfamide, carboplatin, and etoposide (HD-ICE) followed by peripheral blood stem cell transplantation in patients with grade 2 or 3 histologically-proven soft tissue sarcoma that were considered unresectable or marginally resectable.[8] Thirty patients were enrolled, 14 of whom did not receive all allocated interventions due to progressive disease (n=5), ifosfamide-related neurotoxicity (n=6), withdrawal of consent (n=1), complete remission (n=1), and insufficient stem-cell harvest (n=1). Eighteen patients underwent radiation: five preoperatively, 12 postoperatively, and with palliative intent in one. Twenty-four of 30 (80%) patients underwent surgery with macroscopically complete tumor resection. In the subgroup of patients who underwent consolidation high-dose chemotherapy, surgery revealed R0-margins (microscopically margin-negative resection) in 12 patients (75%), while four patients had R1-margins (macroscopically margin-negative but microscopically margin-positive resection). In the subgroup of patients treated without HD-ICE consolidation, seven of the eight patients had R1-margins. Severe hematologic toxicity occurred in most patients, and eight patients developed febrile neutropenia. One patient developed myelodysplastic syndrome after 25 months of follow-up. After a median follow-up period of 50 months (range, 26–120 months) in surviving patients, the median PFS of all patients was 21 months (range, 1–94) and median OS was 37 months (range, 3–120 months), corresponding to five-year PFS and OS rates of 39% and 48%, respectively. The authors conclude that induction chemo-/ radiotherapy and the role of dose intensification should be further studied until potential alternatives of targeted therapies become available for further distinct subtypes of adult type sarcomas.

Kasper (2010) reported the results of a prospective, single institution phase II trial that enrolled 34 patients with advanced and/or metastatic soft tissue sarcoma.[9] After four courses of chemotherapy, patients with at least a partial response underwent high-dose chemotherapy and autologous HCT (n=9). All other patients continued chemotherapy for two more cycles. Patients treated with HCT had statistically significant longer PFS and OS compared with patients treated with standard chemotherapy, although only nine of 34 patients were selected for treatment with HCT.

Schlemmer published a phase II study in 2006 on 55 patients with metastatic soft tissue sarcoma.[10] Although significantly more patients receiving autologous HCT responded to doxorubicin-based induction chemotherapy versus the control group (14% vs. 3%; p=0.003), the estimated OS was not statistically different between those that received autologous HCT and those that did not.

In 2007, Kasper published results of a cases series of 21 patients with soft-tissue sarcoma, which showed a PFS and an OS benefit only in patients with no evidence of disease before receiving HDC and autologous HCT.[11]

Small-Cell Lung Carcinoma

In 2009, Jiang published results from a systematic review and meta-analysis of the medical literature through October 2008, including English language studies using intensified chemotherapy with autologous hematopoietic progenitors to treat SCLC.[12] The meta-analysis consisted of five RCTs (three were phase III trials and two were phase II), for a total of 641 patients. No significant increase in the likelihood of an improved response rate with autologous transplant versus control chemotherapy was found. No statistically significant increase in OS among the autologous transplant patients compared to control regimens was found. The authors concluded that current evidence does not support the use of intensified chemotherapy and autologous HCT for treating SMLC.

One smaller randomized study and several single-arm studies of HDC and autologous HCT for SCLC are summarized in a 2007 systematic review article by Crivellari.[13] The authors begin the conclusion of their review with this statement, "The lesson we have learned is that the current literature indicates that there is no evidence that the treatment of SCLC can be improved by increasing the dose intensity, peak dose, or total dose of chemotherapy, and survival rates have reached a plateau, so intensification strategy should probably be abandoned."

In 2005, Lorigan reported on a randomized phase III trial of 318 patients with SCLC to investigate whether doubling the dose density of ifosfamide, carboplatin, and etoposide (ICE) chemotherapy with filgrastim and blood-progenitor-cell support (dose-dense arm) improves survival, compared with standard ICE chemotherapy (standard arm).[14] No statistically significant difference in response rates was seen between the two groups (80% response rate in the standard arm vs. 88% in the dose-dense arm), nor was there a statistically significant difference in OS between the two groups. Statistically significantly more hematologic toxicity was reported in the dose-dense arm than in the standard arm, but the number of cycles complicated by neutropenic sepsis was statistically significantly higher in the standard arm than in the dose-dense arm (15.3% versus 11.6%, respectively; difference = 3.7%, 95% CI = −4.1% to 11.5%; p = .03).

Autologous Hematopoietic Cell Transplantation in Solid Tumors of Adults Section Summary

For individuals who have adult soft tissue sarcomas who receive autologous HCT, the evidence includes two SRs reporting one RCT, as well as three phase 2 single-arm studies, and a case series. Although small phase 2 studies reported either increased response to treatment or longer survival for patients treated with HCT than with standard chemotherapy, the available RCT did not show a survival benefit with autologous HCT. For individuals who have small cell lung cancer who receive autologous HCT, the evidence includes two SRs and one randomized study. Overall, the majority of the data from these studies, including the randomized study, showed no increased OS with autologous HCT. At least one systematic review on this topic recommended that autologous HCT as a dose intensification strategy for SCLC be abandoned in light of evidence demonstrating no clear treatment benefit.[13] Evidence for the use of autologous HCT in other solid tumors in adults, including urothelial carcinoma

and nasopharyngeal carcinoma is limited and consists of small, uncontrolled studies that fail to demonstrate improved health outcomes with the use of autologous HCT in the treatment of these tumor types.

ALLOGENEIC HEMATOPOIETIC CELL TRANSPLANTATION IN SOLID TUMORS OF ADULTS

Multiple Indications

A 2008 review of data from the European Bone Marrow Transplantation Solid Tumors Working Party (EBMT STWP) on allogeneic HCT for renal cell cancer, pancreatic cancer, colorectal cancer and soft-tissue sarcoma found multiple small case series (n≤25) with different conditioning regimens, varying response rates and treatment mortality rates for each indication.[15] The EBMT STWP concluded that, "Allogeneic transplantation in renal cancer and other solid tumors should be considered a developmental therapy until definitive proof of a clinical benefit is achieved by current studies."

Mixed Tumor Types

In 2016, Omazic reported on a long-term follow-up on 61 patients with a variety of solid tumor types considered to be incurable with any conventional therapy who were treated with allogeneic HCT from 1999 to 2012.[16] Tumors included metastatic renal carcinoma (n=22), cholangiocarcinoma (n=17), colon cancer (n=15), prostate cancer (n=3), pancreatic adenocarcinoma (n=3), and breast cancer (n=1). Most patients (n=59) had undergone surgical debulking of the primary tumor, and 31 patients had previously undergone additional therapy with cytotoxic chemotherapy, radiotherapy, or immunotherapy. Conditioning was myeloablative in 23 patients, reduced in 36 patients, and nonmyeloablative in two patients. Over a median follow-up of eight years, the rate of OS at five and ten years were 15% and 9%, respectively.

Nasopharyngeal Carcinoma

In 2011, Toh reported the outcomes of a phase II trial of 21 patients with pretreated metastatic nasopharyngeal carcinoma.[17] Previous treatment was not uniform; patients had received a median of two previous chemotherapy regimens (range 1-8). All patients had extensive metastases. Patients underwent nonmyeloablative allogeneic HCT with sibling allograft. Seven patients (33%) showed a partial response and three (14%) achieved stable disease. Four patients were alive at two years and three showed prolonged disease control past 344 days. One and two-year OS rates were 29 and 19%, respectively, comparable to the median 7-14 months OS reported in the literature for metastatic nasopharyngeal patients treated with salvage chemotherapy without HCT. However, valid and reliable conclusions based upon these results cannot be made due to limitations such as: small sample size, varied pre-HCT treatment regimens, and lack of control group. These limitations hinder the ability to account for the many types of bias that can affect study outcomes.

Renal Cell Carcinoma

Metastatic renal cell carcinoma (RCC) has a range of prognosis based on several risk categories.[18] RCC is relatively resistant to chemotherapy, but is susceptible to immune therapy. Interleukin-2 (IL-2) and/or interferon alpha have induced responses and long-term PFS in 4%–15% of patients.[15] In addition, several targeted therapies have the U.S. Food and Drug (FDA) approval for treatment of advanced RCC for first and/or subsequent lines of

therapy.[18] Based on the susceptibility of RCC to immune therapies, the immune-based strategy of a graft-versus-tumor effect possible with an allogeneic transplant has led to an interest in its use in RCC. Several small case series and pilot studies exist on the use of allogeneic HCT in RCC.

In 2009, Bregni assessed the long-term benefit of allografting in 25 patients with cytokine-refractory metastatic RCC who received a reduced intensity conditioning (RIC) allograft from a sibling who was human leukocyte antigen (HLA) identical.[19] All patients received the same conditioning regimens. Response to allograft was available in 24 patients, with a complete response in one patient and partial response in four patients. Twelve patients had minor response or stable disease, and seven reported progressive disease. Overall response rate (complete plus partial) was 20%. Six patients died because of transplant-related complications. Median survival was 336 days (12–2,332+). One-year OS was 48% (95% CI: 28–68), and five-year OS was 20% (95% CI: 4–36). The authors concluded that allografting may be associated with long-term disease control in only a small fraction of cytokine-resistant patients with RCC.

In 2000, Childs published a study on the first series of patients with RCC treated with nonmyeloablative allogeneic HCT.[20] The investigators showed regression of the tumor in ten of 19 (53%) patients with cytokine-refractory, metastatic RCC who received an HLA-identical sibling allogeneic HCT. Three patients had a complete response, and remained in remission 16, 25, and 27 months after transplant. Four of seven patients with a partial response were alive without disease progression nine to19 months after transplantation. Other pilot trials have demonstrated the graft-versus-tumor effect of allogeneic transplant in metastatic RCC, but most have not shown as high a response rate as the Childs' study.[21] Overall response rates in these pilot trials have been about 25%, with complete response rates of about 8%.

Colorectal Cancer

In 2009, Aglietta reported their experience with 39 patients with metastatic colorectal cancer who underwent RIC allogeneic HCT between 1999 and 2004 at nine European Group for Blood and Marrow Transplantation (EBMT) centers.[22] Patients were treated with one of five different RIC regimens. Patient population characteristics were heterogeneous; pretransplant disease status was partial response in two patients, stable disease in six patients, and progressive disease in 31. After transplant, tumor responses were complete in 2% of patients, partial in 18%, and 26% of patients had stable disease, for overall disease control in 46% of patients. Transplant-related mortality was 10%. Median overall follow-up was 202 days (range, 6–1,020), after which time 33 patients had died. Tumor progression was the cause of death in 74% of patients. Achievement of response after transplantation was associated with a difference in OS, with the 18 patients who had a response having a median OS of approximately 400 days versus approximately 120 days for those who had no response (p=.00018). The authors concluded that the HCT approach should probably be reserved for patients with a partial response or stable disease after second-line therapy for metastatic colorectal cancer, and that second-generation clinical trials in these patients are warranted.

Pancreatic Cancer

In 2009, Abe reported the outcomes for five patients with chemotherapy-resistant, unresectable pancreatic adenocarcinoma who received a nonmyeloablative allogeneic peripheral blood HCT.[23] The median patient age was 54 years (range: 44–62 years). All patients had advanced disease, either with metastases or peritonitis, and had received at least one course of chemotherapy including gemcitabine. After HCT, tumor response was

only observed in two patients; one patient had complete disappearance of the primary tumor and one had a 20% reduction in tumor size. Four patients died of progressive disease on post-transplant day ranging from 28 to day 209 (median: 96 days).

In 2008, Kanda reported on the efficacy of RIC allogeneic HCT against advanced pancreatic cancer in 22 patients from three transplantation centers in Japan.[24] The RIC regimens differed among the centers, and the patient population was fairly heterogeneous, with 15 patients having metastatic disease and seven having locally advanced disease. All but one patient received chemotherapy of various combinations before transplant, and ten patients received local radiation. After HCT, one patient achieved complete response, two patients had partial response, two had minor response, and eight had stable disease, with an overall response rate of 23%. Median survival was 139 days, and the major cause of death was tumor progression (median duration of survival in advanced pancreatic cancer in the nontransplant setting is less than six months, even in patients treated with gemcitabine). Only one patient survived longer than one-year after transplantation. The authors concluded that a tumor response was observed in one-fourth of patients with advanced pancreatic cancer who underwent HCT and that the response was not durable.

Allogeneic Hematopoietic Cell Transplantation in Solid Tumors of Adults Section Summary

For individuals who have renal cell carcinoma, colorectal cancer, pancreatic cancer, or nasopharyngeal cancer who receive allogeneic HCT, the evidence includes uncontrolled, small, single-arm studies. These studies are limited by small sample size, varied pre-HCT treatment regimens, and lack of control groups.

EVIDENCE SECTION SUMMARY

Principal outcomes associated with the treatment of solid organ malignancies are overall survival, disease-specific survival, and treatment related mortality and morbidity. There is not enough evidence that hematopoietic cell transplant (HCT) in the treatment of miscellaneous solid tumors in adults improves overall survival, disease-specific survival, or treatment-related mortality or morbidity. Further research is needed to determine whether there is an association between HCT and these outcomes, and if this association is uniform across all patient populations.

PRACTICE GUIDELINE SUMMARY

NATIONAL COMPREHENSIVE CANCER NETWORK

The most recent National Comprehensive Cancer Network (NCCN) guidelines on the tumors addressed in this policy do not discuss hematopoietic cell transplantation as a treatment option.[18, 25-31]

AMERICAN SOCIETY FOR TRANSPLANTATION AND CELLULAR THERAPY

In 2015, the American Society for Blood and Marrow Transplantation (ASBMT), now called the American Society for Transplantation and Cellular Therapy (ASTCT) issued guidelines related to indications for autologous and allogeneic hematopoietic cell transplantation.[32] The guidelines were updated in 2020.[33] The tumors addressed in this review for which ASTCT provides recommendations in adult patients are as follows:

- Renal cancer, metastatic: allogeneic HCT – D ("developmental"); autologous HCT – N ("not generally recommended").

SUMMARY

There is not enough research to show that hematopoietic cell transplantation (HCT) improves health outcomes for adult patients with the tumors addressed in this policy. Therefore, HCT is considered investigational for these indications.

REFERENCES

1. Carnevale-Schianca F, Ricchiardi A, Capaldi A, et al. Allogeneic hemopoietic stem cell transplantation in solid tumors. *Transplant Proc.* 2005;37(6):2664-6. PMID: 16182778
2. U.S Food and Drug Administration (FDA). Tissues and Tissue Products. [cited 01/18/2024]. 'Available from:' http://www.fda.gov/BiologicsBloodVaccines/TissueTissueProducts/default.htm.
3. Nishimura M, Nasu K, Ohta H, et al. High dose chemotherapy for refractory urothelial carcinoma supported by peripheral blood stem cell transplantation. *Cancer.* 1999;86(9):1827-31. PMID: 10547557
4. Airoldi M, De Crescenzo A, Pedani F, et al. Feasibility and long-term results of autologous PBSC transplantation in recurrent undifferentiated nasopharyngeal carcinoma. *Head Neck.* 2001;23(9):799-803. PMID: 11505492
5. Peinemann F, Enk H, Smith LA. Autologous hematopoietic stem cell transplantation following high-dose chemotherapy for nonrhabdomyosarcoma soft tissue sarcomas. *The Cochrane database of systematic reviews.* 2017;4:CD008216. PMID: 28407197
6. Verma S, Younus J, Stys-Norman D, et al. Dose-intensive chemotherapy with growth factor or autologous bone marrow/stem cell transplant support in first-line treatment of advanced or metastatic adult soft tissue sarcoma: a systematic review. *Cancer.* 2008;112(6):1197-205. PMID: 18224666
7. Heilig CE, Badoglio M, Labopin M, et al. Haematopoietic stem cell transplantation in adult soft-tissue sarcoma: an analysis from the European Society for Blood and Marrow Transplantation. *ESMO Open.* 2020;5(5):e000860. PMID: 33097652
8. Hartmann JT, Horger M, Kluba T, et al. A non-comparative phase II study of dose intensive chemotherapy with doxorubicin and ifosfamide followed by high dose ICE consolidation with PBSCT in non-resectable, high grade, adult type soft tissue sarcomas. *Investigational new drugs.* 2013;31(6):1592-601. PMID: 24091981
9. Kasper B, Scharrenbroich I, Schmitt T, et al. Consolidation with high-dose chemotherapy and stem cell support for responding patients with metastatic soft tissue sarcomas: prospective, single-institutional phase II study. *Bone Marrow Transplant.* 2010;45(7):1234-8. PMID: 19935728
10. Schlemmer M, Wendtner CM, Falk M, et al. Efficacy of consolidation high-dose chemotherapy with ifosfamide, carboplatin and etoposide (HD-ICE) followed by autologous peripheral blood stem cell rescue in chemosensitive patients with metastatic soft tissue sarcomas. *Oncology.* 2006;71(1-2):32-9. PMID: 17344669
11. Kasper B, Dietrich S, Mechtersheimer G, et al. Large institutional experience with dose-intensive chemotherapy and stem cell support in the management of sarcoma patients. *Oncology.* 2007;73(1-2):58-64. PMID: 18334832

12. Jiang J, Shi HZ, Deng JM, et al. Efficacy of intensified chemotherapy with hematopoietic progenitors in small-cell lung cancer: A meta-analysis of the published literature. *Lung Cancer.* 2009;65(2):214-8. PMID: 19118919

13. Crivellari G, Monfardini S, Stragliotto S, et al. Increasing chemotherapy in small-cell lung cancer: from dose intensity and density to megadoses. *Oncologist.* 2007;12(1):79-89. PMID: 17227903

14. Lorigan P, Woll PJ, O'Brien ME, et al. Randomized phase III trial of dose-dense chemotherapy supported by whole-blood hematopoietic progenitors in better-prognosis small-cell lung cancer. *J Natl Cancer Inst.* 2005;97(9):666-74. PMID: 15870437

15. Demirer T, Barkholt L, Blaise D, et al. Transplantation of allogeneic hematopoietic stem cells: an emerging treatment modality for solid tumors. *Nat Clin Pract Oncol.* 2008;5(5):256-67. PMID: 18398414

16. Omazic B, Remberger M, Barkholt L, et al. Long-Term Follow-Up of Allogeneic Hematopoietic Stem Cell Transplantation for Solid Cancer. *Biol Blood Marrow Transplant.* 2016;22(4):676-81. PMID: 26740375

17. Toh HC, Chia WK, Sun L, et al. Graft-vs-tumor effect in patients with advanced nasopharyngeal cancer treated with nonmyeloablative allogeneic PBSC transplantation. *Bone Marrow Transplant.* 2011;46(4):573-9. PMID: 20661236

18. National Comprehensive Cancer Network (NCCN) Clinical Practice Guidelines. Kidney Cancer. v.2.2024. [cited 1/18/2024]. 'Available from:' https://www.nccn.org/professionals/physician_gls/pdf/kidney.pdf.

19. Bregni M, Bernardi M, Servida P, et al. Long-term follow-up of metastatic renal cancer patients undergoing reduced-intensity allografting. *Bone Marrow Transplant.* 2009;44(4):237-42. PMID: 19234510

20. Childs R, Chernoff A, Contentin N, et al. Regression of metastatic renal-cell carcinoma after nonmyeloablative allogeneic peripheral-blood stem-cell transplantation. *N Engl J Med.* 2000;343(11):750-8. PMID: 10984562

21. Imanguli MM, Childs RW. Hematopoietic stem cell transplantation for solid tumors. *Update Cancer Ther.* 2006;1(3):343-52. PMID: No PMID Entry

22. Aglietta M, Barkholt L, Schianca FC, et al. Reduced-intensity allogeneic hematopoietic stem cell transplantation in metastatic colorectal cancer as a novel adoptive cell therapy approach. The European group for blood and marrow transplantation experience. *Biol Blood Marrow Transplant.* 2009;15(3):326-35. PMID: 19203723

23. Abe Y, Ito T, Baba E, et al. Nonmyeloablative allogeneic hematopoietic stem cell transplantation as immunotherapy for pancreatic cancer. *Pancreas.* 2009;38(7):815-9. PMID: 19696692

24. Kanda Y, Omuro Y, Baba E, et al. Allo-SCT using reduced-intensity conditioning against advanced pancreatic cancer: a Japanese survey. *Bone Marrow Transplant.* 2008;42(2):99-103. PMID: 18391987

25. National Comprehensive Cancer Network (NCCN) Guidelines. Soft Tissue Sarcoma. Version 3.2023. [cited 1/18/2024]. 'Available from:' https://www.nccn.org/professionals/physician_gls/pdf/sarcoma.pdf.

26. National Comprehensive Cancer Network (NCCN) Clinical Practice Guidelines. Head and Neck Cancers. Version 2.2024. [cited 1/18/2024]. 'Available from:' https://www.nccn.org/professionals/physician_gls/pdf/head-and-neck.pdf.

27. National Comprehensive Cancer Network (NCCN) Clinical Practice Guidelines. Bladder Cancer. Version 3.2023. [cited 1/18/2024]. 'Available from:' https://www.nccn.org/professionals/physician_gls/pdf/bladder.pdf.

28. National Comprehensive Cancer Network (NCCN) Guidelines. Small Cell Lung Cancer. Version 2.2024. [cited 1/18/2024]. 'Available from:' https://www.nccn.org/professionals/physician_gls/pdf/sclc.pdf.
29. National Comprehensive Cancer Network (NCCN) Guidelines. Pancreatic Adenocarcinoma. Version 1.2024. [cited 1/18/2024]. 'Available from:' https://www.nccn.org/professionals/physician_gls/pdf/pancreatic.pdf.
30. National Comprehensive Cancer Network (NCCN) Clinical Practice Guidelines. Colon Cancer. Version 4.2023. [cited 1/18/2024]. 'Available from:' https://www.nccn.org/professionals/physician_gls/pdf/colon.pdf.
31. National Comprehensive Cancer Network (NCCN) Clinical Practice Guidelines. Rectal Cancer. Version 6.2023. [cited 1/18/2024]. 'Available from:' https://www.nccn.org/professionals/physician_gls/pdf/rectal.pdf.
32. 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.* 2015;21(11):1863-9. PMID: 26256941
33. 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.* 2020;26(7):1247-56. PMID: 32165328

CODES

Codes	Number	Description
CPT	38204	Management of recipient hematopoietic cell donor search and cell acquisition
	38205	Blood-derived hematopoietic progenitor cell harvesting for transplantation, per collection, allogeneic
	38206	;autologous
	38207	Transplant preparation of hematopoietic progenitor cells; cryopreservation and storage
	38208	;thawing of previously frozen harvest, without washing, per donor
	38209	;thawing of previously frozen harvest with washing, per donor
	38210	;specific cell depletion with harvest, T cell depletion
	38211	;tumor cell depletion
	38212	;red blood cell removal
	38213	;platelet depletion
	38214	;plasma (volume) depletion
	38215	;cell concentration in plasma, mononuclear, or buffy coat layer
	38230	Bone marrow harvesting for transplantation; allogeneic
	38232	Bone marrow harvesting for transplantation; autologous
	38240	Bone marrow or blood-derived peripheral stem-cell transplantation; allogeneic
	38241	;autologous
	38242	Allogeneic donor lymphocyte infusions
HCPCS	S2140	Cord blood harvesting for transplantation; allogeneic
	S2142	Cord blood derived stem-cell transplantation, allogeneic
	S2150	Bone marrow or blood-derived peripheral stem-cell harvesting and transplantation, allogeneic or autologous, including pheresis, high-dose chemotherapy, and the number of days of post-transplant care in the global definition (including drugs; hospitalization; medical surgical, diagnostic and emergency services)