

detailed clinical follow-up. Clinical responses were considered as an ordinal variable (better, stable, worse) due to the lack of standardized response assessment.

Results: For the 33 patients included in the analysis, median age was 55 years, and 21 (64%) males. Seventeen patients (51%) underwent ASCT as first or later line therapy, 13 (39%) received PCDT (excluding steroids) as first or later line therapy, and 10 patients received other therapies. Two patients underwent ASCT twice for total of 19 ASCTs. Eight (42%) ASCT were performed as 1st line treatment and 11 (58%) as later line treatments. Four patients received melphalan 200 mg/m², 3 at 140 mg/m² and for the remaining patients the dose of melphalan was unknown. No patients died within 100 days from ASCT. Across all lines of therapy, 14 patients (82%) had clinical improvement after ASCT compared to 54% of patients treated with PCDT and 27% treated with other immunomodulatory drugs. Overall, 63 % of patients receiving an ASCT achieved a complete hematologic response/very good partial response (CR/VGPR) compared to 23 % with PCDT or other therapies. Overall, clinical response rates for patients ever achieving CR/VGPR or better was 93% versus 37% for those achieving <CR/VGPR. For patients receiving ASCT at any time, 5-year overall survival from diagnosis was 94%, compared to 73% for patients never having an ASCT ($P = .3$).

Conclusion: Our results suggest that ASCT in patients with SLONM/MGUS can be performed safely without increased mortality. Limitations of our study include a small sample size, some publication with limited information and “selection” bias for several of the cases. The incremental benefit of ASCT over PCDT as well as the significance of deep clonal responses requires further evaluation.

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Disease Characteristics and Outcomes in Adult Patients with Diffuse Large B-Cell Lymphoma Following Autologous Stem Cell Transplant

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Background: Despite overall improved outcomes in patients (pts) with diffuse large B-cell lymphoma (DLBCL), relapsed/refractory (r/r) disease remains a major cause of morbidity and mortality. At relapse, high-dose chemotherapy with autologous stem cell transplant (ASCT) is the preferred therapy for eligible pts. However, relapse after ASCT is still frequent and associated with poor prognosis. Subsequent transplant may have a role in select pts, but outcomes in these pts are unclear. This study evaluated the characteristics and survival of adult pts with DLBCL who received ASCT in a real-world setting.

Methods: In this retrospective analysis, we used one of the largest observational databases on SCT, the Center for International Blood and Marrow Transplant Research (CIBMTR) registry. The study included 5834 adult pts with DLBCL who had ASCT between 2009 and 2013. Baseline disease stage and prior chemotherapy data were summarized where available.

Results: Mean age at ASCT was 57 ± 12 y, 61% were male, 72% had stage 3/4 disease, 86% had received ≥ 2 prior lines of chemotherapy, and the mean time from diagnosis to first ASCT was 35 ± 43 mo. At the time of first transplant, 16% were in first complete remission (CR1), 38% ≥ CR2, 25% partial remission, 13% relapse, and 7% primary induction failure.

Median survival time following ASCT was 72 mo (95% CI, 64 mo-NE) with 5-y survival rate of 54% (52%-56%). 2752 pts (47%) relapsed following first ASCT, with a median survival of 12 mo (11-14 mo) after relapse. Of these, 2159 (78%) relapsed within 1 y, the median survival after relapse was 9 mo

(8-10 mo) and the 5-y survival probability was 26% (23%-29%). 367 pts (13%) who relapsed after ASCT had a subsequent SCT (mean age of these pts, 51 ± 11 y). Median survival was 25 mo (17-40 mo) compared with 9 mo (8-11 mo) in relapsed pts who did not have a subsequent transplant. In ASCT recipients, the cause of death was primary disease 80%, infection 5%, organ failure 4%, new malignancy 4%, and other 7%. Primary disease was the cause of death in 91% of those who relapsed after ASCT.

326 pts developed secondary malignancies following ASCT. Myelodysplastic syndromes was the most common ($n = 103$), followed by skin cancer ($n = 76$), acute myeloid leukemia ($n = 19$), and others ($n = 128$). The 3- and 5-y cumulative incidences of secondary malignancies were 6% (5%-7%) and 10% (9%-11%), respectively.

Conclusions: r/r DLBCL is an area of significant unmet need. Although ASCT is standard treatment for eligible pts, its benefits are limited, with high rates of relapse, poor prognosis after relapse following ASCT, and risk of secondary malignancies. 47% of pts relapsed following ASCT and only 13% had a subsequent transplant. There is an urgent need for novel therapies, including those that are in late-stage development, such as chimeric antigen receptor T cells targeting CD19. These results may serve as a historical control to assess the effects of new treatments.

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Modifications to the “Classical” Autologous Hematopoietic Stem Cell Transplantation in Multiple Sclerosis: A Less Toxic Approach is Feasible and Improves the Neurological Condition. A Mexican Perspective Guillermo Jose Ruiz-Argüelles¹,

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Background: In an effort to reset the immune system, patients with multiple sclerosis (MS) have been autografted with stem cells. We have shown that these grafts can be performed on an outpatient basis with non-frozen peripheral blood hematopoietic stem cells (PBSC) and a conditioning regimen of cyclophosphamide (Cy) and rituximab, the so-called “Mexican method.”

Material and Methods: Since 2015, all consecutive patients with MS were autografted in two centers in Mexico, following the “Mexican method” (*ClinicalTrials.gov* identifier NCT02674217), on an outpatient basis and employing PBSC. Mobilization was accomplished with Cy and filgrastim (G-CSF); cumulative dose of Cy was 200 mg/kg. Cy doses were delivered in two separate blocks, nine days apart; the first block with the aim to mobilize PBSC and purge lymphoid cells, while the second to further purge lymphoid cells and condition the graft. After granulocyte recovery, patients were administered rituximab (375 mg/m²) and again (100 mg) every two months, over a 12-mo. period. The extended disability status scale (EDSS) score was assessed every 3 mos. after transplant.

Results: 452 patients were autografted; median age was 47 years; time to neutrophil recovery $> .5 \times 10^9/L$ was 7 days (0-12). The outpatient procedure was completed in 437 patients (96.6%); 15 patients were admitted to the hospital due to

neutropenic fever (3), persistent nausea / vomiting (4), iatrogenic pneumothorax (4), dehydration (2), and other causes (2). Transplant related mortality was 1/452. The 12-mo. progression-free survival was 68%. Improvement or stabilization of the EDSS score at 12 mos. was observed in 100%, 72%, and 47% of patients with primary progressive (PP), relapsing remitting (RR) or secondary progressive (SP) forms of MS. In patients with a response, EDSS values decreased significantly from $5.21 \pm .21$ to $3.26 \pm .24$ three mo. after grafting ($p < .0001$) and from $4.54 \pm .37$ to $3.32 \pm .39$ twelve mo. after grafting ($p < .0001$).

Conclusions: The Mexican autograft method in MS carries a very low morbimortality, induces neurological responses in MS, even in variants in which other autograft protocols have not proven useful, such as SP-MS and PP-MS.

Additional information and follow-up are needed to further support these observations.

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MYC Gains in Diffuse Large B-Cell Lymphoma is Associated with Poor Progression Free Survival after Autologous Stem Cell Transplantation

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Background: MYC translocations are seen in up to 15% of Diffuse large B-cell lymphoma (DLBCL). Studies have demonstrated MYC translocations and MYC protein expression to be associated with inferior survival. However, MYC copy number gains (gains / amplification) can be detected even in the absence of MYC translocation and occur at approximately 7-21% of DLBCL. Studies evaluating the effect of MYC gains on outcomes of autologous stem cell transplantation (auto-SCT) are lacking.

Due to the limited data on MYC gains and its effect on auto-SCT, we performed this retrospective single institution study to evaluate the outcomes of DLBCL patients undergoing auto-SCT.

Methods: We retrospectively reviewed all lymphoma patients that underwent auto-SCT between 2006-2015 at Washington University in St. Louis. We included patients aged >18, and who underwent auto-SCT for transformed follicular or relapsed DLBCL and excluded patients with unknown MYC status / primary CNS lymphoma. MYC gain was defined as more than 2 copies per cell identified through FISH utilizing a commercial MYC (8q24) break apart probe. Patients were stratified based on the presence or absence of MYC gain. Survival outcomes were described using Kaplan-Meier methods. Multivariate analysis was performed using Cox proportional hazard model. Cumulative incidence of relapse (CIR) was estimated while accounting for the competing risks.

Results: A total of 175 patients (33 MYC gain+) were identified and included in the final analyses. No significant differences in demographics, transplantation characteristics were noted between the groups except for patients with MYC gain were more likely to have bulky disease (15% vs 39%), received R-CHOP as salvage chemotherapy and more likely to be in PR (partial remission) (52% vs. 29%). Median PFS was 2.7 years versus 8 years respectively in patients with MYC gain versus no MYC gain (Figure 1). On univariate analysis, MYC gain was associated with inferior PFS ($P = .02$) and a trend

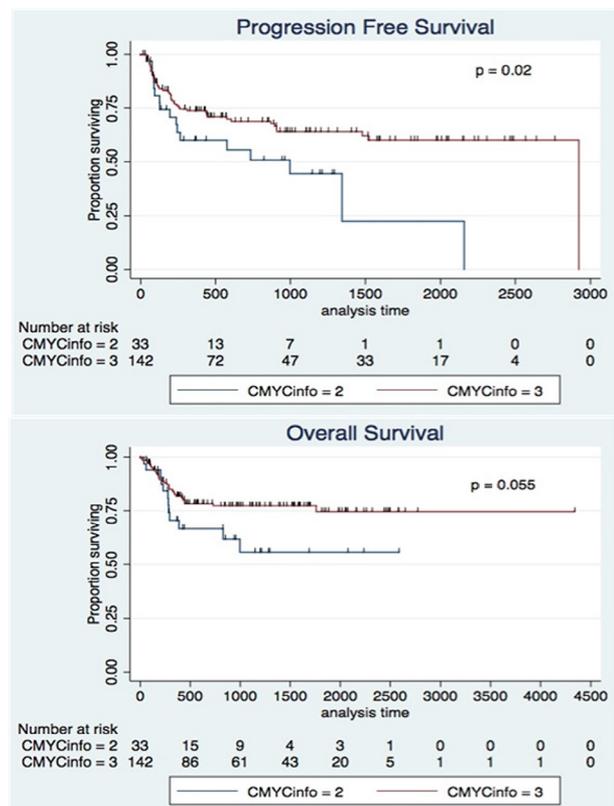


Figure 1. K-M plot demonstrating progression free survival and overall survival between MYC gain and no MYC gain groups.

towards inferior OS ($P = .055$). In multivariate analysis, although MYC gain was associated with increased risk of relapse, was not significant (HR 1.4; 95% CI .81-2.43; $P = .23$) after adjusting for IPI score and disease status at the time of auto-SCT. Remission status at transplant was the only significant predictor for both risk of relapse and OS in multivariate analysis.

Conclusions: In our study, MYC gain in transformed follicular/relapsed DLBCL was associated with inferior progression free survival post-auto-SCT and a trend towards inferior OS. MYC gain was not significant in multivariate model possibly due to small sample size. This could be further due to inclusion of the variable “disease status at transplant”, which was not balanced across MYC groups as patients with MYC gain were more likely to be in PR.

Further analysis including a larger dataset is warranted to evaluate these findings.

Patient Characteristics by MYC gain status		MYC gain		P-value
Variable		Positive N=33	Negative N=142	
Median age (range)		61 (41-74)	60 (23-76)	0.13
Sex (%)	Male / Female	22 (66) / 11 (33)	52 (37) / 90 (63)	0.72
Lymphoma type	Transformed follicular lymphoma (%)	10 (30)	41 (29)	0.87
	Relapsed DLBCL (%)	23 (70)	101 (71)	
Induction/salvage chemotherapy (%)	R-ICE	22 (67)	121 (85)	0.001
	R-DHAP	3 (9)	10 (7)	
	R-GemOx	0	5 (4)	
	R-CHOP	8 (24)	6 (4)	
Disease status at transplantation	CR	16 (48)	101 (71)	0.02
	PR	17 (52)	41 (29)	
Bulky	Yes	5 (15)	49 (35)	0.03
	No	28 (85)	93 (65)	
IPI score	0-2	19 (58)	81 (57)	0.96
	≥3	14 (42)	61 (43)	
Cell of origin subtype	GCB	21 (64)	72 (57)	0.50
	Non-GCB	12 (36)	54 (43)	

Legend: CR; complete response; PR; partial response; VGPR: very good partial response; PD: persistent disease; GCB-germinal center B-cell like;