

Clinicopathological characteristics of T-cell non-Hodgkin lymphoma arising in patients with immunodeficiencies: a single-center case series of 25 patients and a review of the literature

Marieke L. Nijland,^{1#} Lianne Koens,^{2#} Steven T. Pals,³ Ineke J.M. ten Berge,¹ Frederike J. Bemelman¹ and Marie José Kersten^{4*}

¹Renal Transplant Unit, Department of Nephrology, Academic Medical Center; ²Department of Pathology, Academic Medical Center; ³Department of Pathology and Lymphoma and Myeloma Center Amsterdam (LYMMCARE), Academic Medical Center and ⁴Department of Hematology and Lymphoma and Myeloma Center Amsterdam (LYMMCARE), Academic Medical Center, Amsterdam, the Netherlands

#MLN and LK contributed equally to this work.

©2018 Ferrata Storti Foundation. This is an open-access paper. doi:10.3324/haematol.2017.169987

Received: May 3, 2017.

Accepted: December 13, 2017.

Pre-published: December 21, 2017.

Correspondence: m.j.kersten@amc.uva.nl

Reference	Disorder	Prior therapy (IST/CT)	Hist. subtype	No of cases
HIV				
Gilardin L et al. Br J Haematol. 2013;161(6):843-51		None (ART: 13)	PTCL, NOS: 9 ALCL, ALK-: 4 NKTCL: 3 HSTCL: 1	17
Castillo JJ et al. Am J Hematol. 2011;86(3):256-61		None (ART: 10)	PTCL, NOS: 31 ALCL, ALK-: 7 ALCL, ALK NR: 4 NKTCL: 7 AITL: 2	51
Perez K et al. Leuk lymphoma. 2010;51(3):430-8		None (ART: 7)	ALCL, ALK+: 2 ALCL, ALK-: 16 ALCL, ALK NR: 19	37
Biggar RJ et al. J Acquir Immune Defic Syndr. 2001;26(4):371-6		None	CTCL: 48 PTCL, NOS: 36 ATLL: 11 ENKL, nasal type: 1	96
Total				201
Post transplantation				
Seçkin D et al. Am J Tr. 2013; 13:2146-2153		Steroids: 20 Cy: 12 MMF: 11 Tac: 9 Azathioprine: 8	CTCL: 24	24
Herreman A et al. Leuk lymphoma. 2013;54(10):2190-9		Recorded for 9 pts: CNI: 9 Azathioprine/ MMF (not specified): 8 Steroids: 7	PTCL, NOS: 6 HSTCL: 5 CTCL: 12 ALCL, ALK+: 1 ALCL, ALK NR: 5 ENKL, nasal type: 2 Prec T-LBL: 4 NKL: 3 Other: 5	43
Swerdlow SH. Am J Clin Pathol. 2007;127(6):887-95		IS regimens: NR	PTCL, NOS: 47 HSTCL: 18 CTCL: 12 ALCL, ALK+: 3 ALCL, ALK NR: 7 T-LGL: 9 ATLL: 6 ENKL, nasal type: 6 NKTCL: 4 Prec T-LBL: 4 SPTCL: 3 NKL: 3 EATL: 1 IVL: 1 Other: 6	130
Total				197
Autoimmune diseases				
Gammon B et al. J Am Acad Dermatol. 2014 sep;71(3):555-60*	CD	Adalimumab	CD8+ granulomatous CTCL	1
Singh BK et al. Int J Rheum Dis. 2014 Jun;17(5):573-7	JIA	MTX	ALCL, ALK-	1
Subramaniam K et al. Intern Med J. 2014 Mar;44(3):287-90	Psoriasis: 1; CD: 2	Etanercept, CsA, MTX: 1; Azathioprine: 2	HSTCL	3
Terroso G et al. Acta Rheumatol Port. 2014 Jan-Mar;39(1):77-81	RA	MTX	ENKL, nasal type	1
Shukla T et al. Can J Gastroenterol Hepatol. 2014 Jan;28(1):11-2	CD	Infliximab, MTX	ALCL, ALK+	1
Kollepara SS et al. BMJ Case Rep. 2013 Oct 10	CD	Infliximab, MTX	PTCL, NOS	1
Jung KH et al. Mod Rheumatol. 2013 Jul;23(4):817-22	AS	Etanercept	AITL	1
Deepak P et al. Am J Gastroenterol 2013; 108:99-105	CD: 35; UC:7; RA: 34; AS: 4; Psoriasis: 10	TNA- α -i: 24 TNA- α -I + thiopurine: 66	T cell precursor NHL: 3 CTCL: 14 ALCL, ALK NR: 6 PTCL, NOS: 3 AITL: 1 SPTCL: 3 HSTCL: 29 ENKL, nasal type: 2 NHL, NOS, T cell: 29	90
Park JH et al. Dermatology. 2012;225(3):259-63	JRA	Adalimumab	CTCL (LP)	1
De Angelis F et al. Leuk Res. 2012 Sep;36(9):e199-201	RA	Etanercept	ALCL, ALK-	1
Herrinton LJ et al. Pharmacoepidemiol Drug Saf. 2012 Jan;21(1):49-52	CD	Azathioprine,	HSTCL	1

		infliximab		
Bes C et al. Rheumatol Int. 2011 Apr;31(4):533-5	RA	MTX	ALCL, ALK NR	1
Quéreuz G et al. Acta Derm Venereol. 2010 Nov; 90(6):616-20	Psoriasis	MTX, CsA, etanercept	CTCL	1
Nemoto Y et al. Int J Hematol. 2010 Sep; 92(2):364-8	RA	MTX	SPTCL	1
Huwait H et al. Am J Dermatopathol. 2010 Feb;32(1):65-70	RA	MTX	CTCL (CCL)	1
Koens L et al. Acta Derm Venereol. 2009 Nov;89(6):653-4	RA	Etanercept	CTCL	1
Lourari S et al. J Eur Acad Dermatol Venereol. 2009 Aug; 23(8):967-8	RA	Etanercept; Infiximab and MTX	CTCL (MF)	2
Gumbs AA et al. Ann Surg Oncol. 2009 Jul;16(7):2014-7	UC	6-MP, infliximab	HSTCL	1
Outlaw W et al. Inflamm Bowel Dis. 2009 Jul;15(7):965-6.	CD	Infliximab	HSTCL	1
Beigel F et al. Nat Rev Gastroenterol Hepatol. 2009 Jul;6(7):433-6	CD	Azathioprine	HSTCL	1
Schmidt LA. J Hematop. 2009 Jul;2(2):121-6	UC	Infliximab	PTCL, NOS	1
Michot C et al. Br J Dermatol. 2009 Apr;160(4):889-90	RA	Etanercept	SPTCL	1
Burger DC et al. Med J Aust. 2009 Mar 16;190(6):341-2	CD	Infliximab	HSTCL	1
Sanli H et al. J Drugs Dermatol. 2007 Aug;6(8):834-6	AS	Infliximab	CTCL (MF)	1
Dauendorffer JN. Br J Dermatol. 2007 Apr;156(4):742-3	AS	Infliximab	CTCL (SS)	1
Mackey AC et al. J Pediatr Gastroenterol Nutr. 2007 Feb;44(2):265-7	7 CD; 1 UC	Thiopurine, infliximab	HSTCL	8
Kim SK et al. Rheumatol Int. 2006 Jun;26(8):775-6	RA	MTX	ALCL, ALK+	1
Berthelot C. Clin Lymphoma Myeloma. 2006 Jan;6(4):329-32	Psoriasis;RA	Efalizumab; infliximab	CTCL (CD8+)	2
Mougel F. Dermatology. 2006;213(3):239-41	AD	CsA	CTCL (ALCL)	1
Dalle S et al. Br J Dermatol. 2005 Jul;153(1):207-8	AS	Adalimumab	CTCL (MF)	1
Thay M et al. J Pediatr Gastroenterol Nutr. 2005 Feb; 40(2):220-2	CD	6MP, infliximab	HSTCL	1
Yamamoto H. Acta Haematol. 2005;114(2):108-12	SS	Betamethason, cy	AITL	1
Adams AE et al. J Am Acad Dermatol. 2004 Oct	Psoriasis:1; CD:1	Etanercept: 1; 6MP, infliximab:1	CTCL (MF:1; ALCL:1)	2
Mahé E et al. Br J Dermatol. 2003 Jul;149(1):170-3	Psoriasis	CsA, infliximab	CTCL (CD30+/ALCL?)	1
Suvajdzic N et al. Med Oncol. 2003;20(4):409-12	SLE	Prednisone, azathioprine	ALCL, ALK-	1
Katsura Y et al. Int J Hematol. 2003 Apr;77(3):282-5	Behçet disease	Prednisolone, methylprednisolone	Diffuse mixed cell lymphoma (cytotoxic T-cell type)	1
Navarro JT et al. Leuk Lymphoma. 2003 Mar;44(3):531-3	CD	Azathioprine	HSTCL	1
Corazza M et al. Dermatology. 2003;206(4):330-3	Psoriasis	CsA	CTCL (ALCL)	1
Pielop JA et al. Int J Dermatol. 2001 Aug;40(8):505-11	Psoriasis	CsA	CTCL (MF)	1
Tournadre A. Mayo Clin Proc. 2001 Aug;76(8):845-8	RA	MTX	CTCL (EBV+)	1
Le Goff P. Rev Rhum Engl Ed. 1998 Apr;65(4):283-6	RA	MTX	CTCL	1
Vassilopoulos D. J Rheumatol. 1998 Feb;25(2):389-91	RA	Chronic IS therapy	EBV+ TCL	1
Total				143
Hematologic malignancies				
Kilner MF et al. BMJ Case Rep. 2013 Dec.	DLBCL	Rituximab + CT	PTCL, NOS	1
Ishida M et al. Int J Clin Exp Pathol. 2013 Oct 15;6(11):2560-8	DLBCL (and IgG4-related disease)	R-CHOP	ALCL, Alk-	1
Papalas JA et al. Am J Dermatopathol. 2010 Dec;32(8):821-7	HD	MOPP	CTCL (ALCL), pyogenic variant	1
Herro E et al. J Am Acad Dermatol. 2009 Aug;61(2):271-5	B-CLL/SLL:3; PDD:3; DLBCL:1	None:3; Melfalan: 1; CA: 1; CT (multiple agents): 2	CTCL (MF/SS)	7
Marschalkó M et al. Br J Dermatol. 2007 Dec;157(6):1291-3	B-CLL	None	CTCL (MF and ALCL)	1
Barzilai A et al. Br J Dermatol. 2006 Aug;155(2):379-86	B cell lymphomas: 3; B-CLL: 1	CT (multiple agents): 3; none:1	CTCL (MF)	4
Sivaju N et al. Br J Haematol. 2004 May;125(3):266	B-CLL	Chlorambucil, steroids, fludarabine	Nasal and CTCL	1
François A et al. Am J Surg Pathol. 1997 Jul;21(7):781-90	HD	MOPP/ABV	HSTCL	1
Singh L et al. Leuk Lymphoma. 2014 Sep;55(9):2192-5	B-CLL	CT (multiple agents):7; none:6; unknown:1	CTCL (MF/SS)	14
Chang MB et al. Int J Dermatol. 2014 Aug;53(8):966-70	B-CLL	CT (multiple agents)	CTCL	5
Boyer DF et al. Am J Surg Pathol. 2014 Feb;38(2):279-88	B-CLL/SLL	CT (multiple agents)	ALCL, Alk+; PTCL, NOS	2
Alomari A. Int J Surg Pathol. 2013 Jun;21(3):303-8	SLL/CLL	CT (multiple agents)	PTCL, NOS	1
Liu T et al. Int J Surg Pathol. 2010 Oct;18(5):424-8	B-CLL	CT (multiple agents)	ALCL, ALK+	1

Martinez et al. Am J Surg Pathol. 2004 Jul;28(7):849-58	B-CLL	Not recorded	PTCL, NOS:6; CTCL (MF) and NK cell leukemia: 1	7
Volk AL et al. Ann Diagn Pathol. 2002 Jun;6(3):172-82	B-CLL	CT (multiple agents)	CTCL (MF)	1
Martin-Subero JI et al. Am J Hematol. 2001 Dec;68(4):276-9	B-CLL	None	PTCL, NOS	1
Lee A et al. Am J Clin Pathol. 1995 Mar;103(3):348-52	B-CLL	CT (multiple agents)	AITL	1
Harland CC et al. Br J Dermatol. 1992 Nov;127(5):519-23	B-CLL	None:2; steroids, CA:1	CTCL	3
Strickler JG et al. Am J Clin Pathol. 1992 Oct;98(4):424-9	B-CLL	Steroids, CA	"Large cell lymphoma of T cell phenotype" (ALCL?)	1
Sheibani K et al. Blood. 1983 Dec;62(6):1176-81	B-CLL	CT (multiple agents)	CTCL	1
Total				55
Primary immunodeficiencies				
Gammon B et al. J Am Acad Dermatol. 2014 sep;71(3):555-60 ^a	CVID; XLA		CD8+ granulomatous CTCL	2
Jesus AA et al. Clin Dev Immunol. 2011;2011:428703	CVID		HSTCL	1
Suan D et al. Pathology. 2011 Jan;43(1):75-8	CVID		ALCL, Alk-	1
Chang CH et al. Kaohsiung J Med Sci. 2010 Apr;26(4):206-10	HIES		NKL, skin	1
Moradi S et al. Iran J Allergy Asthma Immunol. 2009 Dec;8(4):215-8	ICL		ENKL, nasal type	1
Barete S et al. Acta Derm Venereol. 2009 Nov;89(6):627-30	ICL		CTCL (ALCL)	1
Kanavaros P et al. Leuk Lymphoma. 2001 Jun;42(1-2):235-8	XLA		PTCL, NOS	1
Gottesman SR et al. Leuk Lymphoma. 1999 Feb;32(5-6):589-95	CVID		PTCL, NOS	1
Total				9

Table S1 Overview of cases of T cell lymphomas following immunodeficiencies reported in the literature

^a This publication includes cases with varying underlying disorders, and is therefore also listed in the corresponding table.

Abbreviations: 6MP: 6-mercaptopurine; ABV: doxorubicine, vinblastine, bleomycine; AD: atopic dermatitis; AITL: angioimmunoblastic T cell lymphoma; ALCL: anaplastic large cell lymphoma; ALK: anaplastic lymphoma kinase; ART: antiretroviral therapy; AS: ankylosing spondylitis; ATLL: Adult T-cell leukemia/lymphoma; Prec T-LBL: Precursor T cell lymphoblastic lymphoma ; CA: chlorambucil; CCL: composite cutaneous lymphoma; CD: Crohn's disease; CsA: cyclosporine; CT: chemotherapy; CTCL: primary cutaneous T cell lymphoma; CVID: common variable immunodeficiency; Cy: cyclophosphamide; DLBCL: diffuse large B-cell lymphoma; EATL: enteropathy-associated T-cell lymphoma; ENKL: extranodal NK/T-cell lymphoma; HD: Hodgkin's disease; HIES: Hyper-IgE syndrome; HSTCL: hepatosplenic T cell lymphoma; ICL: idiopathic CD4+ lymphocytopenia; IST: Immunosuppressive therapy; IVA: intravascular lymphoma; JIA: juvenile idiopathic arthritis; JRA: juvenile rheumatoid arthritis; LP: Lymphomatoid papulosis; MF: mycosis fungoides; MMF: mycophenolate mofetil; MOPP: mechlorethamine, vincristine, procarbazine, and prednisolone; MTX: methotrexate; NKL: natural killer cell lymphoma/leukemia; NKL skin: natural killer cell lymphoma involving the skin; NKTL: natural killer/T-cell lymphoma; NR: not recorded or not known; PDD: Plasmacellular proliferative disorders; PTCL, NOS: Peripheral T cell lymphoma, not otherwise specified; SLL: small lymphocytic lymphoma; SPTCL: subcutaneous panniculitis-like T cell lymphoma; Tac: tacrolimus; T-LGL: T-cell large granular lymphocytic leukemia; RA: rheumatoid arthritis; SS: systemic sclerosis; R-CHOP: rituximab, cyclophosphamide, doxorubicin, vincristine and prednisolone; SS: Sézary syndrome; TNF- α -i: TNF- α -inhibitor; Tx: transplantation; UC: ulcerative colitis, XLA: X-linked agammaglobulinemia