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NEW MARKERS FOR LYMPHOMA DIAGNOSIS

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Rticc
Red Temática de Investigación Cooperativa en Cáncer

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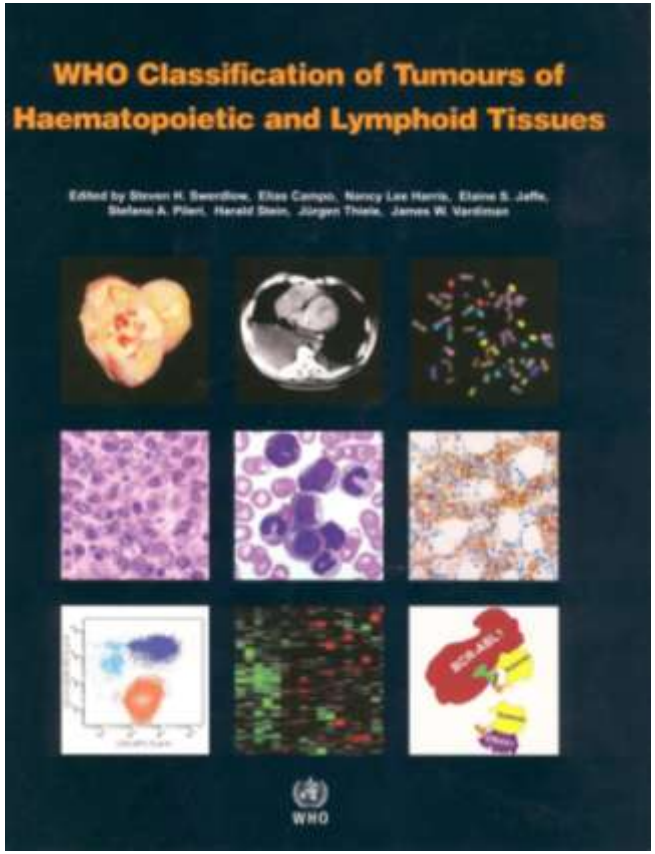
INVESTIGACIÓN CONTRA EL CÁNCER

NEW (&old) MARKERS FOR LYMPHOMA DIAGNOSIS



- **B CELL LYMPHOMAS:**

  Agressive B cell lymphomas: BL, DLBCL, Intermediate BL-DLBCL, Plasmablastic Lymphomas, EBV+ DLBCL of the elderly, MCL.

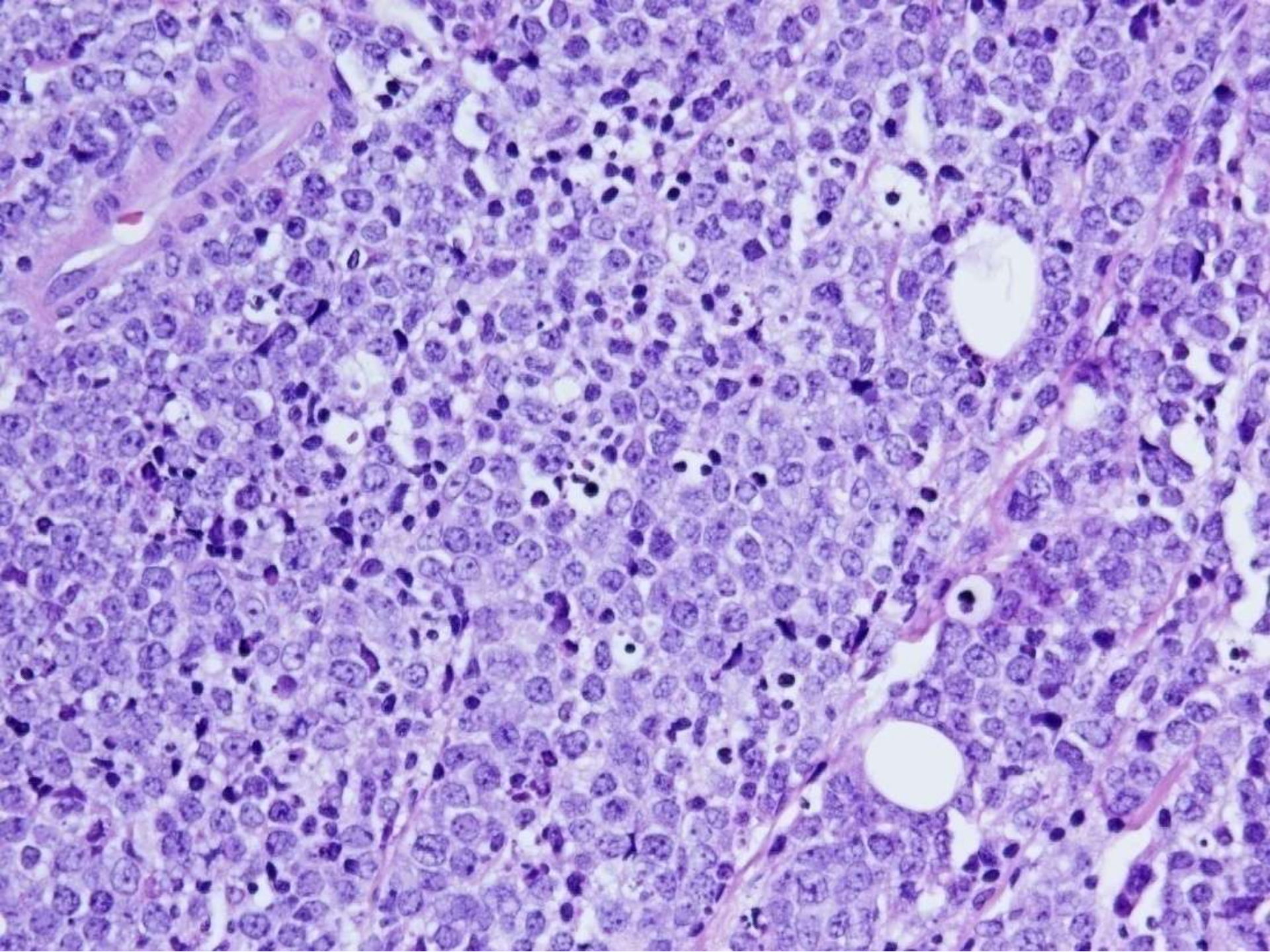
- **T CELL LYMPHOMAS:**

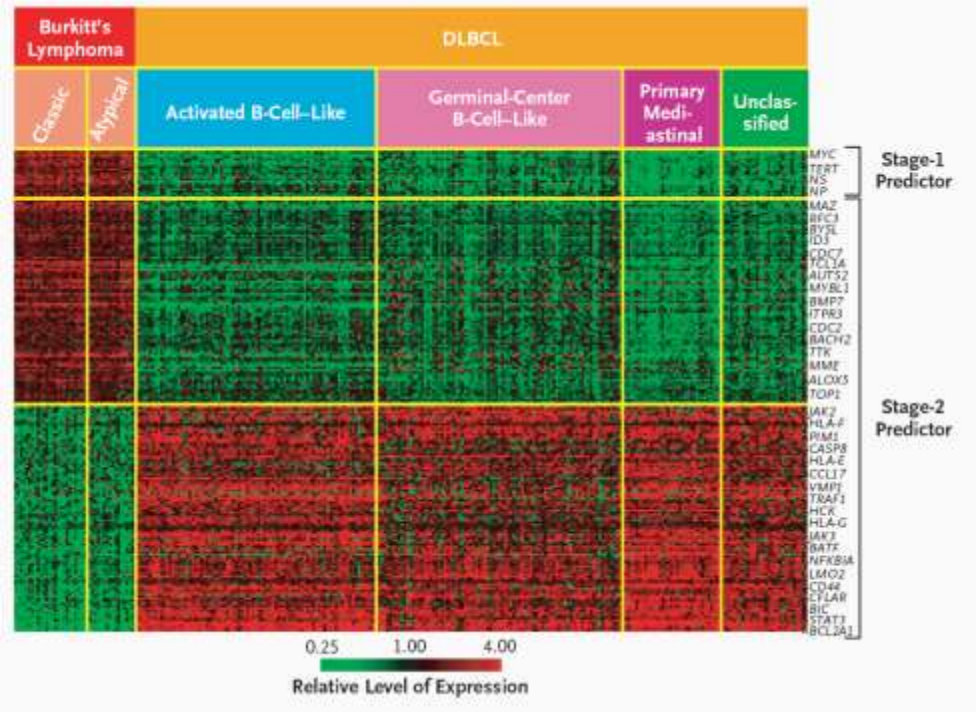
  TFh Lymphomas.

  Cutaneous Agressive T cell Lymphoma (Gamma-Delta TCL & others).

- **HODGKIN LYMPHOMAS:** Markers for the microenvironment.

- **BLASTIC PLASMACYTOID DENDRITIC CELL NEOPLASMS.**





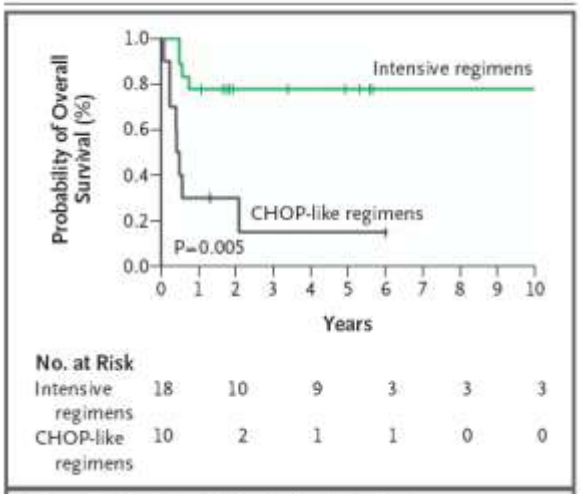
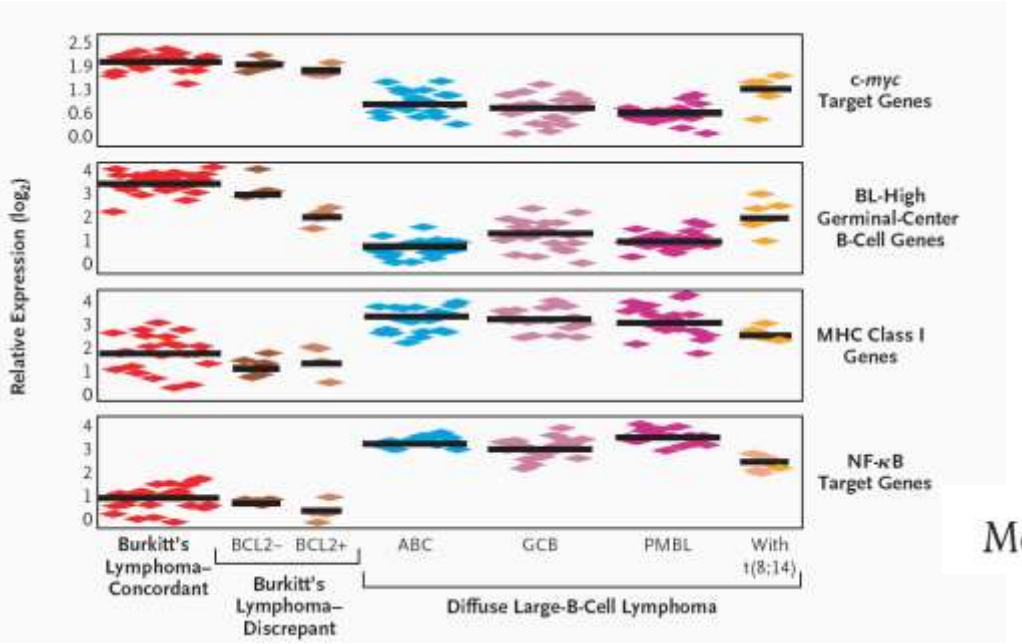


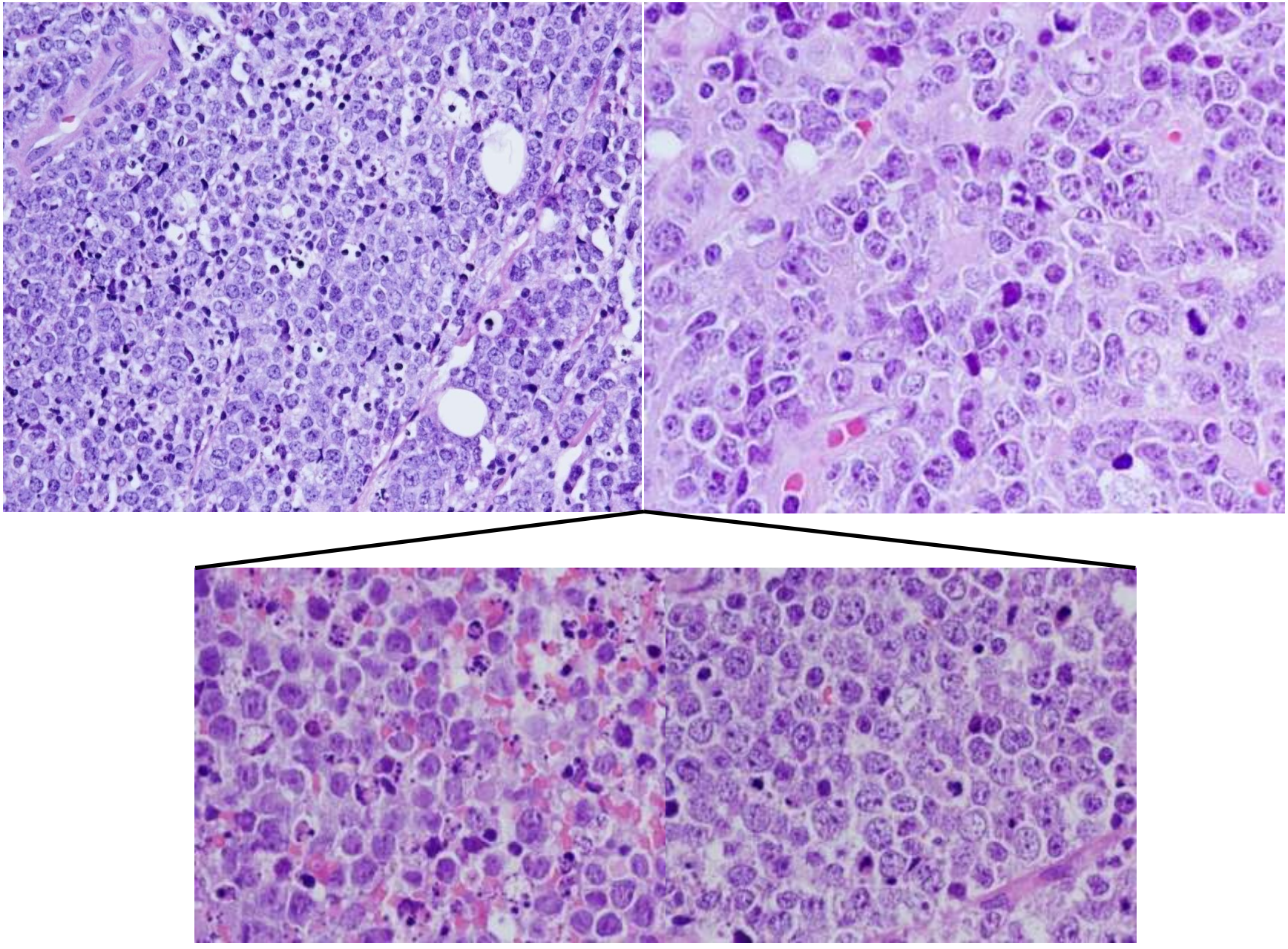
Figure 4. Kaplan–Meier Survival Estimates among Patients with Burkitt's Lymphoma and Diffuse Large-B-Cell Lymphoma.

The analysis includes the 28 children and adults with a molecular diagnosis of Burkitt's lymphoma for whom complete clinical information was available, according to the treatment received. Tick marks denote patients who were alive at the time of last follow-up.



Molecular Diagnosis of Burkitt's Lymphoma

Dave et al NEJM (2006)



Diagnostic criteria for BL, Intermediate BCL between BL and DLBCL and DLBCL.

Panel of markers used in the diagnosis

IHQ: CD20, CD10, bcl2, bcl6, TCL1, CD44, MUM1, p53, Ki67**; FISH**: MYC, bcl2. ; **ISH:** EBV-EBER.

Categories:

1. BL: morphologically typical BL with **BL phenotype (CD10pos, bcl6pos, bcl2neg, Ki67 100%)** and commonly but not always **TCL1pos, CD44neg**). Bcl2 can be positive in otherwise typical BL. If BCL2 is translocated the case should be considered Intermediate BCL.

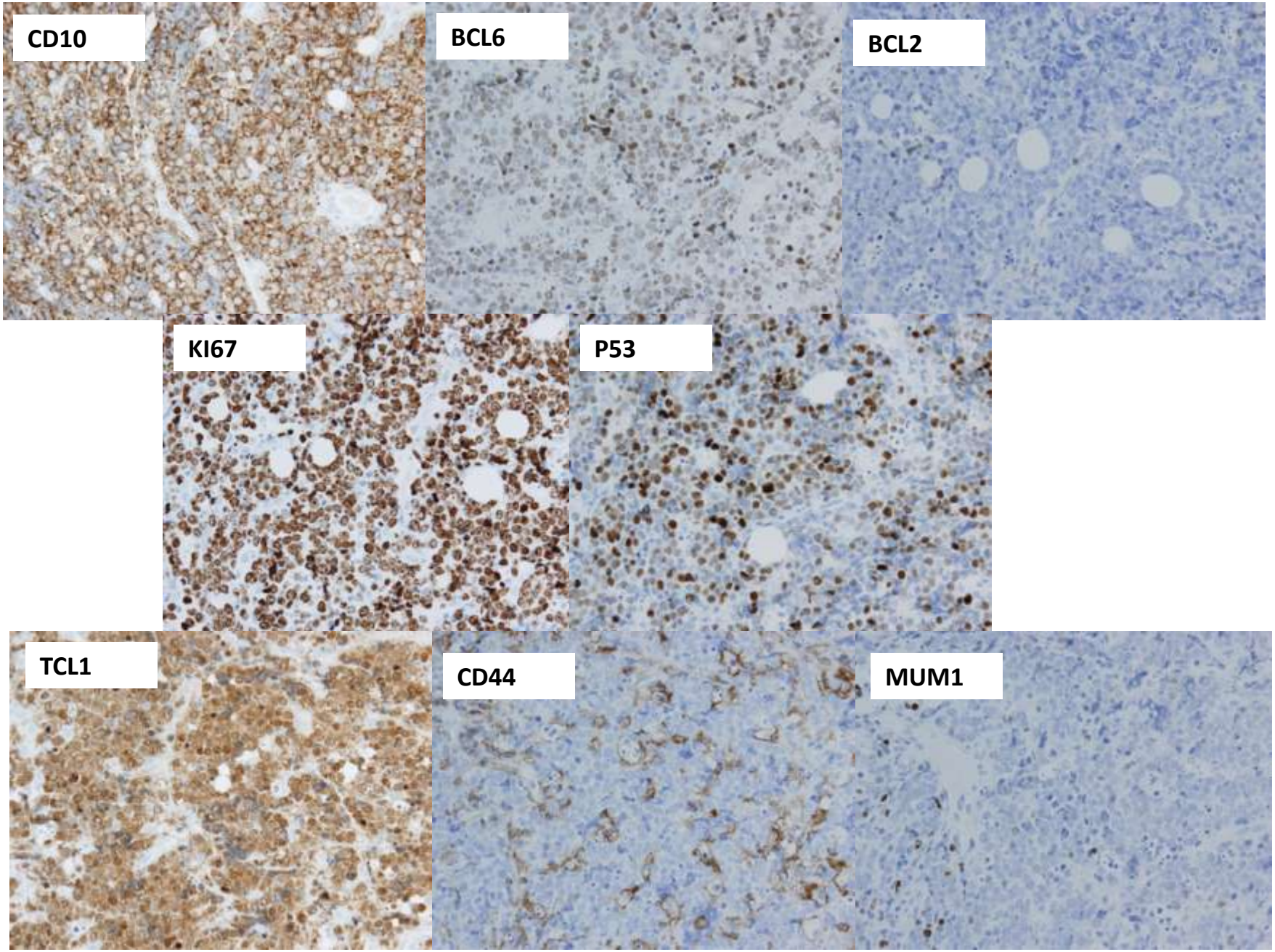
2. Intermediate BCL (3 groups)

a) Morphologically typical BL with atypical phenotype (non BL phenotype, i.e cases CD10 neg & bcl2pos; TCL1neg &CD44pos)
b) Morphologically Intermediate with BL phenotype (CD10pos, bcl6pos, bcl2neg, Ki67 100%) & CMYC translocation.
c) Double hit lymphomas: Morphologically heterogenous (morphologically blastoid + others intermediate with DLBCL; FISH: cmyc+bcl2, cmyc+ other traslocations).

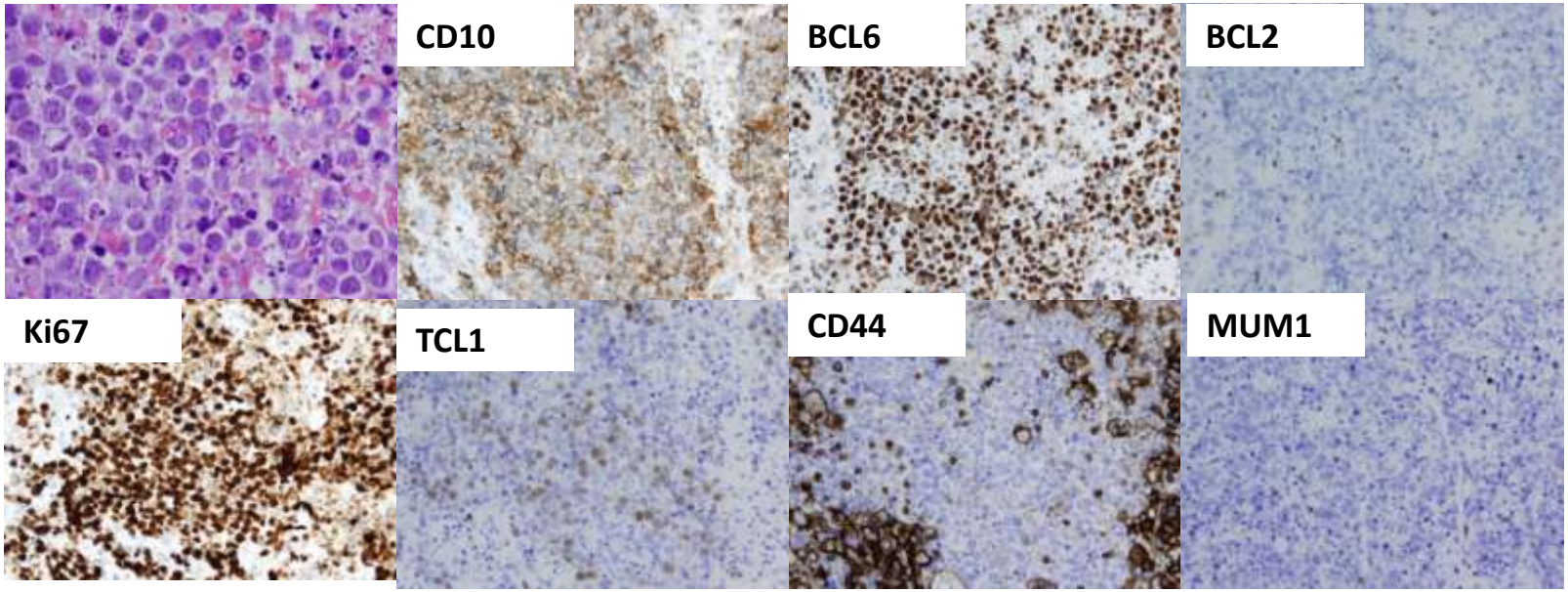
3. DLBCL (Cases of conventional DLBCL with CMYC traslocation are included in category 3).

Morphological BL and DLBCL as described in the WHO classification.

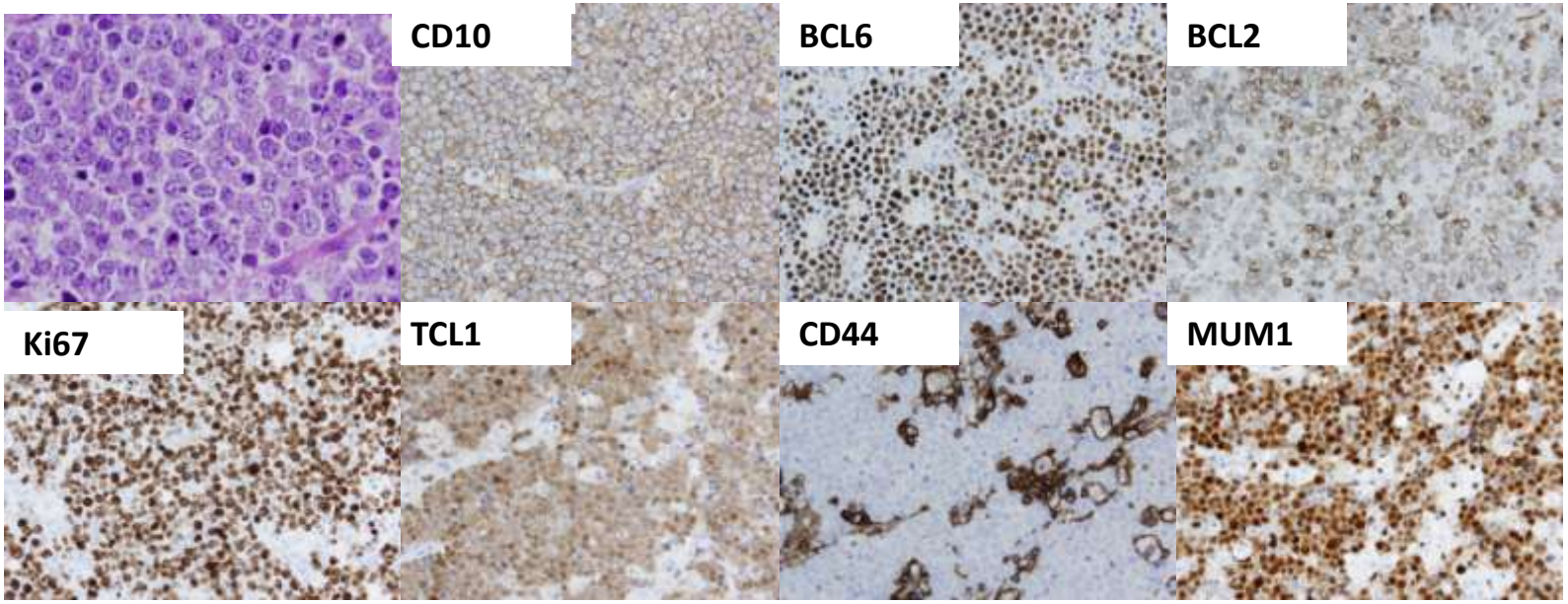
BL phenotype



Intermediate A (aBL)



Intermediate B (“double hit”)



The pre-B-cell receptor associated protein VpreB3 is a useful diagnostic marker for identifying *c-MYC* translocated lymphomas

Scott J. Rodig,[1] Jeffery L. Kutok,[1] Jennifer C. Paterson,[2] Hiroaki Nitta,[3] Wenjun Zhang,[3] Bjoern Chapuy,[4] Lynette K. Tumwine,[5] Santiago Montes-Moreno,[6] Claudio Agostinelli,[7] Nathalie A. Johnson,[8] Susana Ben-Neriah,[8] Pedro Farinha,[8] Margaret A. Shipp,[4] Miguel A. Piris,[6] Thomas M. Grogan,[3,10] Stefano A. Pileri,[7] Randy D. Gascoyne,[8] and Teresa Marafioti[2]

Table 1. Association of VpreB3 expression with *c-MYC* abnormalities.

Tumor Type	Positive cases	Total cases	% Positive
Burkitt's lymphoma	44	44	100
Endemic	16	16	100*
Sporadic	28	28	100*
Intermediate DLBCL/BL	5	5	100
Diffuse large B-cell lymphoma	49	191	26
with *c-MYC* translocation	15	18	83*
with *c-MYC* polysomy	25	75	33*
without *c-MYC* abnormalities	9	98	9

**Differs from DLBCL without c-MYC abnormalities with P<0.001.*

Table 2. Association of VpreB3 expression with cell of origin.

Tumor type	Positive cases	Total cases	% Positive	
DLBCL; GCB	29	65	45	
c-MYC translocation	10	11	91[a]	
c-MYC polysomy	13	25	52[b]	
without *c-MYC* abnormalities	6	29	21	
DLBCL; non-GCB	15	101	15	*P*<0.05
c-MYC translocation	2	3	67[a]	*P*<0.05
c-MYC polysomy	10	43	23[b]	
without *c-MYC* abnormalities	3	55	5	

[a]Differs from the respective "without c-MYC abnormalities" group with P<0.05; [b]Differs from the respective "without c-MYC abnormalities" group with P<0.05.

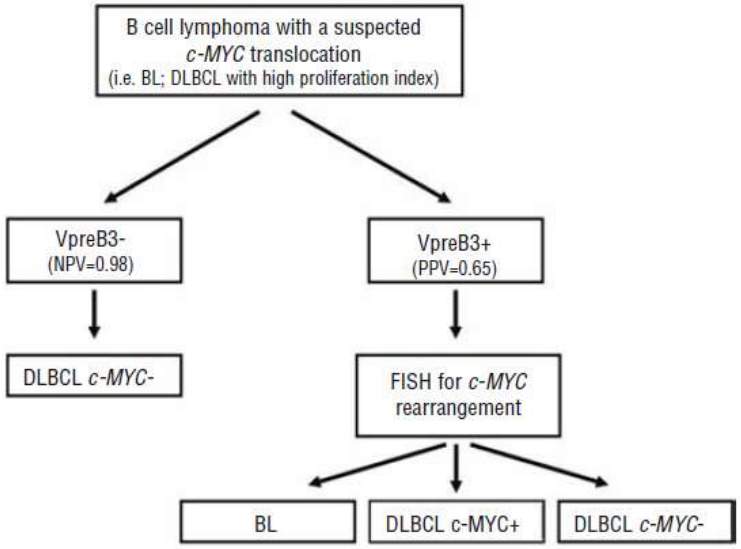
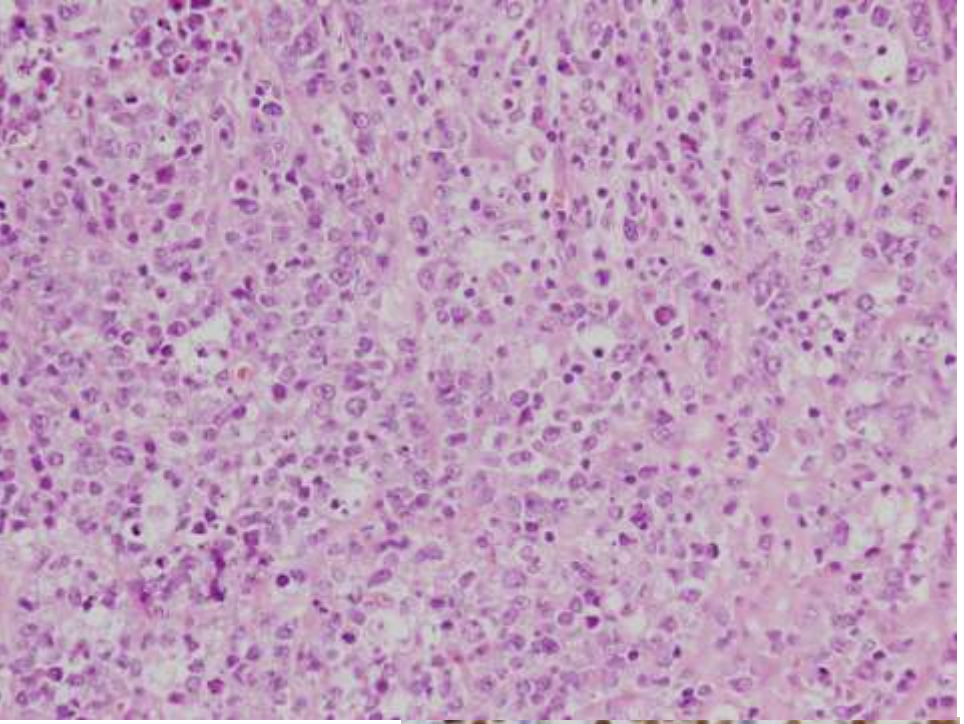
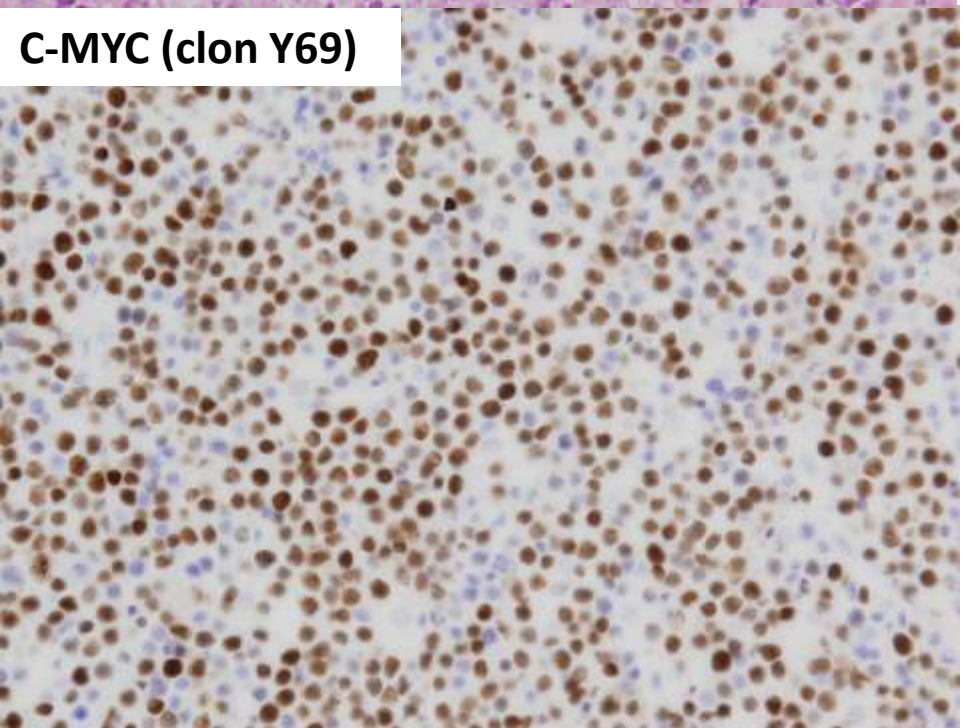


Figure 3. Proposed algorithm for evaluating a B-cell lymphoma with a suspected *c-MYC* translocation using immunohistochemistry for VpreB3. NPV: negative predictive value; PPV: positive predictive value.





C-MYC (clon Y69)

Altered Subcellular Localization of c-Myc Protein Identifies Aggressive B-cell Lymphomas Harboring a *c-MYC* Translocation

Marianna B. Ruzinova, MD, PhD, Tyler Caron, BS,* and Scott J. Rodig, MD, PhD*†*

TABLE 3. Summary of the Major Immunohistochemical Staining Patterns and the *c-MYC* Status of the Examined Tumors

c-myc Staining Pattern	*c-MYC* Translocation (No. Cases)	*c-MYC* Germline (No. Cases)	Total
Nuclear or mixed nuclear/cytoplasmic	22	2	24
Cytoplasmic	1	18	19
Total	23	20	43

TABLE 4. Utility of Immunohistochemical Staining for c-myc as Determined by 2 Pathologists

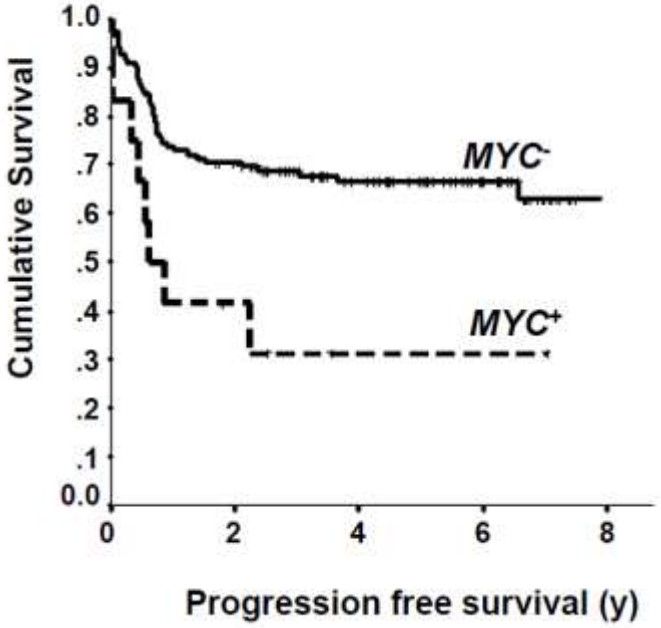
Statistic*	Value
Sensitivity	0.96
Specificity	0.90
PPV	0.92
NPV	0.95
P value	< 0.0001
κ statistic	0.90

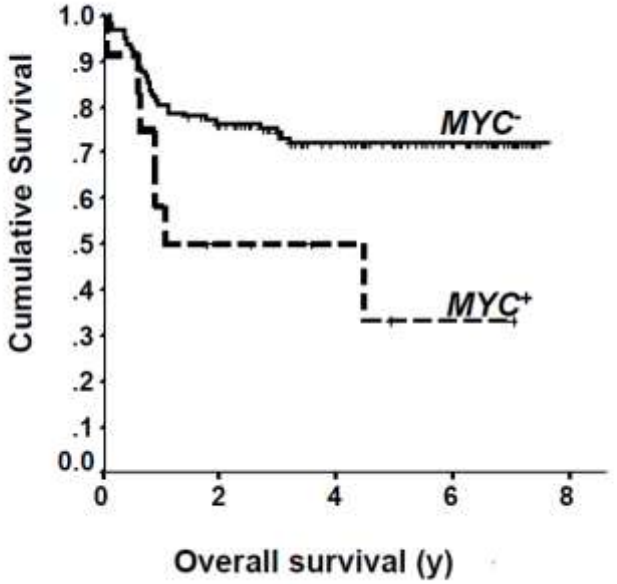
*Of predominantly nuclear or mixed nuclear; cytoplasmic staining without perinuclear accentuation indicating *c-MYC* translocation.

NPV indicates negative-predictive value; PPV, positive-predictive value.

MYC gene re-arrangements are associated with a poor prognosis in diffuse large B-cell lymphoma patients treated with R-CHOP chemotherapy

Kerry J. Savage, Nathalie A. Johnson, Susana Ben-Neriah, Joseph M. Connors, Laurie H. Sehn, Pedro Farinha, Douglas E. Horsman and Randy D. Gascoyne





MYC+ shorter time to CNS relapse.

Blood 2009

Rearrangement of *MYC* Is Associated With Poor Prognosis in Patients With Diffuse Large B-Cell Lymphoma Treated in the Era of Rituximab

Sharon Barrans, Simon Crouch, Alex Smith, Kathryn Turner, Roger Owen, Russell Patmore, Eve Roman, and Andrew Jack

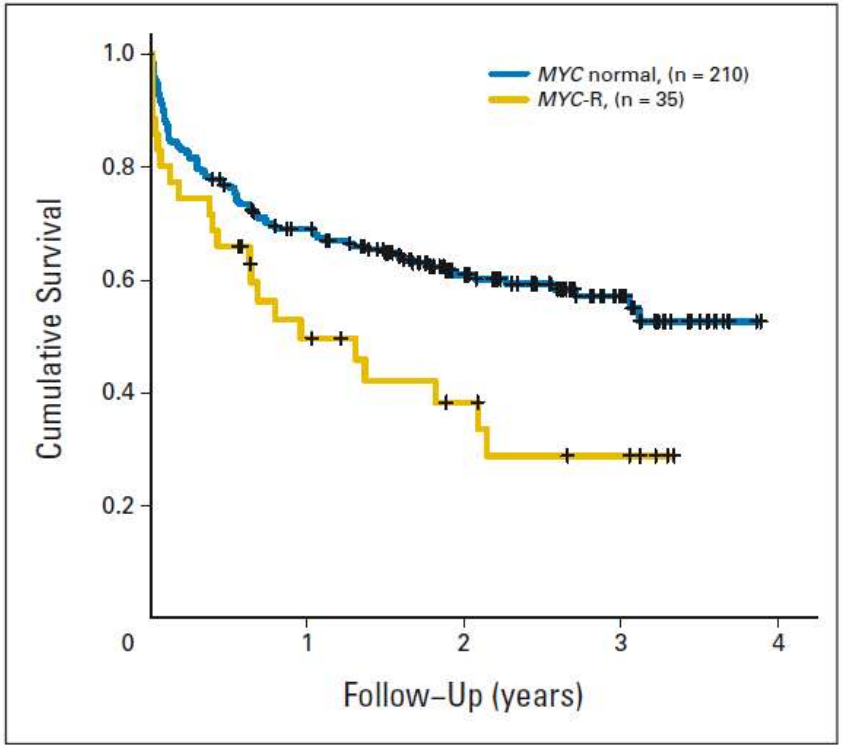


Fig 2. Univariate Kaplan-Meier analysis of overall survival in the *MYC* rearrangement (*MYC*-R) versus nonrearranged patients. Patients with rearrangement of *MYC* have a significantly inferior outcome compared to those without (hazard ratio, 2.03; 95% CI, 1.15 to 3.58). The probability of survival at 2 years was 0.35 in the *MYC* rearrangement group versus 0.61 for all others, based on n = 240 patients with *MYC* data and clinical follow-up.

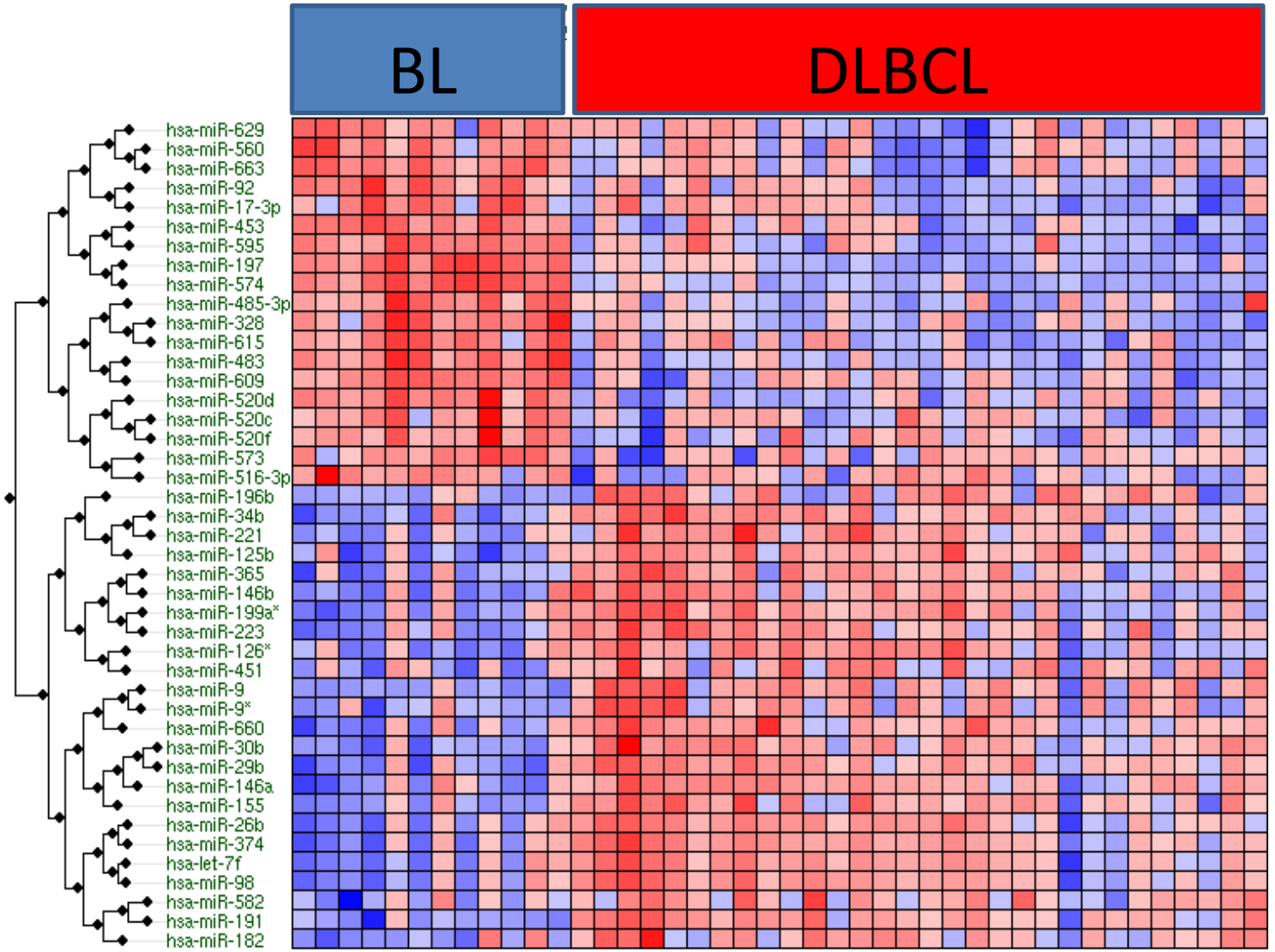
Table 2. Model Coefficients/Hazard Multipliers of the Model Produced by Analysis of Patients With Diffuse Large B-Cell Lymphoma Who Had Complete Data (n = 176) and in All Patients After Multiple Imputation (N = 303)

Parameter	Coefficient	SE	Hazard Ratio	95% CI
Age				
Complete data	0.04	0.01	1.04	1.01 to 1.06
Multiple imputation	0.05	0.01	1.05	1.03 to 1.07
Age-removed IPI				
Intermediate				
Complete data	1.08	0.30	2.95	1.65 to 5.27
Multiple imputation	0.69	0.21	1.99	1.31 to 3.03
High				
Complete data	1.74	0.31	5.67	3.08 to 10.45
Multiple imputation	1.19	0.22	3.30	2.13 to 5.12
MYC rearranged				
Complete data	0.71	0.29	2.03	1.15 to 3.58
Multiple imputation	0.52	0.24	1.68	1.05 to 2.69

Abbreviation: IPI, International Prognostic Index.

JCO 2010

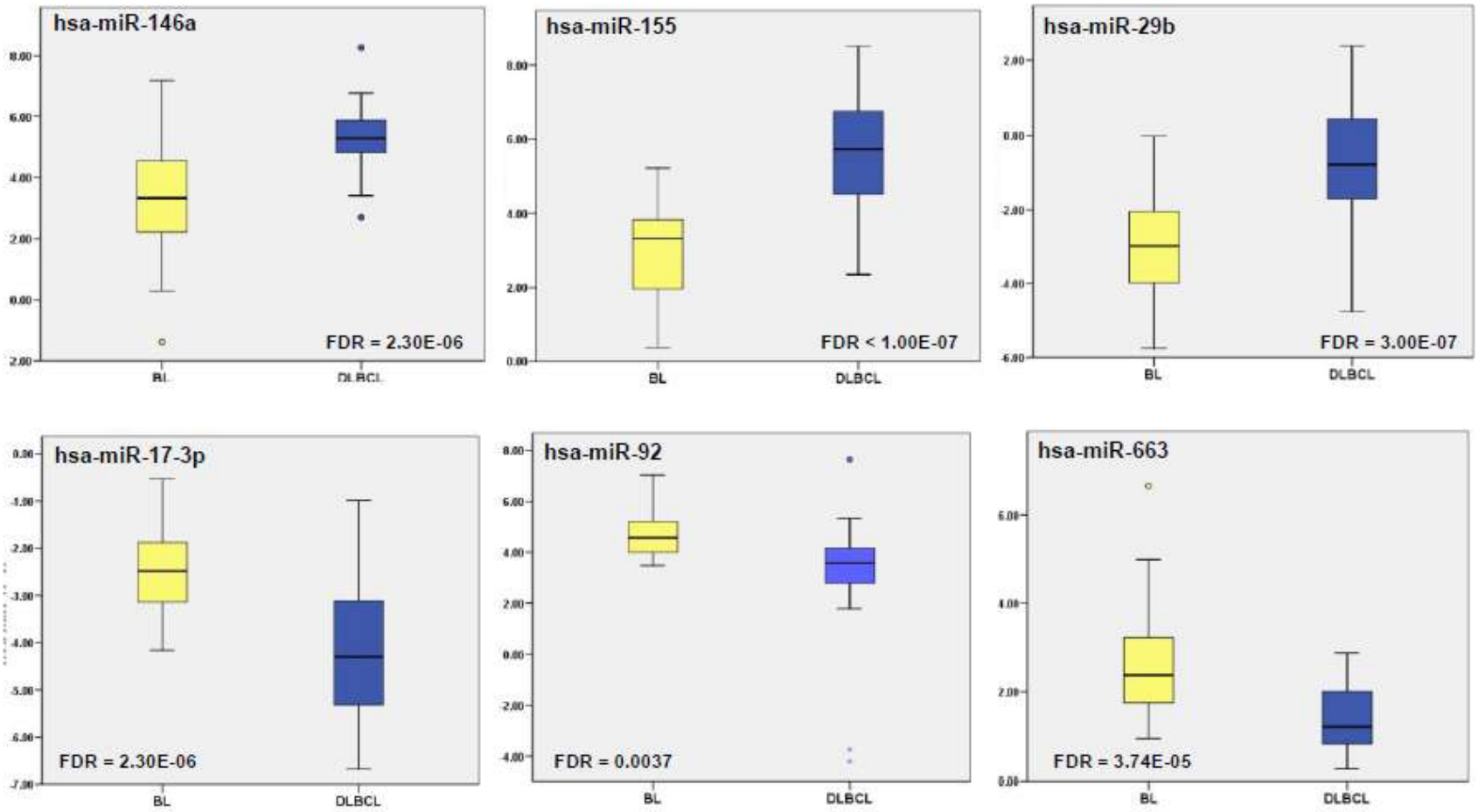
miRNAs as potential markers for Lymphoma Diagnosis.



FDR<0.05 and fold change>1.5

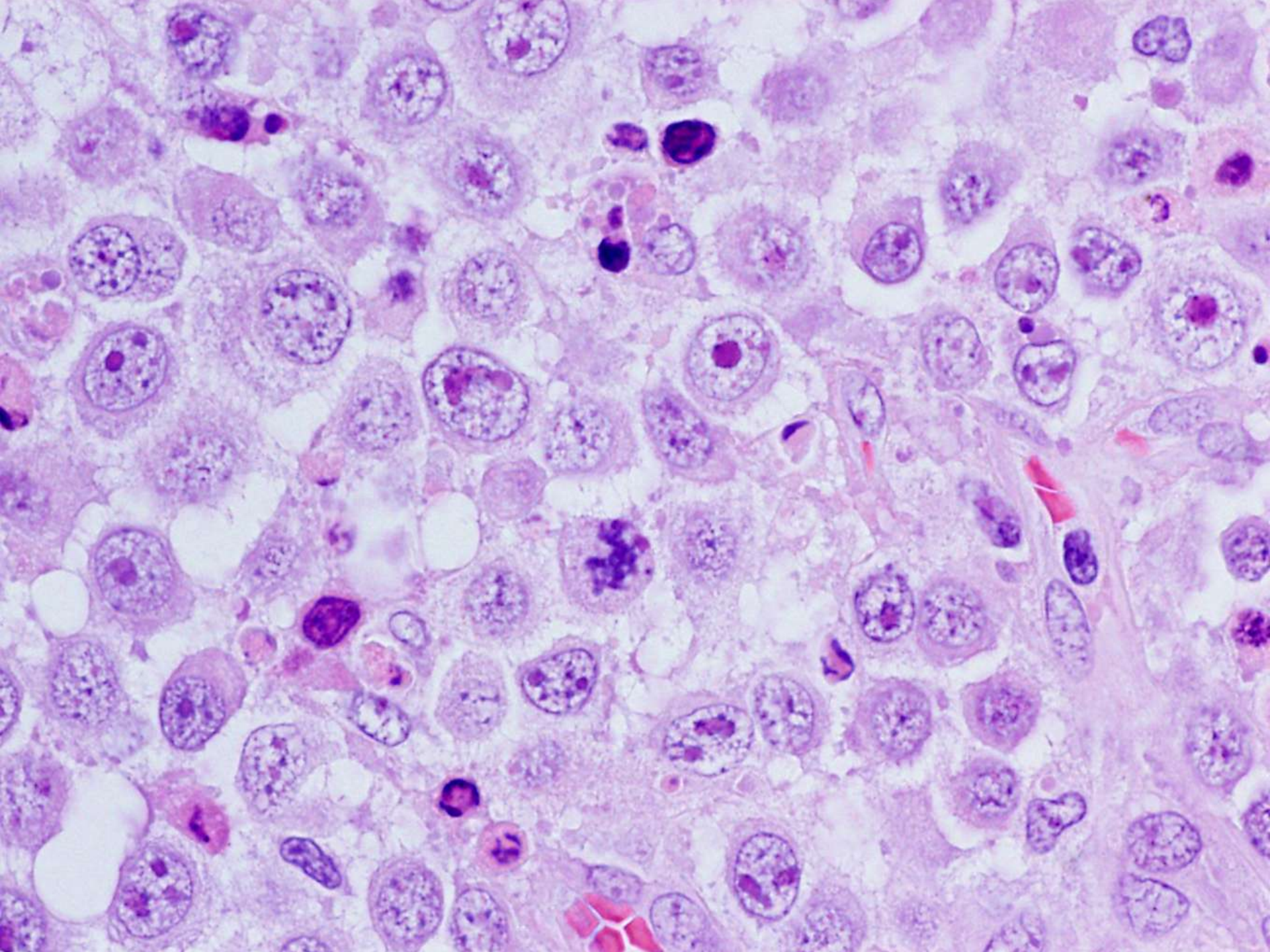
L di Lisio et al.submitted

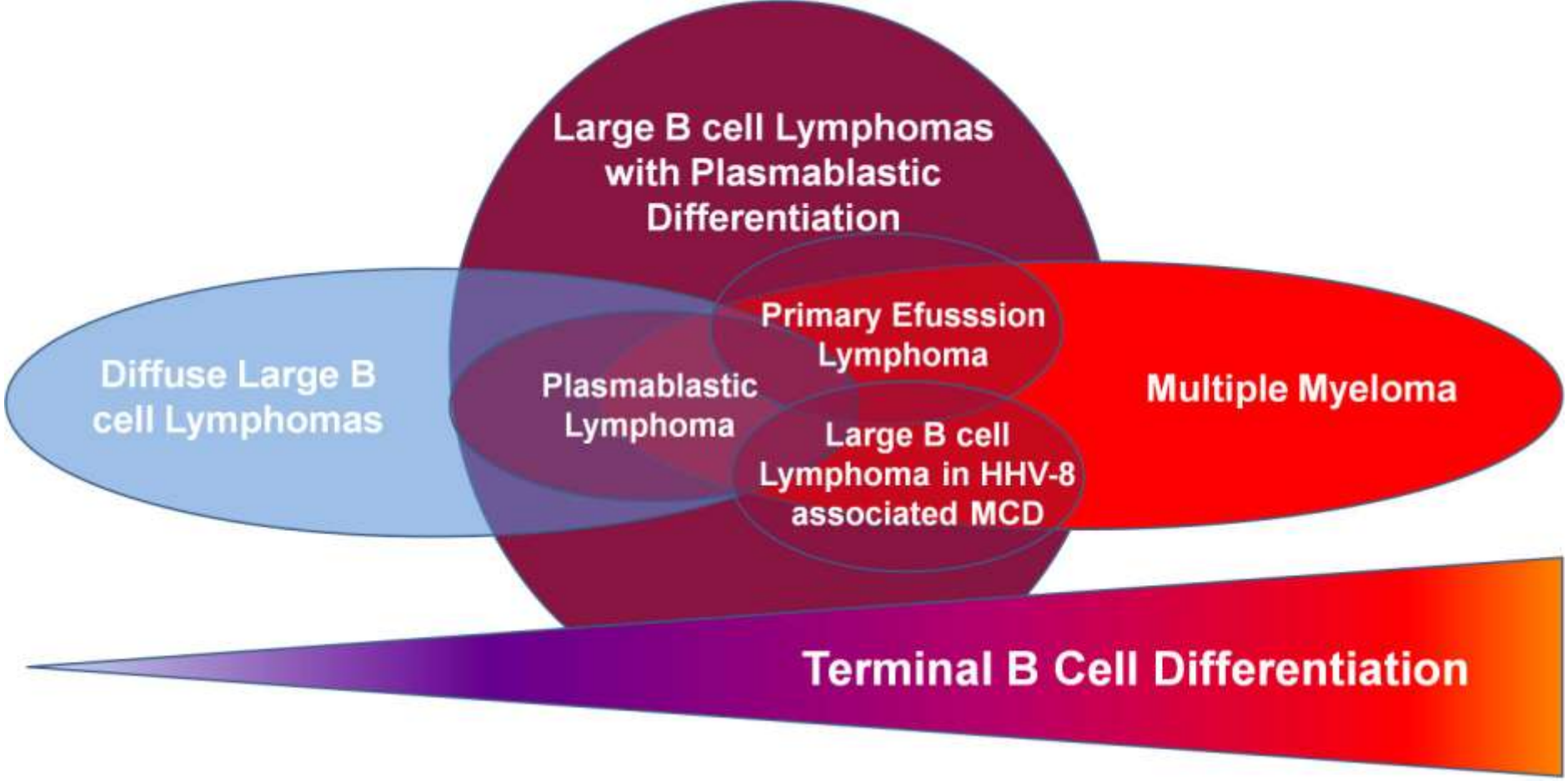
miRNAs as potential markers for Lymphoma Diagnosis.



RT-PCR in a larger series of FFPE tissue diagnostic samples.

L di Lisio et al. submitted





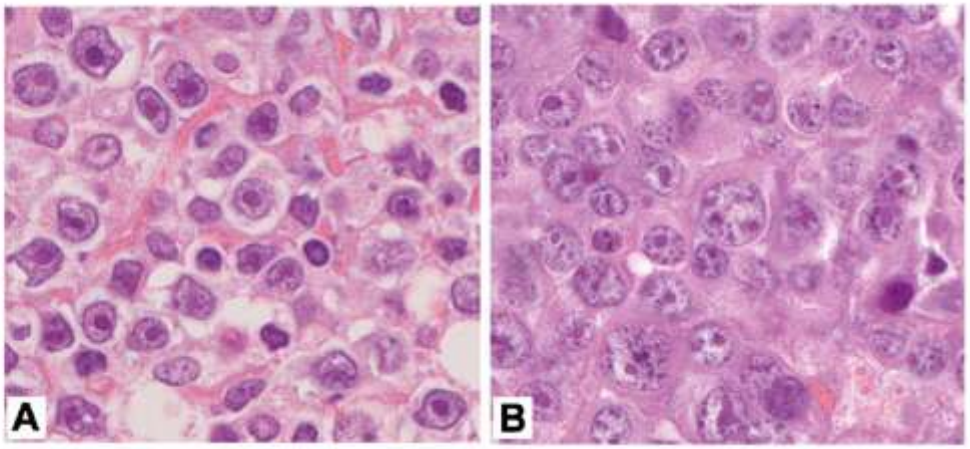
Large B Cell Lymphomas with Plasmablastic Differentiation.

Plasmablastic Lymphoma.
ALK-positive large B-cell lymphoma.
Primary Efussion Lymphoma PEL (cavitary or extracavitary).
Large B cell Lymphoma arising in HHV-8 associated Multicentric Castleman Disease.
Diffuse Large B cell Lymphomas with partial plasmablastic phenotype/DLBCL with immunoblastic differentiation.

Immunoblastic morphology but not the immunohistochemical GCB/nonGCB classifier predicts outcome in diffuse large B-cell lymphoma in the RICOVER-60 trial of the DSHNHL

German Ott, Marita Ziepert, Wolfram Klapper, Heike Horn, Monika Szczepanowski, Heinz-Wolfram Bernd, Christoph Thorns, Alfred C. Feller, Dido Lenze, Michael Hummel, Harald Stein, Hans-Konrad Müller-Hermelink, Matthias Frank, Martin-Leo Hansmann, Thomas F. E. Barth, Peter Möller, Sergio Cogliatti, Michael Pfreundschuh, Norbert Schmitz, Lorenz Trümper, Markus Loeffler and Andreas Rosenwald

Figure 1. Cytomorphology of immunoblastic lymphoma. (A) IB lymphoma predominantly harboring large cells with abundant, deeply basophilic cytoplasm, large vesicular nuclei and a large central solitary nucleolus (100× objective, total magnification ×1000). (B) IB lymphoma with plasmablastic features. Note that the predominant cell is large, with abundant, basophilic cytoplasm and eccentric, round to oval nuclei differing in size and a solitary or several paracentric nucleoli (100× objective, total magnification ×1000). Images have been performed with a Zeiss Axiophot Microscope, a Jenoptik ProgRes CF camera, and the ProgRes CapturePro 2.6 software package for image processing (Jenoptik).



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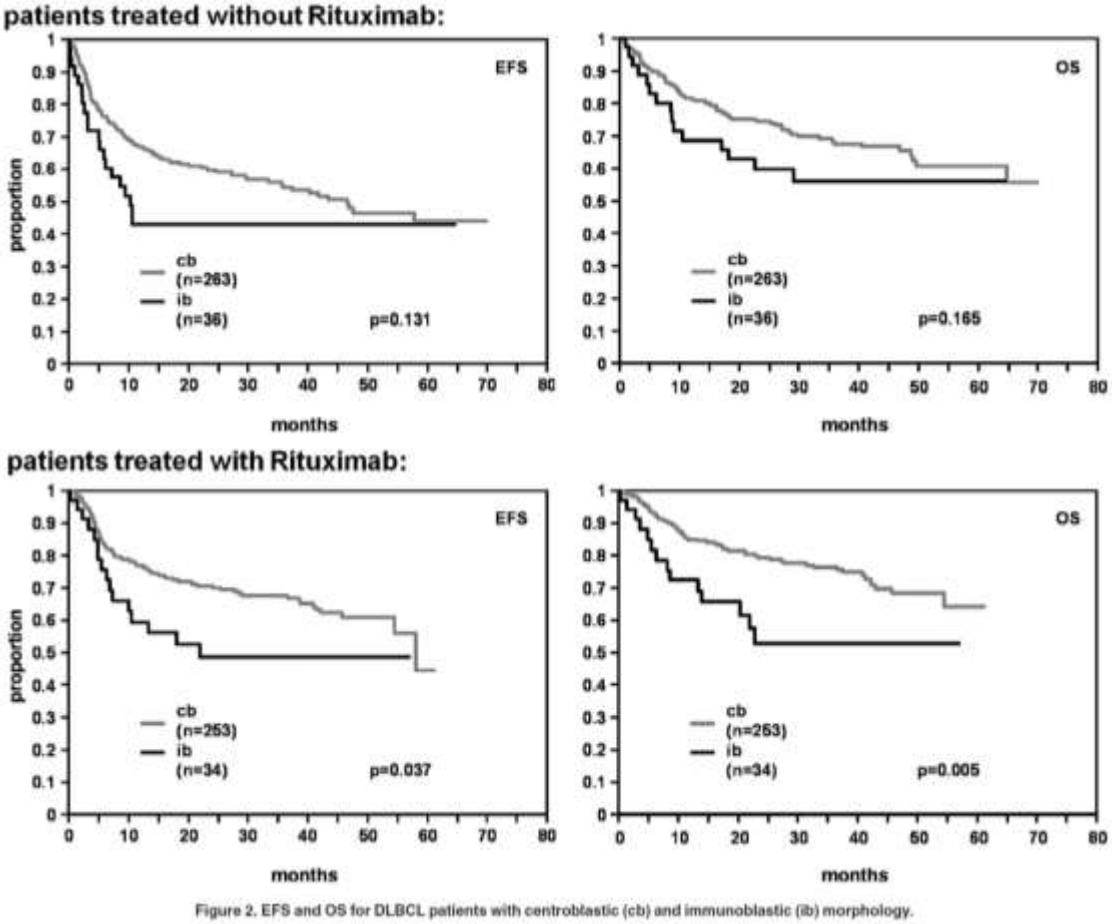
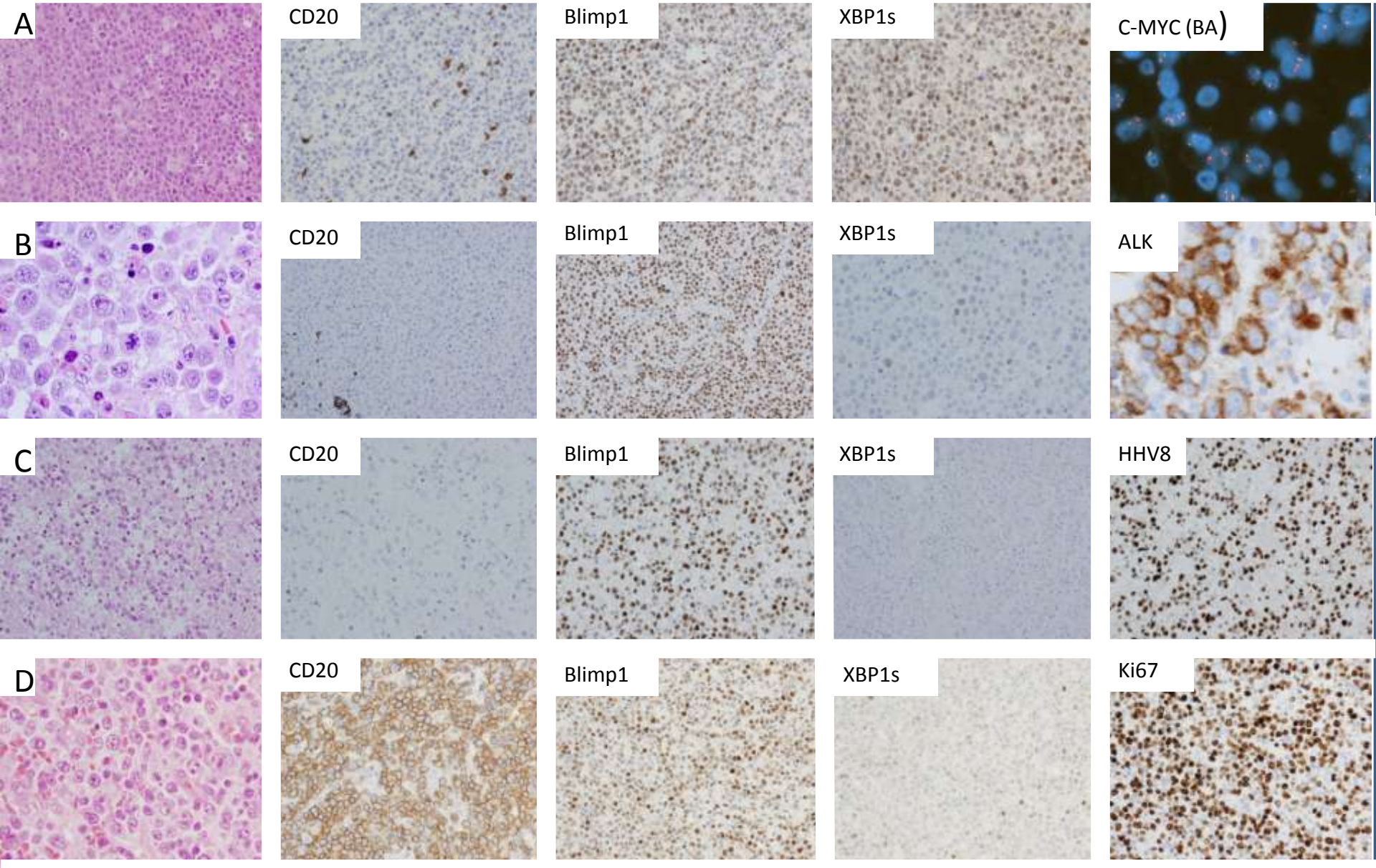


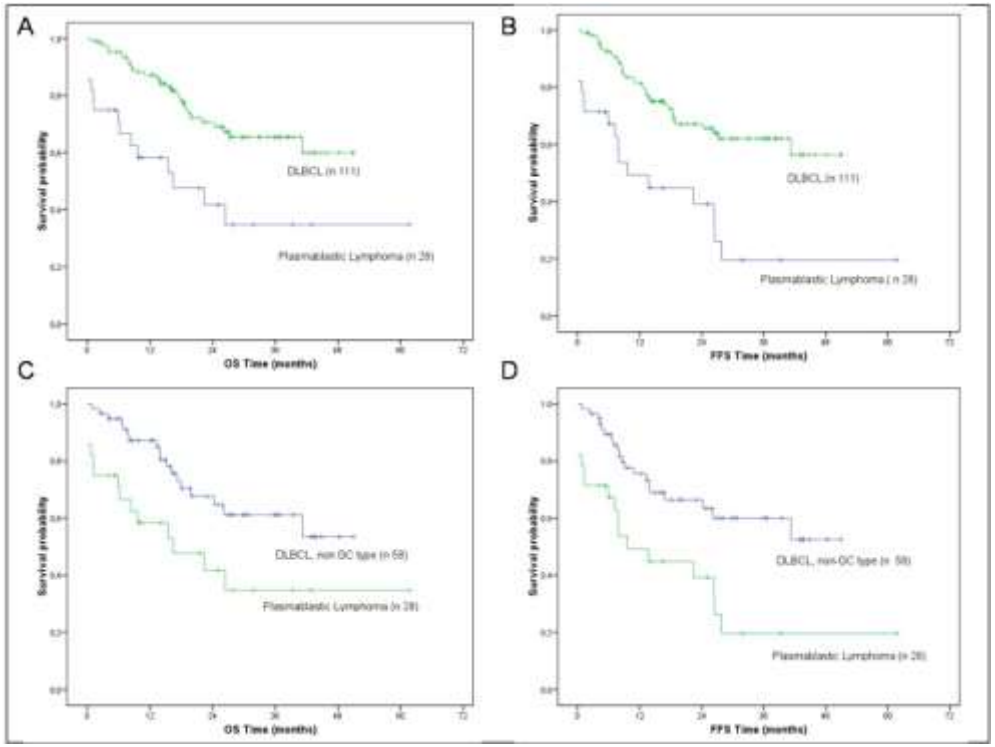
Figure 2. EFS and OS for DLBCL patients with centroblastic (cb) and immunoblastic (ib) morphology.

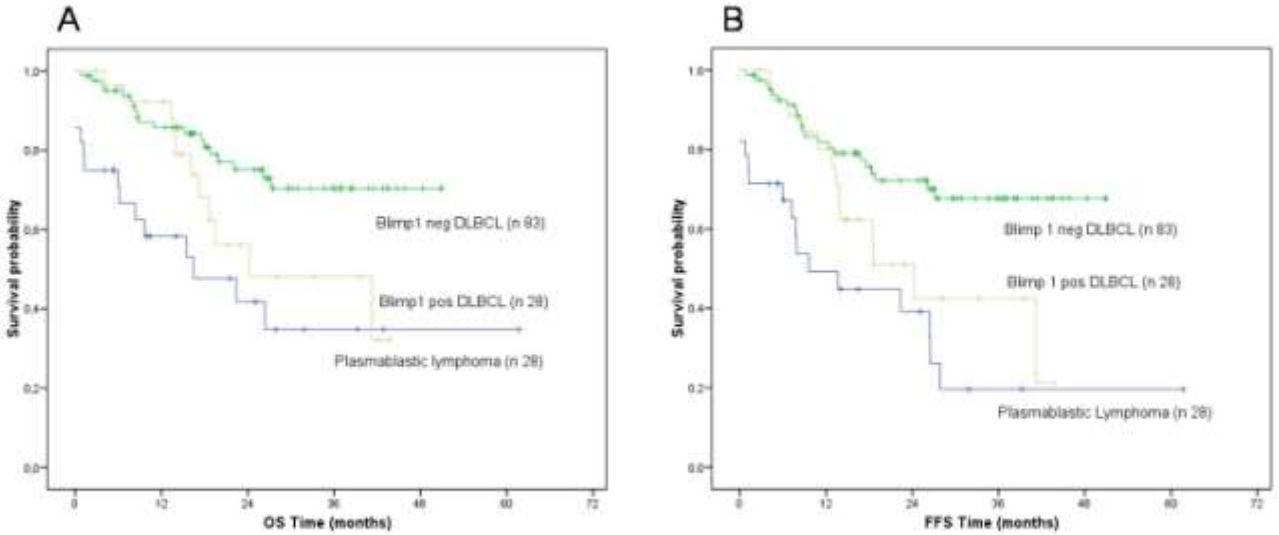
Table 3. Cox model for morphological subtype (IB vs CB) adjusted for the IPI factors for EFS and OS

	EFS			OS		
	RR	95% CI	*P*	RR	95% CI	*P*
IB	1.5	(1.0; 2.1)	.034	1.7	(1.2; 2.6)	.007
LDH > UNV	1.5	(1.1; 2.0)	.004	1.9	(1.4; 2.6)	< .001
ECOG > 1	1.9	(1.4; 2.6)	<.001	2.0	(1.4; 2.8)	< .001
Stage III/IV	1.5	(1.1; 2.1)	.005	1.5	(1.0; 2.2)	.027
E > 1	1.3	(1.0; 1.9)	.082	1.8	(1.3; 2.7)	.002



Large B cell Lymphomas with Plasmablastic Differentiation.

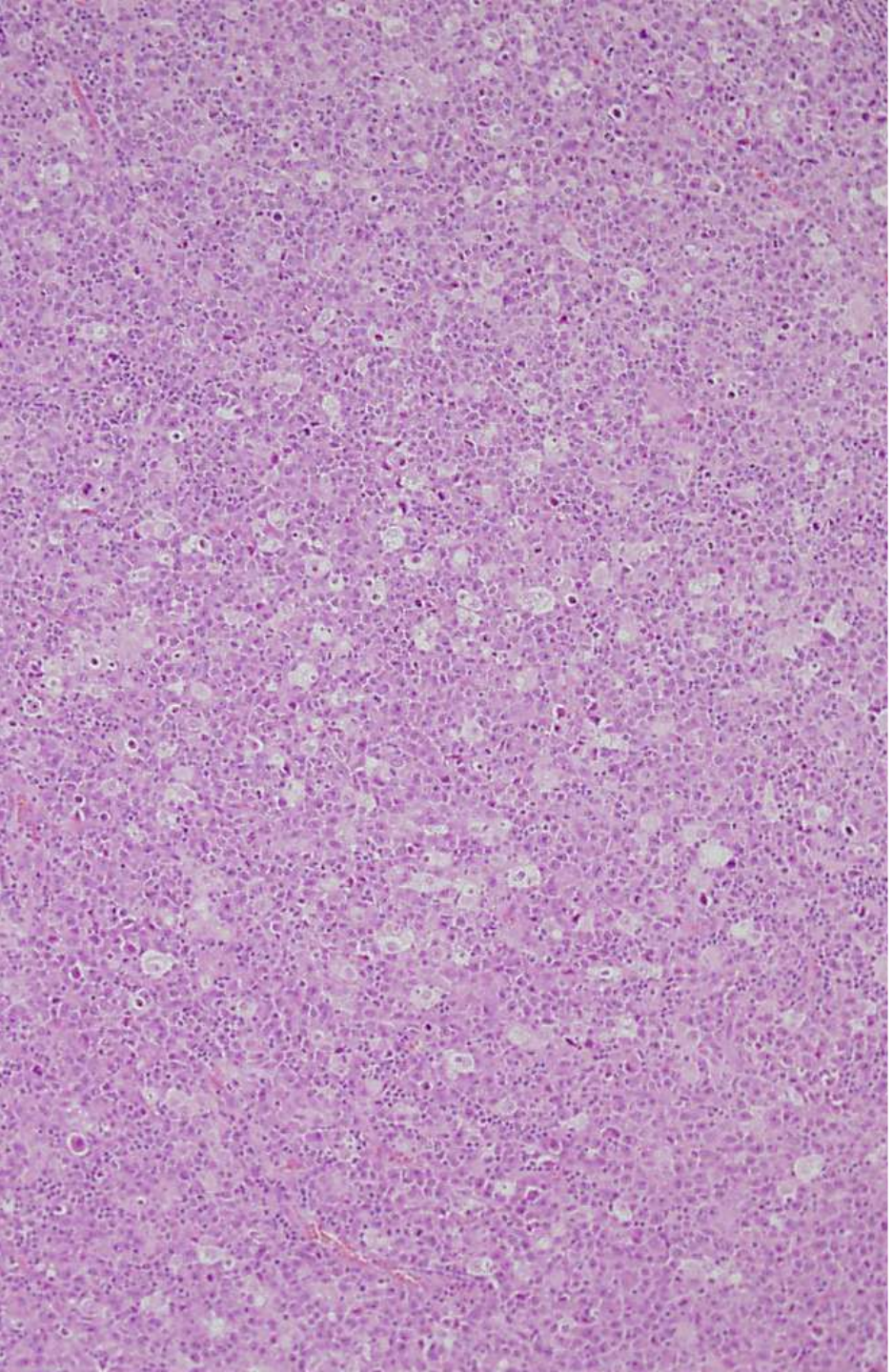


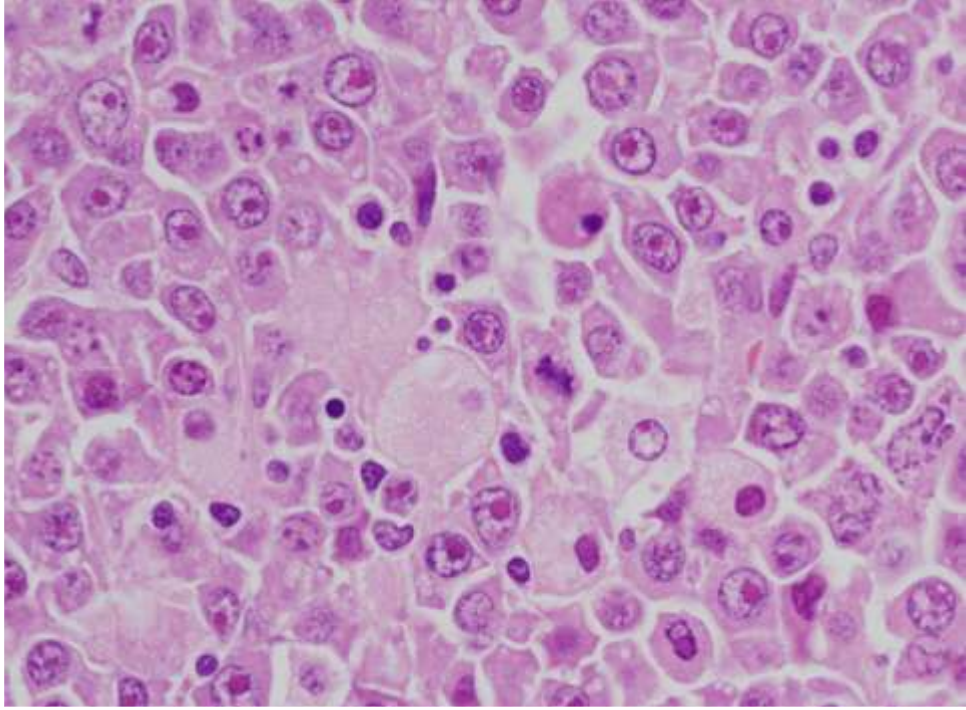


Aggressive large B cell lymphoma with plasma cell differentiation: immunohistochemical characterization of plasmablastic lymphoma and diffuse large B cell lymphoma with partial plasmablastic phenotype

by Santiago Montes-Moreno, Ana Rosa Gonzalez-Medina, Socorro Maria Rodriguez Pinilla, Lorena Maestre, Lydia Sanchez-Verde, Giovanna Roncador, Manuela Mollejo, Juan Fernando Garcia, Javier Menarguez, Carlos Montalban, Carmen Ruiz-Marcellan, Eulogio Conde, and Miguel Piris

Haematologica 2010





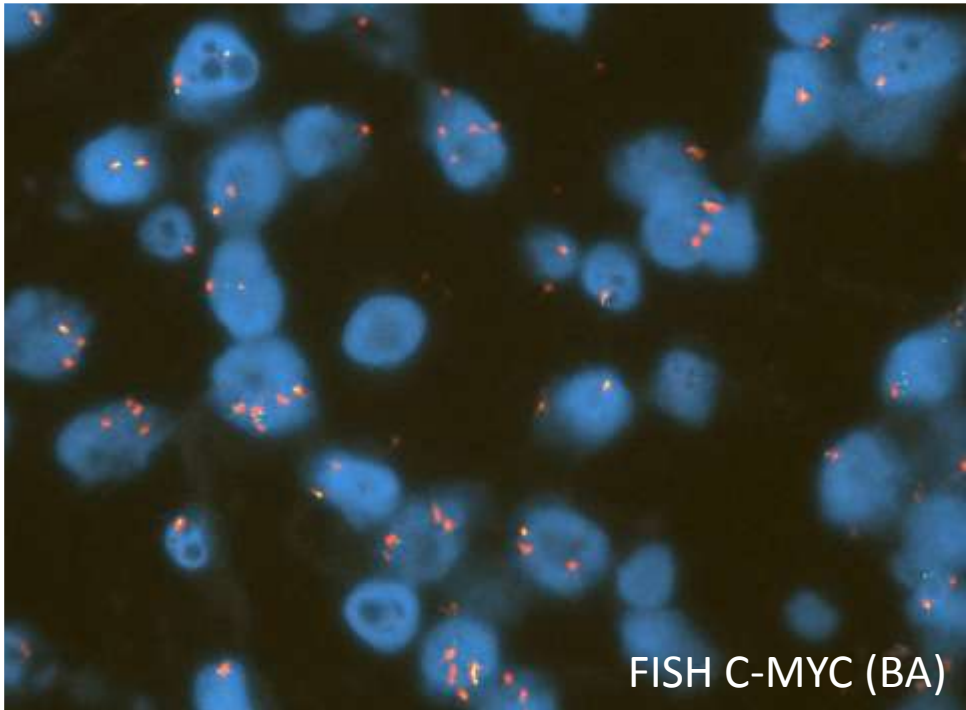
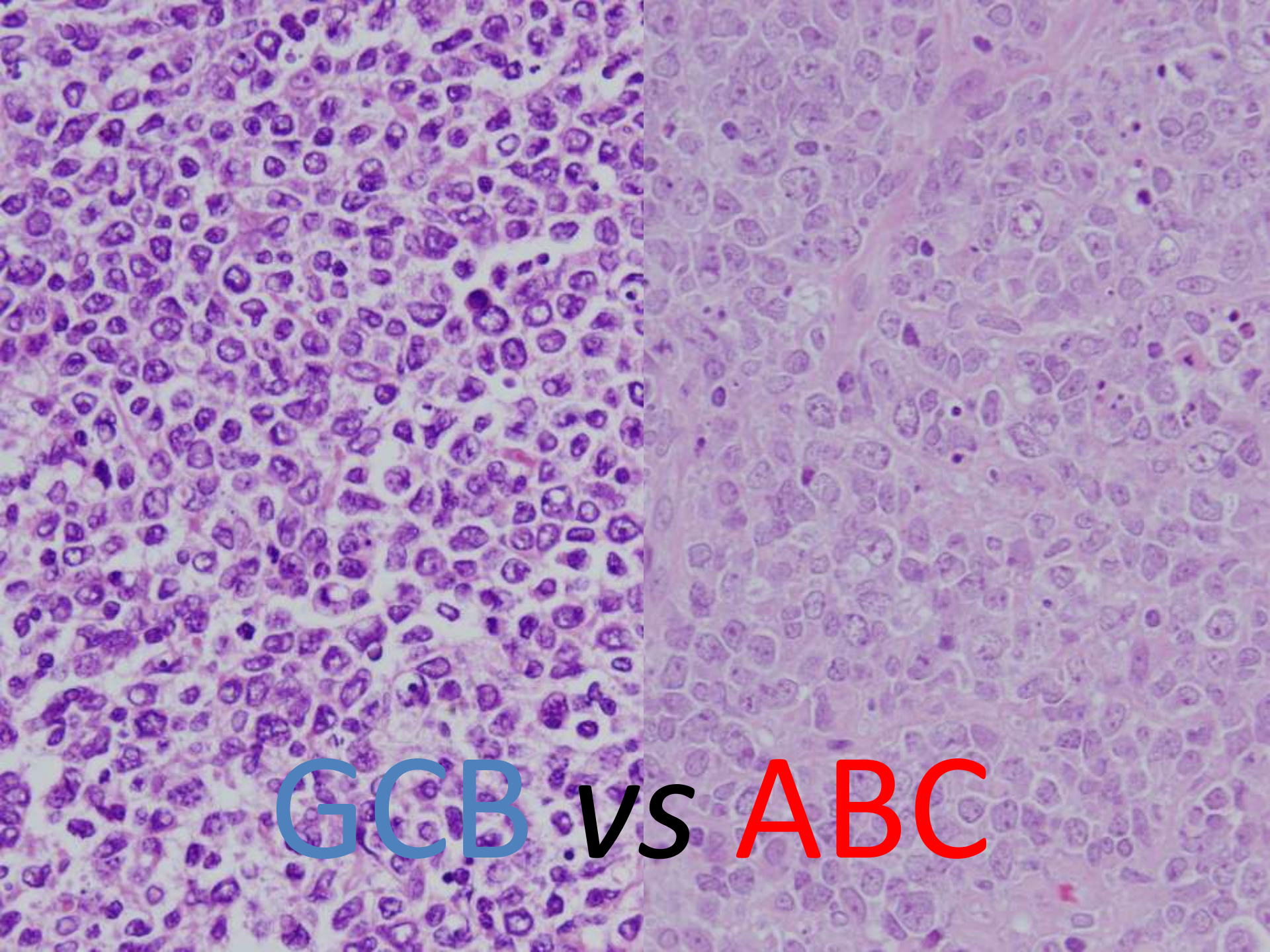

FISH C-MYC (BA)

TABLE 3. Frequency of the Genetic Alterations Detected by FISH

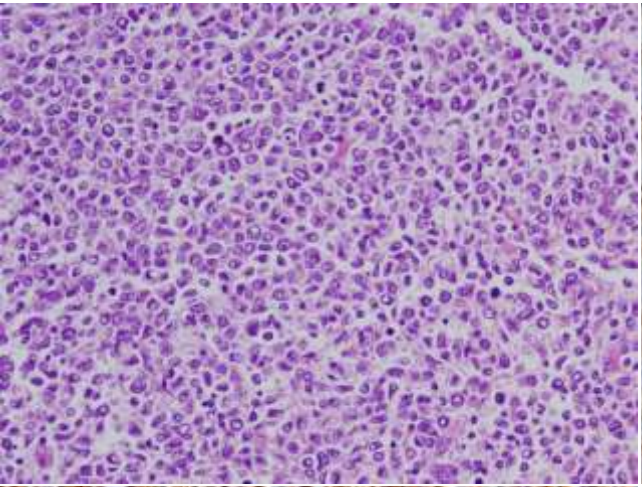
Probe	Alteration	All PBL Cases (%)	PBL Monomorphic (%)	PBL Plasmacytic Differentiation (%)	PEL (%)
MYC	Gain	8/41 (20)	4/28 (15)*	4/13 (31)*	1/3 (33)
	Rearrangement	20/41 (49)	16/28 (57)	4/13 (31)	0/3
BCL2	Gain	12/39 (31)	5/25 (20)	7/14 (50)	1/3 (33)
	Rearrangement	0/39	0/25	0/14	0/3
BCL6	Gain	16/38 (41)	8/24 (33)	8/14 (57)	0/3
	Rearrangement	0/38	0/24	0/14	0/3
MALT1	Gain	12/36 (33)	6/24 (25)	6/12 (50)	1/2 (50)
	Rearrangement	0/36	0/24	0/12	0/2
PAX5	Gain	12/37 (32)	5/24 (21)	7/13 (54)	1/3 (33)
	Rearrangement	0/36	0/23	0/13	0/3
IGH	Gain	7/38 (18)	2/25 (8)	5/13 (38)	0/3
	Rearrangement	16/38 (42)	13/25 (52)	3/13 (23)	0/3
≥ 3 gains		12/40 (30)	6/26 (23)	6/14 (43)	0/3

*One case with *MYC* translocated and gained is included in the category of rearrangements.

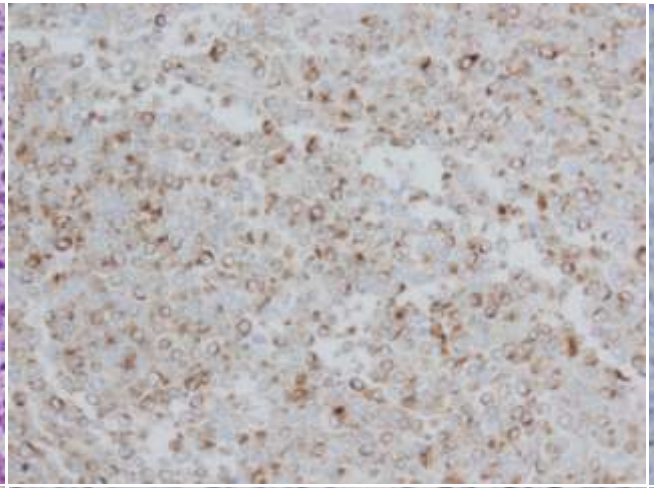
Taddesse-Heath et al. Modern Pathol,July 2010:991-999.
Valera et al Am J Surg Pathol, Nov 2010;1686-94.


GCB vs ABC

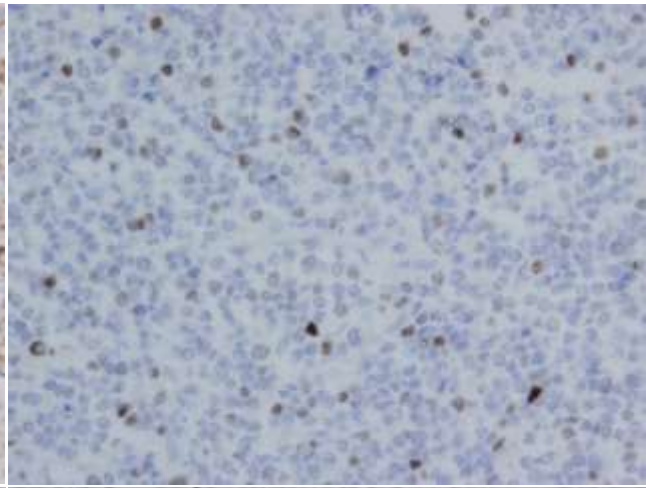
HE

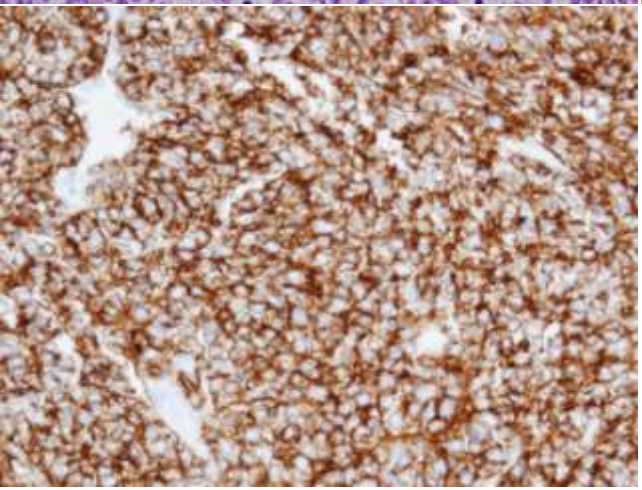


GCET 1

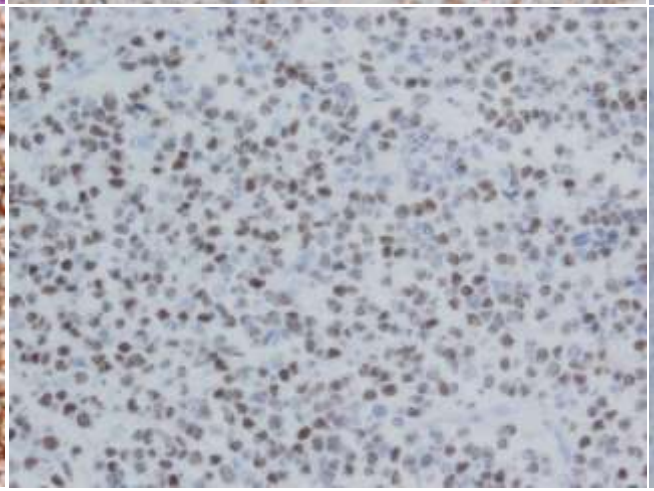


MUM1

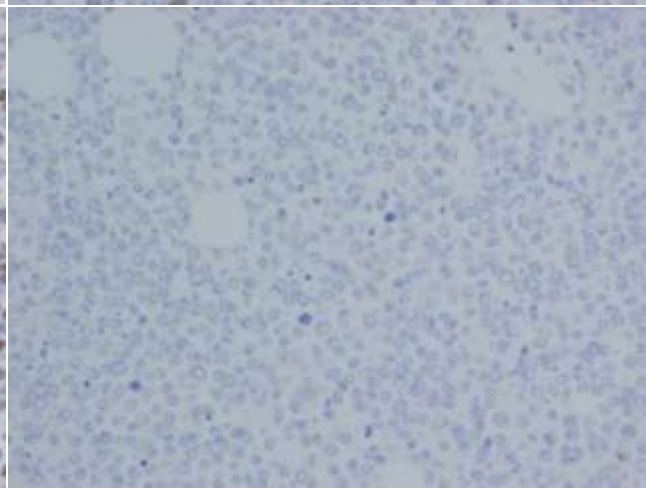




CD10



BCL6

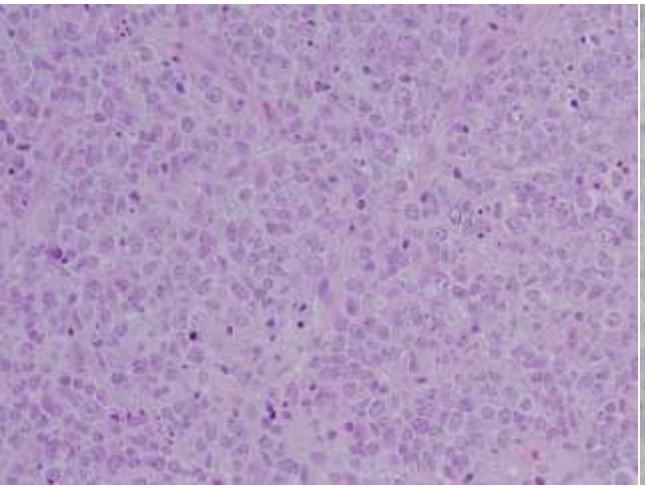


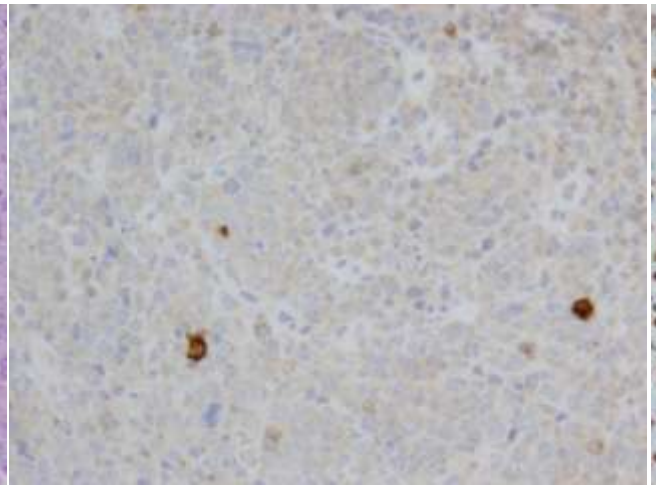
FOXP1

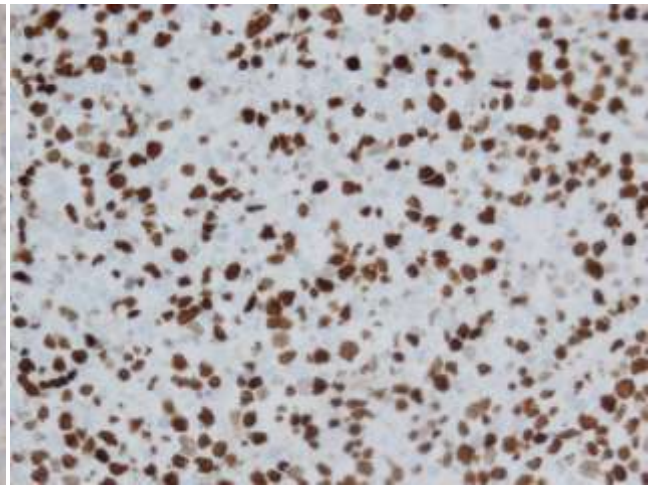
HE

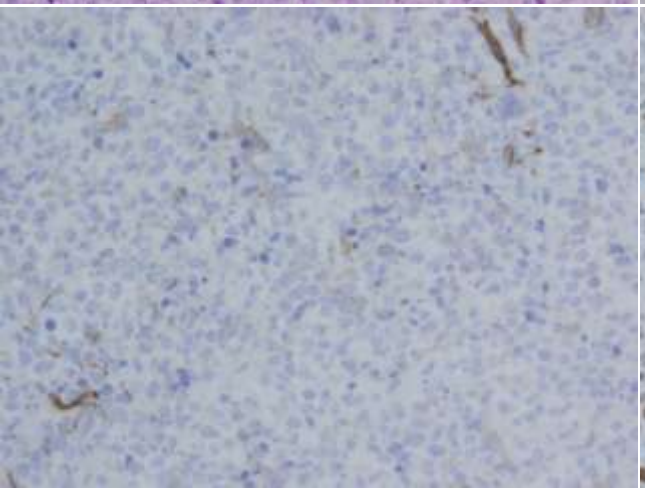
GCET 1

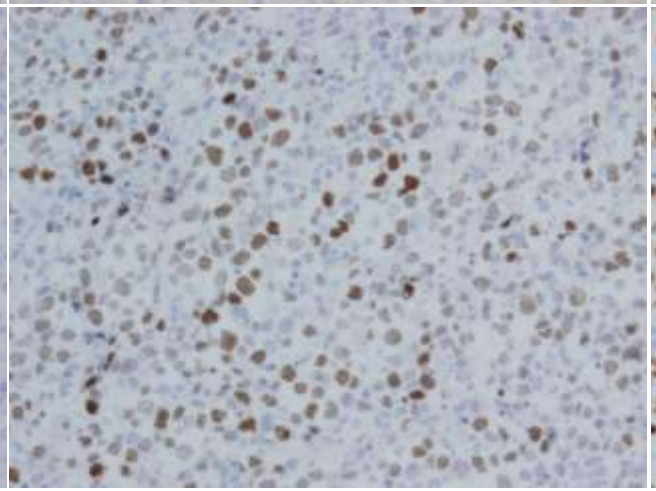
MUM1

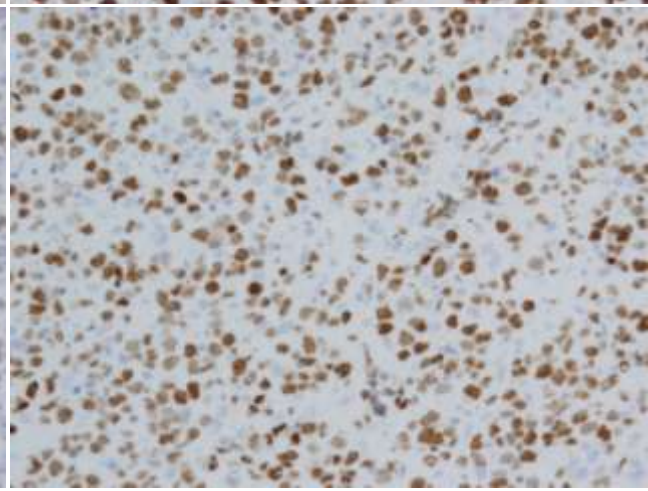










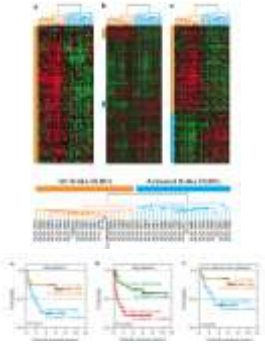


CD10

BCL6

FOXP1

Los subtipos biologicos de DLBCL tienen un impacto en el pronóstico en pacientes tratados con R-CHOP?



Nuevo contexto clínico: Quimio-Immunoterapia con Rituximab (R-CHOP)

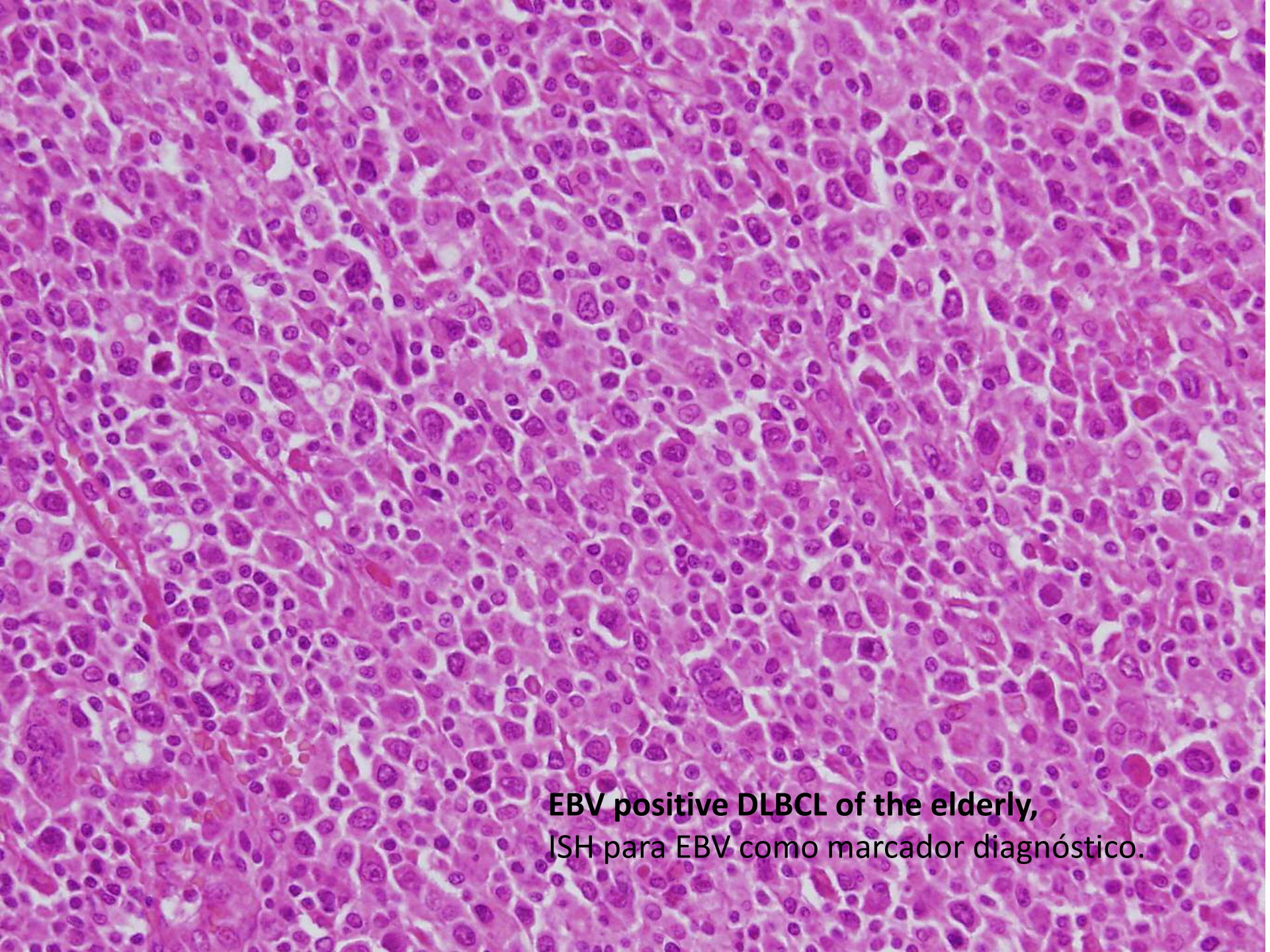
EVIDENCIA A FAVOR

- Choi et al CCR 2009.
-Meyer et al JCO2010.
-Montes-Moreno et al, Blood 2011

EVIDENCIA EN CONTRA

- Ott et al, Blood 2010
-Gutierrez-García et al Blood 2011
-Salles et al, Blood 2011

PUBLICACIÓN	NUMERO DE PACIENTES Y TIPO DE SERIE	ALGORITMO/S UTILIZADO/S	IMPACTO CLINICO	Comentarios
Choi et al. CCR 2009	84 (CHOP) + 63 (R-CHOP) (multicentrica, retrospectiva)	Hans y Choi	GCB (87% vivos a los 3 a) vs ABC (44%) p < 0.001	93% concordancia con GEP
Meyer et al JCO 2010	262 R-CHOP (& CHOP-like), (multicéntrica, retrospectiva)	Hans, Choi, Hans*, Choi*, Muris, Nyman,	Choi & Tally, mayor concordancia con GEP (87 y 93%). Todos los algoritmos con efecto pronóstico	
Ott et ak, Blood 2010	179 (CHOP) + 173 (R-CHOP), multicentrica. Ensayo clínico RICOVER 60	Hans*	ns OS, EFS	IB morphology
Gutierrez-García et al. Blood 2011	157 (R-CHOP) (multicentrica, retrospectiva)	Hans, Choi, Muris, Colomo, Tally	ns OS, PFS	GEP predictor.
Montes-Moreno et al. Blood 2011	240 (R-CHOP & CHOP-like) (multicentrica, retrospectiva)	Choi	GCB (81% vivos a los 2 años) vs ABC (69%) p <0.05	miRNAs predictores de OS y PFS. Score de riesgo combinado con IPI
Salles et al. Blood 2011	1514 (RCHOP 347p, CHOP 289p, Early CHOP 878p) (multicéntrica procedente de ECs)	Hans, BCL2, Ki67, HLA-DR, CD5	ns OS en R-CHOP, ni CHOP, sólo significativo en Early CHOP	Indice combinado BCL2+Ki67+IPI

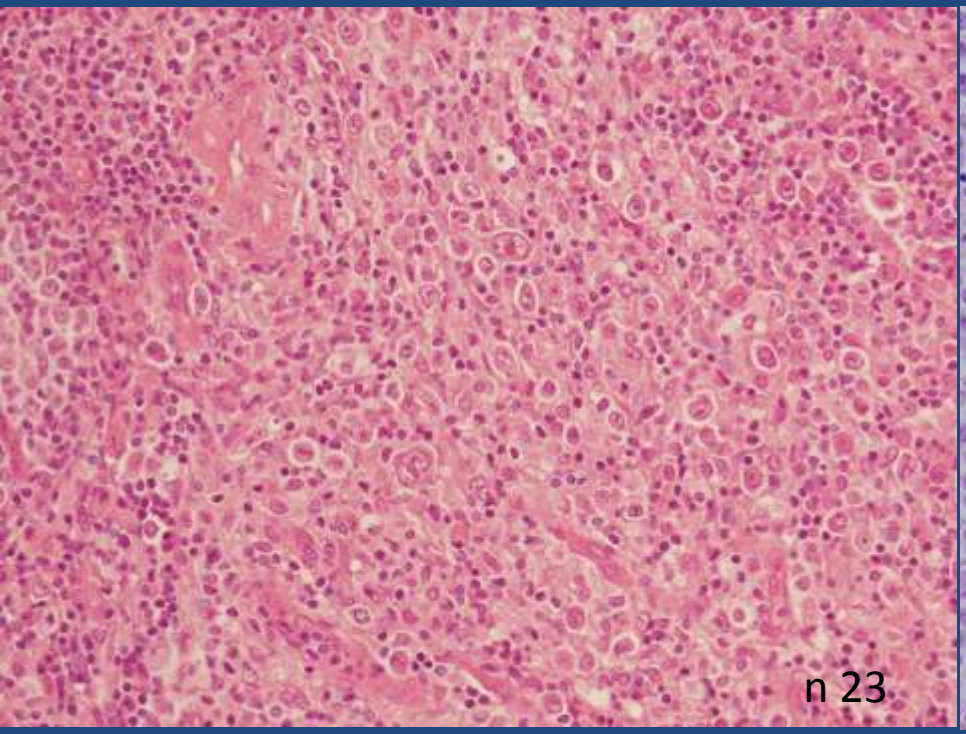


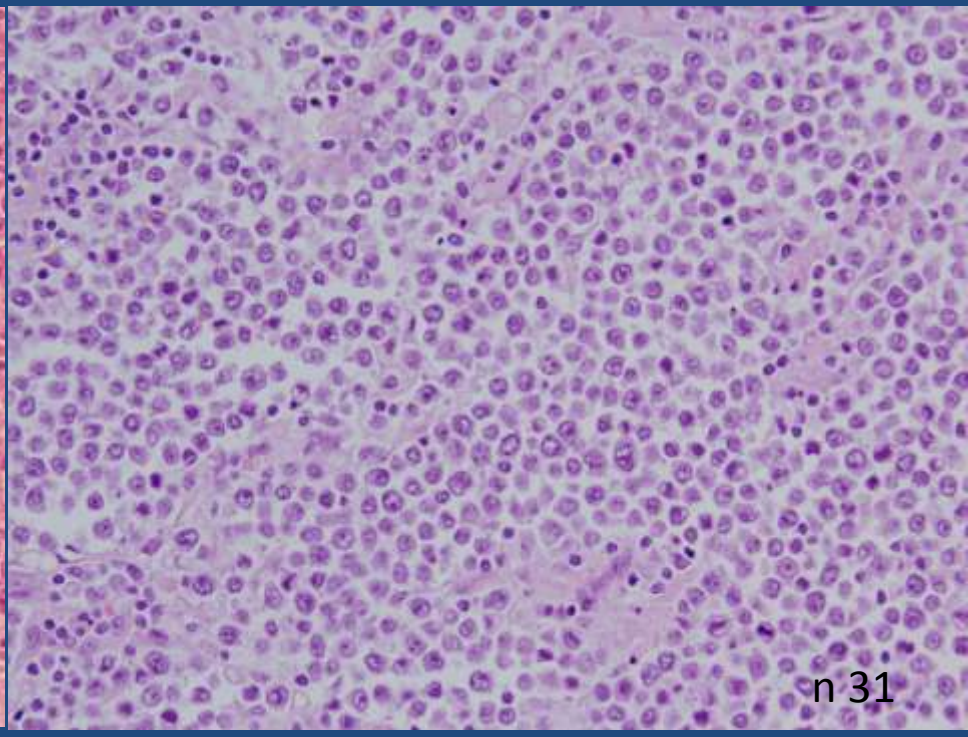
EBV positive DLBCL of the elderly,
ISH para EBV como marcador diagnóstico.

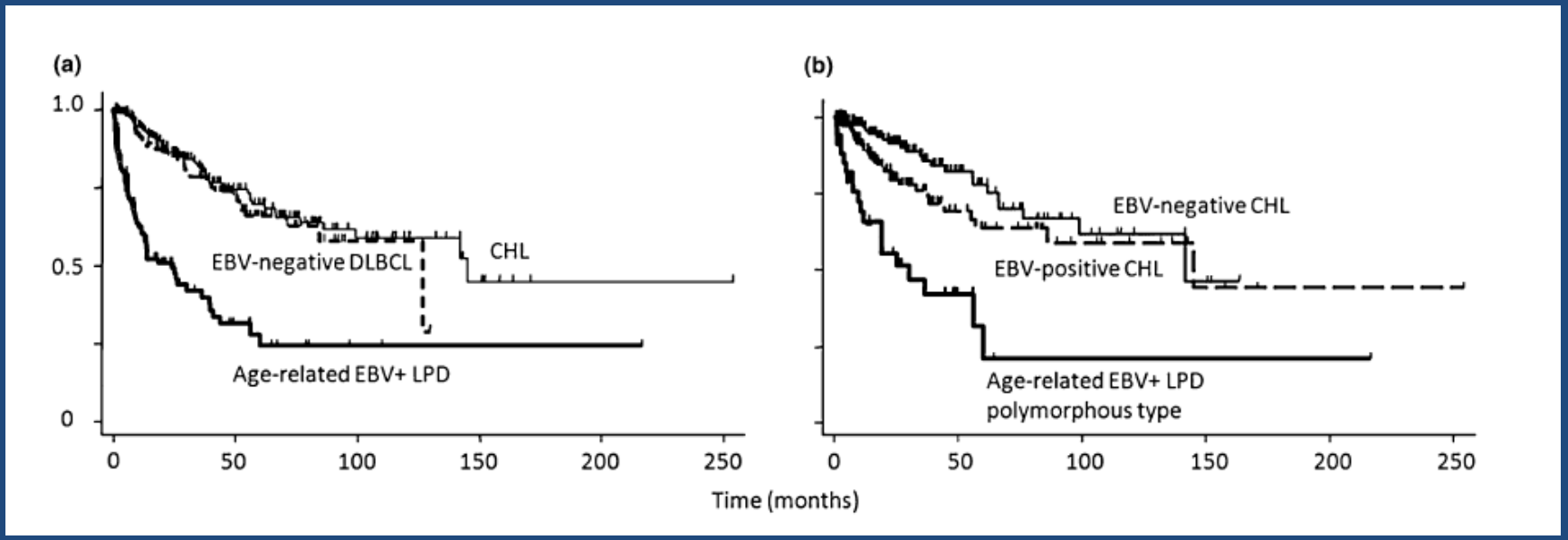
Spectrum of Adult-late-onset EBV-associated B-cell LPD [1,2]

1. lymph node based- EBV associated reactive lymphoid hyperplasia
2. EBV-positive nodal B-cell lymphoproliferations resembling PTLD
3. EBV-positive extranodal B-cell lymphoproliferations resembling PTLD
4. EBV positive DLBCL
5. EBV positive B cell proliferations resembling CHL.

[1] *Cohen JI, Kimura H, Nakamura S, Ko Y-H, Jaffe ES, Annals Oncology 2009*
[2] *Dojcinov SD, et al. Blood 2011*

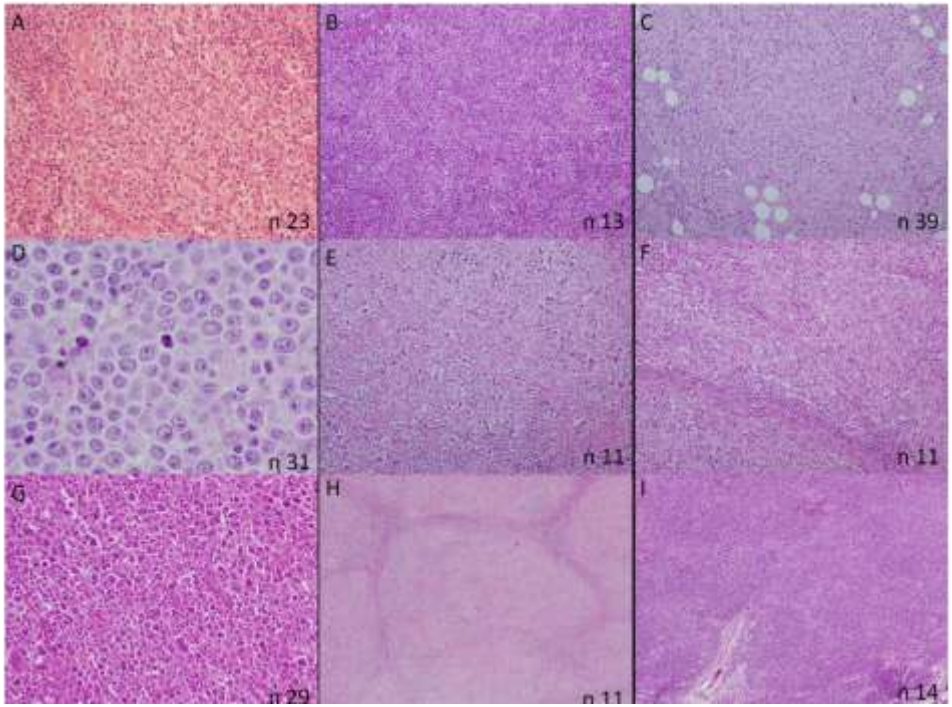






[5] *Shimoyama Y, Asano N et al , Pathology Int 2009*

EBV+ DIFFUSE LARGE B CELL LYMPHOMA OF THE ELDERLY IS A B CELL NEOPLASM CHARACTERIZED BY PROMINENT NFkB ACTIVATION. EVALUATION OF A SERIES OF 47 CASES.



IMMUNOHISTOCHEMICAL EVALUATION

IHQ marker	N cases positive/Total N of cases (%)
CD20	47/47 (100%)
CD30	41/46 (89%)
CD15	4/43(9%)
BCL2	45/47 (96%)
KI67>50%	40/45 (84%)
EBV-LMP1	37/44 (84%)
EBER (ISH)	47/47 (100%)
P50*	35/44 (79%)
P52*	32/43 (74%)
P50&P52*	27/43 (63%)

COO-CLASSIFICATION	N cases positive/Total N of cases (%)
GCB**	9/41 (22%)
ABC**	32/41 (78%)
GCB***	2/44 (4%)
NON-GC***	42/44 (95%)

MORPHOLOGICAL FEATURES

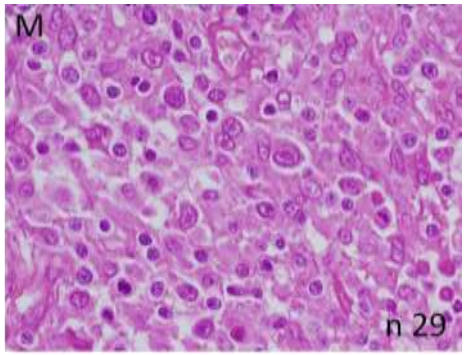
POLYMORHIC PATTERN (46 cases)

Large B Cell type (29 cases, 62%)

Polymorphic LPD-type (9 cases, 19%)

Hodgkin-like type (8 cases, 17%)

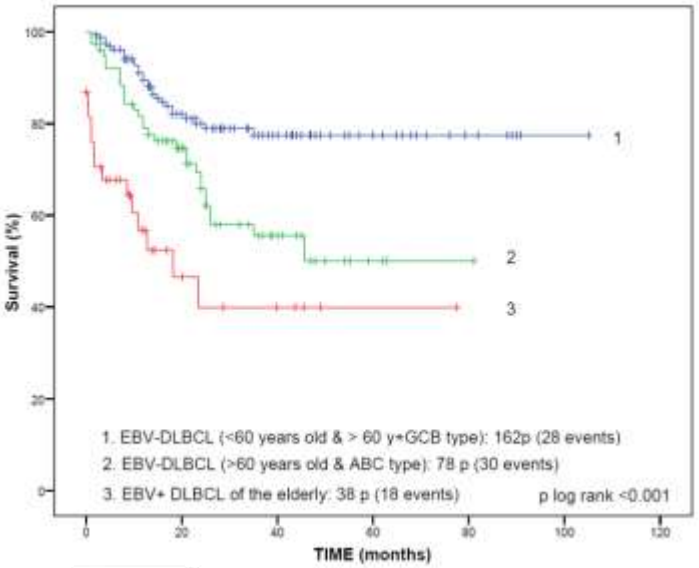
MONOMORPHIC PATTERN (1 case)



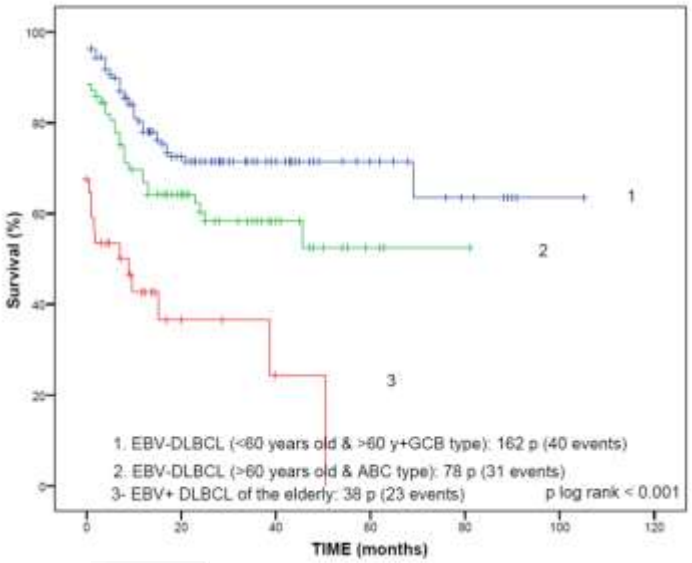
* only nuclear localization of the staining is considered positive.
** according to Choi´s algorithm
*** according to Hans algorithm.

USCAP 2011

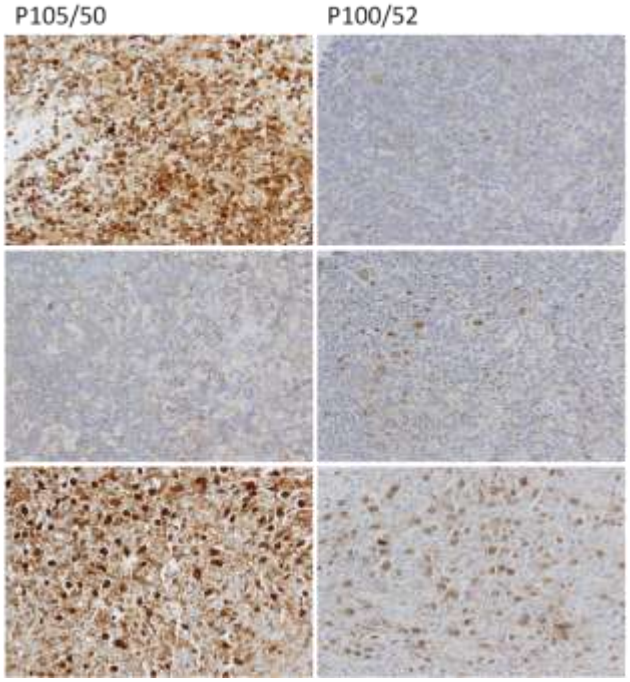
A



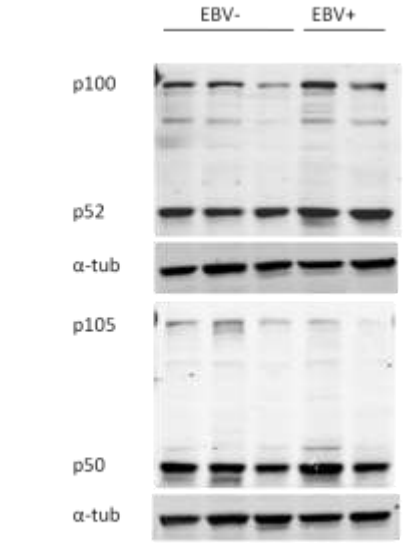
B



C



D



ratiop52/p100	1.46	1.59	3.68	1.64	2.08
ratio p50/p105	1.96	1.13	2.86	4.17	8.13

USCAP 2011

SOX 11. a new marker for MCL

Original Article

SOX11 expression is highly specific for mantle cell lymphoma and identifies the cyclin D1-negative subtype

Ana Mozos,[1] Cristina Royo,[1] Elena Hartmann,[2] Daphne De Jong,[3] Cristina Baró,[4] Alexandra Valera,[1] Kai Fu,[5] Dennis D. Weisenburger,[5] Jan Delabie,[6] Shih-Sung Chuang,[7] Elaine S. Jaffe,[8] Carmen Ruiz-Marcellan,[9] Sandeep Dave,[10] Lisa Rimsza,[11] Rita Braziel,[12] Randy D. Gascoyne,[13] Francisco Solé,[4] Armando López-Guillermo,[1] Dolors Colomer,[1] Louis M. Staudt,[8] Andreas Rosenwald,[14] German Ott,[14] Pedro Jares,[1] and Elias Campo[1]

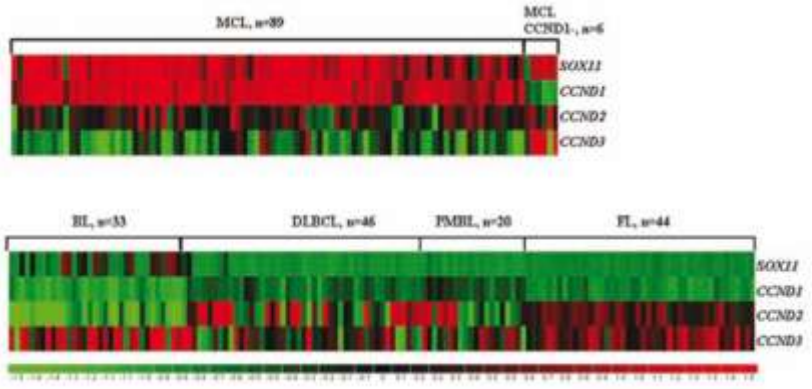


Figure 1. Heat map representing gene expression values for SOX11, CYCLIN D1 (CCND1), CYCLIN D2 (CCND2) AND CYCLIN D3 (CCND3). Cases of MCL, including *CCND1*-negative MCL are shown in the top half whereas other lymphoid neoplasms are displayed in the bottom half.

Table 1. SOX11 nuclear protein expression in lymphoid neoplasms.

	n	Sox11-positive (%)
Cyclin D1-negative MCL	12	12 (100%)
Mantle cell lymphoma	54	50 (93%)
Chronic lymphocytic leukemia	12	0 (0%)
Splenic marginal zone lymphoma	9	0 (0%)
Nodal marginal zone lymphoma	11	0 (0%)
Follicular lymphoma	22	0 (0%)
Diffuse large B-cell lymphoma	63	0 (0%)
Burkitt's lymphoma	8	2 (25%)*
Classical Hodgkin's lymphoma	36	1 (3%)**
NLPHL	5	0 (0%)
Multiple myeloma (cyclinD1-positive)	2	0 (0%)
B-cell lymphoblastic lymphoma/leukemia	1	1 (100%)
T-cell lymphoblastic lymphoma/leukemia	5	5 (100%)
Peripheral T-cell lymphoma, NOS	15	0 (0%)
Angioinmunoblastic T-cell lymphoma	5	0 (0%)
Hepatosplenic T-cell lymphoma	3	0 (0%)
Anaplastic large cell lymphoma (ALK+)	3	0 (0%)
Anaplastic large cell lymphoma (ALK-)	3	0 (0%)
T-cell prolymphocytic leukemia	3	2 (66%)
Extranodal NK/T-cell lymphoma, nasal type	3	0 (0%)

*MCL: mantle cell lymphoma; NLPHL: nodular lymphocytic predominant Hodgkin's lymphoma; NOS: not otherwise specified; *three additional cases showed weak immunostaining. **the staining intensity was weak.*

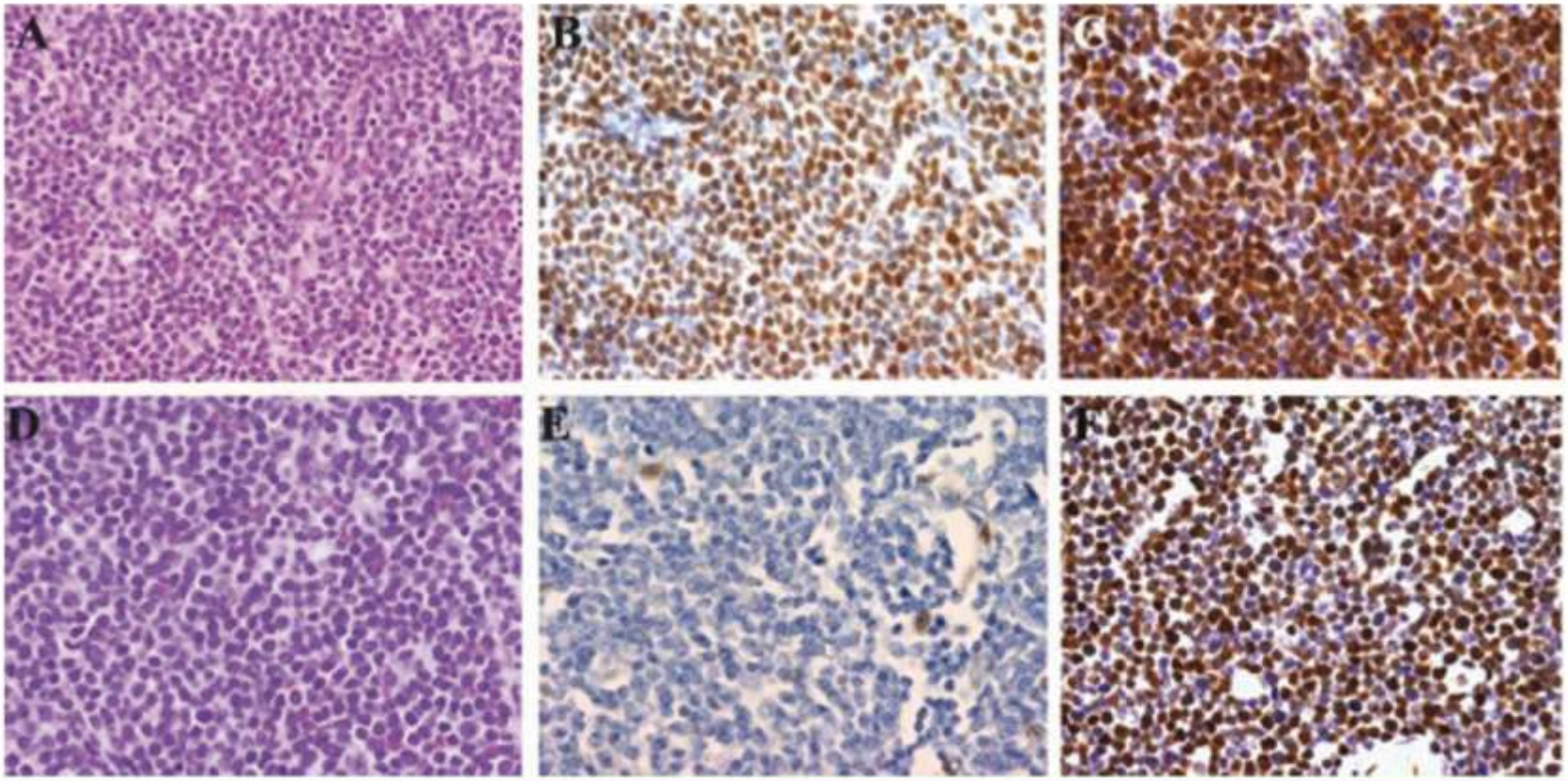
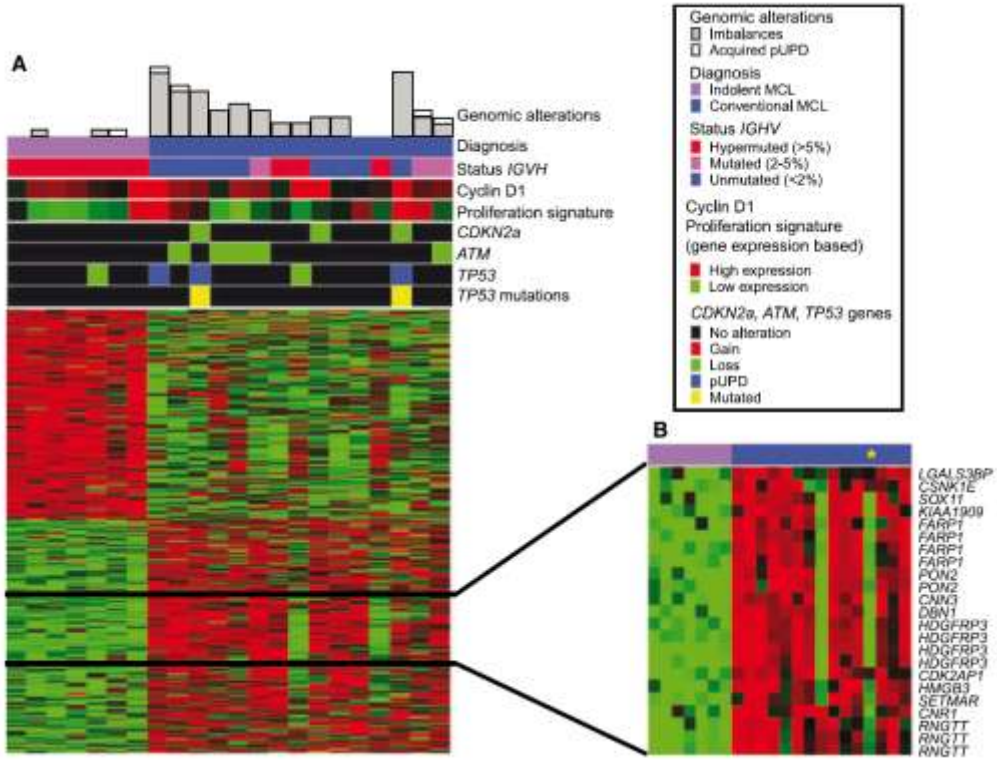


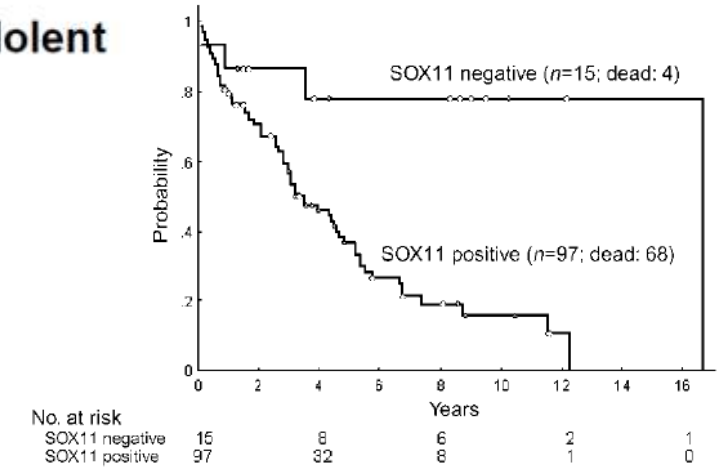
Figure 3. SOX11 protein expression in conventional and cyclin D1-negative MCL. (A, D) Conventional and cyclin D1-negative MCL, respectively (Hematoxilin & Eosin; x400); (B, E) Cyclin D1 and (C, F) SOX11 expression in conventional and cyclin D1-negative MCL, respectively (immunohistochemistry; x200);

Genomic and Gene Expression Profiling Defines Indolent Forms of Mantle Cell Lymphoma

Verónica Fernández, Olga Salamero, Blanca Espinet, et al.

Cancer Res 2010;70:1408-1418. Published OnlineFirst February 2, 2010.





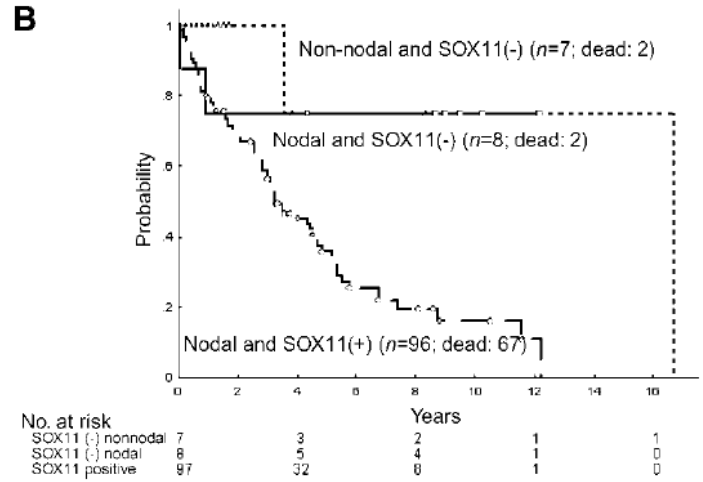


Figure 4. A, Kaplan-Meier estimates of OS of the 112 MCLs in the validation series according to SOX11 expression ($P < 0.001$). B, OS of 112 patients with MCL according to the nodal/nonnodal presentation and SOX11 expression ($P = 0.05$). The only patient with nonnodal presentation and SOX11-positive was not included.

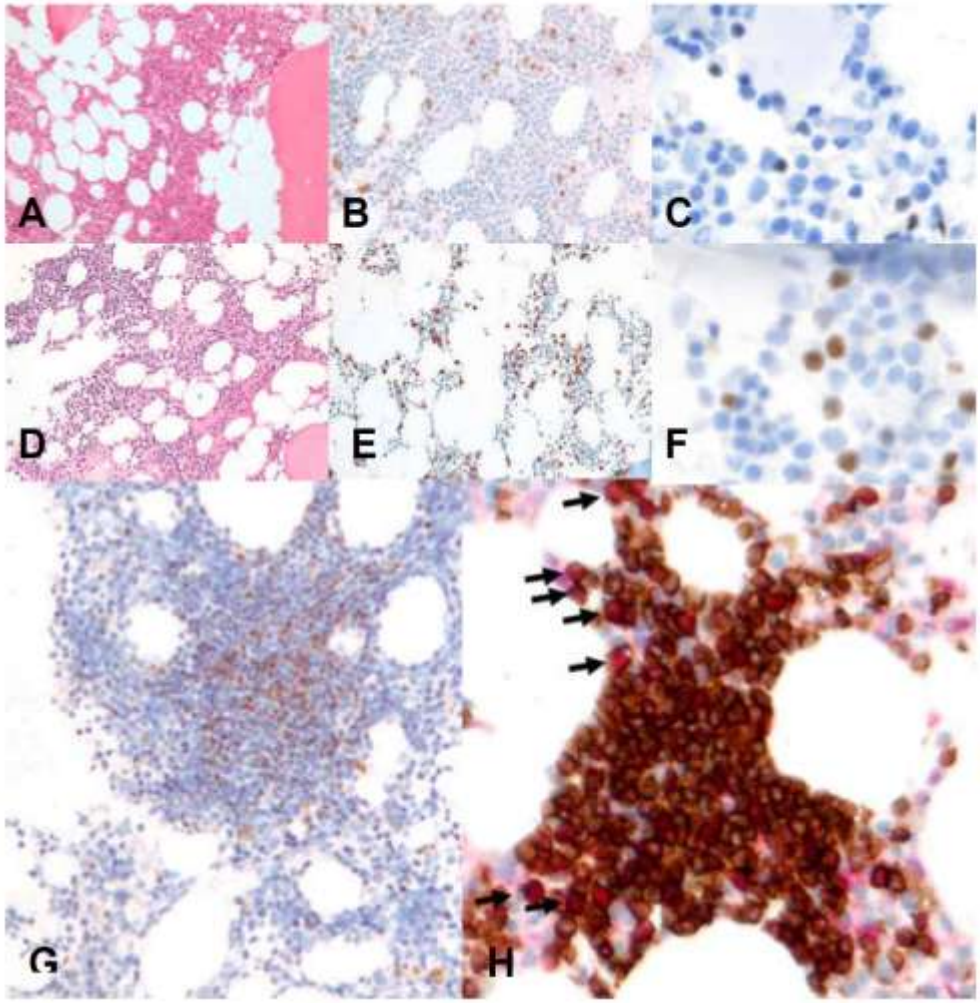


Table 3. Follow-up data.

Patient	Time to treatment (months)	Therapeutic agent(s)	Length of follow-up (months)	Status
1	N/A	N/A	89	AWEP
2	30	rituximab	89	AWEP
3	26	multiple therapies*	109	DOD
4	N/A	N/A	5	AWEP
5	N/A	N/A	26	AWEP
6	N/A	N/A	28	AWEP
7	N/A	N/A	10	AWEP
8	N/A	N/A	19	AWEP

N/A: not applicable; AWEP: alive without evidence of progression; DOD: died of disease.

SOX 11, 5 testados, 4 / 5 NEG 1 20-30% POS.

Indolent mantle cell leukemia: clinicopathologic variant characterized by isolated lymphocytosis, interstitial bone marrow involvement, kappa light chain restriction, and good prognosis

by Sarah L. Ondrejka, Raymond Lai, Neeraj Kumar, Stephen D. Smith, and Eric D. Hsi

Haematologica 2011 [Epub ahead of print]

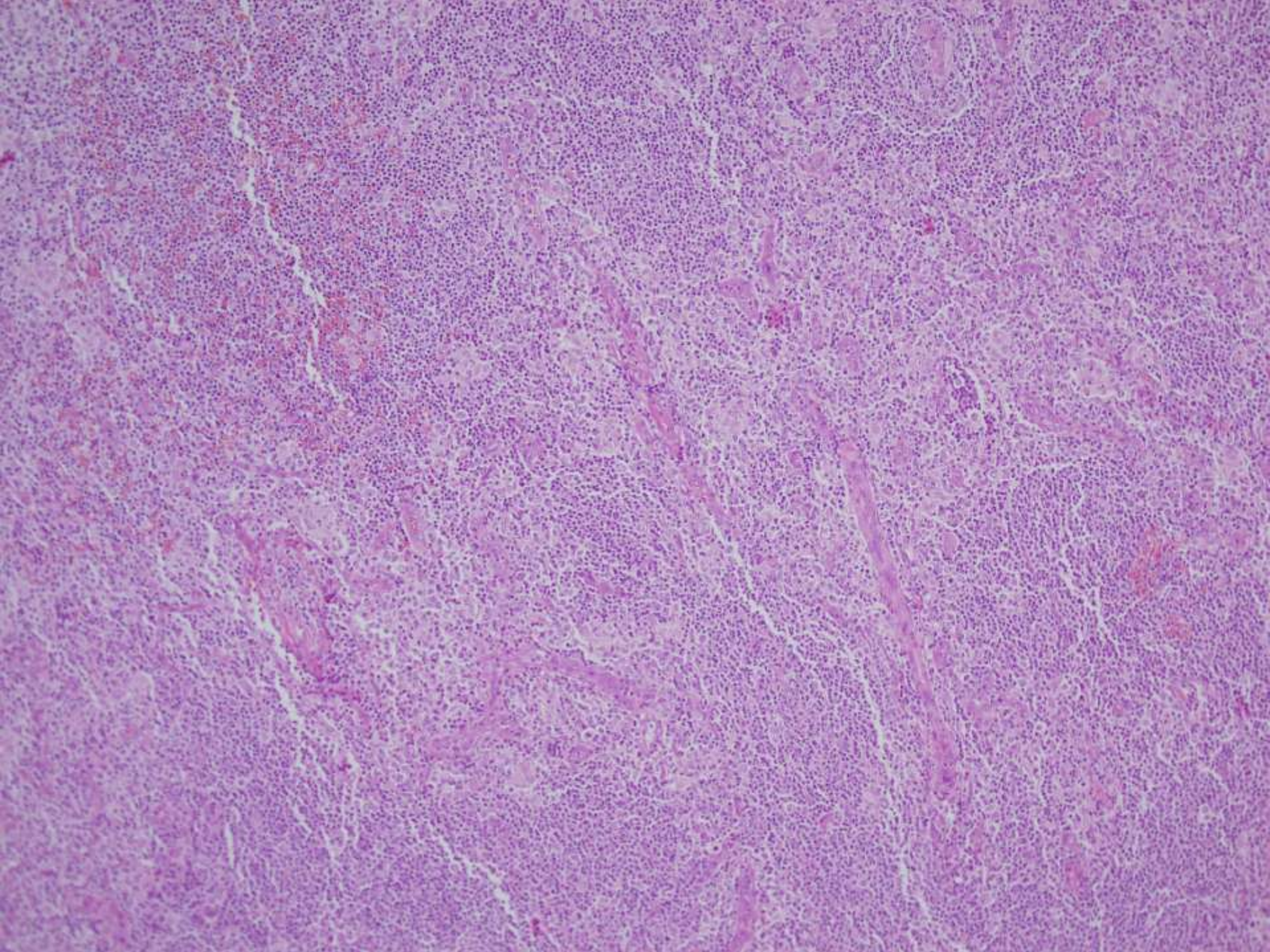
SOX11 expression in Indolent and blastoid MCL?

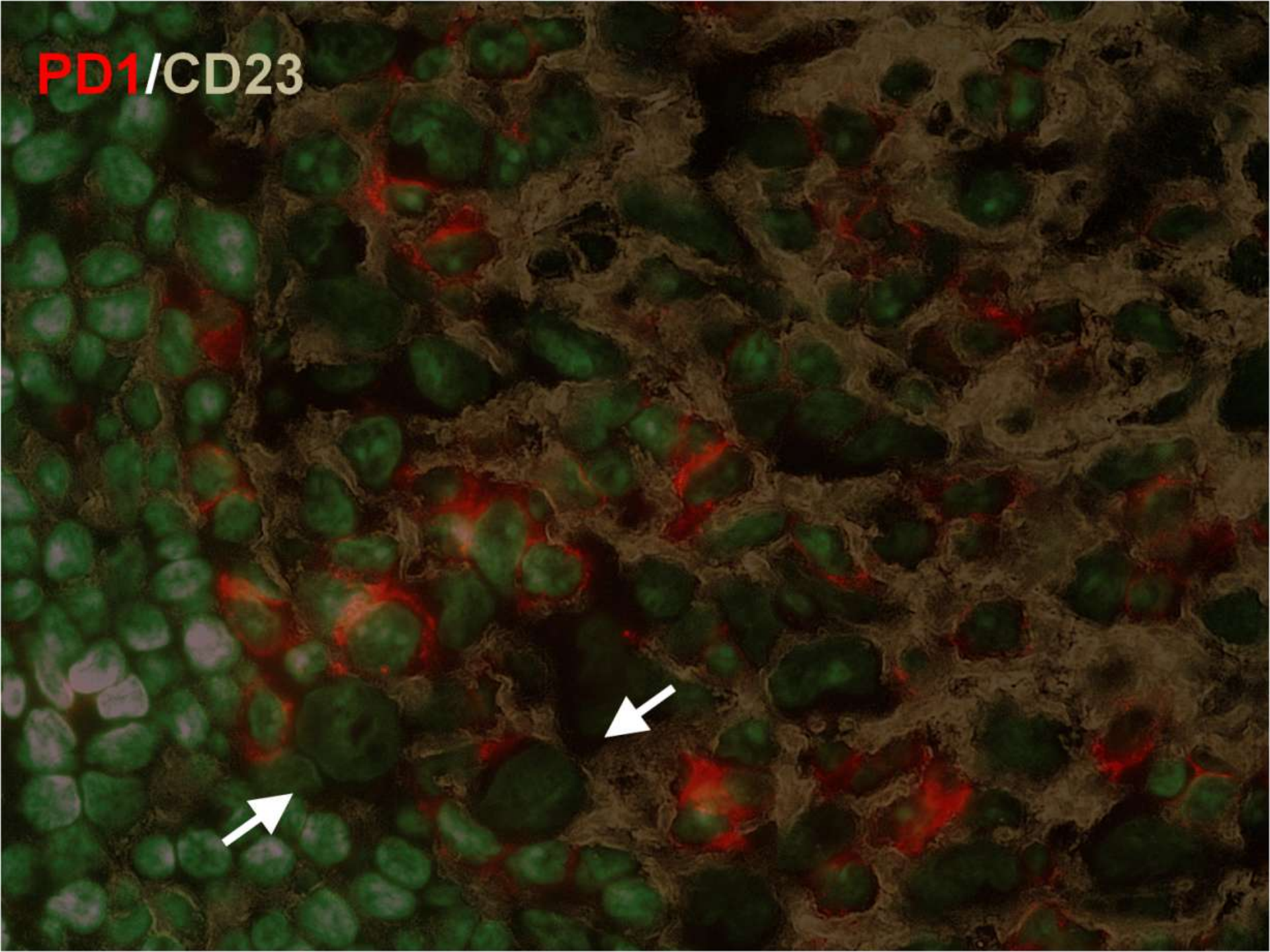
- Conflicting results regarding the clinical significance of low levels of SOX11 expression.

  Brandi et al. The proportion of tumor cells expressing SOX11 is associated with progression free survival in "conventional" Mantle Cell Lymphoma. Mod Pathol 24 S1, Feb 2011.

- SOX 11 positivity in Blastoid CyclinD1- MCL

  W Zeng et al. SOX 11 expression in B-cell lymphoma and identification of the first putative cases of cyclinD1 negative blastoid mantle cell lymphoma. Mod Pathol 24 S1, Feb 2011.




PD1/CD23

Expression of two markers of germinal center T cells (SAP and PD-1) in angioimmunoblastic T-cell lymphoma

Giovanna Roncador, José-Francisco García Verdes-Montenegro, Sara Tedoldi, Jennifer C. Paterson, Wolfram Klapper, Erica Ballabio, Lorena Maestre, Stefano Pileri, Martin-Leo Hansmann, Miguel A. Piris, David Y. Mason, Teresa Marafioti

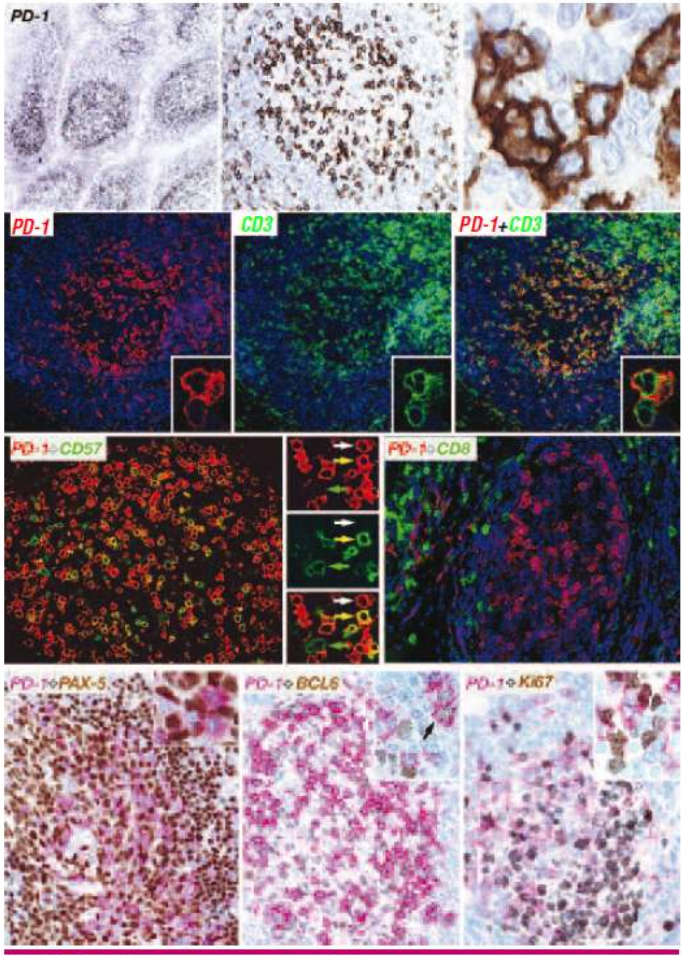
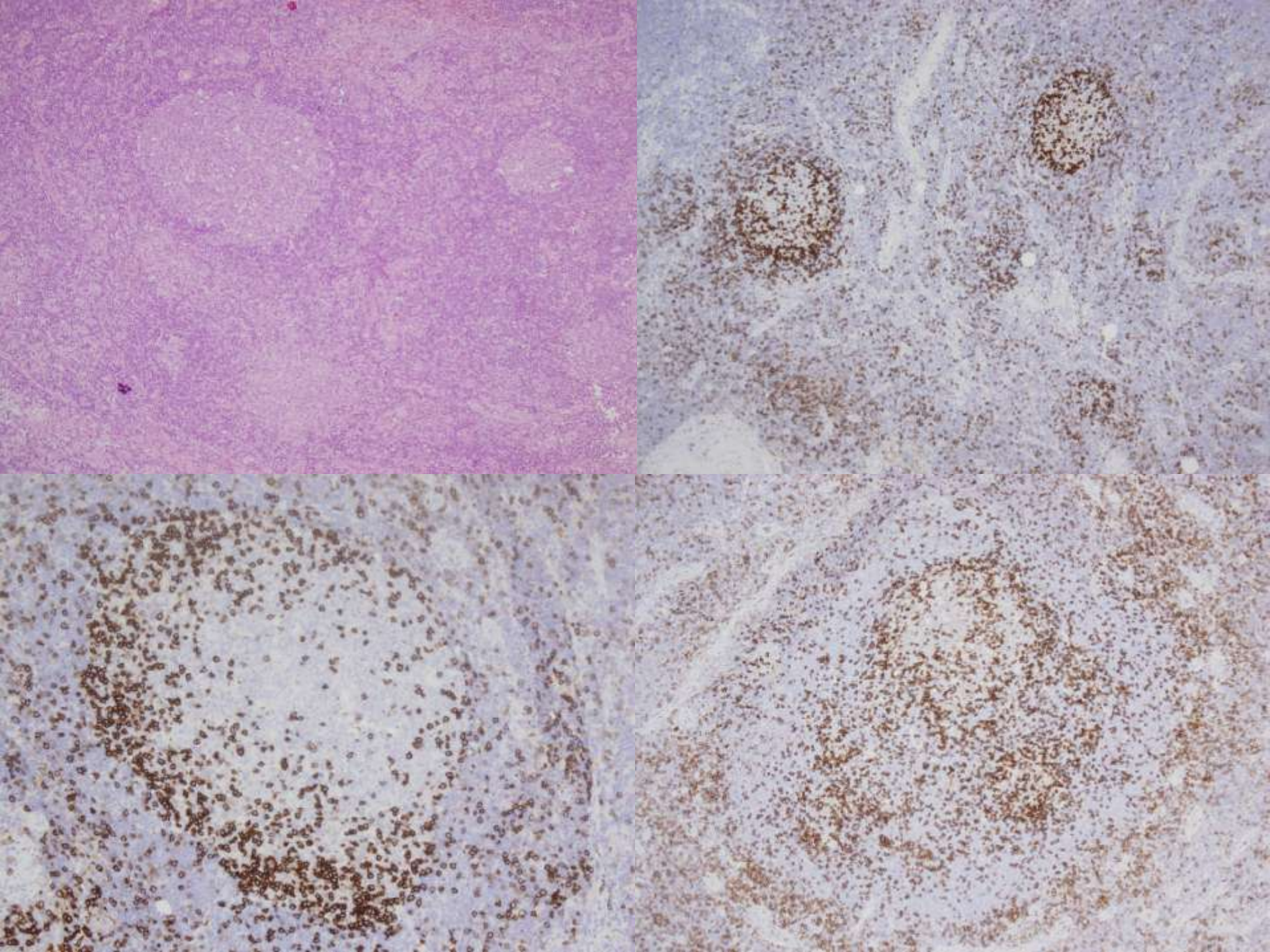
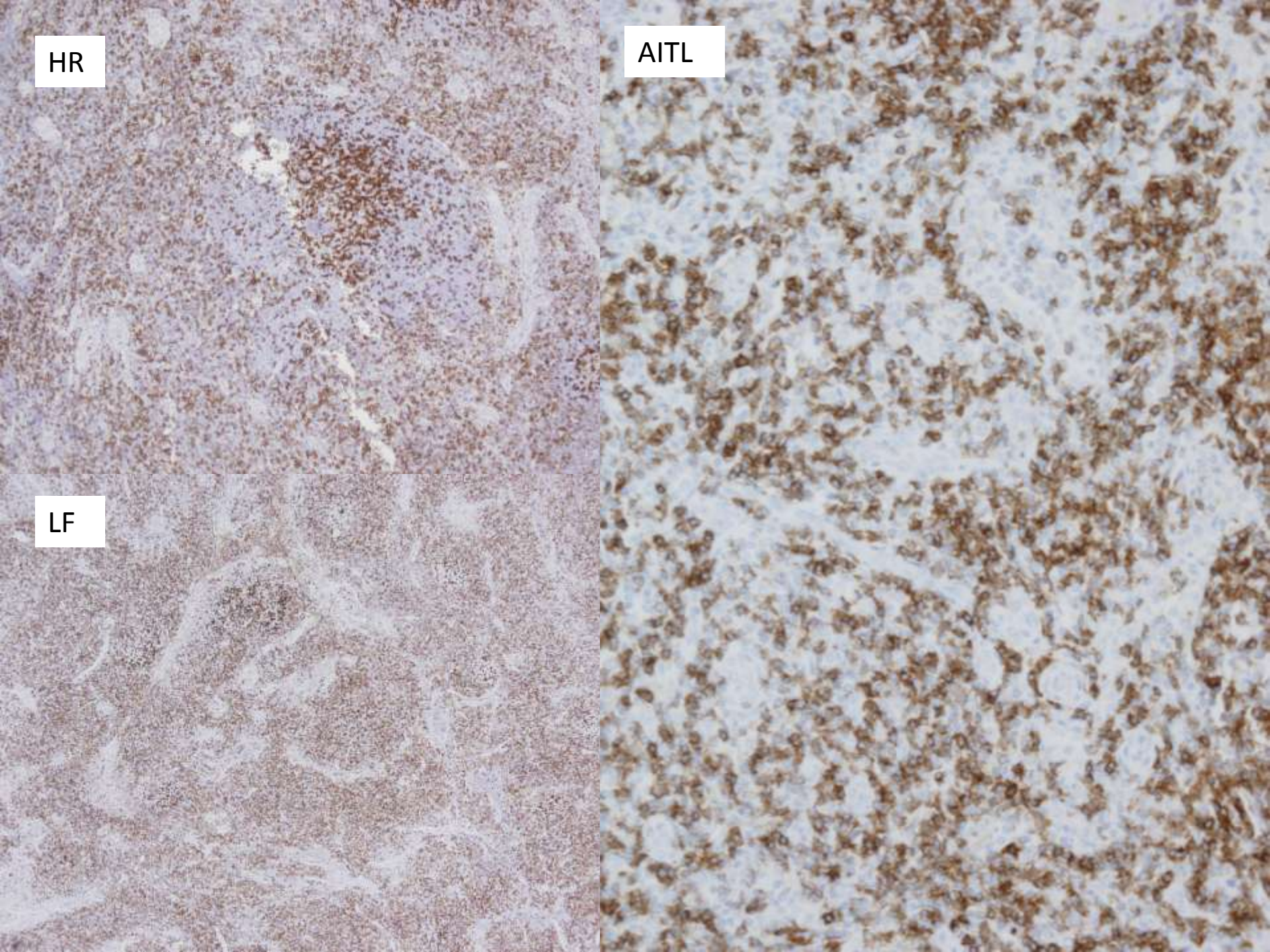


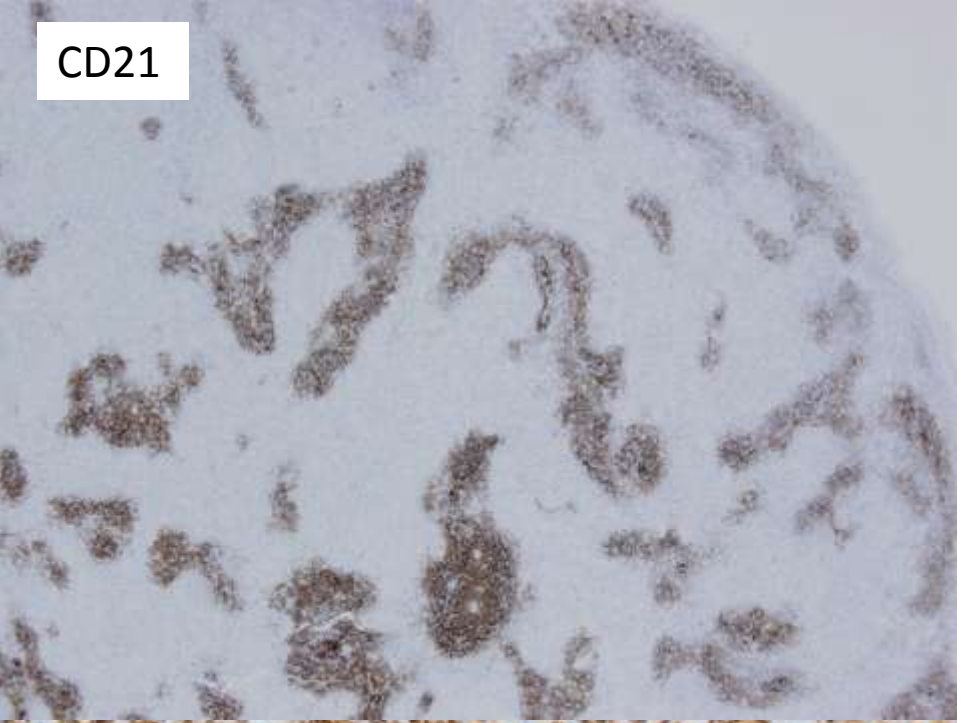
Table 2. Immunostaining of PD-1 and SAP in lymphoid neoplasms (positive cases/ total cases).

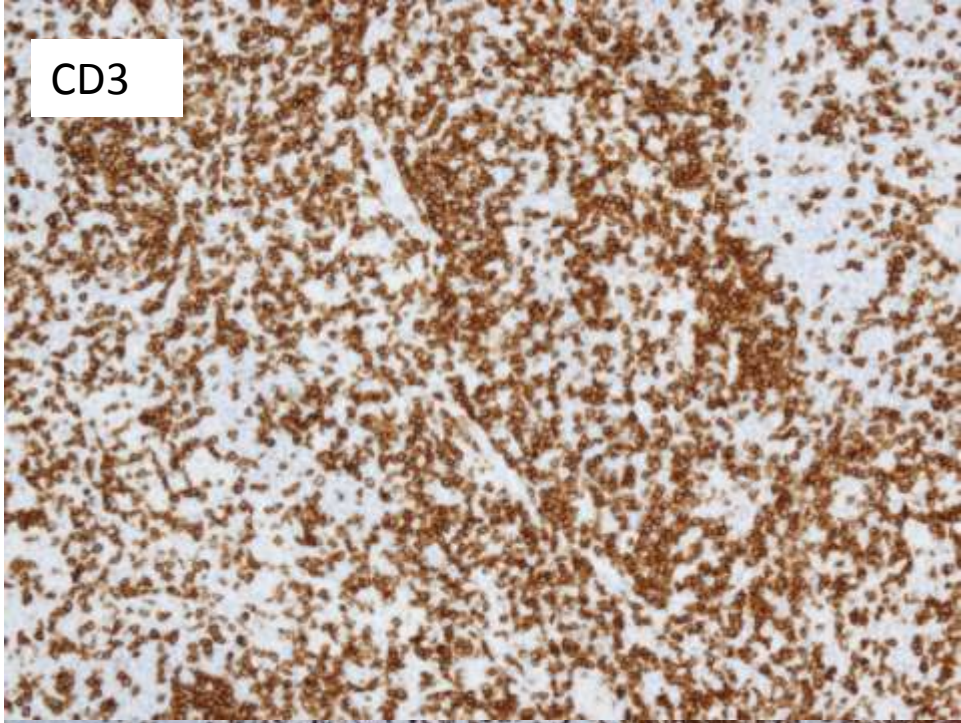
	PD-1	*SAP*
Lymphoma/leukemia type		
T/NK cell non-Hodgkin's		
Lymphoblastic (T)	0/20	15/21
Peripheral	5/30[a]	13[d]/37
Intestinal	1/10	3[e]/10
Angioimmunoblastic T cell (AITL)	42/49	59/69
Natural killer (NK)	1[b]/8	3/5
Mycosis fungoides	5/9	0/6[f]
ALK-positive	0/4	1[g]/13
ALK-negative, ALCL	0/1	1[h]/7
B cell non-Hodgkin's		
Lymphoblastic (B)	0/10	0/11
Chronic lymphocytic (CLL)	0/13[c]	0/20
Mantle cell	0/14	0/20
Follicular (Grade 1, 2, 3)	0/70	0/114
Burkitt's	0/21	0/14
Diffuse large	3/98	3[i]/115
Marginal zone (nodal and splenic)	0/14	0/23
MALT	0/8	0/12
Hairy cell	0/1	0/1
Myeloma/plasmacytoma	0/2	0/10
Hodgkin's		
Classical	0/18	1/21
Lymphocyte predominant	0/11	4[j]/14

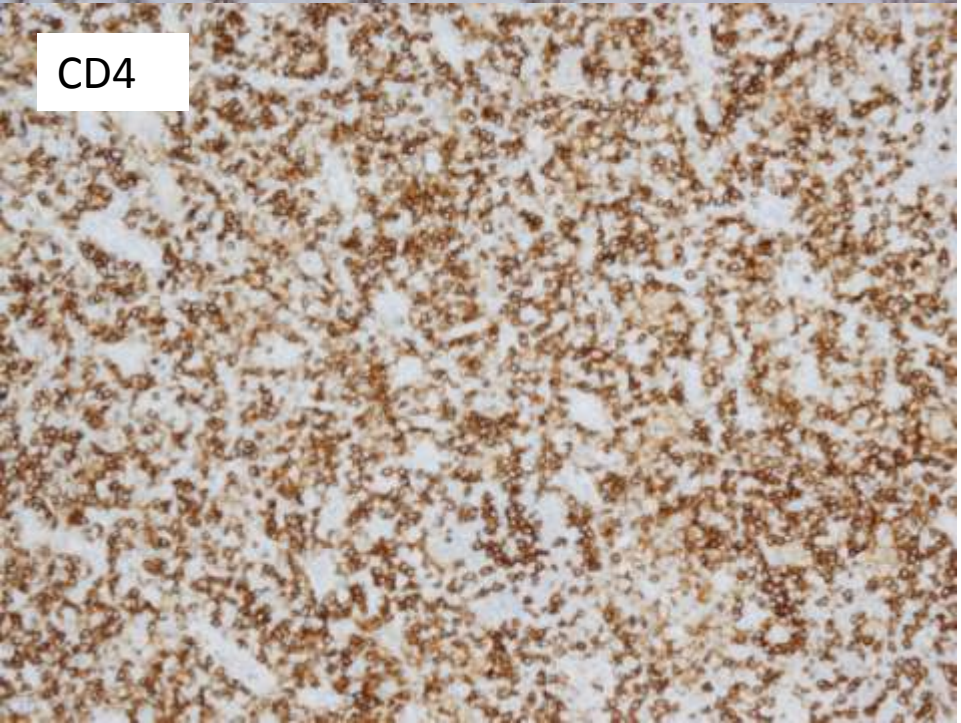
Haematologica 2007; 92:1059-1066

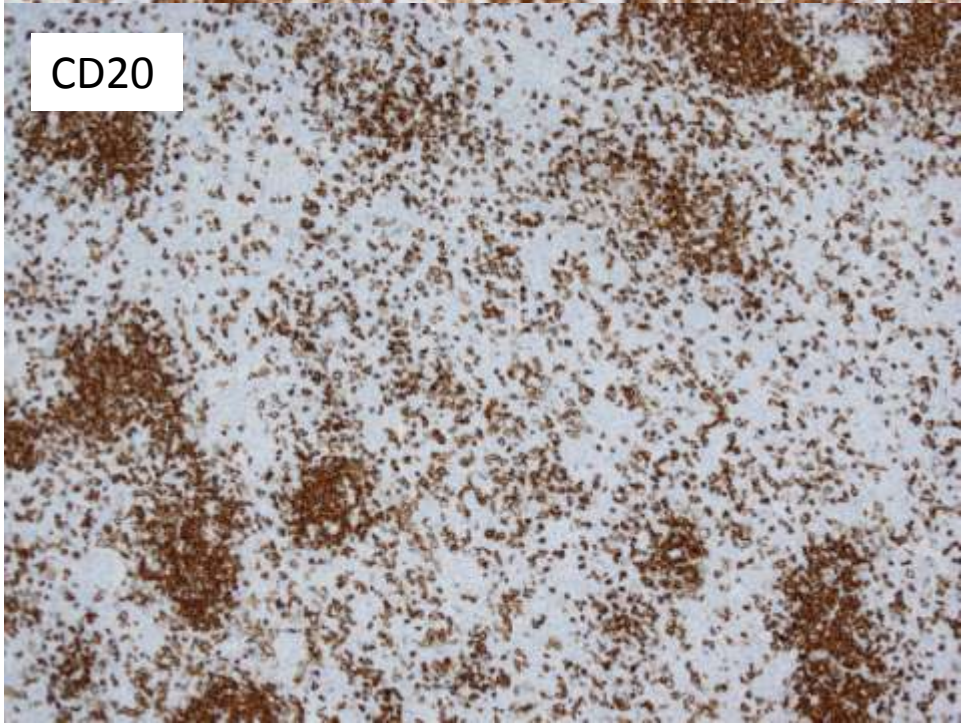


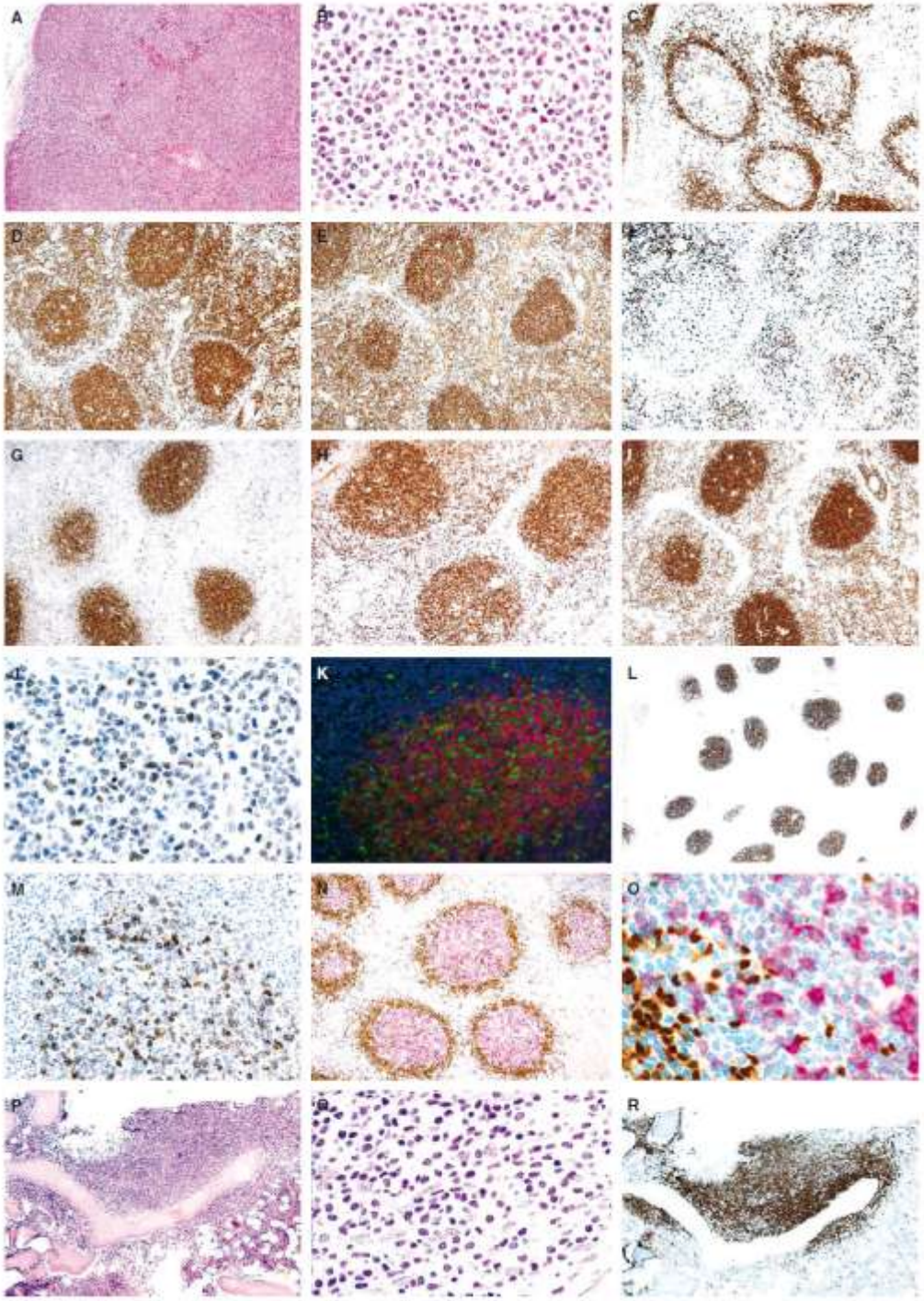

HR
LF
AITL


CD21


CD3


CD4

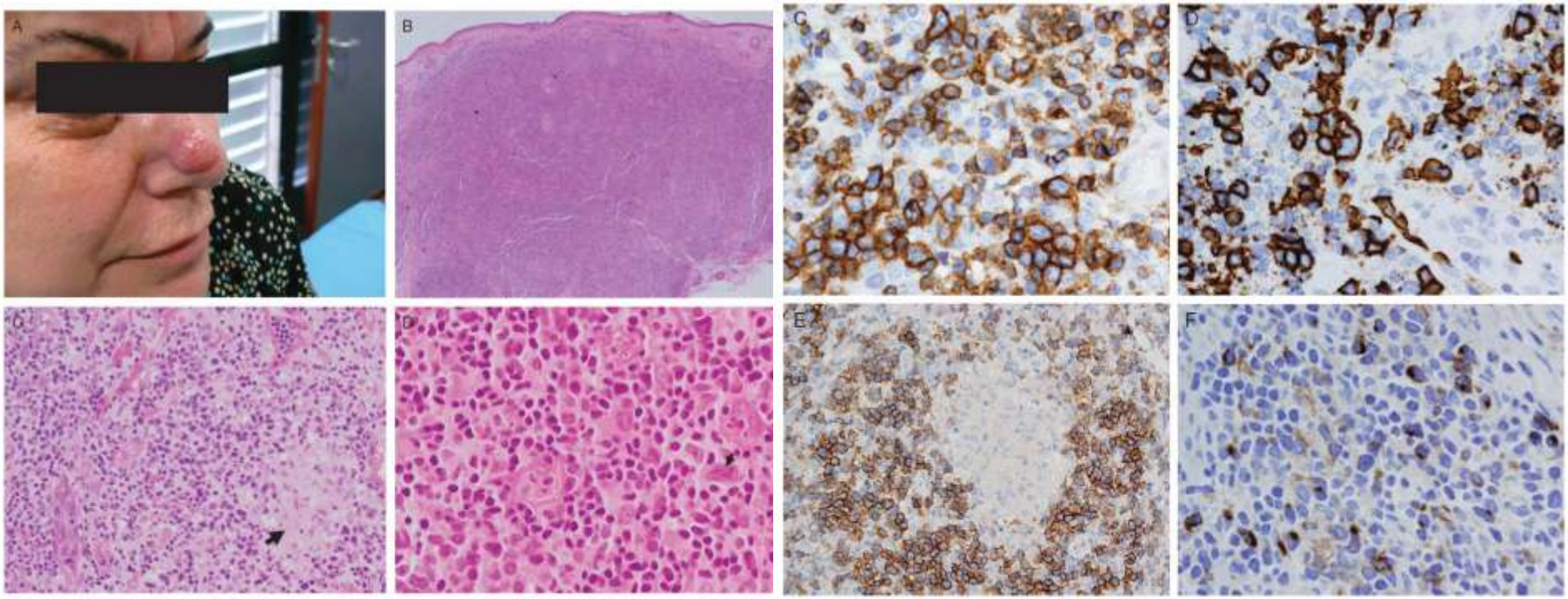

CD20

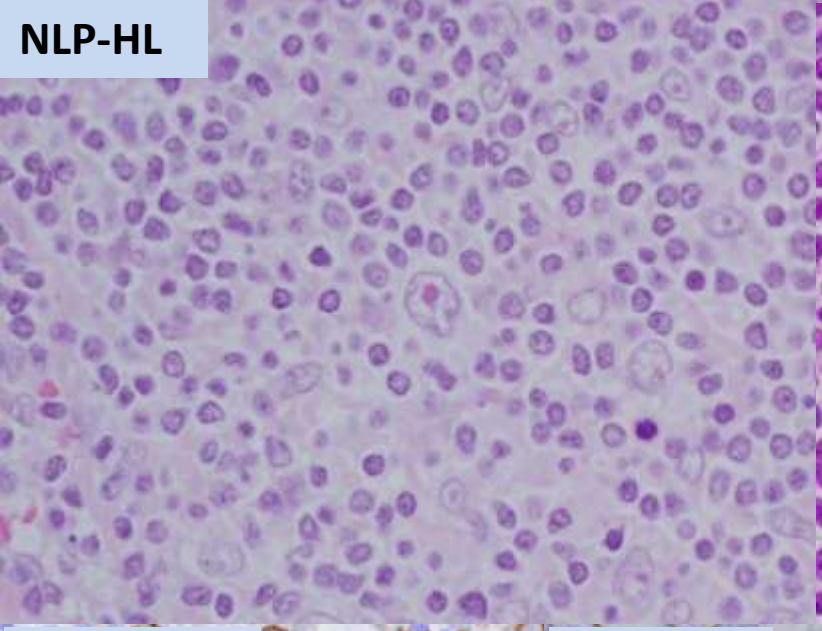


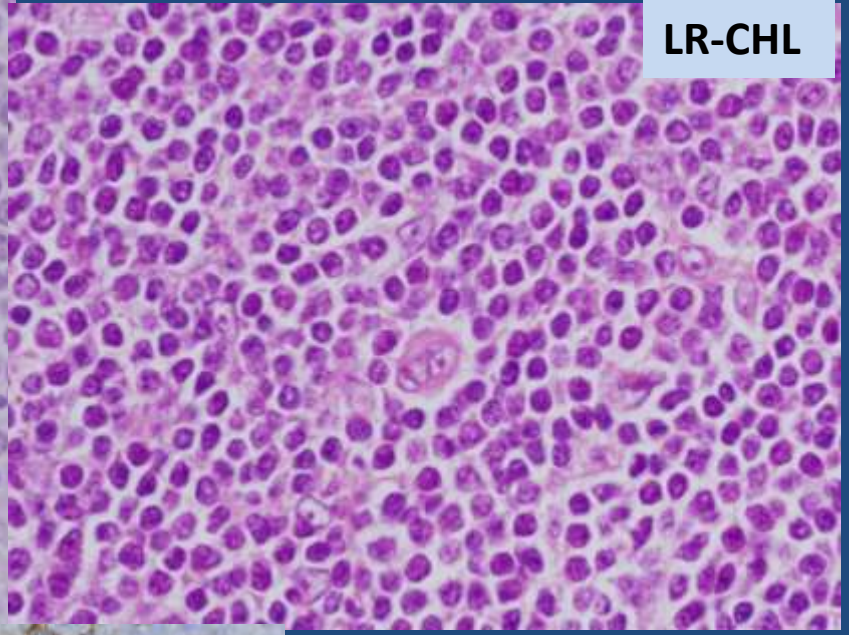
Follicular T-cell lymphoma: description of a case with characteristic findings suggesting it is a different condition from AITL

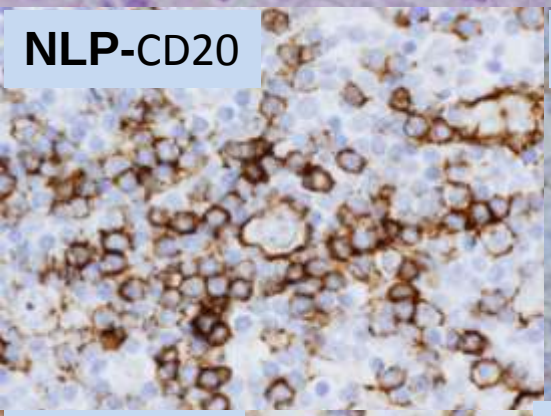
Nazario Ortiz Muchotrigo et al.
Histopathology 2009

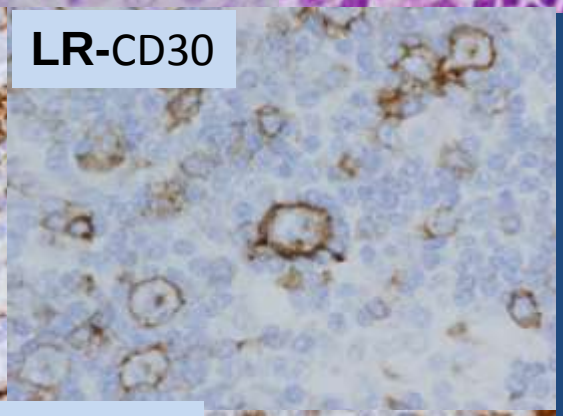
Primary Cutaneous CD4+ Small/Medium-sized Pleomorphic T-cell Lymphoma Expresses Follicular T-cell Markers

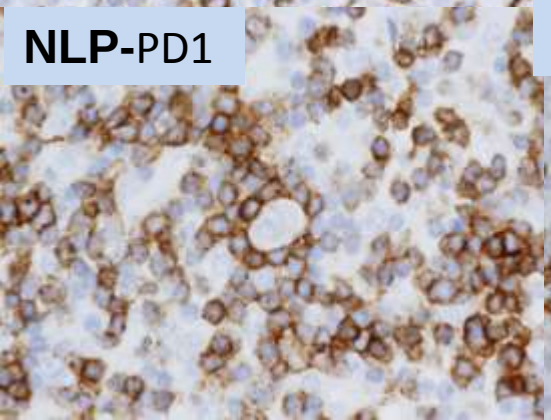


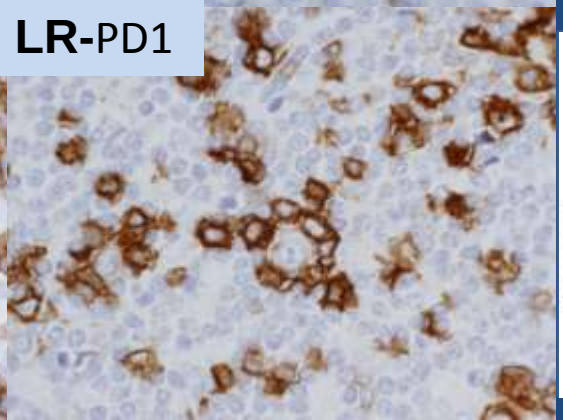












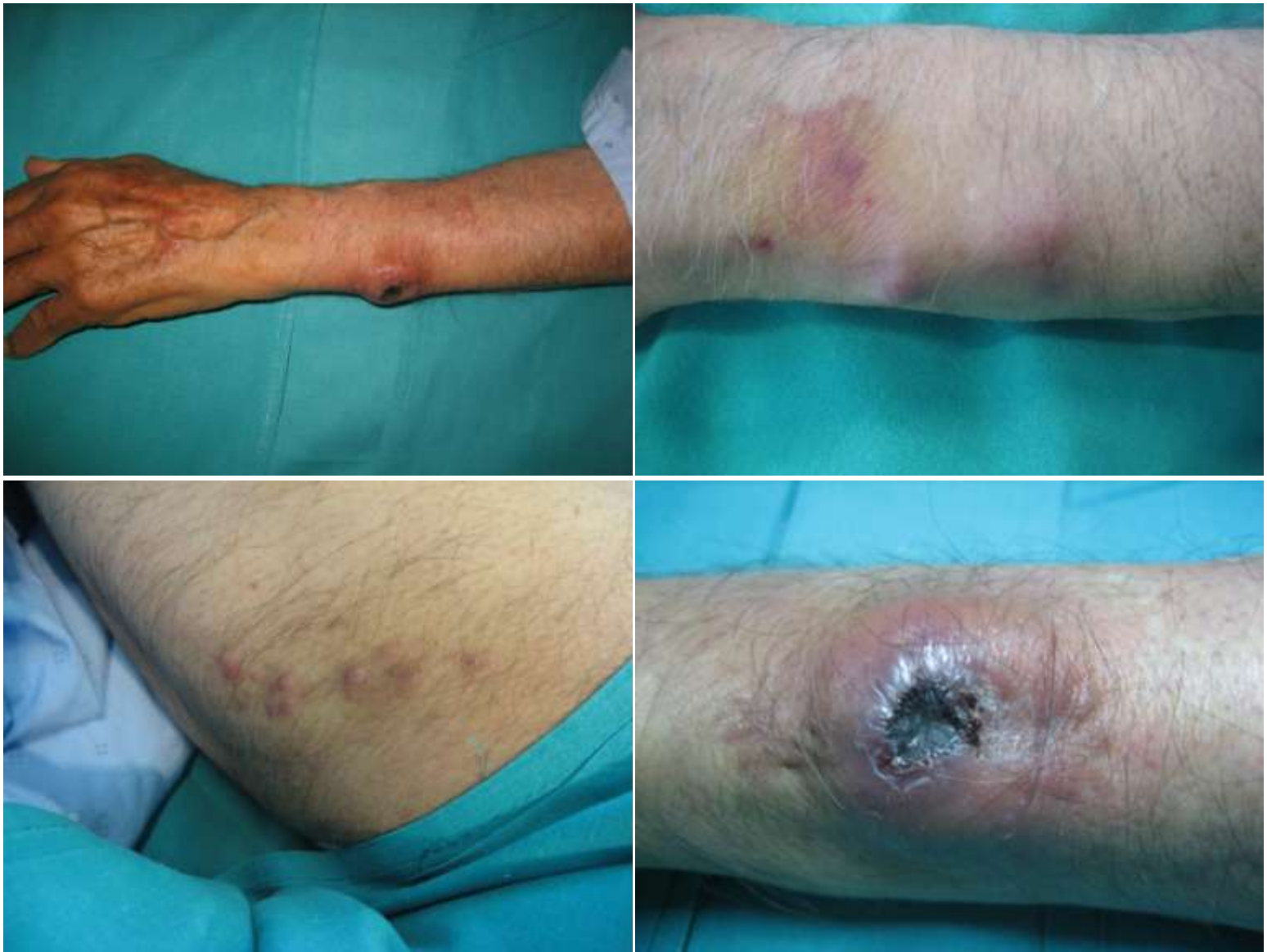
PD-1, a Follicular T-cell Marker Useful for Recognizing Nodular Lymphocyte-predominant Hodgkin Lymphoma

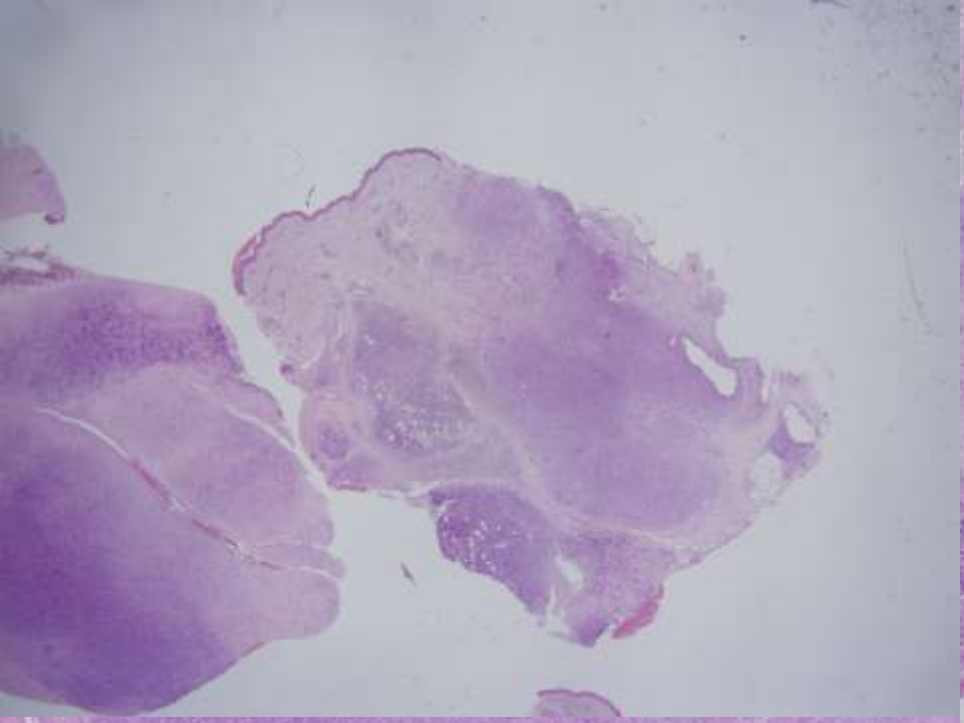
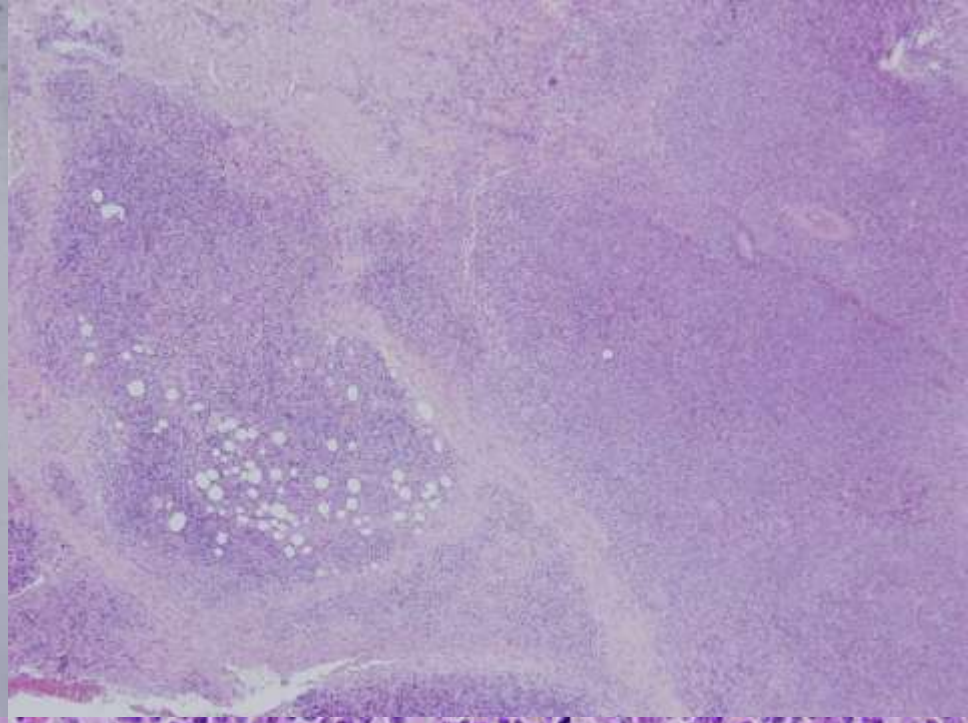
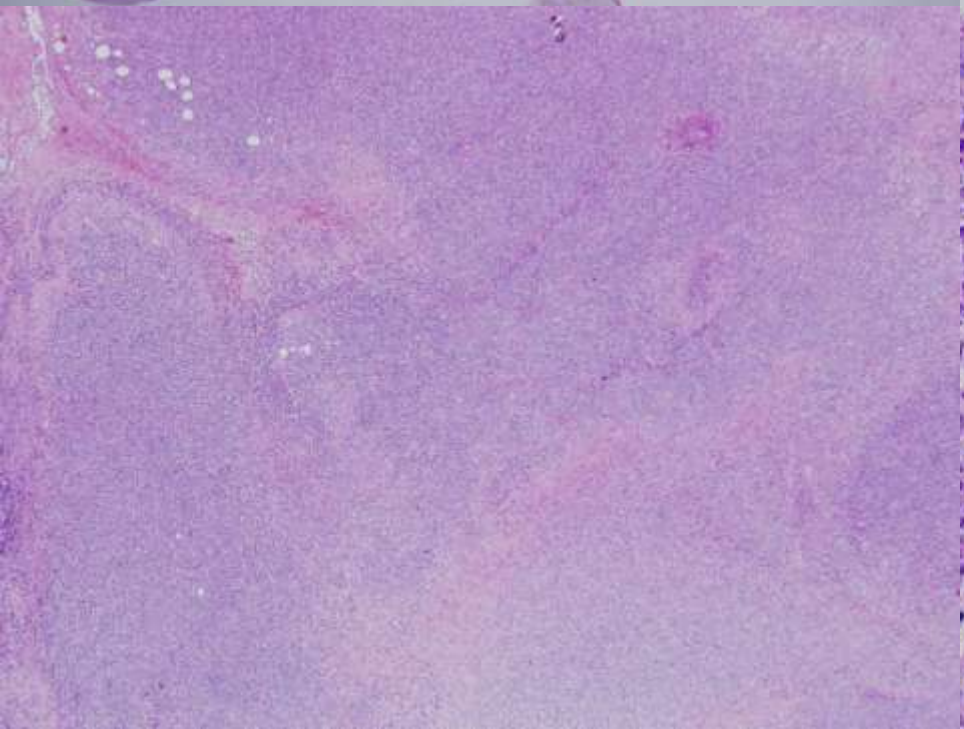
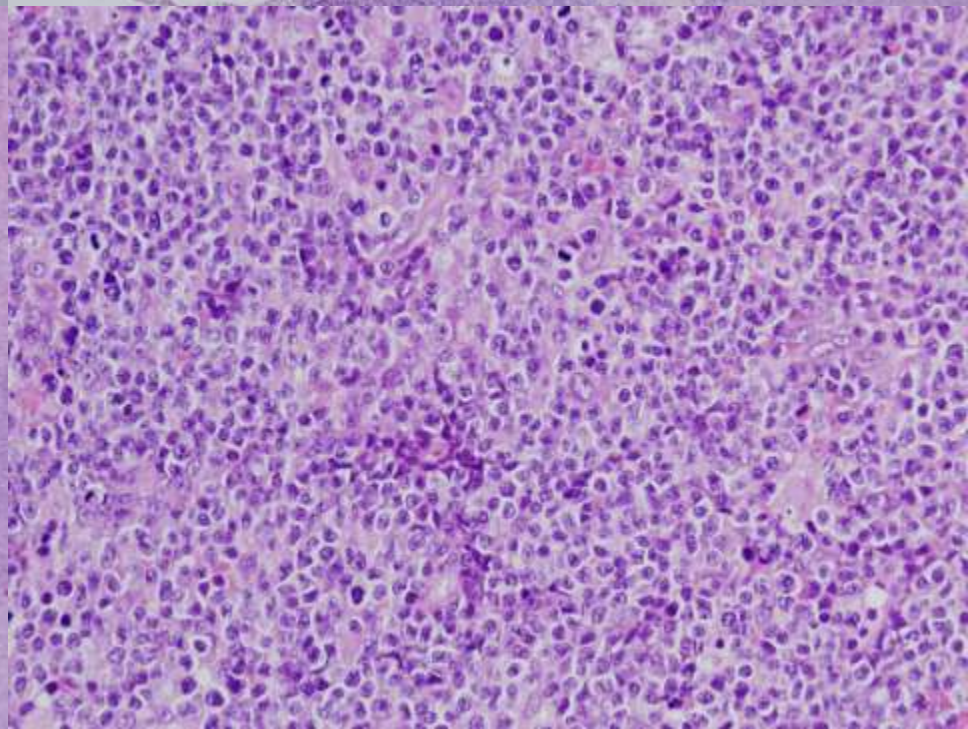
Nam-Cha et al . Am J Surg Pathol 2008

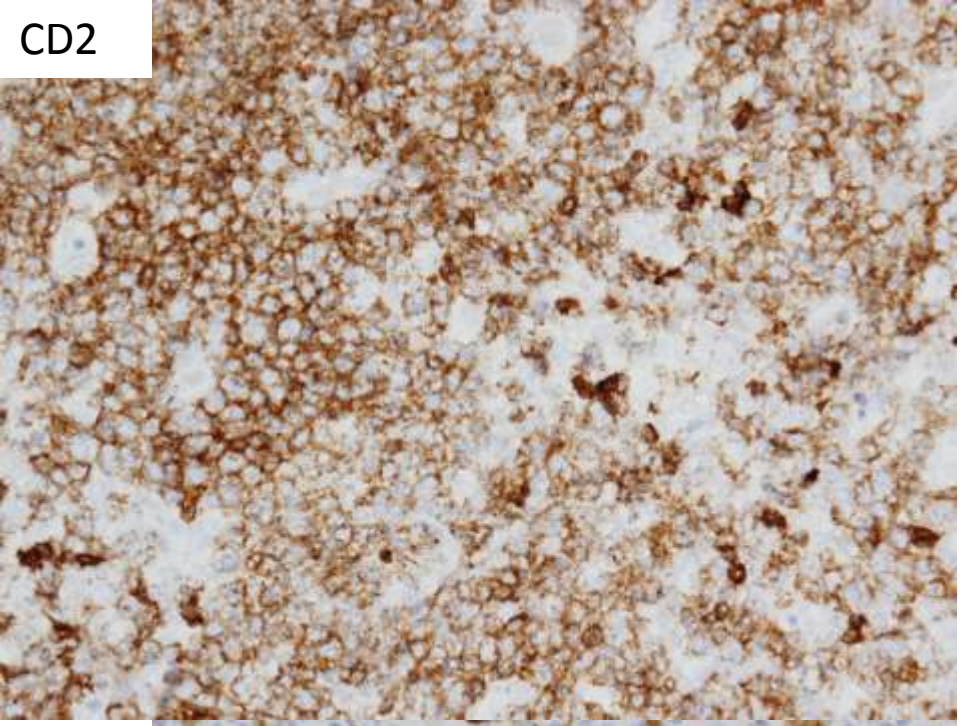
Lymphocyte-rich classical Hodgkin's lymphoma: distinctive tumor and microenvironment markers

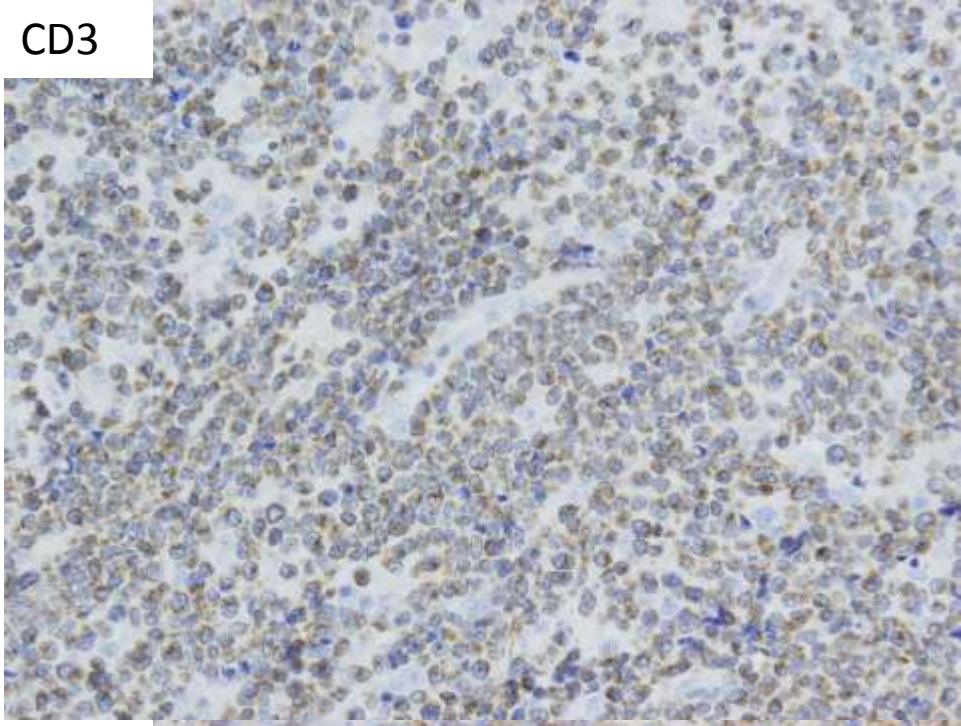
Nam-Cha et al . Mod Pathol 2009

New markers for Cutaneous T-cell Lymphoma.




CD2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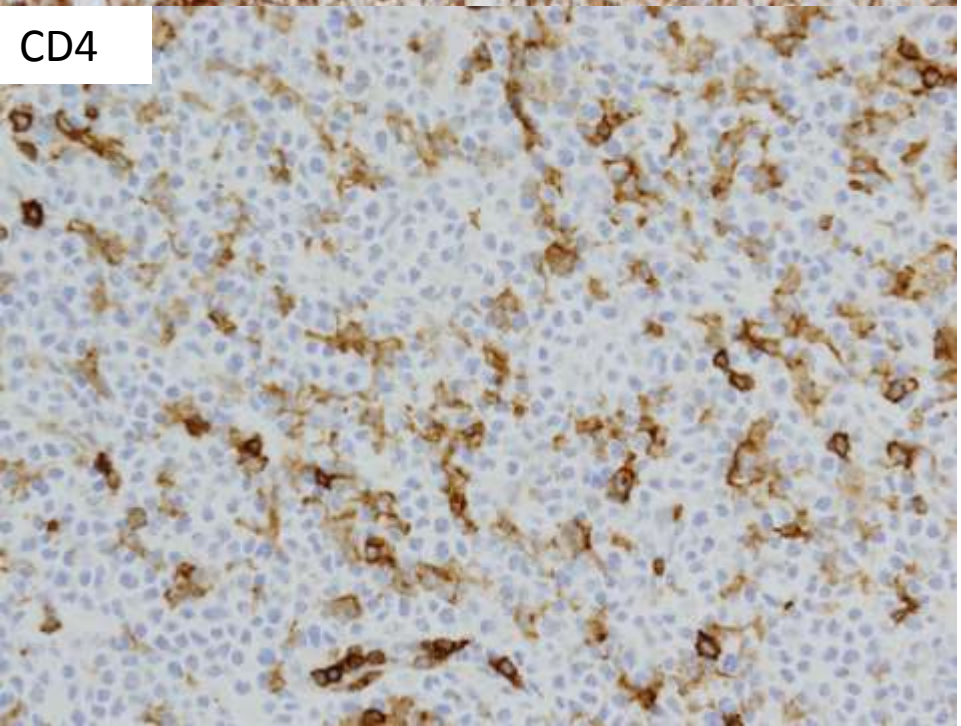
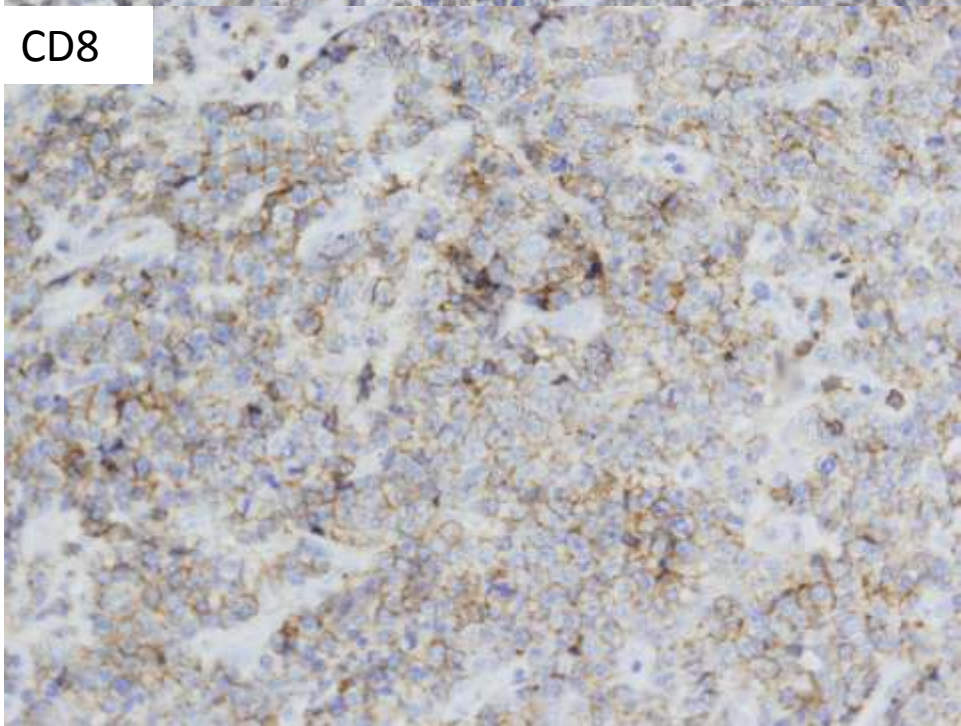
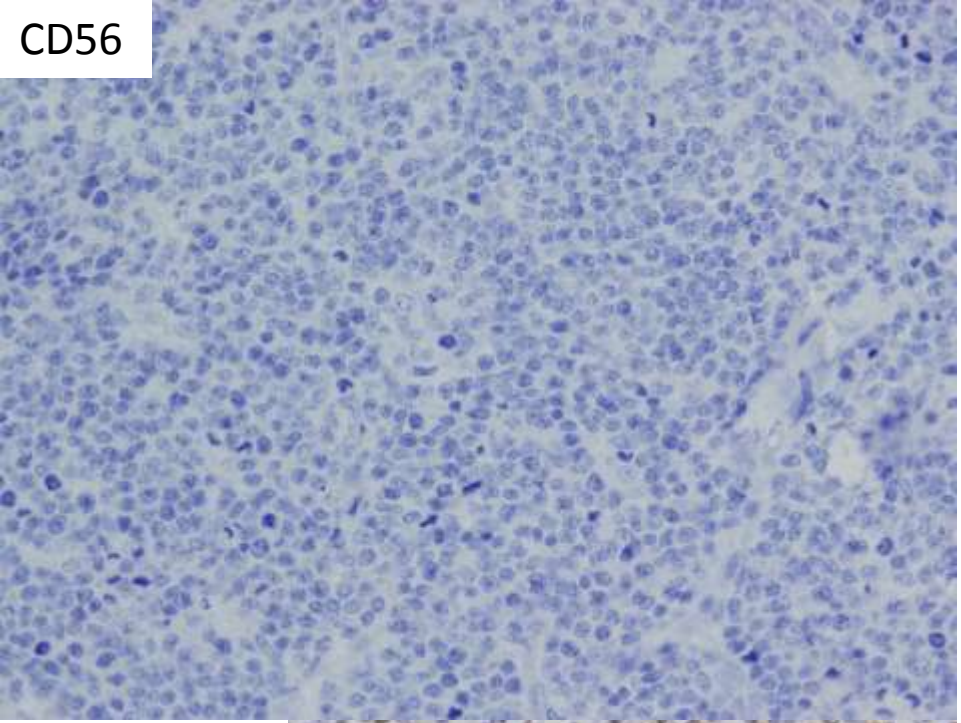
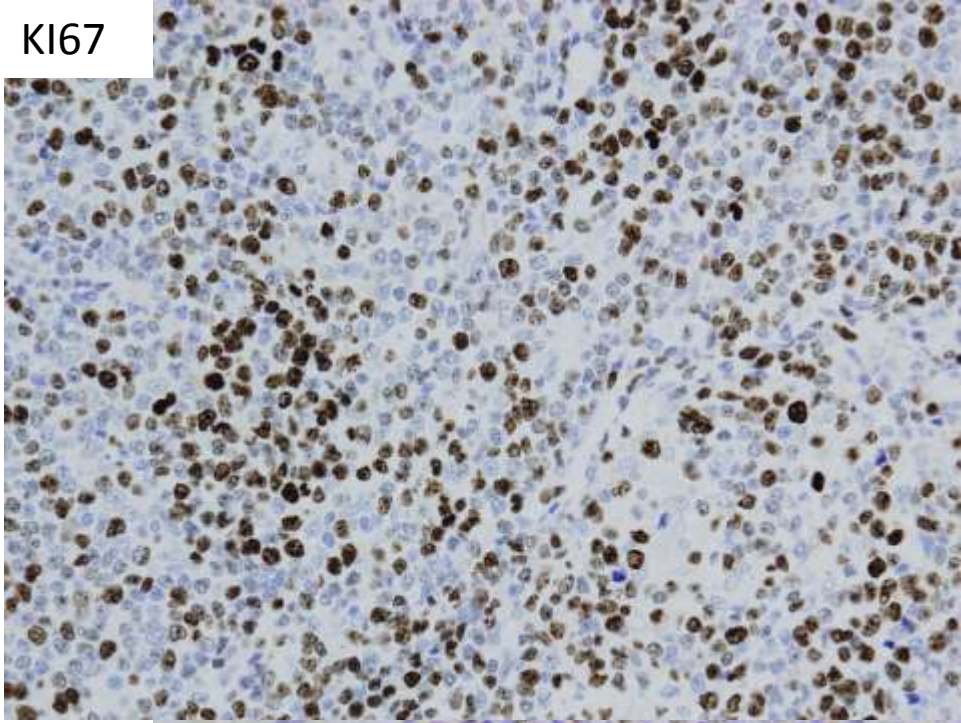
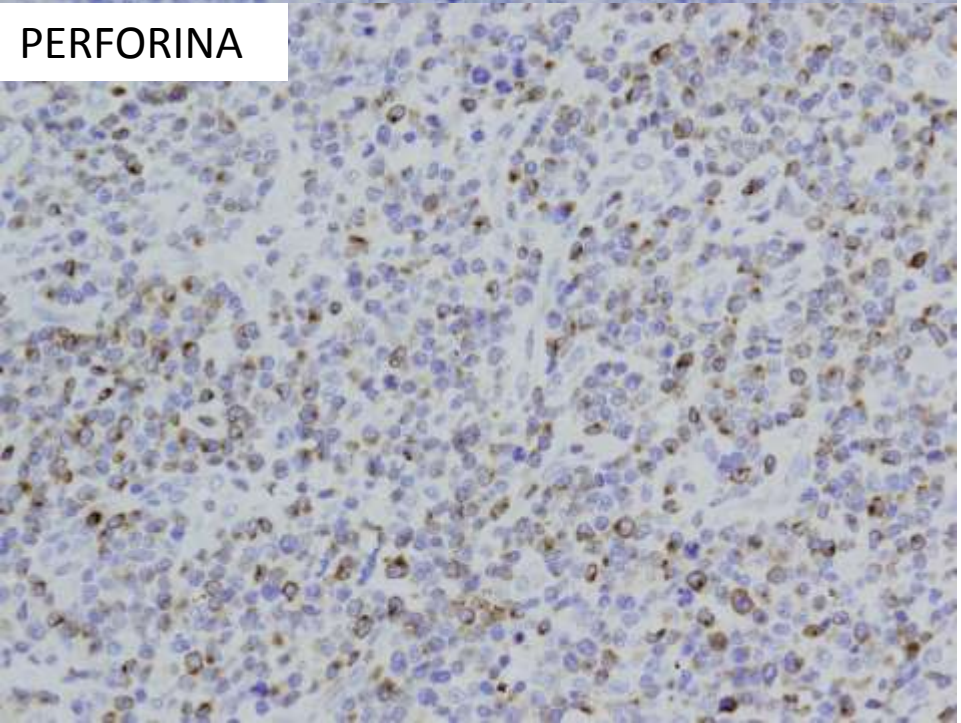
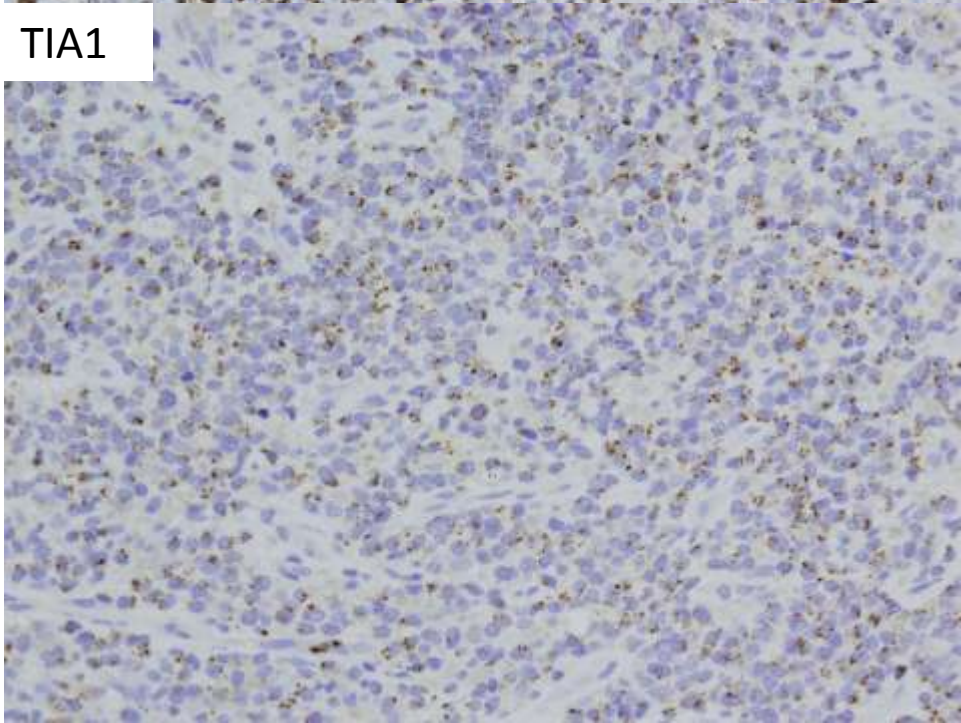

CD4

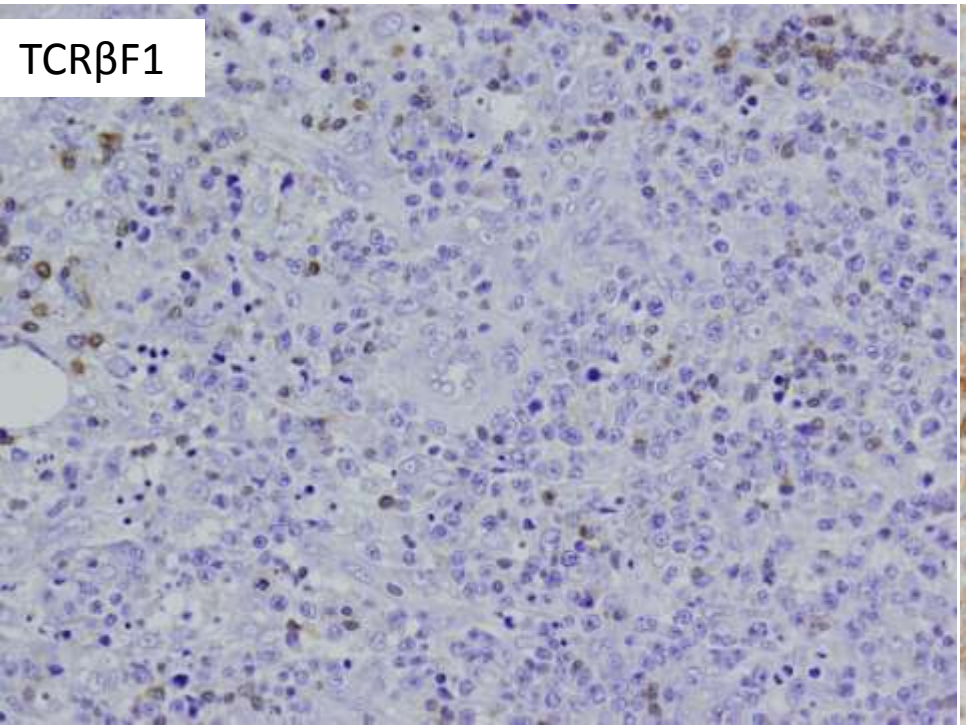

CD8

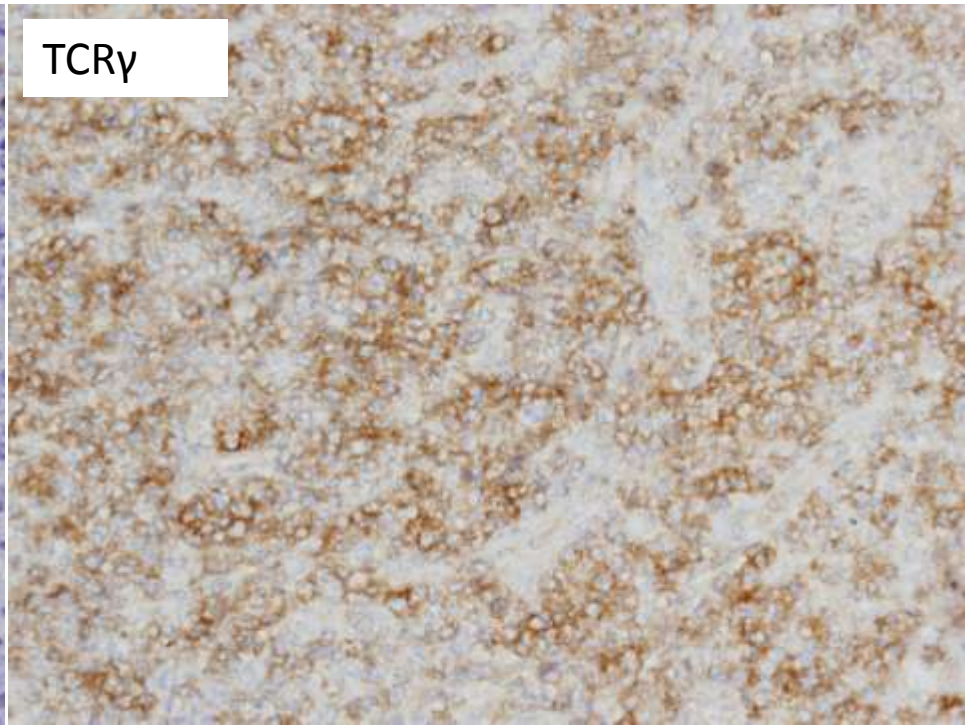

CD56


KI67


PERFORINA


TIA1

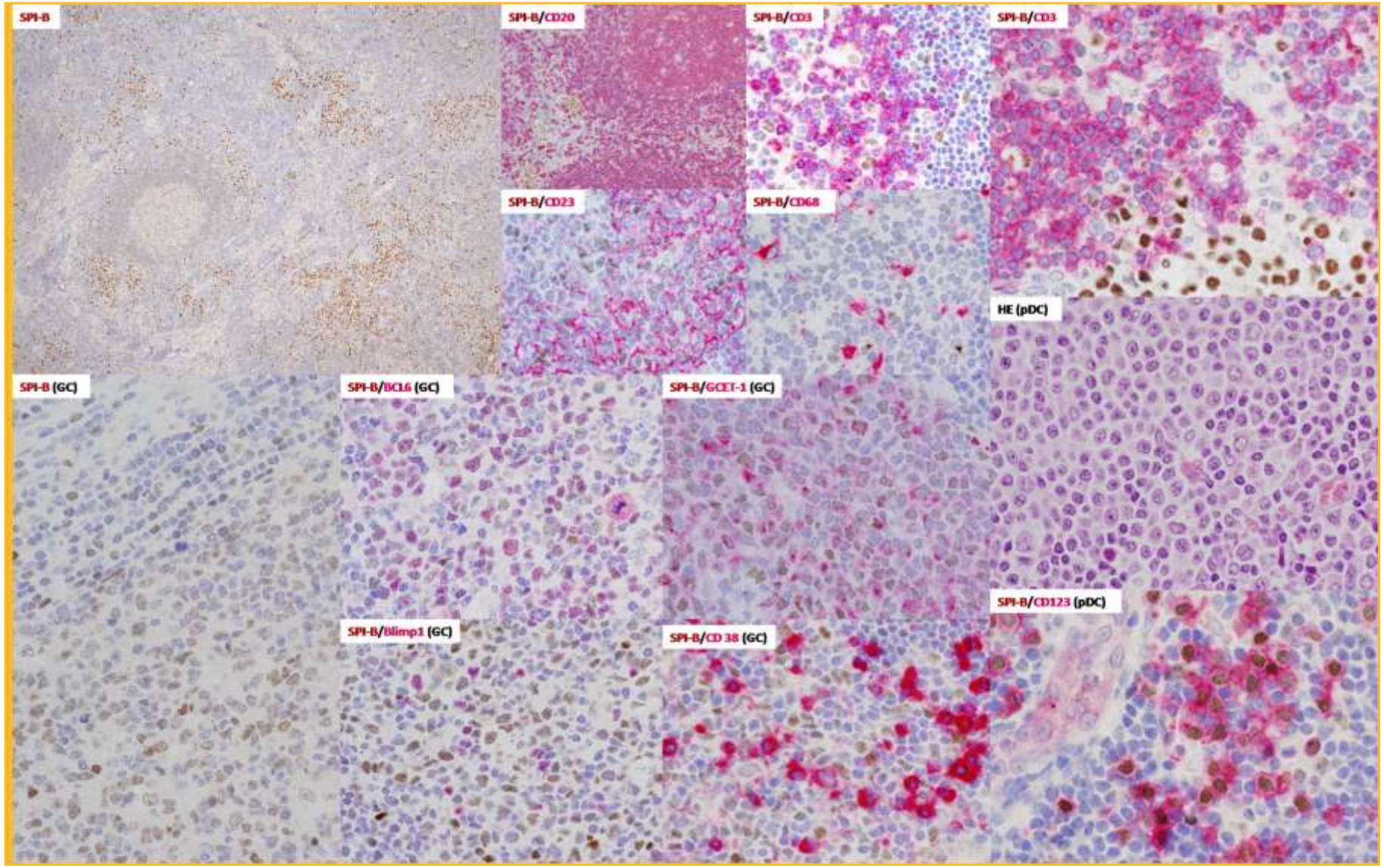


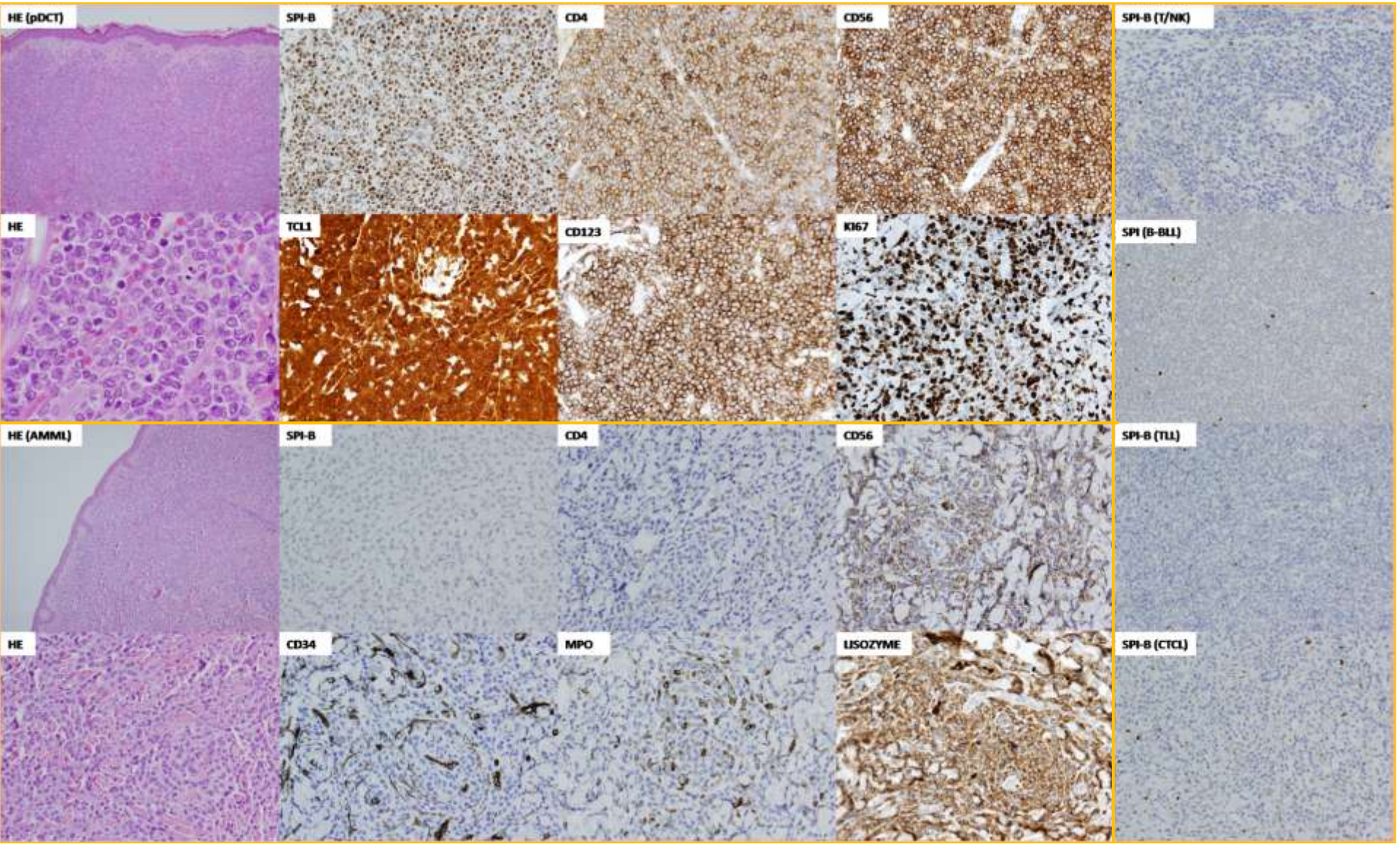


PCR (TCR primers Biomed2): Reordenamientos MONOCLONALES de TCRG1 y TCR delta.

DAP: LINFOMA CUTÁNEO DE CELULAS T GAMMA DELTA.

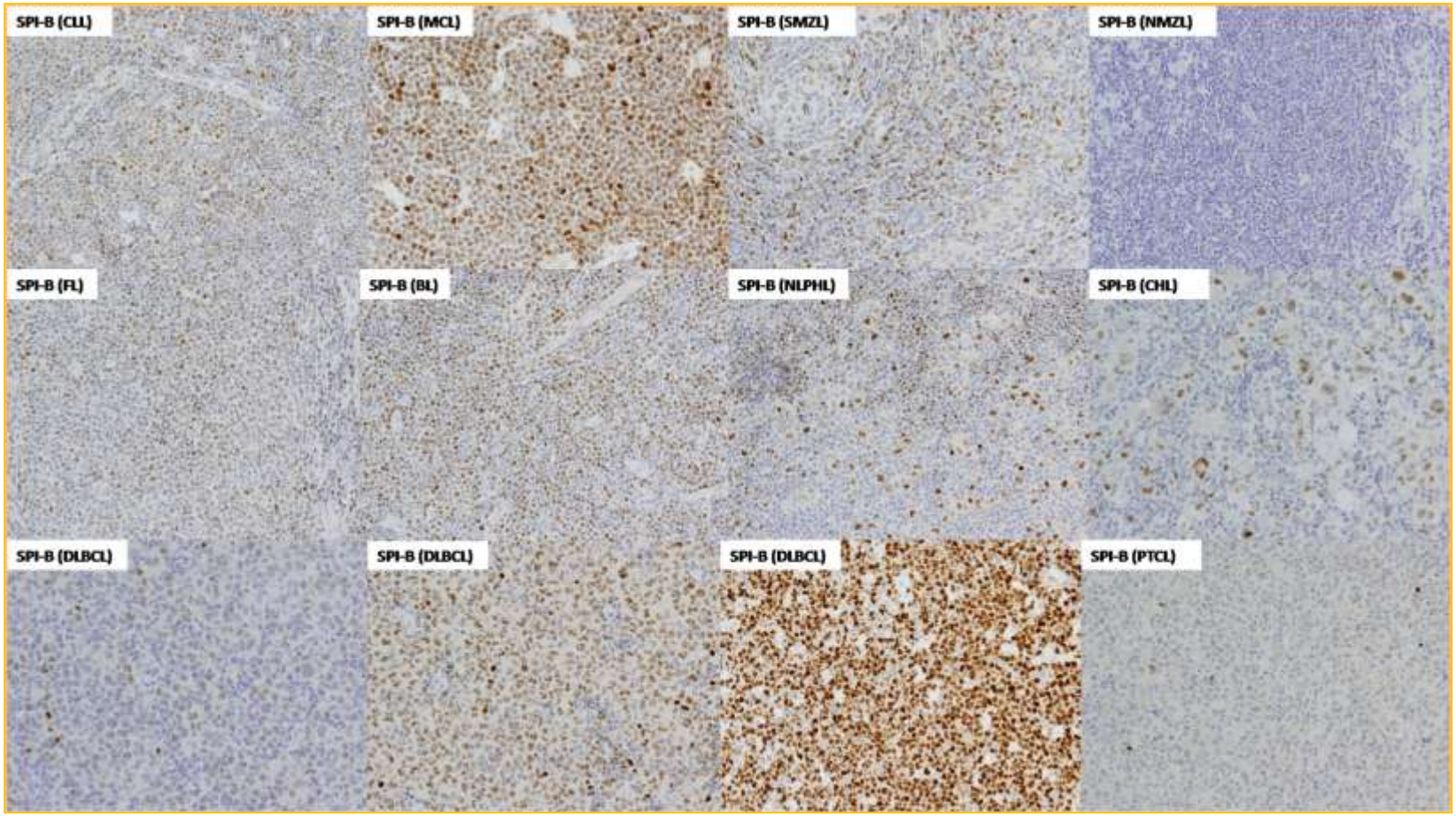
New markers for Blastic Plasmacytoid Dendritic cell neoplasms.




HE (pDCT)
SPI-B
CD4
CD56
SPI-B (T/NK)
HE
TCL1
CD123
KI67
SPI (B-BLL)
HE (AMML)
SPI-B
CD4
CD56
SPI-B (TLL)
HE
CD34
MPO
LISOZYME
SPI-B (CTCL)

LYMPHOMA TYPE (WHO)	POSITIVE		NEGATIVE		TOTAL N CASES
	n	%	n	%	
pDCT	30	100	0	0	30
AMML	0	0	6	100	6
AML NOS	0	0	2	100	2
PRECURSOR T-LL	0	0	13	100	13
PRECURSOR B-LL	1	8	11	92	12
NASAL TYPE NK/TCL	0	0	21	100	21
PRIMARY CTCL (CD4+)	0	0	7	100	7

LYMPHOMA TYPE (WHO)	WEAKLY POSITIVE		STRONGLY POSITIVE		NEGATIVE CASES		TOTAL N CASES
	n	%	n	%	n	%	
CLL/SLL	15	45	8	24	10	30	33
MCL	39	53	3	4	32	43	74
SMZL	1	3	12	32	25	66	38
NMZL/MALT			27	44	34	56	61
FL			26	81	6	19	32
BL			9	90	1	10	10
DLBCL	28	28	48	48	24	24	100
HL (NLPHL & CHL)	36	54	7	10	24	36	67
PTCL	14	18			66	83	80



Lymphoma Group

Histology and Immunohistochemistry *Core Unit*

Monoclonal Antibodies *Core Unit*