

Regence

Medical Policy Manual

Transplant, Policy No. 45.40

Hematopoietic Cell Transplantation for Light-Chain (AL) Amyloidosis or Waldenström Macroglobulinemia

Effective: July 1, 2023

Next Review: April 2024

Last Review: May 2023

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

Hematopoietic cell transplantation is performed to restore normal function following chemotherapy treatment.

MEDICAL POLICY CRITERIA

- I. Autologous hematopoietic cell transplantation (HCT) may be considered **medically necessary** for any of the following:
 - A. Light chain (AL) amyloidosis
 - B. As salvage therapy for chemosensitive Waldenström macroglobulinemia.
- II. Autologous hematopoietic cell transplantation is considered **not medically necessary** as a therapy for chemoresistant Waldenström macroglobulinemia.
- III. Autologous hematopoietic cell transplantation is considered **investigational** as a first-line treatment for Waldenström macroglobulinemia.
- IV. Allogeneic hematopoietic cell transplantation is considered **investigational** for Light-chain (AL) amyloidosis and Waldenström macroglobulinemia.

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

POLICY GUIDELINES

Light chain (AL) amyloidosis was previously known as primary systemic amyloidosis.

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 postremission 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.

LIST OF INFORMATION NEEDED FOR REVIEW

It is critical that the list of information below is submitted for review to determine if the policy criteria are met. If any of these items are not submitted, it could impact our review and decision outcome.

- History and Physical/Chart Notes
- Diagnosis and indication for transplant

CROSS REFERENCES

1. [Donor Lymphocyte Infusion for Malignancies Treated with an Allogeneic Hematopoietic Cell Transplant](#), Transplant, Policy No. 45.03
2. [Placental and Umbilical Cord Blood as a Source of Stem Cells](#), Transplant, Policy No. 45.16
3. [Hematopoietic Cell Transplantation for Non-Hodgkin Lymphomas](#), Transplant, Policy No. 45.23
4. [Hematopoietic Cell Transplantation for Hodgkin Lymphoma](#), Transplant, Policy No. 45.30

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 human leukocyte antigens (HLA) using cellular, serologic, or molecular techniques. HLA refers to the tissue type expressed at the HLA A, B, and DR loci on each arm of chromosome six. Depending on the disease being treated, an acceptable donor will match the patient at all or most of the HLA loci.

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 stem 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, immune suppressant 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. 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 will

refer to all conditioning regimens intended to be nonmyeloablative, as opposed to fully myeloablative (conventional) regimens.

LIGHT CHAIN (AL) AMYLOIDOSIS

The primary amyloidoses comprise a group of diseases with an underlying clonal plasma cell dyscrasia. They are characterized by the extracellular deposition of pathologic, insoluble protein fibrils with a beta-pleated sheet configuration that exhibit a pathognomonic red-green birefringence when stained with Congo red dye and examined under polarized light. These diseases are classified on the basis of the type of amyloidogenic protein involved, as well as by the distribution of amyloid deposits. In systemic amyloidosis, the unnatural protein is produced at a site that is remote from the site(s) of deposition, whereas in localized disease the protein is produced at the site of deposition. AL amyloidosis, previously known as primary systemic amyloidosis, is the most common type of systemic amyloidosis. The amyloidogenic protein in AL amyloidosis is an immunoglobulin (Ig) light chain or light chain fragment that is produced by a clonal population of plasma cells in the bone marrow. Deposition of AL amyloidogenic proteins causes organ dysfunction, most frequently in the kidneys, heart, and liver, although the central nervous system and brain may be affected.

Historically, this disease has had a poor prognosis, with a median survival from diagnosis of about 12 months, although outcomes have improved with the advent of combination chemotherapy with alkylating agents and autologous HCT. Emerging approaches include the use of immunomodulating drugs such as thalidomide, pomalidomide, or lenalidomide, and the proteasome inhibitor bortezomib. The anti-CD38 monoclonal antibody daratumumab/hyaluronidase-fihj received approval in July 2021 for treatment of newly diagnosed light chain amyloidosis in combination with bortezomib, cyclophosphamide, and dexamethasone. Regardless of the approach chosen, treatment of AL amyloidosis is aimed at rapidly reducing the production of amyloidogenic monoclonal light chains by suppressing the underlying plasma cell dyscrasia, with supportive care to decrease symptoms and maintain organ function. The therapeutic index of any chemotherapy regimen is a key consideration in the context of underlying organ dysfunction.

WALDENSTRÖM MACROGLOBULINEMIA

Waldenström macroglobulinemia (WM) is a rare B-cell malignancy. Median survival of WM ranges from five to ten years, with age, hemoglobin concentration, serum albumin level, and beta-2 microglobulin level as predictors of outcome. The Revised European American Lymphoma (REAL) and World Health Organization (WHO) classification and a consensus group formed at the Second International Workshop on WM recognize WM primarily as a lymphoplasmacytic lymphoma (LPL) with an associated immunoglobulin M (IgM) monoclonal gammopathy.^[1] The definition also requires the presence of a characteristic pattern of bone marrow infiltration with small lymphocytes demonstrating plasmacytic differentiation with variable cell surface antigen expression. The Second International Workshop indicated no minimum serum concentration of IgM is necessary for a diagnosis of WM.

Treatment of WM is indicated only in symptomatic patients and should not be initiated solely on the basis of serum IgM concentration.^[2]

EVIDENCE SUMMARY

The principal outcomes associated with treatment of primary systemic amyloidosis or WM 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 (QOL) may be another primary outcome, particularly among patients living with refractory disease. Ideally, the impact of hematopoietic cell transplantation on the treatment of these conditions is best understood in well-designed randomized controlled trials (RCT) that compare this therapy to standard medical treatment, such as conventional standard-dose chemotherapy. 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.

AL AMYLOIDOSIS

Several clinical trials, including an RCT, and several non-comparative case series, and registry reports have been reported on the use of autologous hematopoietic cell transplantation (HCT) in patients with AL amyloidosis. To date, no evidence from clinical trials has been identified on the use of allogeneic HCT for treatment of AL amyloidosis.

Systematic Review

Cai (2020) performed a network meta-analysis comparing six chemotherapeutic regimens and autologous HCT among 3,402 patients with immunoglobulin light-chain amyloidosis.^[3] The analysis included three RCTs and 13 observational controlled trials with a sample size ranging from 24 to 796 and mean follow-up of one to five years. Results indicated that the chemotherapy combination of bortezomib, melphalan, and dexamethasone was ranked first among all evaluated treatments regarding hematologic response and CR. Autologous HCT was ranked second for hematologic response and fourth for CR. Thalidomide, cyclophosphamide, and dexamethasone induced the highest renal response rate and bortezomib and dexamethasone was possibly the best treatment for a cardiac response per the analysis. Limitations included that hematologic and organ response definitions changed over time, some treatments that were not evaluated in a controlled study were excluded from the analysis, and the majority of included studies were retrospective in nature.

Randomized Controlled Trials

One randomized multicenter trial involving eight centers from the Myelome Autogreffe (MAG) and Intergroupe Francophone du Myelome (IFM) Intergroup compared conventional chemotherapy with melphalan plus dexamethasone with myeloablative melphalan followed by autologous HCT in patients with AL amyloidosis.^[4] Patients between 18 and 70 years of age with a histological diagnosis of AL amyloidosis and either a complete hematologic response characterization of amyloid deposits or evidence of a monoclonal Ig protein in the serum or urine or a monoclonal staining pattern of bone marrow plasma cells, and history of no more than two courses of any chemotherapy regimen. They were stratified according to age (younger than 65 years or 65 years or older) and according to the affected organ system (cardiac, renal, neurological, or other) and randomly allocated. Patients in the melphalan plus dexamethasone group (n=50) received monthly courses of dose-adjusted (according to cytopenic status) oral melphalan, 10 mg/m² of body-surface area, on days one to four plus oral dexamethasone, 40 mg/day on days one to four, for up to 18 courses if no severe adverse events occurred. In the autologous HCT patients (n=50), hematopoietic stem cells were obtained from peripheral blood with granulocyte colony-stimulating factor mobilization.

Melphalan was administered intravenously on day zero, and stem cells were infused on day two, with the dose reduced from 200 mg/m² to 140 mg/m² for patients aged 65 years or older and for those with an LVEF <30%, a calculated creatinine clearance <30 mL/min, or severe liver disease. According to intention-to-treat analysis, the hematologic response rate did not differ between groups, with 12 complete responses (CR; 24%) and 14 partial responses (PR; 28%) in the melphalan-dexamethasone recipients versus 11 CR (22%) and seven PR (14%) in the autologous HCT group (p=0.11).

At publication of the study, the median follow-up for the entire cohort was 24 months, and for survivors it was 36 months; 20 patients in the melphalan-dexamethasone group had died versus 31 in the autologous HCT group. Among 65 patients who could be evaluated, the intention-to-treat median survival for patients assigned to melphalan plus dexamethasone was 56.9 months, versus 22.2 months in the autologous HSCT group (p=0.04). Survival rates and duration were significantly better in responders (CR plus PR) compared to NR (p<0.0001). Analysis of patients who survived for at least six months and who received their assigned treatment, showed no significant difference in survival rates in patients assigned to melphalan plus dexamethasone compared to autologous HCT, with neither group reaching median survival after 80 months (p=0.38).

This randomized trial suggests that autologous HCT may be no more efficacious than conventional chemotherapy in prolonging survival among patients with AL amyloidosis. However, the results are limited by the size of the study, a lack of assessor blinding or allocation concealment, and a large attrition post-randomization. Thus, among 50 patients assigned to autologous HCT, 13 (26%) did not receive the planned treatment (one declined, two had insufficient stem-cell harvest, ten died before treatment) whereas 7 of 50 (14%) assigned to melphalan plus dexamethasone did not receive planned treatment (five died before treatment, one did not tolerate treatment, one received incorrect treatment). Therefore, even though this was a randomized trial, the results are not sufficient to change the policy statement given the body of evidence available from other, albeit nonrandomized, studies.

Nonrandomized Studies

Several retrospective and prospective series have been reported on the use of autologous HCT in patients with AL. Results from these series are consistent with others that suggest autologous HCT is feasible and beneficial in selected patients with AL.^[5-28]

A retrospective analysis published by Fuchida (2022) included registry data (cases registered to the Transplant Registry Unified Management Program between December 1999 and December 2015) from 330 patients (median age, 57 years; range, 31 to 74) treated with autologous HCT for AL.^[29] Additional clinical information was collected through a secondary survey from 110 of these patients (33.3%). Overall hematologic response was a partial response or better in 77.6% of the patients and a complete response was seen in 49.3%. Five-year OS was 70.1%.

Sharpley (2021) published a retrospective case-matched study (N=136) that compared bortezomib and autologous HCT for first-line treatment of AL.^[30] All patients had been diagnosed with amyloidosis within the prior 12 months. Patients were matched using propensity scores that included age, performance status, cardiac and liver markers, and the number of organs involved. At two years, OS was similar between groups (hazard ratio, 0.95; 95% confidence interval [CI], 0.41 to 2.20, p=.908). Median progression-free survival (50 vs. 42 months, respectively; p=0.058) was also similar between groups.

In 2019, Sharpley evaluated outcomes in 264 patients with amyloidosis who had undergone an autologous HCT between 1994 and 2018 in the United Kingdom.^[27] These patients were analyzed as an entire cohort and then by four time cohorts: 1994 to 2000, 2000 to 2006, 2007 to 2012, and 2013 to 2018. The overall median OS after autologous HCT was 87 months (95% confidence interval [CI], 77 to 106 months). A hematologic response was seen in 94.8% of patients and was a strong predictor of time to next treatment ($p < 0.0001$) and OS ($p = 0.007$). Treatment-related mortality was 8.7% overall and decreased significantly over time.

A 2015 report from the Center for International Blood and Marrow Transplant Research Study identified 1536 patients with amyloidosis who had undergone autologous HCT between 1995 and 2012.^[31] Early mortality and OS were analyzed in three time cohorts: 1995 to 2000, 2001 to 2006, and 2007 to 2012. Over this time period, OS improved from 55% to 77%, while early mortality decreased from 20% to 5%. Multivariate analysis showed that cardiac involvement was associated with high mortality and inferior OS. Higher dosages of melphalan were associated with a lowered relapse risk.

Parmar (2014) compared autologous HSCT with conventional therapies (CTR) in AL patients over a period of 14 years.^[32] Autologous HCT was performed in 80 patients with a one-year non-relapse mortality rate of 12.5%. Novel agents were used as part of induction therapy in 56% of transplant recipients compared with 46% of CTR patients. Outcomes of hematological and organ responses were observed in 74.6% and 39% in the autologous HCT patients compared with 53% and 12% in the CTR patients, respectively. The projected five-year survival for autologous HCT compared with CTR was 63% vs 38%, respectively. Autologous HSCT patients who were alive one year after initial diagnosis experienced improved five-year OS (72%) versus 65% in CTR patients. Multivariate analysis demonstrated that age older than 60 years, induction therapy with novel agents, kidney only involvement and autologous HCT were significantly associated with improved survival. Study authors concluded that autologous HCT was associated with long-term survival in patients with AL amyloidosis.

Section Summary

Available evidence is sufficient to demonstrate a treatment benefit associated with autologous HCT in patients with AL amyloidosis. Data on the use of allogeneic HCT to treat AL amyloidosis are sparse, with no systematic evaluation in a clinical trial.^[33] Until clinical trials reporting the use of allogeneic HCT are reported in the scientific literature, the safety and effectiveness of this treatment in primary amyloidosis will remain unknown.

WALDENSTRÖM MACROGLOBULINEMIA

The evidence supporting the use of autologous or allogeneic hematopoietic cell transplantation (HCT) in patients with WM consists of non-randomized trials, several of them with retrospective study designs.

Parrondo (2020) performed a systematic review and meta-analysis of the efficacy of autologous and allogeneic hematopoietic cell transplantation in Waldenström Macroglobulinemia.^[34] A total of seven studies of allogeneic transplant ($n = 311$ patients) and eight of autologous transplant ($n = 278$ patients) met inclusion criteria. For autologous and allogeneic transplant, pooled OS (reported at three to five years) was 57% (95% CI 50 to 65%) and 76% (95% CI 65 to 86%), respectively, progression-free survival (PFS) was 49% (95% CI 42 to 56%) and 55% (95% CI 42 to 68%), respectively, and nonrelapse mortality (NRM) was 29% (95% CI 23 to 34%) and 4% (95% CI 1 to 7%), respectively. Rates of relapse following

allogeneic and autologous transplant were 23% (95% CI 18 to 28%) and 42% (95% CI 30 to 55%), respectively. The authors noted a two-fold lower relapse rate and seven-fold higher NRM for allogeneic versus autologous transplant.

Sakurai (2020) reported results of a retrospective study of patients with WM treated with SCT. The registry database from the Japan Society for Hematopoietic Cell Transplantation was used to identify 46 patients who received autologous transplantation and 31 who received allogeneic transplantation. More patients with advanced disease status at the time of transplantation were identified in the allogeneic SCT group. Additionally, patients in the allogeneic group received more lines of chemotherapy. The one-year cumulative incidences of NRM were 30.0% (95% CI 14.7 to 46.9%) in the allogeneic SCT and 0% in the autologous SCT group. The estimated three-year OS and PFS rates were 84.5% (95% CI 66.0 to 93.4%) and 70.8% (95% CI 53.0 to 82.9%), respectively, in the autologous SCT group, and 52.2% (95% CI 32.5 to 68.6%) and 45.0% (95% CI 26.3 to 62.0%), respectively, in the allogeneic SCT group.

A retrospective Center for International Blood and Marrow Transplant Research (CIBMTR) registry analysis of SCT (autologous, n=10, allogeneic, n=26) for WM reported three-year overall survival rates of 46% (95% CI 27 to 65%) for allogeneic HSCT recipients and 70% (95% CI 40 to 93%) for autologous HSCT patients.^[35] Although the CIBMTR results appear favorable, it should be noted that patients in this report were heavily pretreated, highly heterogeneous in terms of disease characteristics and risk factors, and received a variety of conditioning regimens, including myeloablative and RIC, between 1986 and 2002.

Kyriakou (2010) reported on 158 adult patients with WM reported to the European Group for Blood and Marrow Transplantation (EBMT) between January 1991 and December 2005.^[36] Median time from diagnosis to autologous HSCT was 1.7 years (range, 0.3 to 20.3 years), 32% of the patients had experienced treatment failure with at least three of therapy, and 93% had sensitive disease at the time of transplant. Median follow-up for surviving patients was 4.2 years (range 0.5 to 14.8 years). Nonrelapse mortality was 3.8% at one year. The estimated five-year relapse rate was 52.1%. PFS and OS were 39.7% and 68.5%, respectively, at five years and were significantly influenced by number of lines of therapy and the degree of chemorefractory at HSCT. The authors conclude that autologous HSCT is a feasible procedure in young patients with advanced WM but that it should not be offered to patients with chemoresistant disease and to those who received more than three lines of therapy.

Kyriakou (2010) also reported on a retrospective analysis of a smaller group of patients who had allogeneic HSCT for WM.^[37] A total of 86 patients received allogeneic HSCT by using either myeloablative conditioning (MAC; n=37) or reduced-intensity conditioning (RIC; n=49) regimens. The median age was 49 years (range 23 to 64 years); 47 patients had received three or more previous lines of therapy, and 8 patients had experienced failure on a prior autologous HSCT. A total of 59 patients (68.6%) had chemotherapy-sensitive disease at the time of allogeneic SCT. Median follow-up of the surviving patients was 50 months. The overall response rate was 75.6%. The relapse rates at three years were 11% for MAC and 25% for RIC. Overall survival at five years was 62% for MAC and 64% for RIC, respectively. The occurrence of chronic graft-versus-host (GVH) disease was associated with a lower relapse rate. The authors concluded that allogeneic HSCT can induce durable remissions in a selected population of young and heavily pretreated patients who have WM.

Cornell (2016) reported retrospectively on 144 adult patients entered in the Center for International Blood and Marrow Transplant Research registry between 2001 and 2013 who

underwent allogeneic HCT.^[38] Patients had relapsed after receiving at least one line of prior therapy. Hematopoietic cells were obtained from HLA matched or mismatched donors; cord blood stem cells were excluded. A total of 67 patients received myeloablative conditioning and 67 received reduced intensity conditioning. Over half of patients (n=82 [57%]) had chemosensitive disease. Overall survival (OS) was 74% at one year and 52% at five years. Patients with chemosensitive disease had significantly better one-year and five-year overall survival compared with patients with chemoresistant disease.

Section Summary

As for AL amyloidosis, available data on the use of autologous HCT for WM are sufficient (because of rarity of the disease) to indicate a potential treatment benefit in patients with this rare type of B cell malignancy who have failed other treatment options. Available evidence is not sufficient to indicate whether patients treated with allogeneic HCT experience a similar treatment benefit.

PRACTICE GUIDELINE SUMMARY

AL AMYLOIDOSIS

National Comprehensive Cancer Network

The National Comprehensive Cancer Network (NCCN) guidelines on systemic light chain amyloidosis (v.1.2022) recommend assessing organ involvement based on amyloidosis consensus criteria in newly diagnosed disease.^[39] Next, patients should be evaluated for stem cell transplant candidacy. The current guidelines include high-dose melphalan followed by autologous stem cell transplantation as a therapeutic consideration for management of patients (all category 2A recommendations) along with best supportive care. Since the optimal therapy remains unknown, the NCCN "strongly encourages treatment in the context of a clinical trial when possible."

American Society for Transplantation and Cellular Therapy

In 2020, the American Society for Transplantation and Cellular Therapy (ASTCT) issued guidelines on the indications for hematopoietic cell transplantation (HCT) and immune effector therapy.^[40] The ASTCT gave the rating of N (not generally recommended; neither evidence nor clinical practice support the routine use) for the use of allogeneic HCT for the treatment of primary amyloidosis in adults. The ASTCT gave a rating of S (standard of care) for the use of autologous HCT in the treatment of amyloid light-chain amyloidosis in adults.

British Committee for Standards in Haematology

The British Committee for Standards in Haematology convened a working group to develop guidelines on the management of AL amyloidosis, which were published in 2015.^[41] Below is a summary of the guidelines on high dose melphalan and autologous stem cell transplantation (HDM-ASCT) and allogeneic transplantation as treatments of AL amyloidosis:

- HDM-ASCT recommended as preferred first line treatment for patients (grade 1c):
 - Up to 65-70 years of age
 - Estimated glomerular filtration rate >50 ml/min
 - Low cardiac biomarkers
 - Low level plasma cell infiltration in bone marrow at time of transplant

- Without the following contraindications:
 - Cardiac amyloidosis with N-terminal pro-brain natriuretic peptide >590 pmol/l and/or troponin-T >0.06 ng/ml
 - Severe autonomic neuropathy
 - Significant gastrointestinal bleeding
 - Recurrent pleural effusions
 - Eastern Cooperative Oncology Group performance status >2
- HDM-ASCT may be considered for select patients up to 65-70 years of age with relapsed/refractory disease or with early relapse of plasma cell dyscrasia after chemotherapy (grade 1c)
- Allogeneic transplantation is generally not recommended due to high treatment-related mortality, but may be considered in relapsed younger patients with limited organ involvement who have a matched sibling donor.

WALDENSTRÖM MACROGLOBULINEMIA

National Comprehensive Cancer Network

The National Comprehensive Cancer Network (NCCN) guidelines on systemic light chain amyloidosis (v.2.2023) recommend assessing organ involvement based on amyloidosis consensus criteria in newly diagnosed disease.^[42] Next, patients should be evaluated for stem cell transplant candidacy. The current guidelines prefer the regimen of daratumumab and hyaluronidase-fihj/bortezomib/cyclophosphamide/dexamethasone with other recommended regimens including: bortezomib with or without dexamethasone, bortezomib/cyclophosphamide/dexamethasone, bortezomib/lenalidomide/dexamethasone, bortezomib/melphalan/dexamethasone, and melphalan/dexamethasone in certain circumstances. Since the optimal therapy remains unknown, the NCCN "strongly encourages treatment in the context of a clinical trial when possible."

The National Comprehensive Cancer Network (NCCN) guidelines for Waldenstrom macroglobulinemia/lymphoplasmacytic lymphoma (v.3.2022) state that primary treatment options include high-dose chemotherapy followed by autologous stem cell rescue.^[43] The guidelines also state myeloablative or non-myeloablative allogeneic HCT may be considered, but only in the context of a clinical trial.

INTERNATIONAL WORKSHOP ON WALDENSTRÖM MACROGLOBULINEMIA

In 2016, consensus recommendations from the Eighth International Workshop on Waldenström Macroglobulinemia were published.^[44] The panel concluded that autologous hematopoietic cell transplantation (HCT) is a treatment option for high-risk WM patients who are eligible for transplant. They further stated that autologous HCT should be offered at early relapses and is not as beneficial once patients have been exposed to more than 3 lines of therapy or in those with chemotherapy refractory disease. The definition of "chemotherapy refractory disease" is not specified. Regarding allogeneic HCT, they stated that this treatment, "when appropriate, should preferably be considered in the context of clinical trials." The consensus treatment recommendations from the tenth International Workshop on Waldenström Macroglobulinemia published in 2020 stated that evidence is "limited to small case series and registry studies without comparator groups" but did not give updated recommendations regarding HCT.^[45]

American Society for Transplantation and Cellular Therapy

The 2020 ASTCT guidelines on the indications for autologous and allogeneic hematopoietic cell transplantation (HCT) made recommendations regarding Waldenström Macroglobulinemia.^[40] The ASTCT gave the rating of N (not generally recommended; neither evidence nor clinical practice support the routine use) for the use of HCT for Waldenström Macroglobulinemia with the following exceptions: allogeneic HCT for primary refractory, resistant (rated R; Standard of care, rare indication), first or greater relapse, sensitive and relapse after autologous transplant (rated C; Standard of care, clinical evidence available), and first or greater relapse, resistant (rated R); and autologous HCT for primary refractory, sensitive (rated C) and first or greater relapse, sensitive (rated S; Standard of care).

SUMMARY

AL AMYLOIDOSIS

There is enough research to show that autologous hematopoietic cell transplant (HCT) can improve health outcomes in patients with AL amyloidosis. Therefore, use of this procedure may be considered medically necessary.

There is not enough research to show that allogeneic hematopoietic cell transplant (HCT) improves health outcomes for patients with AL amyloidosis. Therefore, allogeneic HCT is considered investigational in patients with AL amyloidosis.

WALDENSTRÖM MACROGLOBULINEMIA

There is enough research to show that autologous hematopoietic cell transplant (HCT) can improve health outcomes for certain patients with Waldenström macroglobulinemia (WM). Current clinical guidelines based on research recommend that this treatment be considered only among patients who have failed previous treatment and whose disease is responsive to chemotherapy. Therefore, the use of autologous HCT as salvage treatment for WM is considered medically necessary in patients with chemosensitive disease.

There is enough research to show that autologous hematopoietic cell transplant (HCT) does not improve health outcomes for patients with Waldenström macroglobulinemia that is resistant to chemotherapy. Therefore, the use of autologous HCT in these patients is considered not medically necessary.

There is not enough evidence that autologous hematopoietic cell transplant (HCT) can improve health outcomes when used as a first-line treatment for Waldenström macroglobulinemia (WM). Use of this procedure as a primary treatment of WM is therefore considered investigational.

There is not enough research to show that allogeneic hematopoietic cell transplant (HCT) can improve health outcomes for people with Waldenström macroglobulinemia (WM). Clinical guidelines based on research do not recommend the use of this type of transplantation outside of clinical trials. Therefore, use of allogeneic HCT for treatment of WM is considered investigational.

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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
	38220	Diagnostic bone marrow; aspiration(s)
	38221	Diagnostic bone marrow; biopsy(ies)
	38222	Diagnostic bone marrow; biopsy(ies) and aspiration(s)
	38230	Bone marrow harvesting for transplantation; allogeneic
	38232	Bone marrow harvesting for transplantation; autologous
	38240	Hematopoietic progenitor cell (HPC); allogeneic transplantation per donor
	38241	;autologous transplantation
	38243	;HPC boost
38242	Allogeneic 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)

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