

DLBCL Adapt IQ: A Molecular-Adaptive Clinical Decision Support System for Personalized Regimen Selection and Real-Time Clinical Trial Matching: Development and Dataset Validation in Diffuse Large B-Cell Lymphoma



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INTRODUCTION

- Management of diffuse large B-cell lymphoma (DLBCL) relies on static guideline-based algorithms that do not adapt to real-time patient-level response and toxicity data.
- We provide point of care tool that combines line of therapy aware regimen ranking, cycle by cycle adaptive re-evaluation, and integrated clinical trial matching in a single capable application.

METHODOLOGY

- DLBCL AdaptIQ is a clinical decision support tool designed for resource-limited settings.
- The system integrates 28 patient variables including IPI components, cell-of-origin subtype (GCB vs. ABC), MYC/BCL2/BCL6 FISH and IHC values, LVEF, renal function, ECOG performance status, and prior therapy line.
- A rule-based expert engine, grounded in NCCN 2025, ESMO, and BSH guidelines and anchored to published trial data (POLARIX, ZUMA-7, TRANSFORM, REMoDL-B, CAVALLI, LOTIS-2, GO29365, NP40126); scores 14 regimens across four axes: efficacy fit, toxicity/organ-function constraints, guideline alignment, and adaptive cycle penalty.
- The physician enters Deauville PET score, CTCAE toxicity grade, ANC, and LVEF
- Additional features include a clinical trial matcher linked to 10 NCT-verified DLBCL trials with live ClinicalTrials.gov API integration, a Kaplan-Meier-style PFS curve visualizer, a cumulative toxicity heatmap, and a structured Tumor Board PDF export.
- To evaluate output accuracy, all 209 cases from the TCIA DLBCL-Morphology dataset (Vrabac et al.) were individually entered into the tool.

TAKE HOME MESSAGE

- DLBCL AdaptIQ is a novel, free, and accessible clinical decision support framework validated against a 209-patient annotated pathology cohort, demonstrating high accuracy across molecular classification, risk stratification, and regimen scoring.
- Prospective validation against treatment outcomes is recommended



TOOL DESCRIPTION

- The tool generated individualized, guideline-concordant recommendations across all lines of therapy with correct IPI score computation in 94.6% of complete cases (n=203), 100% concordance for IPI 4-class risk group assignment, and 99.5% R-IPI risk group concordance.
- Biological consistency (PFS ≤ OS) was confirmed in 100% of patients.
- Tool-derived biomarker classifications; including double-expresser rate (12.1%), MYC FISH positivity (7.8%), and BCL2 FISH positivity (22.4%), aligned with established literature benchmarks across all parameters.
- No clinically significant systematic error was detected.
- The tool has been registered with the U.S. Copyright Office as an original software work.

DLBCL AdaptIQ
Adaptive Chemotherapy Intelligence

RESEARCH TOOL

Baseline Assessment

Disease Characterization

DLBCL SUBTYPE (COO BY IHC)
ABC / non-GCB — Activated B-cell

ANK ARBOR STAGE
Stage III

EXTRANODAL SITES
0-4+

BULK DISEASE
Yes (≥10 cm)

LDH LEVEL
Elevated (any level above ULN)

TREATMENT INTENT
Palliative

Molecular & Genetic Profile Learn More if not tested

MYC REARRANGEMENT
Negative

BCL2 REARRANGEMENT
Negative

BCL6 REARRANGEMENT
Negative

MYC PROTEIN EXPRESSION (IHC)
Positive (≥40%)

Cycle-by-Cycle Adaptive Update

Enter post-cycle data (labs, toxicity, imaging response) to re-evaluate and adapt the treatment plan. This is the core novel feature — no existing system does this.

Active regimen: R-CHOP + HAART. Enter data after each cycle to trigger adaptive re-evaluation. The system will flag if a regimen switch is warranted based on response and toxicity.

CYCLE PROGRESS

✓ Cycle 1 ✓ Cycle 2 ✓ Cycle 3 Cycle 4 Cycle 5 Cycle 6

Cycle 4 — Post-Cycle Assessment

RESPONSE ASSESSMENT
— Not yet assessed —

INTERIM PET/CT (DEAUVILLE SCORE)
— Not done —

WORST CTCAE TOXICITY GRADE
Grade 0 — No toxicity

MAIN TOXICITY TYPE
None

ANC (x10⁹/L)

LVEF THIS CYCLE (%)

Clinical Trial Matching

Relevant trials matched to this patient's profile. Eligibility is assessed based on stage, molecular markers, prior therapy, and performance status.

MATCHED TRIALS
4

PHASE 3 TRIALS
2

AVG MATCH SCORE
86%

How trials are matched: Eligibility is assessed based on DLBCL subtype, IPI, molecular markers (DH/DE), prior therapy line, and performance status. Match score reflects predicted eligibility confidence. Verify full inclusion/exclusion criteria before enrollment.

POLARIX: Pola-R-CHP vs R-CHOP in Previously Untreated DLBCL

PHASE 3 **LIKELY ELIGIBLE** **RECOMMENDED** **ACTIVATED**

Key Results: Primary endpoint met: Pola-R-CHP improved PFS (HR 0.73). CR rate 78% vs 74%.

Match Score
96%

View Trial

CAVALLI: Venetoclax + R-CHOP for BCL-2+ DLBCL (including Double-Expressor)

PHASE 2 **LIKELY ELIGIBLE** **ACTIVE, NOT RECOMMENDED** **ACTIVATED**

Match Score
91%

Double-expresser phenotype (MYC ≥40% / BCL2 ≥50%). Standard R-CHOP has inferior outcomes. Pola-R-CHP or escalation preferred. Consider venetoclax trial (NCT02055820).

RANKED REGIMEN RECOMMENDATIONS

TOP RECOMMENDATION

R-CHOP + HAART

Rituximab Cyclophosphamide Doxorubicin Vincristine

Prednisone + HAART

66% 55% 6
CR RATE 2YR PFS CYCLES

Confidence 74%

Rationale: HIV-associated DLBCL: R-CHOP with concurrent HAART is standard. Requires pharmacokinetic review of ART-chemo interactions. CD4 monitoring mandatory.
Evidence: Level 2A | **Schedule:** 6 cycles with concurrent ART
⚠ Monitor ART-chemo drug interactions carefully

R-miniCHOP

Rituximab Cyclophosphamide 50% Doxorubicin 50%

Vincristine Prednisone

62% 42% 6
CR RATE 2YR PFS CYCLES

Confidence 70%

Rationale: Frail elderly (ECOG ≥3 or age ≥80): R-miniCHOP (50% dose reduction) showed acceptable tolerability in LYSA trials. Palliative intent acceptable.
Evidence: Level 2A | **Schedule:** 6 cycles (dose-reduced)
⚠ Frailty/age detected — full-dose regimens not recommended

Edit Patient Data **Start Cycle Tracking**