

Bölüm 13

HODGKİN LENFOMADA OTOLOG VE ALLOGENEİK KÖK HÜCRE NAKLİNİN YERİ

Pelin AYTAN¹

Hodgkin Lenfoma (HL) lenfositik sistemi ve lenf nodlarını tutan yaygın olmayan kanserdir (NCCN 2018). Çoğu hasta 15-30 yaş arası tanı almakla birlikte diğer sık görüldüğü yaş grubu 55 yaş ve üzeridir (NCCN 2018). WHO sınıflaması HL’yi 2 ana tipe ayırır: klasik HL (KHL) ve nodüler lenfosit predominant HL (NLPHL) (WHO classification, 2008). Batı ülkelerinde tüm HL’lerin içinde KHL %95, NLPHL %5 oranındadır (NCCN 2018).

KHL’de hastalar tanı ve tetkikler sonrası evre 1-2 ve evre 3-4 olarak gruplara bölünürler. NCCN olumsuz faktörlerin varlığına göre evre 1A-2A (olumlu), evre 1-2 olumsuz nonbulky, Evre 1-2 olumsuz bulky hastalık olarak ayrılır. Kombine modalite tedavisi ABVD (adriamisin, bleomisin, vinblastin, doksurubisin) veya Stanford V kemoterapi + tutulu alan radyoterapi (TART) evre 1-2 olumlu hastalarda tercih edilir. Genç hastalarda kemoterapinin uzun süreli risklerinden kaçınmak için ABVD tek başına tercih edilir. Kombine modalite tedavi (ABVD + tutulu bölge RT (TBRT) [kategori 1] (Engert & ark., 2010) veya Stanford V kemoterapi) (Advani & ark., 2013) veya kemoterapi (sadece ABVD) stage 1A-2A olumlu hastalığı olanlarda tedavi seçeneklerindendir.

HD 11 çalışmasına göre evre 1-2 olumsuz hastalık tanımı: En az bir risk faktörünün bulunması, bulky mediastinal kitle, ekstranodal tutulum, sedimentasyon \geq 50 veya sedimentasyon \geq 30 B semptomları ile, 3 veya daha fazla tutulu lenf nod ve bulky mediastinal kitle veya ekstanodal tutulum olmadan evre 2B – ABVD sonrası + TBRT (Eich & ark., 2010) veya AVD (Johnson & ark., 2016), ABVD sonrası BEACOPP ve/veya TBRT (Raemaekers & ark., 2014), Stanford V + TBRT (Horning & ark., 2002, Gordon & ark., 2013) veya escalated BEACOPP (2 siklüs) sonrası ABVD (2 siklüs) veya 60 yaş altı seçilmiş hastalarda TBRT tedavi seçenekleri arasındadır (NCCN önerilerine göre)

Uluslararası prognostik skor (IPS), evre 3-4 hastalarda prognozu belirleme ve tedavi yaklaşımını değerlendirmede yardımcı olur. Tanı anında kötü prog-

¹ Uzman Dr., Adana Başkent Üniversitesi Dr. Turgut Noyan Uygulama ve Araştırma Hastanesi, Erişkin Kemik İliği Nakil Merkezi, e-mail: drpelinaytan@gmail.com

geçirdi, 3 hasta aGVHD ile hayatını kaybetti (Merryman & ark., 2017). Donor lenfosit infüzyonu (DLI) içeren en büyük çalışma MD Anderson Kanser Merkezi tarafından 27 hasta ile yapılmış olup toplam cevap oranı (ORR) %37 ve ortanca cevap zamanı 7,5 ay olarak bulunmuştur. Tüm hastalar GVHD geçirmiştir ve 4 yıllık TS %20 bulunmuştur. (Anderlini & ark., 2004). Peggs ve arkadaşları relaps hastalıkta ORR %79, dört yıllık PS %59 bulmuşlar. Tüm hastalarda hazırlama rejiminde alemtuzumab kullanıldığı için DLI'a cevap oranlarının yüksek oluşu bununla ilişkili bulunmuştur (Peggs & ark., 2007).

Yirmi dokuzu HL olan 31 lenfoma hastasının bulunduğu çok merkezli bir çalışmada allonakil sonrası relaps olan nivolumab veya pembrolizumab verilen hastalarda ORR %77 idi. (Haverkos & ark., 2017). Tedavi ilişkili GVHD %55 bulunmuş, konvansiyonel GVHD yaklaşımına dirençli ve %26'sı GVHD nedeniyle kaybedilmiştir (Haverkos & ark., 2017). Başka bir çalışmada allonakil sonrası nivolumab verilen 20 HL hastasında %30 GVHD insidansı ile ORR %95 ve hastaların %10'u da GVHD nedeniyle hayatını kaybetmiştir (Herbaux & ark., 2017).

Otolog nakil sonrası relaps hastalarda daha önceden BV verilmemişse mutlaka BV uygulanması önerilmekte. TR 1/3'de elde edilmesine rağmen hemen allo nakile almaktansa 16 doz BV verilmesi önerilir. Çünkü bu hastalarda tedavi sonu 1/3'ü TR durumunu korumaktadır. Ancak BV ile PR sağlandığı takdirde bu cevabin korunması kısa süreceğinden ileri tedavi planı yapılmalıdır. Allo nakil öncesi CPI ile devam edilebilir. Allonakil öncesi metabolik tam yanıt alınması önemli değildir. Öncesinde otolog HKHN yapılmış hastalar relaps durumunda RIC ile allo nakile alınmalıdır. Çünkü myeloablatif hazırlama rejimi ile allonakil sonrası NRM'deki azalma daha önceden otolog nakil yapılmamış hastalarda sağlanmıştır. Karşılaştırmalı sağ kalım sonuçlarına göre haploidentik nakil UAD ve UADD nakillerine göre azalmış cGVHD oranları nedeniyle güçlü bir alternatifir. Eğer uyumlu akraba veya tam uyumlu akraba dışı donör mevcut değilse UCB veya UADD ile nakil değil haploidentik nakil önerilir. UAD, UADD veya haploidentik donör yoksa UCB düşünülebilir. CPI allonakil öncesinde verilmemişse dahi nakil sonrası artmış oranlarda toksisite görülebilir. Allonakil sonrası relaps halinde DLI'yı takiben sitoredüktif tedaviye cevap sınırlıdır. CPI nakil sonrası anlamlı GVHD riski nedeniyle büyük bir dikkatle uygulanmalıdır.

REFERANSLAR

- Advani RH, Hoppe RT, Baer D, Mason J, Warnke R, Allen J, Daadi S, Rosenberg SA, Horning SJ. (2013). Efficacy of abbreviated Stanford V chemotherapy and involved-field radiotherapy in early-stage Hodgkin lymphoma: mature results of the G4 trial. *Ann Oncol.*, 24(4):1044-8.

- Advani RH, Horning SJ, Hoppe RT, Daadi S, Allen J, Natkunam Y, Bartlett NL. (2014) Mature results of a phase II study of rituximab therapy for nodular lymphocyte-predominant Hodgkin lymphoma. *J Clin Oncol.*, 32(9):912-8.
- Al-Mansour M, Connors JM, Gascogne RD, Skinnider B, Savage KJ. (2010) Transformation to aggressive lymphoma in nodular lymphocyte-predominant Hodgkin's lymphoma. *J Clin Oncol.*, 28(5):793-9.
- Alvarez I, Sureda A, Caballero MD, Urbano-Ispizua A, Ribera JM, Canales M, García-Conde J, Sanz G, Arranz R, Bernal MT, de la Serna J, Díez JL, Moraleda JM, Rubió-Félix D, Xicoy B, Martínez C, Mateos MV, Sierra J. (2006) Nonmyeloablative stem cell transplantation is an effective therapy for refractory or relapsed hodgkin lymphoma: results of a spanish prospective cooperative protocol. *Biol Blood Marrow Transplant.*, 12(2):172-83.
- Anderlini, P., Acholou, S.A., Okoroji, G.J. et al. (2004) Donor leukocyte infusions in relapsed Hodgkin's lymphoma following allogeneic stem cell transplantation: CD3+ cell dose, GVHD and disease response. *Bone Marrow Transplant.*, 34:511–514.
- Anderlini, P., Saliba, R., Acholou, S. et al (2008) Fludarabine-melphalan as a preparative regimen for reduced-intensity conditioning allogeneic stem cell transplantation in relapsed and refractory Hodgkin's lymphoma: the updated M.D. Anderson Cancer Center experience. *Haematologica*, 93:257–264.
- Ansell SM, Lesokhin AM, Borrello I, Halwani A, Scott EC, Gutierrez M, Schuster SJ, Millenson MM, Cattray D, Freeman GJ, Rodig SJ, Chapuy B, Ligon AH, Zhu L, Grosso JF, Kim SY, Timmerman JM, Shipp MA, Armand P. (2015) PD-1 blockade with nivolumab in relapsed or refractory Hodgkin's lymphoma. *N Engl J Med.*, 372(4):311-9.
- Armand P, Shipp MA, Ribrag V, Michot JM, Zinzani PL, Kuruvilla J, Snyder ES, Ricart AD, Balakumaran A, Rose S, Moskowitz CH. (2016) Programmed Death-1 Blockade With Pembrolizumab in Patients With Classical Hodgkin Lymphoma After Brentuximab Vedotin Failure. *J Clin Oncol.*, 34(31):3733-3739.
- Armand, P., Kim, H.T., Ho, V.T. et al. (2008) Allogeneic transplantation with reduced-intensity conditioning for Hodgkin and non-Hodgkin lymphoma: importance of histology for outcome. *Biol Blood Marrow Transplant.*, 14:418–425.
- Armitage, JO. (2010) Early-stage Hodgkin's lymphoma. *N Engl J Med.*, 363:653–662.
- Boll B, Goergen H, Arndt N, Meissner J, Krause SW, Schnell R, von Tresckow B, Eichenauer DA, Sasse S, Fuchs M, Behringer K, Klimm BC, Naumann R, Diehl V, Engert A, Borchmann P. (2013) Relapsed hodgkin lymphoma in older patients: a comprehensive analysis from the German hodgkin study group. *J Clin Oncol.*, 31(35):4431-7.
- Boll B, Goergen H, Behringer K, Bröckelmann PJ, Hitz F, Kerkhoff A, Greil R, von Tresckow B, Eichenauer DA, Bürkle C, Borchmann S, Fuchs M, Diehl V, Engert A, Borchmann P. (2016) Bleomycin in older early-stage favorable Hodgkin lymphoma patients: analysis of the German Hodgkin Study Group (GHSG) HD10 and HD13 trials. *Blood.*, 127(18):2189-92.
- Burroughs, L.M., O'Donnell, P.V., Sandmaier, B.M. et al. (2008) Comparison of outcomes of HLA-matched related, unrelated, or HLA-haploidentical related hematopoietic cell transplantation following nonmyeloablative conditioning for relapsed or refractory Hodgkin lymphoma. *Biol Blood Marrow Transplant.*, 14:1279–1287.
- Castagna, L., Bramanti, S., Devillier, R. et al, (2017) Haploidentical transplantation with post-infusion cyclophosphamide in advanced Hodgkin lymphoma. *Bone Marrow Transplant.*, 52:683–688.
- Chen R, Gopal AK, Smith SE, et al. (2016) Five-year survival and durability results of

- brentuximab vedotin in patients with relapsed or refractory Hodgkin lymphoma. *Blood*, 128(12):1562-1566.
- Chen R, Palmer JM, Tsai NC, et al. (2014) Brentuximab vedotin is associated with improved progression-free survival after allogeneic transplantation for Hodgkin lymphoma. *Biol Blood Marrow Transplant.*, 20(11):1864-1868.
- Chen R, Zinzani PL, Fanale MA, et al. (2017) KEYNOTE-087. Phase II study of the efficacy and safety of pembrolizumab for relapsed/refractory classic Hodgkin lymphoma. *J Clin Oncol.*, 35(19):2125-2132.
- Chen RC, Chin MS, Ng AK, Feng Y, Neuberg D, Silver B, Pinkus GS, Stevenson MA, Mauch PM. (2010) Early-stage, lymphocyte-predominant Hodgkin's lymphoma: patient outcomes from a large, single-institution series with long follow-up. *J Clin Oncol.*, 28(1):136-41
- Chen RW, Palmer J, Martin P, Tsai N, Kim Y, Mott M, Sahebi F, Siddiqi T, Popplewell LL, Leonard JP, Shore TB, Forman SJ. (2014) Results of a Phase II Trial of Brentuximab Vedotin As First Line Salvage Therapy in Relapsed/Refractory HL Prior to AHCT. *Blood*, 124:501
- Chen, R., Palmer, J.M., Thomas, S.H. et al. (2012) Brentuximab vedotin enables successful reduced-intensity allogeneic hematopoietic cell transplantation in patients with relapsed or refractory Hodgkin lymphoma. *Blood*, 119:6379–6381.
- Duggan DB, Petroni GR, Johnson JL, Glick JH, Fisher RI, Connors JM, Canellos GP, Peterson BA. (2003) Randomized comparison of ABVD and MOPP/ABV hybrid for the treatment of advanced Hodgkin's disease: report of an intergroup trial. *J Clin Oncol.*, 21(4):607-14.
- Edwards-Bennett SM, Jacks LM, Moskowitz CH, Wu EJ, Zhang Z, Noy A, Portlock CS, Straus DJ, Zelenetz AD, Yahalom J. (2010) Stanford V program for locally extensive and advanced Hodgkin lymphoma: the Memorial Sloan-Kettering Cancer Center experience. *Ann Oncol.*, 21(3):574-81
- Eich HT, Diehl V, Görgen H, Pabst T, Markova J, Debus J, Ho A, Dörken B, Rank A, Grosu AL, Wiegel T, Karstens JH, Greil R, Willich N, Schmidberger H, Döhner H, Borchmann P, Müller-Hermelink HK, Müller RP, Engert A. (2010) Intensified chemotherapy and dose-reduced involved-field radiotherapy in patients with early unfavorable Hodgkin's lymphoma: final analysis of the German Hodgkin Study Group HD11 trial. *J Clin Oncol.*, 28(27):4199-206
- El-Galaly TC, Mylam KJ, Bøgsted M, Brown P, Rossing M, Gang AO, Haglund A, Arboe B, Clausen MR, Jensen P, Pedersen M, Bukh A, Jensen BA, Poulsen CB, d'Amore F, Hutchings M. (2014) Role of routine imaging in detecting recurrent lymphoma: A review of 258 patients with relapsed aggressive non-Hodgkin and Hodgkin lymphoma. *Am J Hematol.*, 89(6):575-80.
- El-Galaly TC, Mylam KJ, Brown P, Specht L, Christiansen I, Munksgaard L, Johnsen HE, Loft A, Bukh A, Iyer V, Nielsen AL, Hutchings M. (2012) Positron emission tomography/computed tomography surveillance in patients with Hodgkin lymphoma in first remission has a low positive predictive value and high costs. *Haematologica*, 97(6):931-6.
- Engert A, Haverkamp H, Kobe C, Markova J, Renner C, Ho A, Zijlstra J, Král Z, Fuchs M, Hallek M, Kanz L, Döhner H, Dörken B, Engel N, Topp M, Klutmann S, Amthauer H, Bockisch A, Kluge R, Kratochwil C, Schober O, Greil R, Andreesen R, Kneba M, Pfreundschuh M, Stein H, Eich HT, Müller RP, Dietlein M, Borchmann P, Diehl V. (2012) German Hodgkin Study Group; Swiss Group for Clinical Cancer Research;

- Arbeitsgemeinschaft Medikamentöse Tumortherapie. Reduced-intensity chemotherapy and PET-guided radiotherapy in patients with advanced stage Hodgkin's lymphoma (HD15 trial): a randomised, open-label, phase 3 non-inferiority trial. *Lancet*, 379(9828):1791-9.
- Engert A, Plütschow A, Eich HT, Lohri A, Dörken B, Borchmann P, Berger B, Greil R, Willborn KC, Wilhelm M, Debus J, Eble MJ, Söklér M, Ho A, Rank A, Ganser A, Trümper L, Bokemeyer C, Kirchner H, Schubert J, Král Z, Fuchs M, Müller-Hermelink HK, Müller RP, Diehl V. (2010) Reduced treatment intensity in patients with early-stage Hodgkin's lymphoma. *N Engl J Med*, 363(7):640-52.
- Evens AM, Altman JK, Mittal BB, Hou N, Rademaker A, Patton D, Kaminer L, Williams S, Duffey S, Variakojis D, Singhal S, Tallman MS, Mehta J, Winter JN, Gordon LI. (2007) Phase I/II trial of total lymphoid irradiation and high-dose chemotherapy with autologous stem-cell transplantation for relapsed and refractory Hodgkin's lymphoma. *Ann Oncol*, 18(4):679-88.
- Fehniger TA, Larson S, Trinkaus K, Siegel MJ, Cashen AF, Blum KA, Fenske TS, Hurd DD, Goy A, Schneider SE, Keppel CR, Wagner-Johnston ND, Carson KR, Bartlett NL. (2011) A phase 2 multicenter study of lenalidomide in relapsed or refractory classical Hodgkin lymphoma. *Blood*, 118(19):5119-25.
- Gauthier, J., Castagna, L., Garnier, F. et al, (2017) Reduced-intensity and non-myeloablative allogeneic stem cell transplantation from alternative HLA-mismatched donors for Hodgkin lymphoma: a study by the French Society of Bone Marrow Transplantation and Cellular Therapy. *Bone Marrow Transplant*, 52:689–696.
- Genadieve-Stavrik, S., Boumendil, A., Dreger, P. et al. (2016) Myeloablative versus reduced intensity allogeneic stem cell transplantation for relapsed/refractory Hodgkin's lymphoma in recent years: a retrospective analysis of the Lymphoma Working Party of the European Group for Blood and Marrow Transplantation. *Ann Oncol*, 27:2251–2257.
- Giaccone, L., Festuccia, M., Zallio, F. et al. (2017) Long-term follow-up of allogeneic stem cell transplantation in relapsed/refractory Hodgkin lymphoma. *Bone Marrow Transplant*, 52:1208–1211.
- Gordon LI, Hong F, Fisher RI, Bartlett NL, Connors JM, Gascoyne RD, Wagner H, Stiff PJ, Cheson BD, Gospodarowicz M, Advani R, Kahl BS, Friedberg JW, Blum KA, Haibermann TM, Tuscano JM, Hoppe RT, Horning SJ. (2013) Randomized phase III trial of ABVD versus Stanford V with or without radiation therapy in locally extensive and advanced-stage Hodgkin lymphoma: an intergroup study coordinated by the Eastern Cooperative Oncology Group (E2496). *J Clin Oncol*, 31(6):684-91.
- Haverkos, B.M., Abbott, D., Hamadani, M. et al. (2017) PD-1 blockade for relapsed lymphoma post allogeneic hematopoietic cell transplant: high response rate but frequent GVHD. *Blood*, 130:221–228.
- Herbaux, C., Gauthier, J., Brice, P. et al. (2017) Efficacy and tolerability of nivolumab after allogeneic transplantation for relapsed Hodgkin lymphoma. *Blood*, 129:2471–2478.
- Hoppe RT, Advani RH, Ai WZ, et al. (2017) Hodgkin Lymphoma Version 1.2017, NCCN Clinical Practice Guidelines in Oncology. *J Natl Compr Canc Netw*, 15(5):608-638.
- Johnson P, Federico M, Kirkwood A, Fosså A, Berkahn L, Carella A, d'Amore F, Enblad G, Franceschetto A, Fulham M, Luminari S, O'Doherty M, Patrick P, Roberts T, Sidra G, Stevens L, Smith P, Trotman J, Viney Z, Radford J, Barrington S. (2016) Adapted Treatment Guided by Interim PET-CT Scan in Advanced Hodgkin's Lymphoma. *N*

- Engl J Med., 374(25):2419-29.
- Johnston PB, Inwards DJ, Colgan JP, Laplant BR, Kabat BF, Habermann TM, Micallef IN, Porrata LF, Ansell SM, Reeder CB, Roy V, Witzig TE. (2010) A Phase II trial of the oral mTOR inhibitor everolimus in relapsed Hodgkin lymphoma. *Am J Hematol.*, 85(5):320-4.
- Josting, A., Reiser, M., Rueffer, U., Salzberger, B., Diehl, V., Engert, A. (2000) Treatment of primary progressive Hodgkin's and aggressive non-Hodgkin's lymphoma: is there a chance for cure?. *J Clin Oncol.*, 18:332–339.
- Kako, S., Izutsu, K., Kato, K. et al, (2015) The role of hematopoietic stem cell transplantation for relapsed and refractory Hodgkin lymphoma. *Am J Hematol.*, 90:132–138.
- Kharfan-Dabaja M.A., Hamadani, M., Sibai, H., Savani, B.N. (2014) Managing Hodgkin lymphoma relapsing after autologous hematopoietic cell transplantation: a not-so-good cancer after all. *Bone Marrow Transplant.*, 49:599–606.
- Kolstad A, Nome O, Delabie J, Lauritsen GF, Fossa A, Holte H. (2007) Standard CHOP-21 as first line therapy for elderly patients with Hodgkin's lymphoma. *Leuk Lymphoma*. 48(3):570-6.
- Martinez C, Gayoso J, Canals C, Finel H, Peggs K, Dominietto A, Castagna L, Afanasyev B, Robinson S, Blaise D, Corradini P, Itala-Remes M, Bermúdez A, Forcade E, Russo D, Potter M, McQuaker G, Yakoub-Agha I, Scheid C, Bloor A, Montoto S, Dreger P, Sureda A. (2017) Lymphoma Working Party of the European Group for Blood and Marrow Transplantation. Post-Transplantation Cyclophosphamide-Based Haploididential Transplantation as Alternative to Matched Sibling or Unrelated Donor Transplantation for Hodgkin Lymphoma: A Registry Study of the Lymphoma Working Party of the European Society for Blood and Marrow Transplantation. *J Clin Oncol.*, 35(30):3425-3432.
- Martínez, C., Canals, C., Sarina, B. et al, (2013) Identification of prognostic factors predicting outcome in Hodgkin's lymphoma patients relapsing after autologous stem cell transplantation. *Ann Oncol.* 24:2430–2434.
- Merli, F., Luminari, S., Gobbi, P.G. et al. (2016) Long-term results of the HD2000 trial comparing ABVD versus BEACOPP versus COPP-EBV-CAD in untreated patients with advanced Hodgkin lymphoma: a study by Fondazione Italiana Linfomi. *J Clin Oncol.*, 34:1175–1181.
- Merryman RW, Kim HT, Zinzani PL, et al. (2017) Safety and efficacy of allogeneic hematopoietic stem cell transplant after PD-1 blockade in relapsed/refractory lymphoma. *Blood*, 129(10):1380-1388.
- Merryman, R.W., Kim, H.T., Zinzani, P.L. et al. (2017) Safety and efficacy of allogeneic hematopoietic stem cell transplant after PD-1 blockade in relapsed/refractory lymphoma. *Blood*, 129:1380–13
- Miettinen M, Franssila KO, Saxén E. (1983) Hodgkin's disease, lymphocytic predominance nodular. Increased risk for subsequent non-Hodgkin's lymphomas. *Cancer*, 51(12):2293-300.
- Mocikova H, Obrtlikova P, Vackova B, Trneny M. (2010) Positron emission tomography at the end of first-line therapy and during follow-up in patients with Hodgkin lymphoma: a retrospective study. *Ann Oncol.*, 21(6):1222-7.
- Moskowitz AJ, Hamlin PA Jr, Perales MA, Gerecitano J, Horwitz SM, Matasar MJ, Noy A, Palomba ML, Portlock CS, Straus DJ, Graustein T, Zelenetz AD, Moskowitz CH. (2013) Phase II study of bendamustine in relapsed and refractory Hodgkin lymphoma. *J Clin Oncol.*, 31(4):456-60.

- Moskowitz CH, Kewalramani T, Nimer SD, Gonzalez M, Zelenetz AD, Yahalom J. (2004) Effectiveness of high dose chemoradiotherapy and autologous stem cell transplantation for patients with biopsy-proven primary refractory Hodgkin's disease. *Br J Haematol.*, 124(5):645-52.
- Moskowitz CH, Nademanee A, Masszi T, Agura E, Holowiecki J, Abidi MH, Chen AI, Stiff P, Gianni AM, Carella A, Osmanov D, Bachanova V, Sweetenham J, Sureda A, Huebner D, Sievers EL, Chi A, Larsen EK, Hunder NN, Walewski J. (2015) AETHERA Study Group. Brentuximab vedotin as consolidation therapy after autologous stem-cell transplantation in patients with Hodgkin's lymphoma at risk of relapse or progression (AETHERA): a randomised, double-blind, placebo-controlled, phase 3 trial. *Lancet*, 385(9980):1853-62.
- Nogová L, Reineke T, Eich HT, Josting A, Müller-Hermelink HK, Wingbermühle K, Brillant C, Gossmann A, Oertel J, Bollen MV, Müller RP, Diehl V, Engert A. (2005) Extended field radiotherapy, combined modality treatment or involved field radiotherapy for patients with stage IA lymphocyte-predominant Hodgkin's lymphoma: a retrospective analysis from the German Hodgkin Study Group (GHSG). *Ann Oncol.*, 16(10):1683-7.
- Peggs KS. (2018) Should all patients with Hodgkin lymphoma who relapse after autologous SCT be considered for allogeneic SCT? *Blood Adv.*, 2(7):817-820
- Peggs, K.S., Sureda, A., Qian, W. et al, (2007) Reduced-intensity conditioning for allogeneic haematopoietic stem cell transplantation in relapsed and refractory Hodgkin lymphoma: impact of alemtuzumab and donor lymphocyte infusions on long-term outcomes. *Br J Haematol.*, 139:70–80.
- Perales MA, Ceberio I, Armand P, et al. (2015) American Society for Blood and Marrow Transplantation. Role of cytotoxic therapy with hematopoietic cell transplantation in the treatment of Hodgkin lymphoma: guidelines from the American Society for Blood and Marrow Transplantation. *Biol Blood Marrow Transplant.*, 21(6):971-983.
- Proctor SJ, Wilkinson J, Jones G, Watson GC, Lucraft HH, Mainou-Fowler T, Culligan D, Galloway MJ, Wood KM, McNally RJ, James PW, Goodlad JR. (2012) Evaluation of treatment outcome in 175 patients with Hodgkin lymphoma aged 60 years or over: the SHIELD study. *Blood.*, 119(25):6005-15.
- Raemaekers JM, André MP, Federico M, Girinsky T, Oumedaly R, Brusamolino E, Brice P, Fermé C, van der Maazen R, Gotti M, Bouabdallah R, Sebban CJ, Lievens Y, Re A, Stamatoullas A, Morschhauser F, Lugtenburg PJ, Abruzzese E, Olivier P, Casasnovas RO, van Imhoff G, Raveloarivahy T, Bellei M, van der Borgh T, Bardet S, Versari A, Hutchings M, Meignan M, Fortpied C. (2014) Omitting radiotherapy in early positron emission tomography-negative stage I/II Hodgkin lymphoma is associated with an increased risk of early relapse: Clinical results of the preplanned interim analysis of the randomized EORTC/LYSA/FIL H10 trial. *J Clin Oncol.*, 32(12):1188-94.
- Rashidi, A., Ebadi, M., Cashen, A.F. (2016) Allogeneic hematopoietic stem cell transplantation in Hodgkin lymphoma: a systematic review and meta-analysis. *Bone Marrow Transplant.*, 51:521–528.
- Schlembach PJ, Wilder RB, Jones D, Ha CS, Fayad LE, Younes A, Hagemeister F, Hess M, Cabanillas F, Cox JD. (2002) Radiotherapy alone for lymphocyte-predominant Hodgkin's disease. *Cancer J.*, 8(5):377-83.
- Sirohi B, Cunningham D, Powles R, Murphy F, Arkenau T, Norman A, Oates J, Wotherspoon A, Horwich A. (2008) Long-term outcome of autologous stem-cell transplantation in relapsed or refractory Hodgkin's lymphoma. *Ann Oncol.*, 19(7):1312-9.

- Stamatoullas A, Brice P, Bouabdallah R, Mareschal S, Camus V, Rahal I, Franchi P, Lanic H, Tilly H. (2015) Outcome of patients older than 60 years with classical Hodgkin lymphoma treated with front line ABVD chemotherapy: frequent pulmonary events suggest limiting the use of bleomycin in the elderly. *Br J Haematol.*, 170(2):179-84
- Sureda A, Canals C, Arranz R, Caballero D, Ribera JM, Brune M, Passweg J, Martino R, Valcárcel D, Besalduch J, Duarte R, León A, Pascual MJ, García-Noblejas A, López Corral L, Xicoy B, Sierra J, Schmitz N. (2012) Allogeneic stem cell transplantation after reduced intensity conditioning in patients with relapsed or refractory Hodgkin's lymphoma. Results of the HDR-ALLO study - a prospective clinical trial by the Grupo Español de Linfomas/Trasplante de Médula Osea (GEL/TAMO) and the Lymphoma Working Party of the European Group for Blood and Marrow Transplantation. *Haematologica*, 97(2):310-7.
- The NCCN Clinical Practice Guidelines in Oncology for Hodgkin Lymphoma Version 3, April 16, 2018
- WHO classification of tumours of haematopoietic and lymphoid tissues. In Swerdlow SH, Campo E Harris NL. et al, eds (ed 4). Lyon France: IARC, 2008
- Wilder RB, Schlembach PJ, Jones D, Chronowski GM, Ha CS, Younes A, Hagemeister FB, Barista I, Cabanillas F, Cox JD. (2002) European Organization for Research and Treatment of Cancer and Groupe d'Etude des Lymphomes de l'Adulte very favorable and favorable, lymphocyte-predominant Hodgkin disease. *Cancer*, 94(6):1731-8.
- Wirth A, Yuen K, Barton M, Roos D, Gogna K, Pratt G, Macleod C, Bydder S, Morgan G, Christie D (2005) Long-term outcome after radiotherapy alone for lymphocyte-predominant Hodgkin lymphoma: a retrospective multicenter study of the Australasian Radiation Oncology Lymphoma Group. *Cancer*, 104(6):1221-9.
- Younes A, Santoro A, Shipp M, et al. (2016) Nivolumab for classical Hodgkin's lymphoma after failure of both autologous stem-cell transplantation and brentuximab vedotin: a multicentre, multicohort, single-arm phase 2 trial. *Lancet Oncol.*, 17(9):1283-1294
- Younes A, Santoro A, Shipp M, Zinzani PL, Timmerman JM, Ansell S, Armand P, Fanale M, Ratanatharathorn V, Kuruvilla J, Cohen JB, Collins G, Savage KJ, Trneny M, Kato K, Farsaci B, Parker SM, Rodig S, Roemer MG, Ligon AH, Engert A. (2016) Nivolumab for classical Hodgkin's lymphoma after failure of both autologous stem-cell transplantation and brentuximab vedotin: a multicentre, multicohort, single-arm phase 2 trial. *Lancet Oncol.*, 17(9):1283-94.