

22nd

INTERNATIONAL
ULTMANN
CHICAGO
LYMPHOMA
SYMPOSIUM

Next Generation Hematopathology 2025

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Disclosures

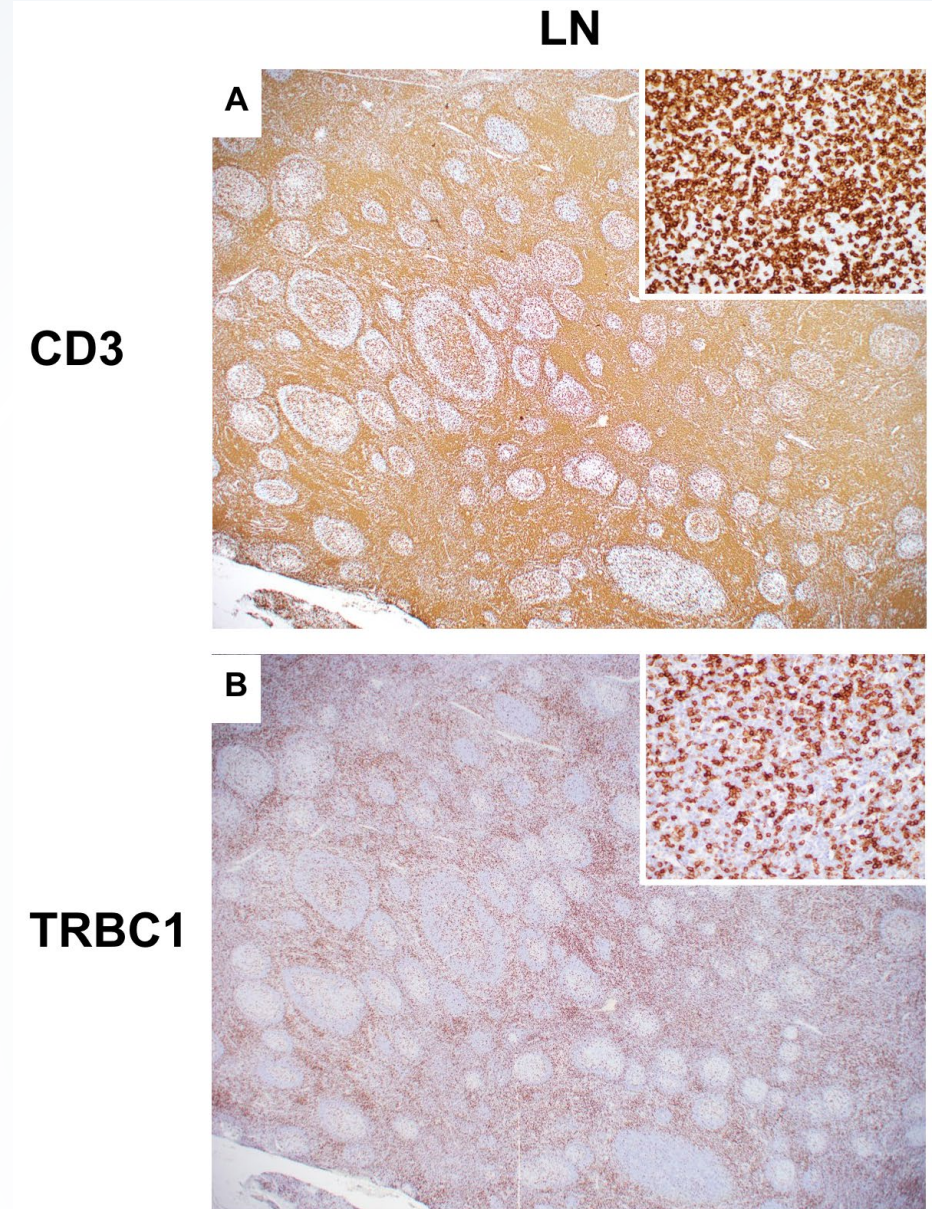
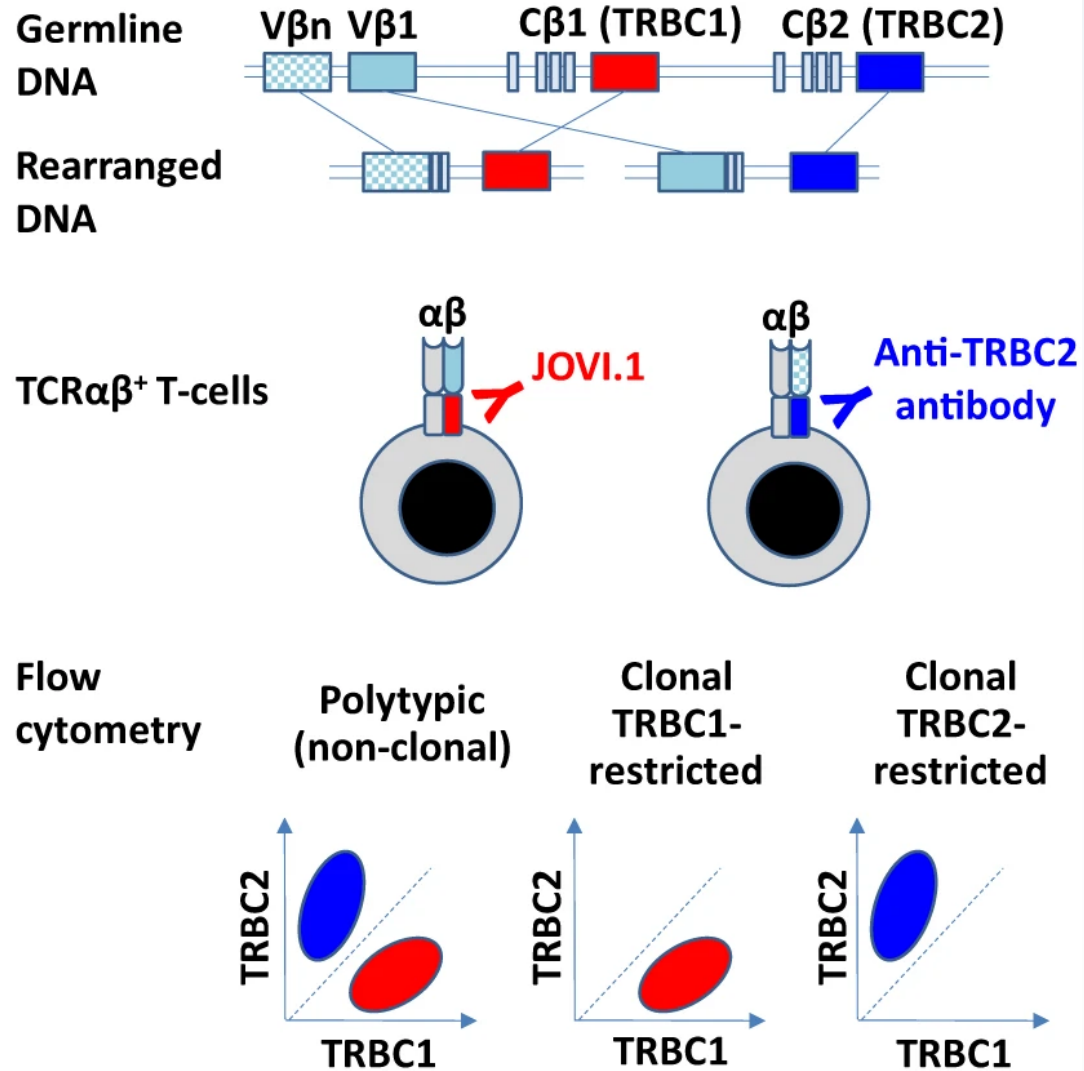
Research support from Astra Zeneca.

Applications of Hematopathology Beyond 2025

- Improved diagnostic precision and sensitivity
- Clonal hematopoiesis in disease biology and clinical management
- Disease monitoring by phenotypic and genotypic markers
- Development of microenvironmental biomarkers
- Development of digital and computational hematopathology

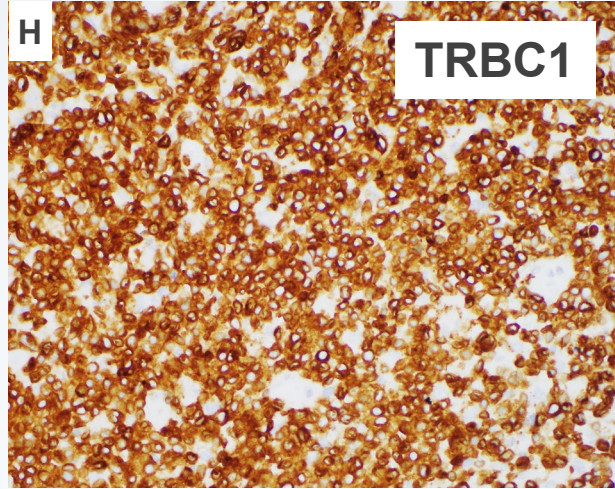
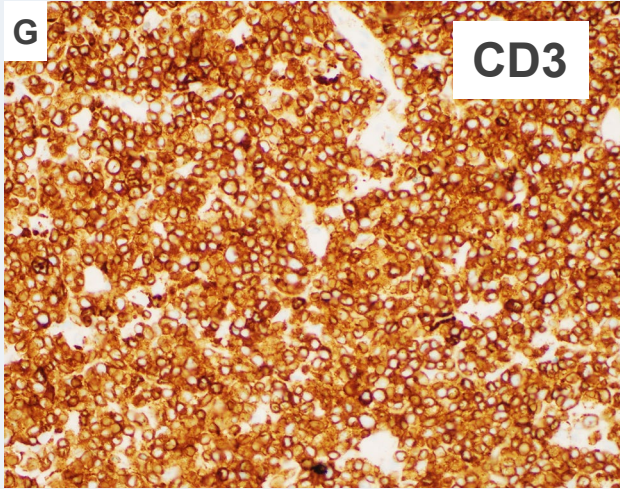
Improved diagnostic precision and sensitivity

T-cell clonality by TCR β Constant Region variants

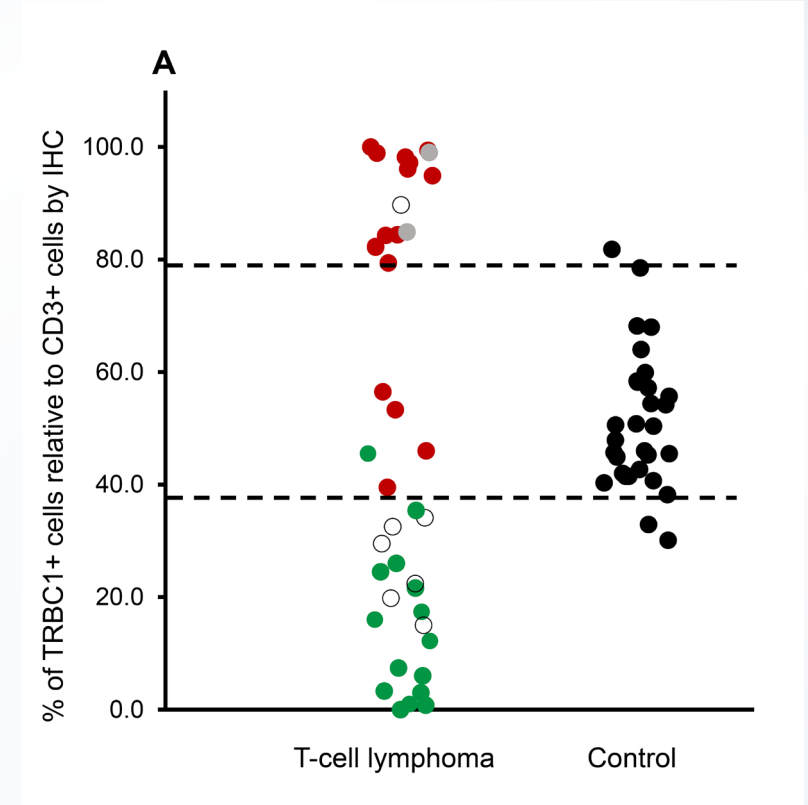
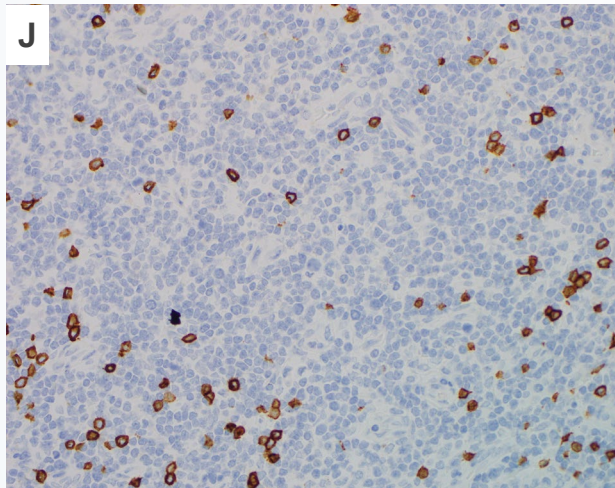
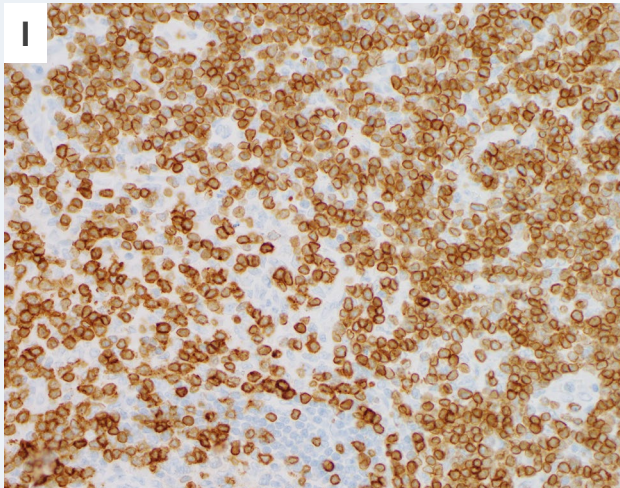


TRBC1 Staining Patterns in T-cell Neoplasms

Monotypic
positive



Monotypic
negative



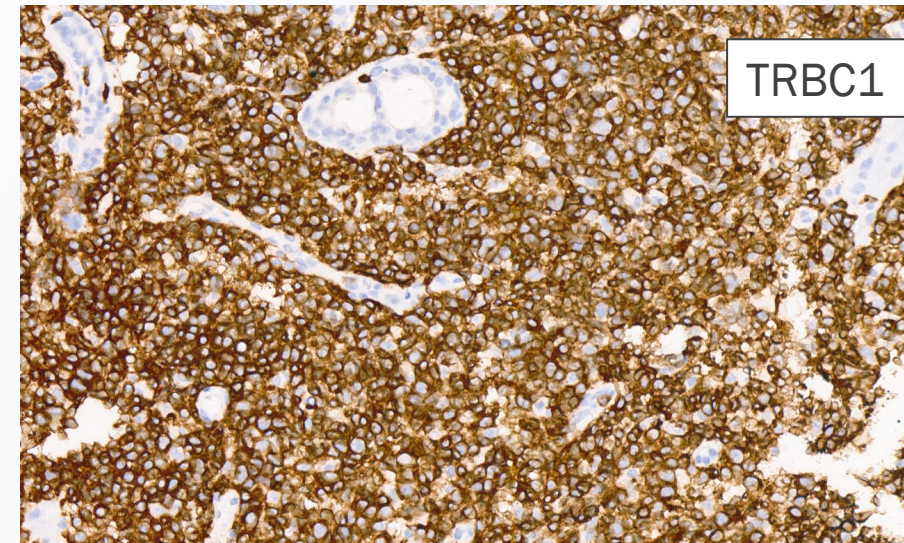
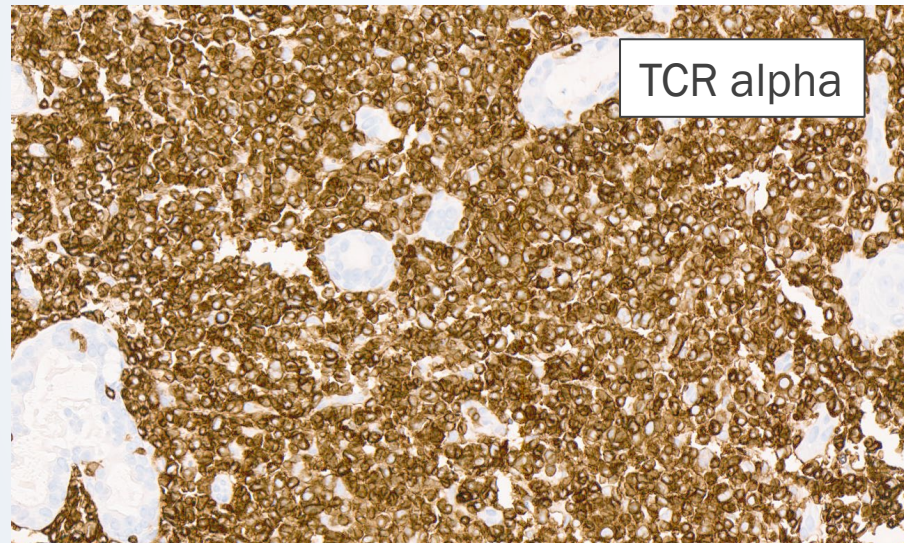
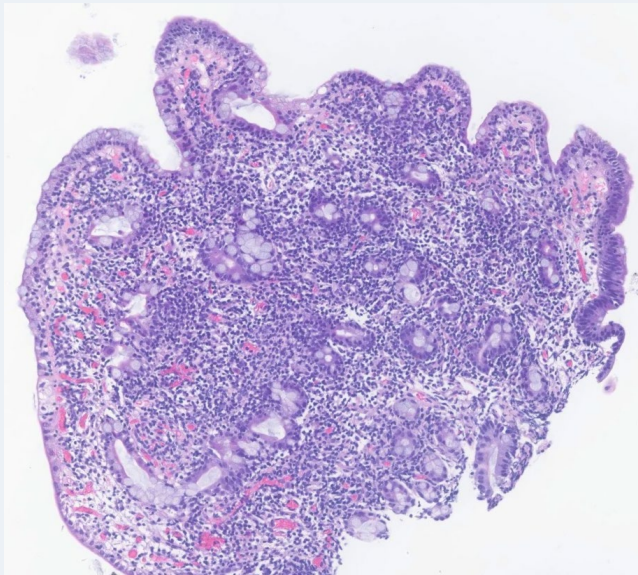
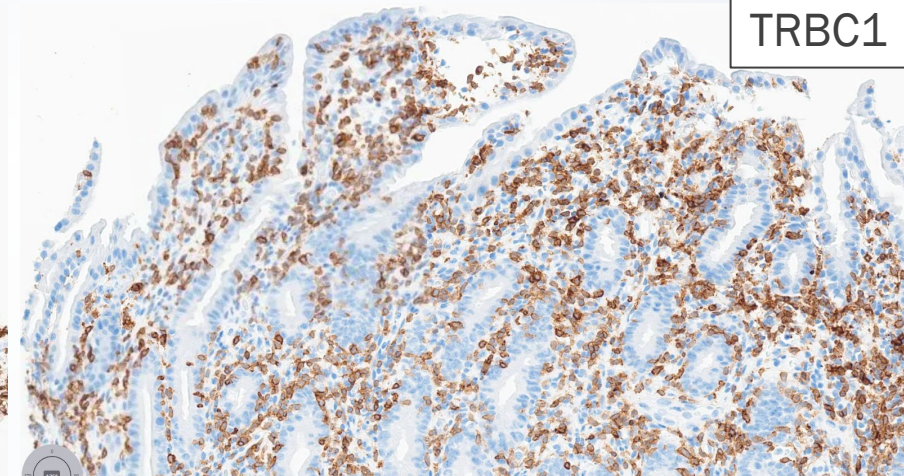
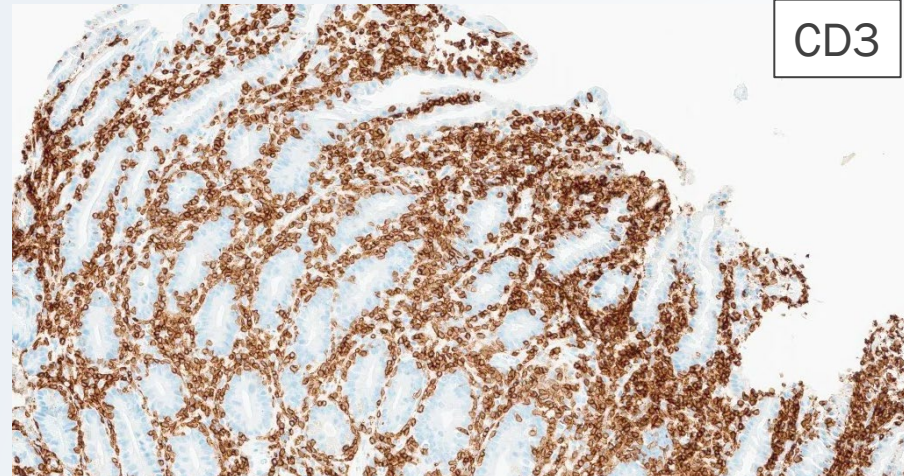
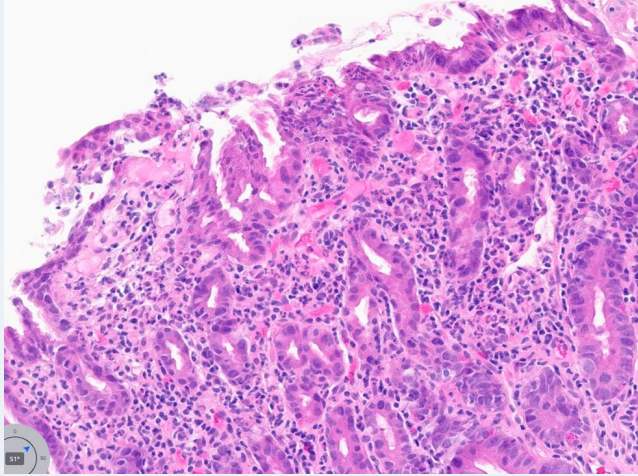
Sensitivity 87.5%

Specificity 90.3%

PPV 92.1%

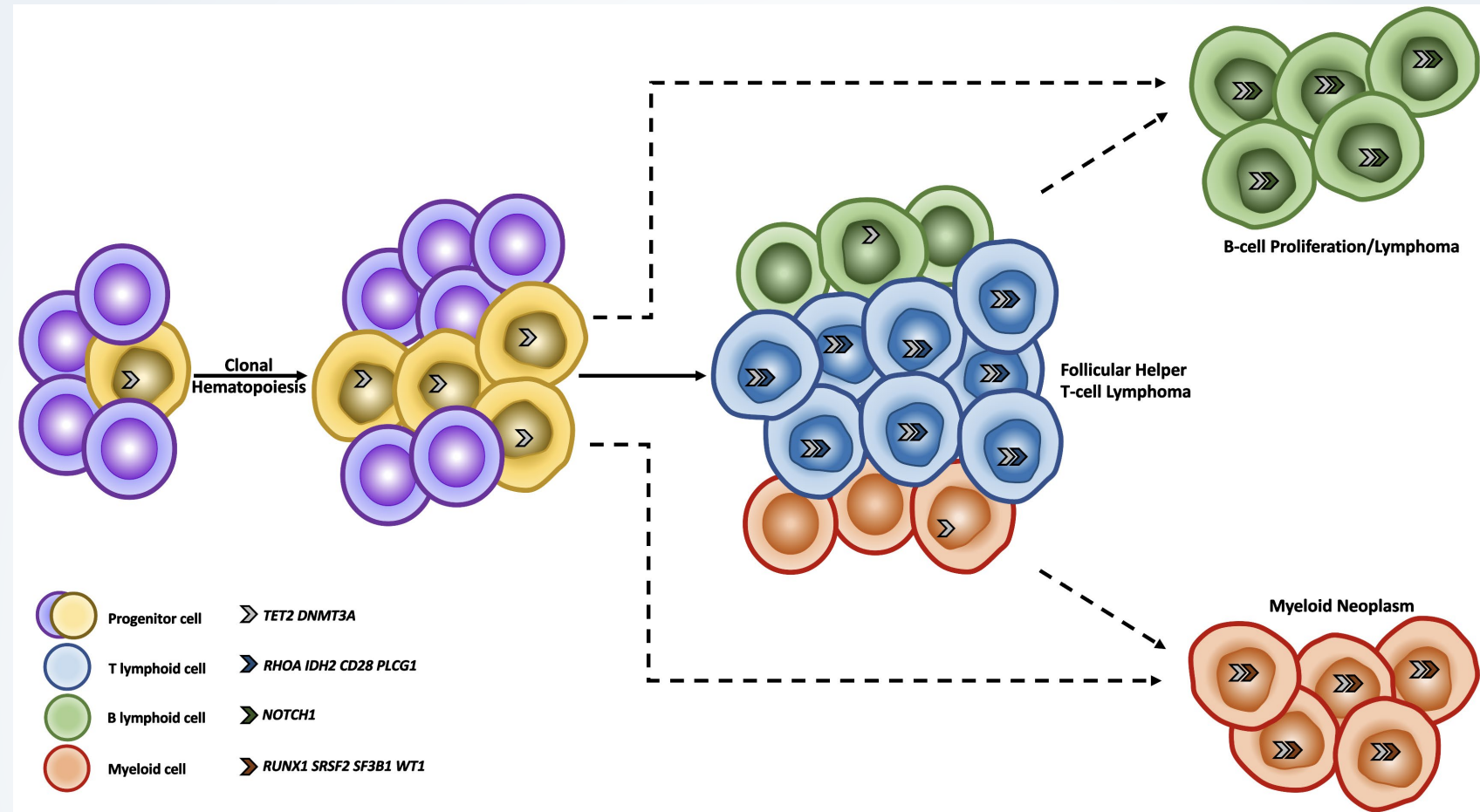
NPV 84.8%

Iatrogenic CART therapy induced intestinal TLPD



Clonal hematopoiesis (CH) in lymphoma

- Follicular Helper T-cell lymphomas arise from underlying CH.
- CH clone can give rise to FHTL, B cell LPDs and myeloid neoplasms by divergent clonal evolution.
- Myeloid neoplasms can precede, or emerge after FHTL diagnosis



Lewis, Liu, Xiao, Dogan. Blood Adv 2020, Haematologica 2024, Blood Neoplasia 2025

De Leval, Gaulard, Dogan. Blood 2024

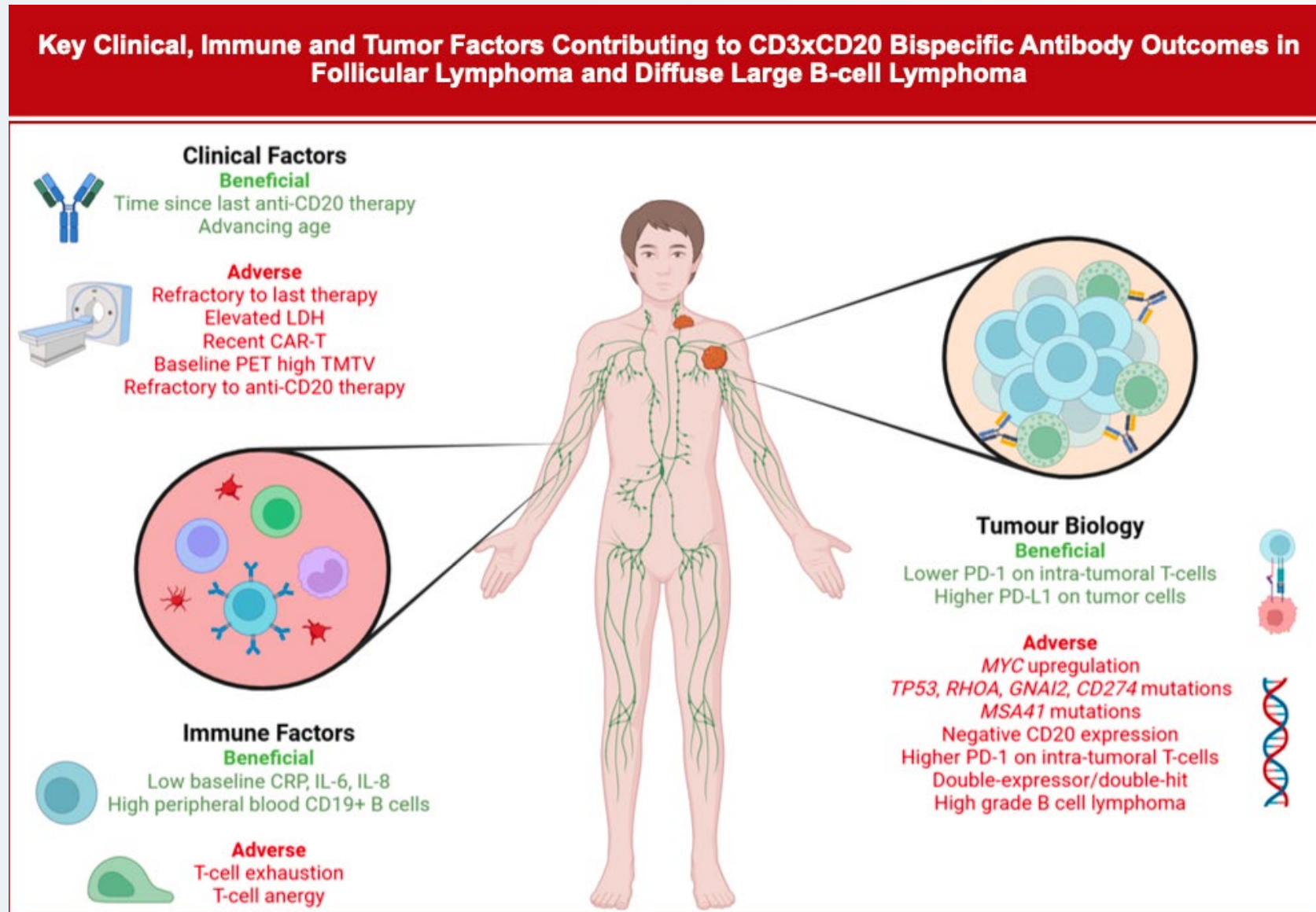
Arber et al. The International Consensus Classification of Myeloid and Lymphoid Neoplasms, 2025

Disease monitoring by phenotypic and genotypic markers

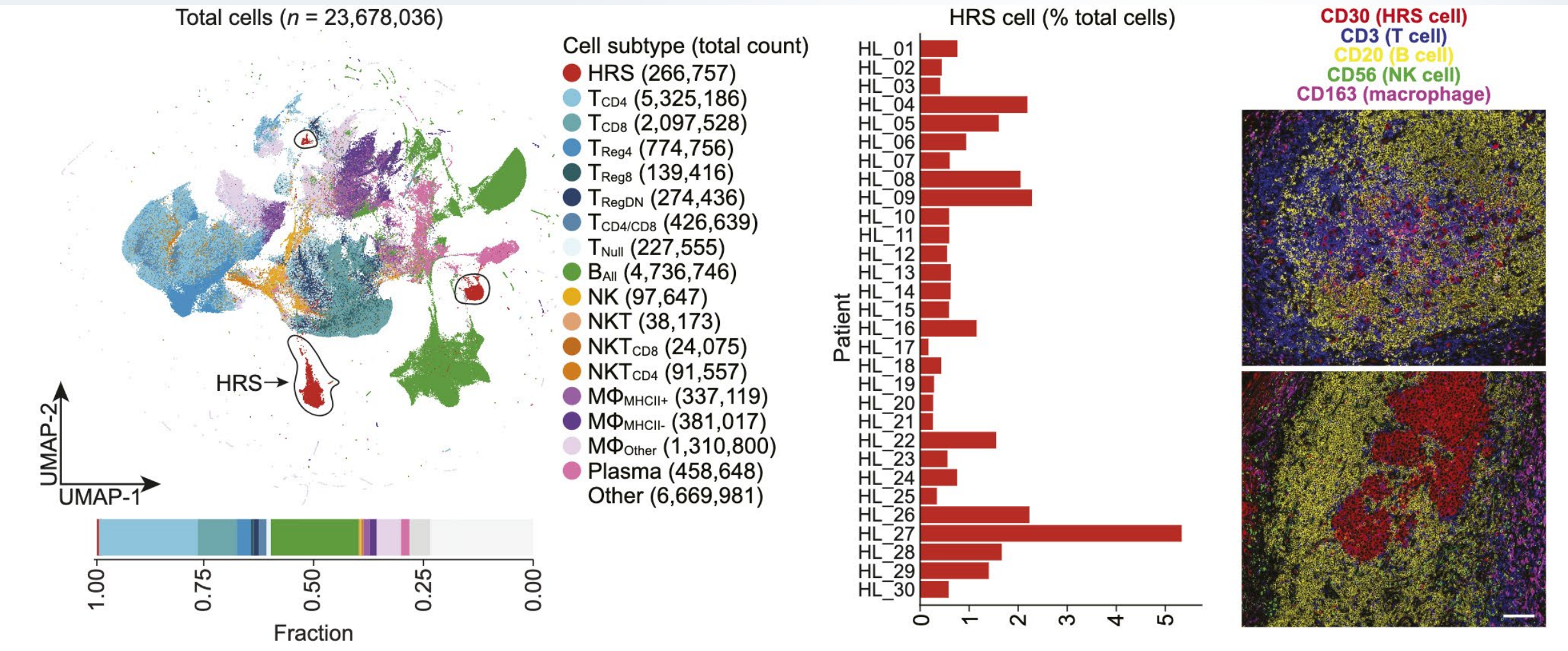
Measurable residual disease (MRD) assessment:

- Analytical methods
 - Multiparameter flow cytometry
 - Genomic profiling
 - Cells (Blood and bone marrow)
 - ctDNA (Plasma, CSF)
- Clinical applications
 - Response to therapy
 - Discontinuation of maintenance
 - Surrogate outcome end point for clinical trial
 - Prediction of resistance or relapse

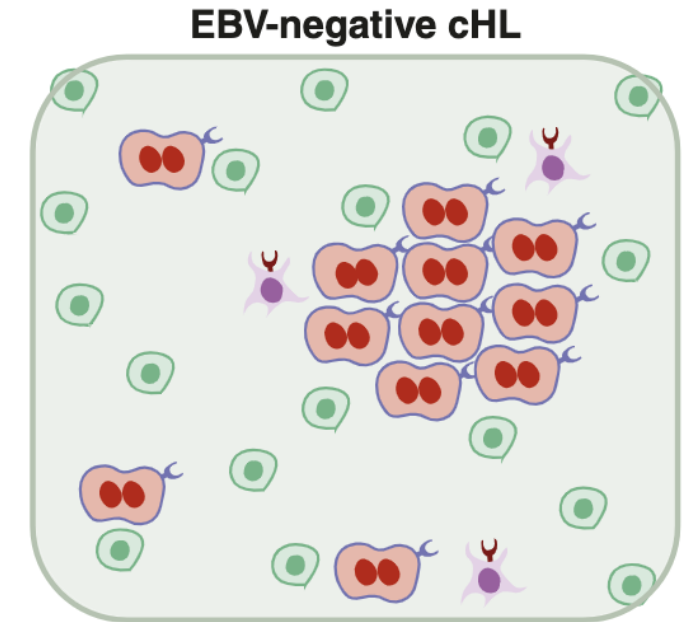
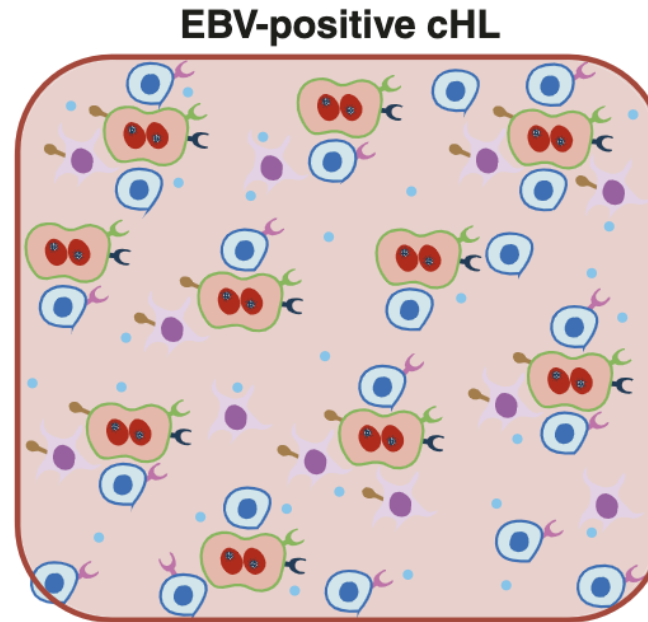
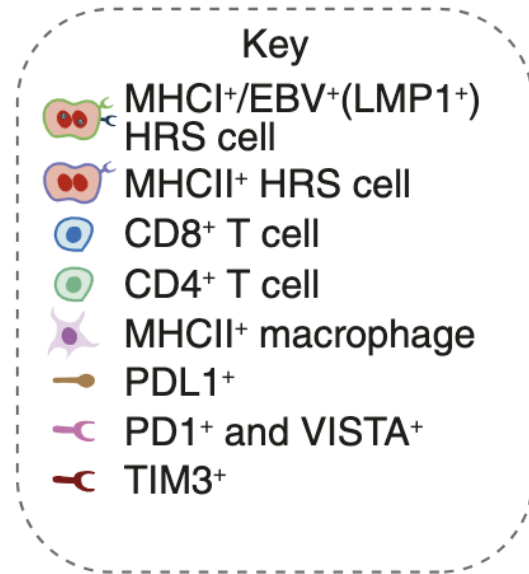
Development of TME biomarkers



Multiplexed Spatial Profiling of Hodgkin Reed–Sternberg Cell Neighborhoods in Classic Hodgkin Lymphoma



A model of HRS cells and their TME in EBV-positive and EBV-negative cHL

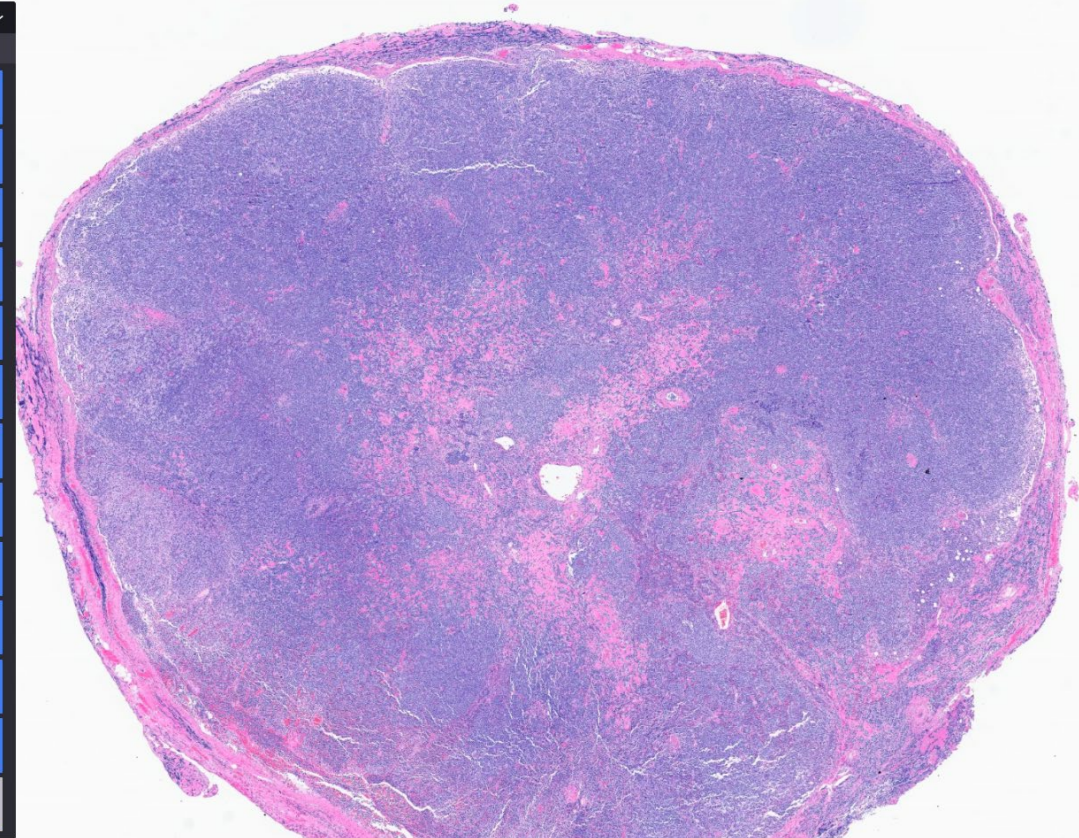
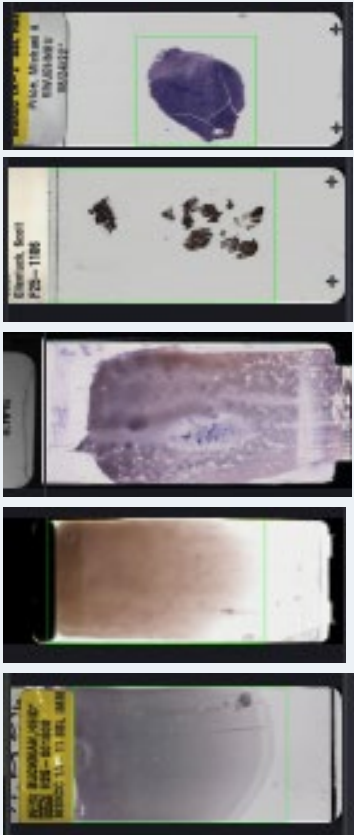


Immune escape strategy
 MHCII/MHCI expression (HRS cell)
 Syncytial cHL and immune excluded
 High CD4⁺ regulatory T cells
 Immune checkpoint expression (HRS cell)
 Immune checkpoint expression (TME)
 Cell populations
 Interferon expression
 CXCR3 chemokine ligand expression

EBV-positive cHL
MHCI ⁺ or MHCII ⁺ , MHCII ⁺
Rare (3/150 FOVs)
Subset of tumors (1/5)
PDL1 ⁺
PD1 ⁺ VISTA ⁺ PDL1 ⁺
CD8 ⁺ T cell MHC-II ⁺ macrophage
High
High

EBV-negative cHL
MHCII ⁺ or MHCII ⁻ , MHCII ⁻
Frequent (150/437 FOVs)
Subset of tumors (8/25)
TIM3 ⁺
TIM3 ⁺ CD40 ⁺
CD4 ⁺ T cell
Low
Low

Development of digital and computational hematopathology

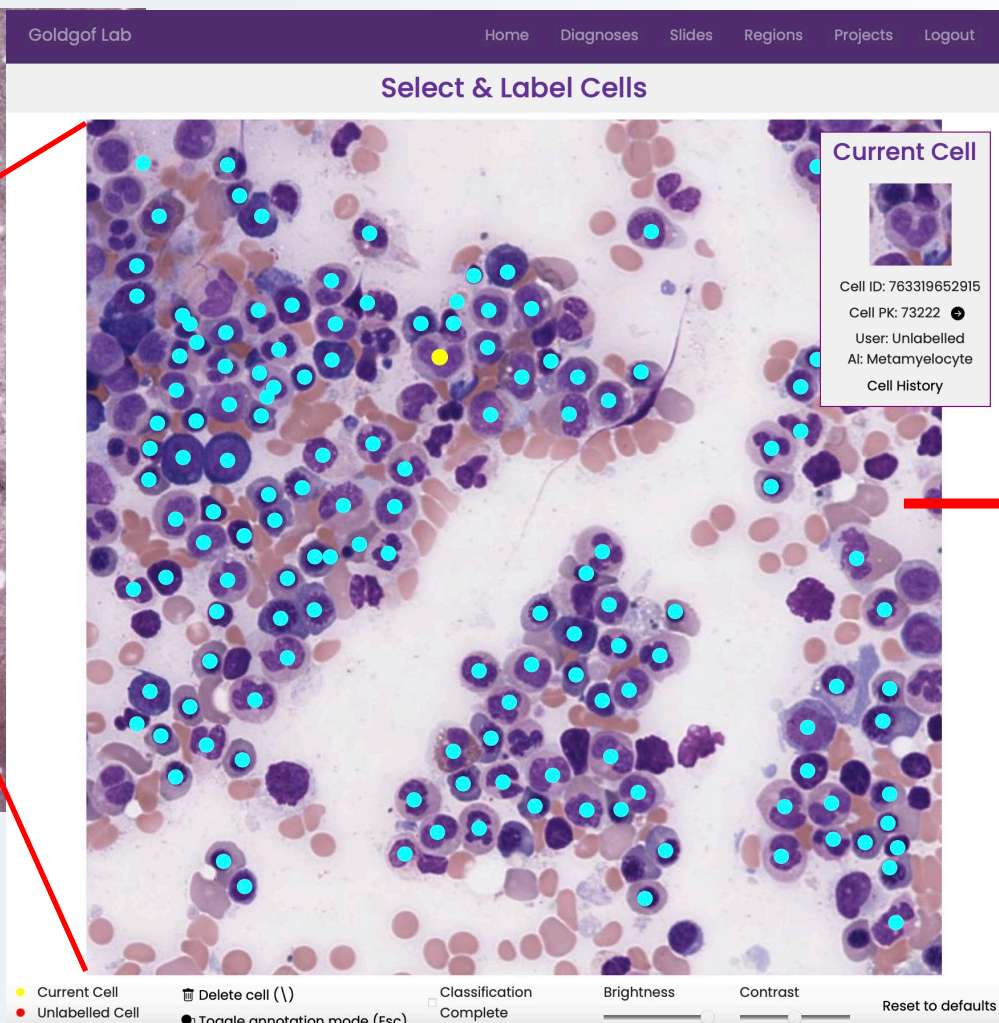


High-Dimensional Blood and Bone Marrow Cell Morphology Profiling



Whole Slide Image Viewer

Selected Regions



Goldgof Lab

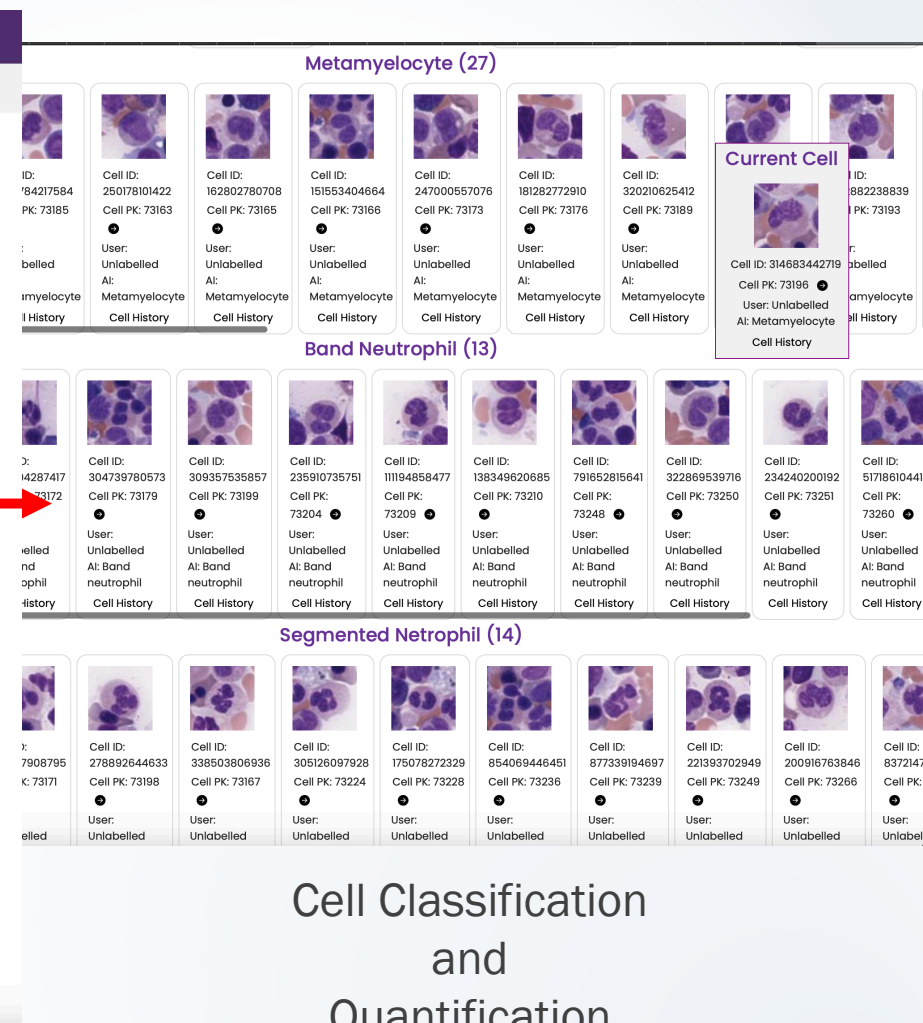
Home Diagnoses Slides Regions Projects Logout

Select & Label Cells

Current Cell

Cell ID: 763319652915
Cell PK: 73222
User: Unlabelled
At: Metamyelocyte
Cell History

Cell Detection



Metamyelocyte (27)

ID:	Cell ID:	Cell ID:	Cell ID:	Cell ID:	Cell ID:	Cell ID:	Cell ID:
184217584	250178101422	162802780708	151553404664	247000557076	181282772910	320210625412	181282772910
PK: 73185	Cell PK: 73163	Cell PK: 73165	Cell PK: 73166	Cell PK: 73173	Cell PK: 73176	Cell PK: 73189	Cell PK: 73193
User: Unlabelled	User: Unlabelled	User: Unlabelled	User: Unlabelled	User: Unlabelled	User: Unlabelled	User: Unlabelled	User: Unlabelled
At: Metamyelocyte	At: Metamyelocyte	At: Metamyelocyte	At: Metamyelocyte	At: Metamyelocyte	At: Metamyelocyte	At: Metamyelocyte	At: Metamyelocyte
Cell History	Cell History	Cell History	Cell History	Cell History	Cell History	Cell History	Cell History

Band Neutrophil (13)

ID:	Cell ID:	Cell ID:	Cell ID:	Cell ID:	Cell ID:	Cell ID:	Cell ID:
14287417	304739780573	309357535857	235910735751	11194858477	138349620685	791652815641	322869539716
PK: 73172	Cell PK: 73179	Cell PK: 73199	Cell PK: 73204	Cell PK: 73209	Cell PK: 73210	Cell PK: 73248	Cell PK: 73250
User: Unlabelled	User: Unlabelled	User: Unlabelled	User: Unlabelled	User: Unlabelled	User: Unlabelled	User: Unlabelled	User: Unlabelled
At: Band neutrophil	At: Band neutrophil	At: Band neutrophil	At: Band neutrophil	At: Band neutrophil	At: Band neutrophil	At: Band neutrophil	At: Band neutrophil
Cell History	Cell History	Cell History	Cell History	Cell History	Cell History	Cell History	Cell History

Segmented Neutrophil (14)

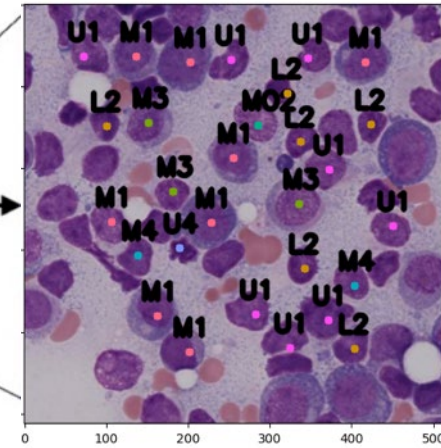
ID:	Cell ID:	Cell ID:	Cell ID:	Cell ID:	Cell ID:	Cell ID:	Cell ID:
7908795	278892644633	338503806936	305126097928	175078272329	854069446451	877339194697	221393702949
PK: 73171	Cell PK: 73198	Cell PK: 73167	Cell PK: 73224	Cell PK: 73228	Cell PK: 73236	Cell PK: 73239	Cell PK: 73249
User: Unlabelled	User: Unlabelled	User: Unlabelled	User: Unlabelled	User: Unlabelled	User: Unlabelled	User: Unlabelled	User: Unlabelled
At: Band neutrophil	At: Band neutrophil	At: Band neutrophil	At: Band neutrophil	At: Band neutrophil	At: Band neutrophil	At: Band neutrophil	At: Band neutrophil
Cell History	Cell History	Cell History	Cell History	Cell History	Cell History	Cell History	Cell History

Cell Classification and Quantification



A histological section of a developing ovary, stained with hematoxylin and eosin (H&E). The image shows the outer layer of the ovary, the germinal epithelium, and the underlying primary follicles. The theca interna is visible as a layer of cells surrounding the follicles. A red square highlights a region of interest, and a black square highlights another region of interest.

Digitized whole
slide image



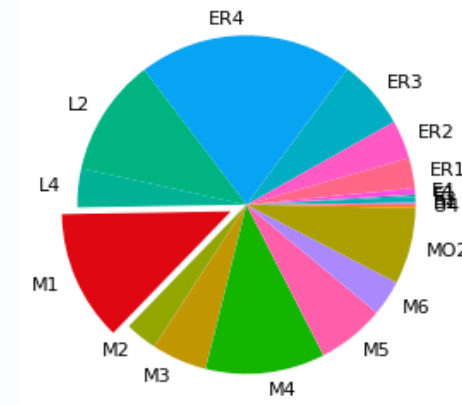
AI Morphometry

- Additional Test Ordering
- Results Integration
- Automated Reporting
- Treatment Recommendation
- Morphometric and Multimodal
- Biomarkers Discovery
- EHR Integration
- Support Multiple Imaging Modalities
- Prognosis
- Billing Support

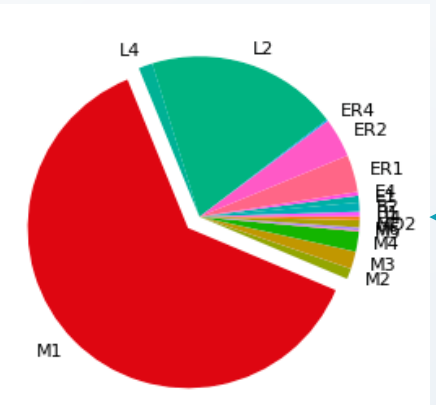
A pie chart illustrating the distribution of 15 categories. The categories and their approximate proportions are as follows:

Category	Approximate Proportion
L2	35%
ER4	25%
ER3	10%
ER2	2%
ER1	1%
ER04	1%
U1	8%
MO2	2%
M6	1%
M5	4%
M4	6%
M3	2%
M2	1%
M1	5%
L4	1%

Normal



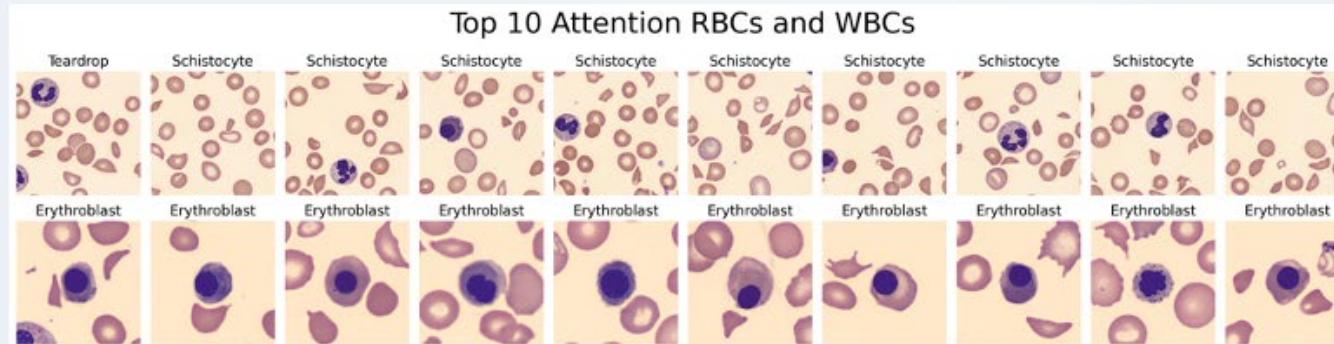
CMML



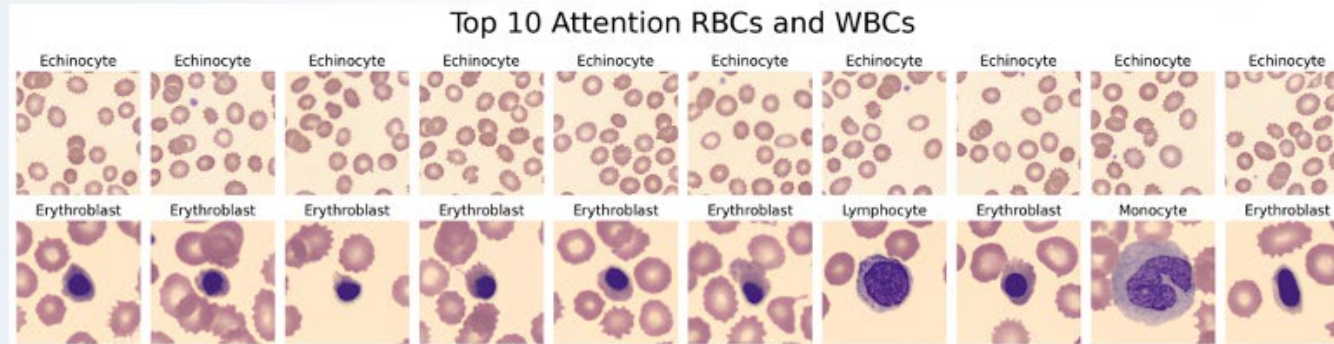
AML

24 hour mortality risk detection in PB smears

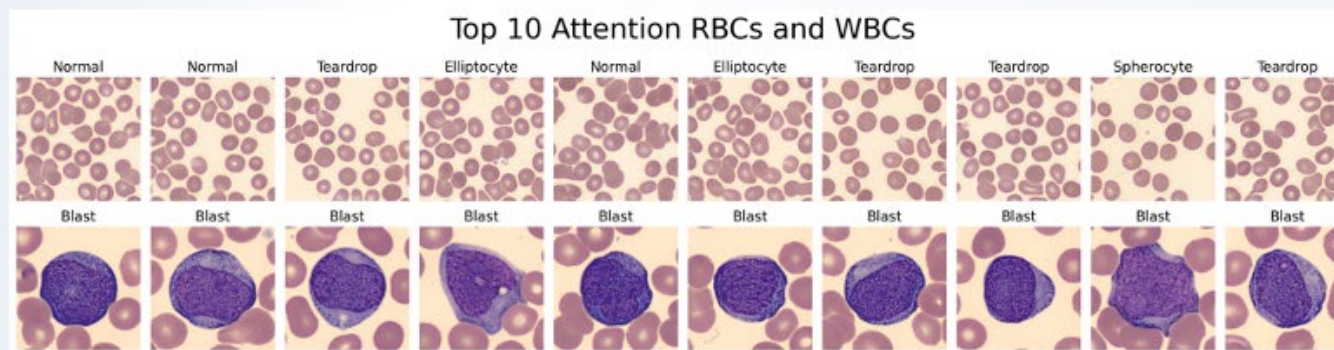
Deceased Patient 1



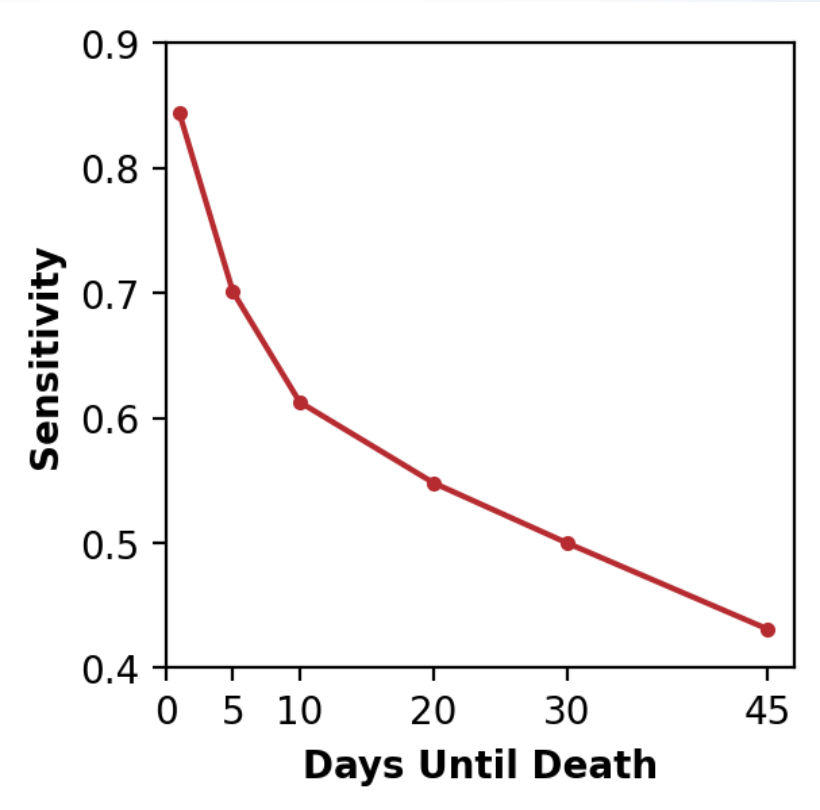
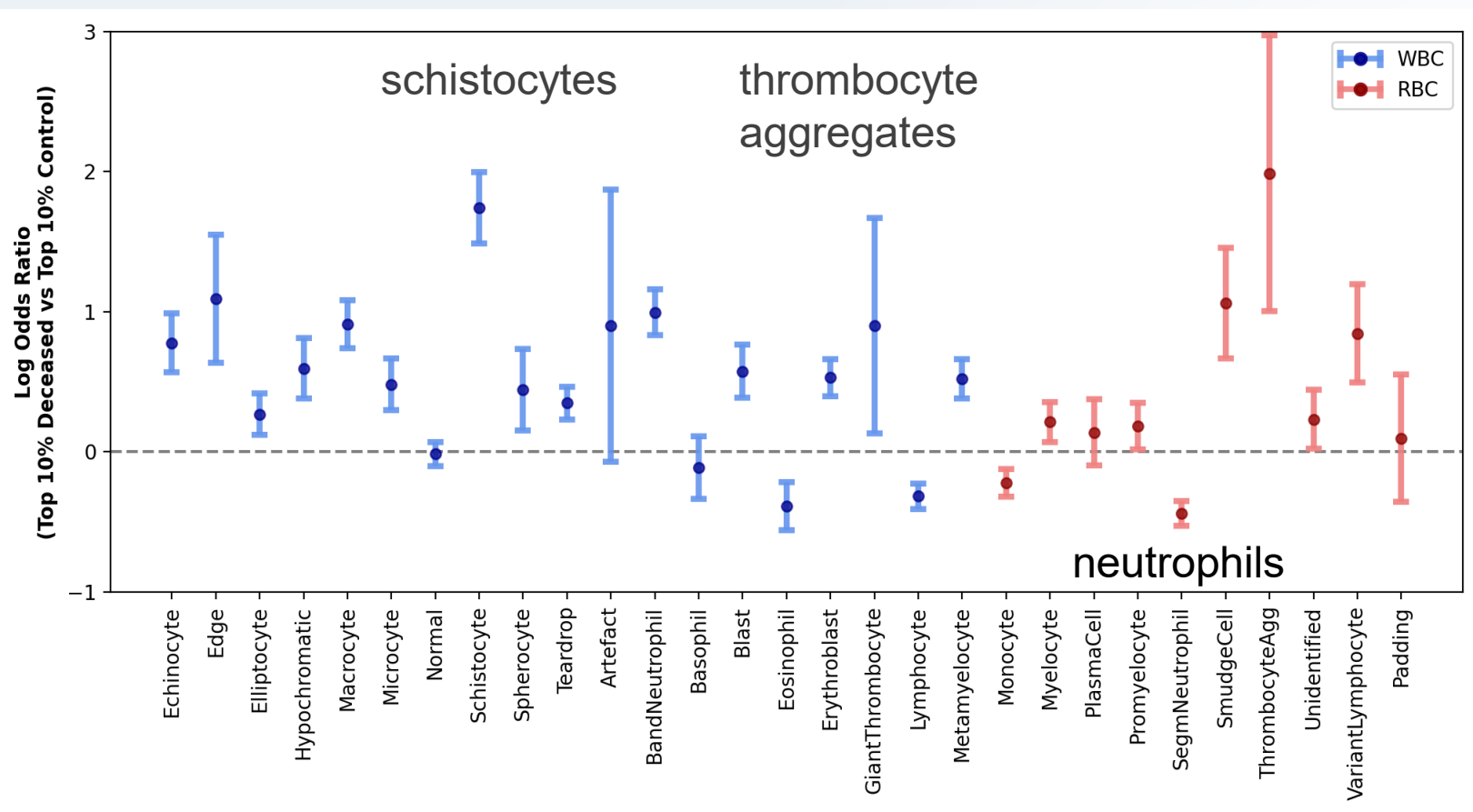
Deceased Patient 2



Deceased Patient 3

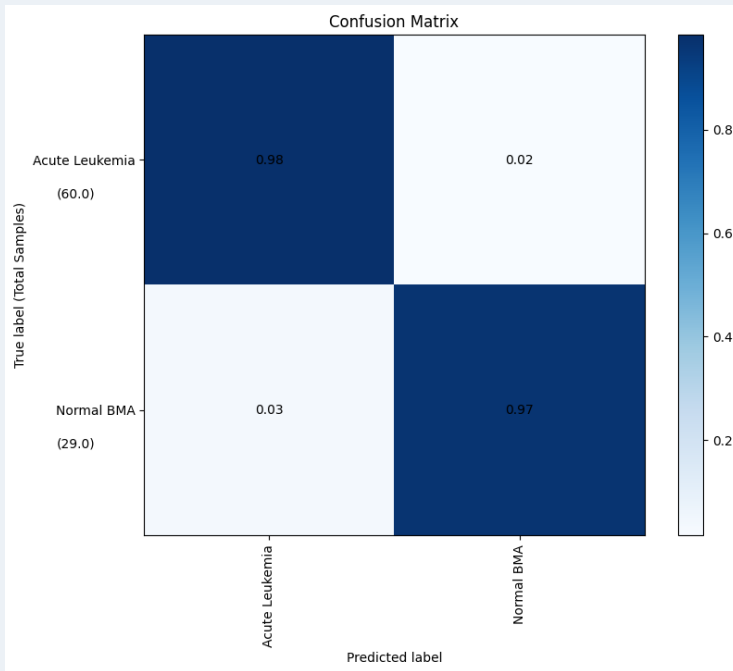


24 hour mortality risk detection in PB smears



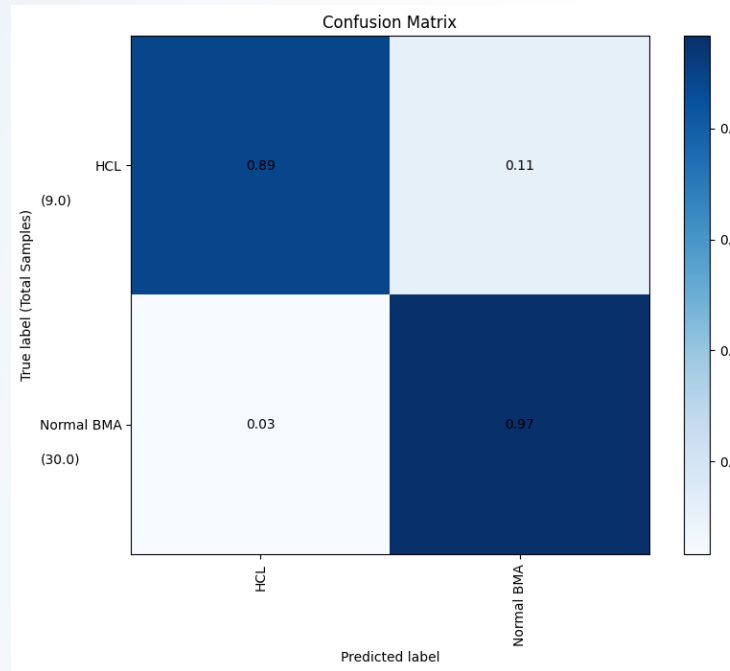
Peripheral Blood Screening

Acute Leukemia (AML + ALL)



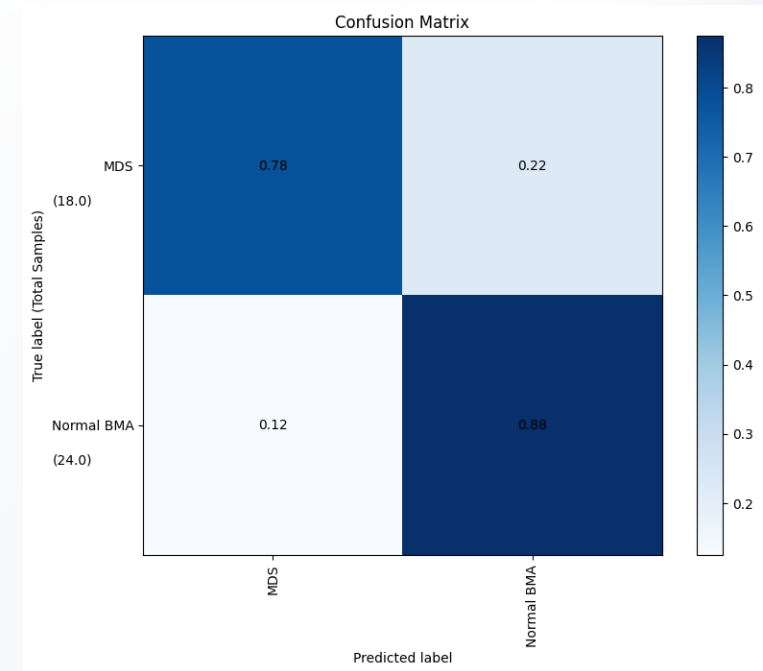
AUC = 0.975

Hairy Cell Leukemia



AUC = 0.989

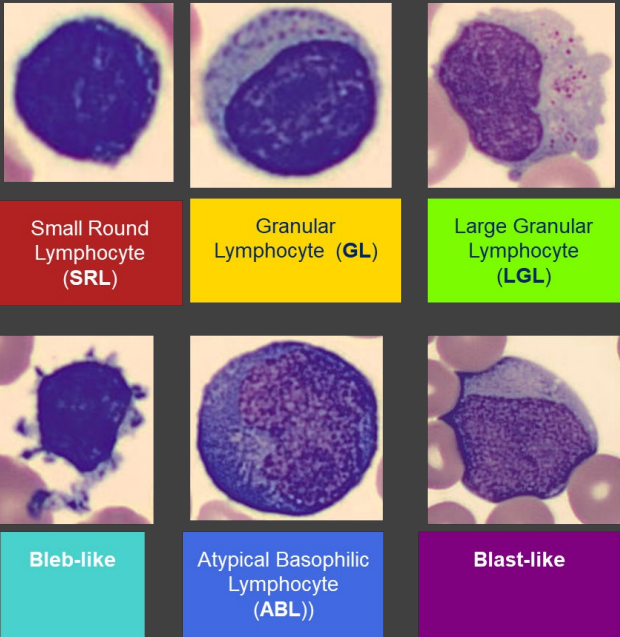
Myelodysplastic Syndromes



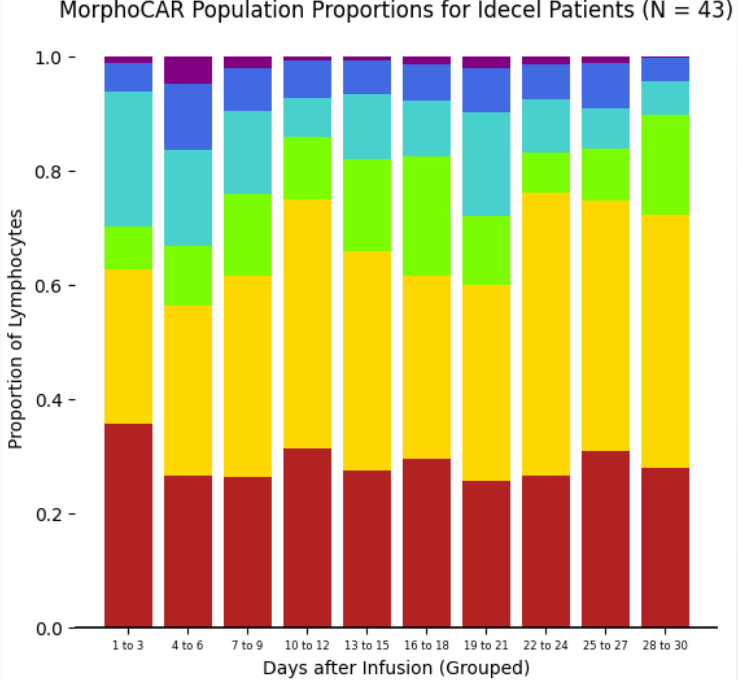
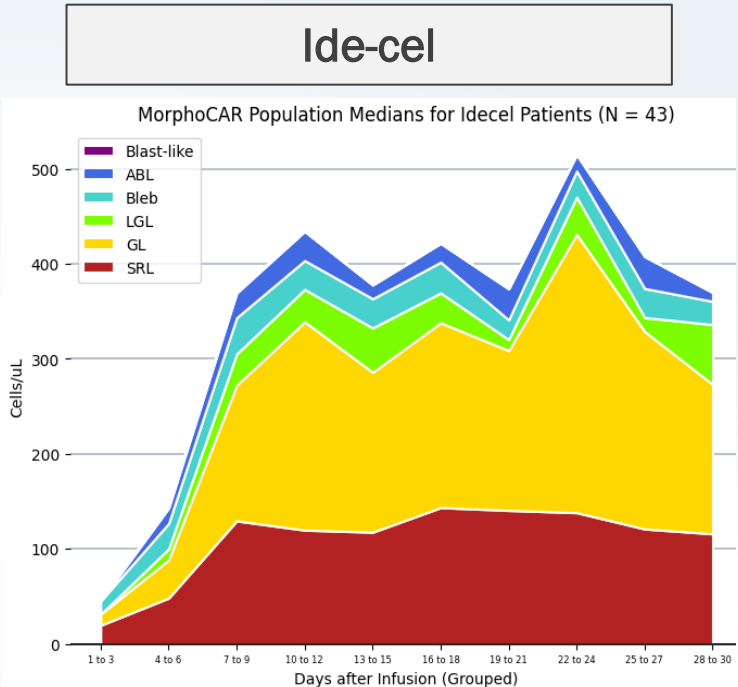
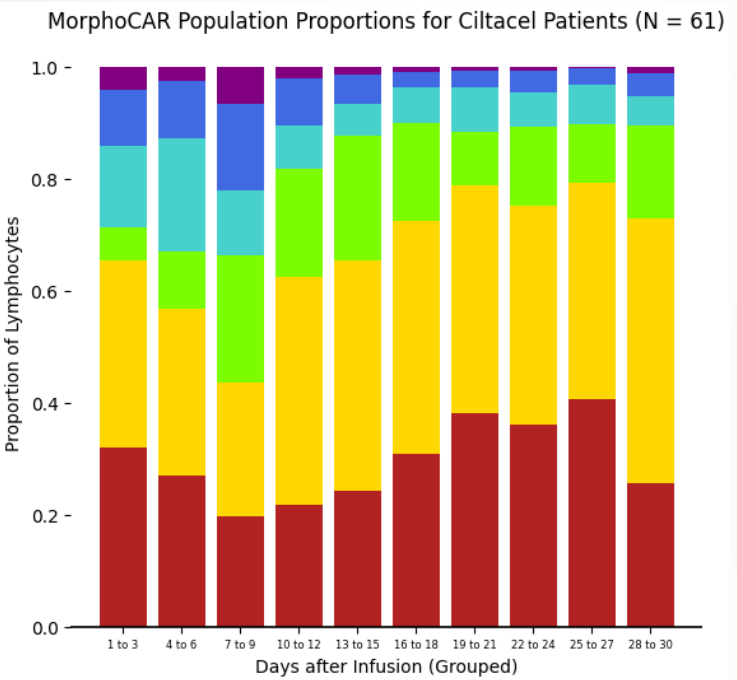
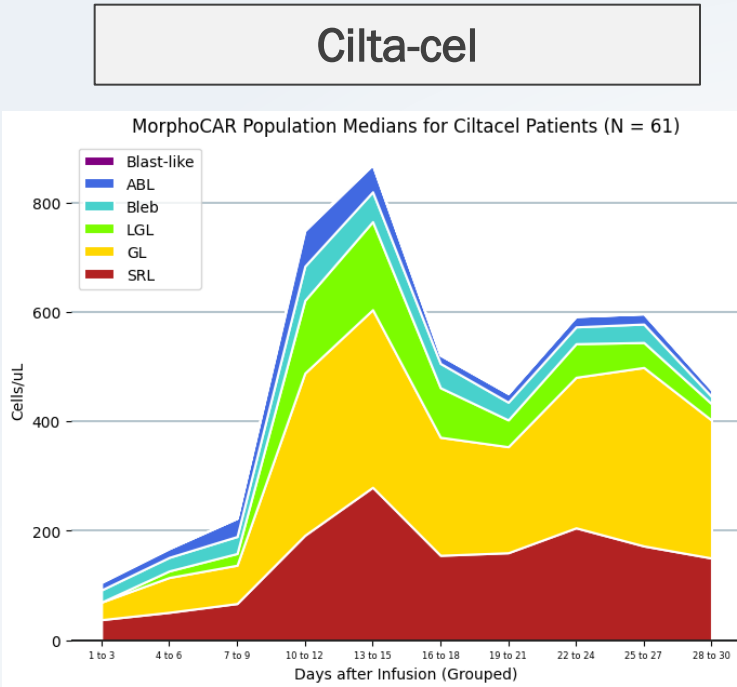
AUC = 0.835

Descriptive Analysis of Lymphocyte Morphotype from Infusion to Day +30 by CAR-T Product

Lymphocyte Morphology Classification

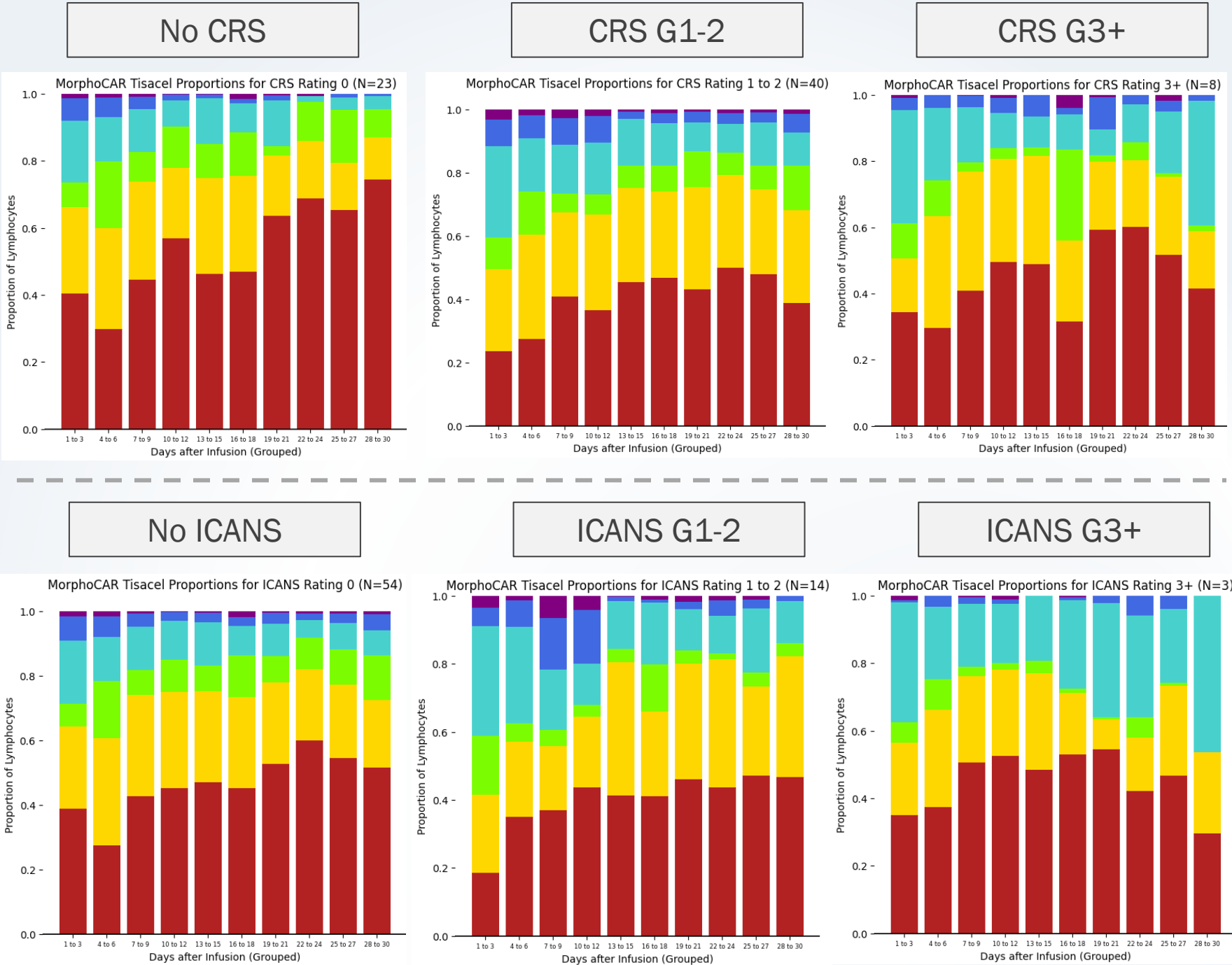
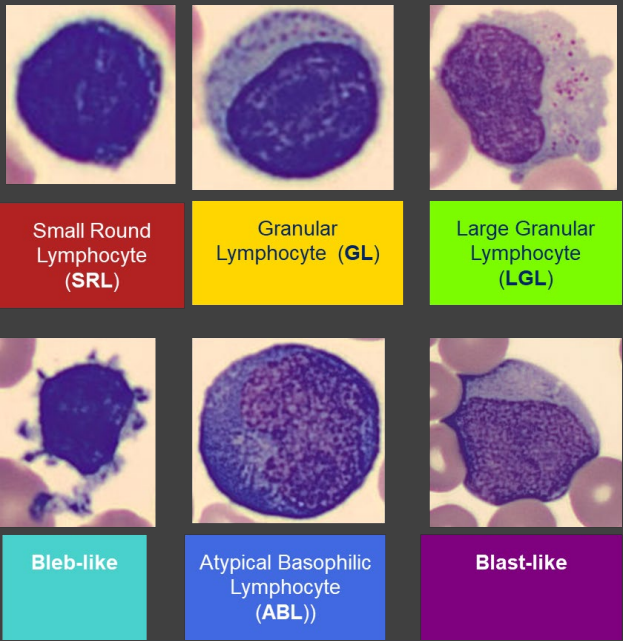


Y-axes of the stacked line plots are on a different scale



Descriptive Analysis of Lymphocyte Morphotype from Infusion to Day +30 by CRS and ICANS Grades in Tisa-Cel

Lymphocyte Morphology Classification



22nd

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Conclusions by ChatGPT

Hematopathology is expanding to encompass a broad array of analytical dimensions. By integrating insights from tumor genetics, host genetics, phenotypic expression, and topographical data, it provides a comprehensive understanding of hematologic diseases.