CD10 Loss Defines a Biologically Distinct and Extranodal-Enriched Subset of Follicular Lymphoma: A Systematic Review and Meta-Analysis

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Background

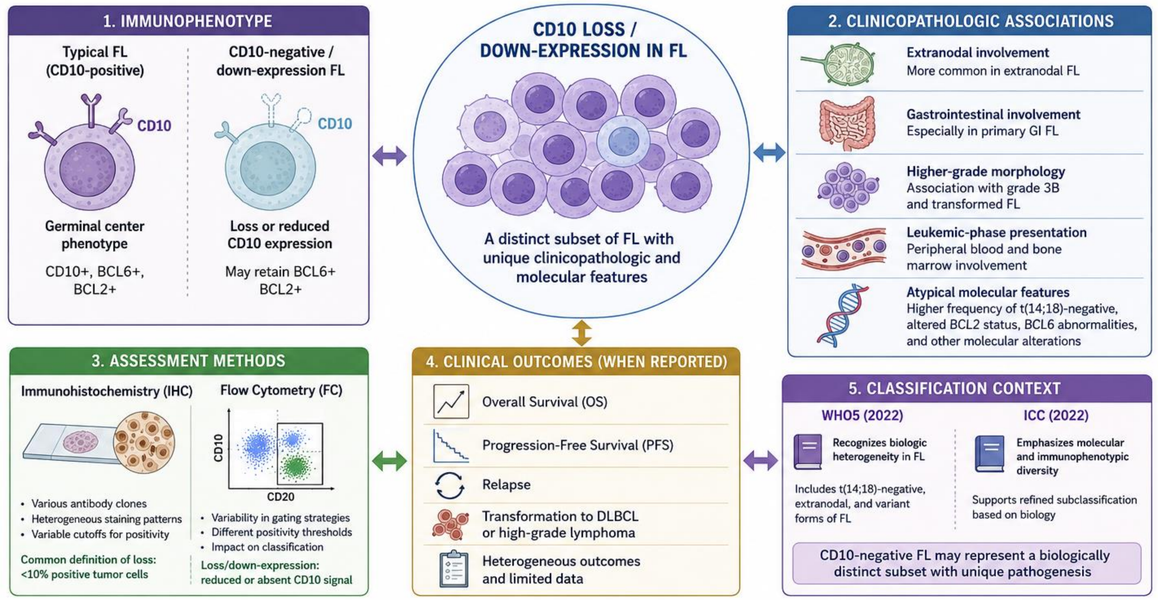
CD10 is a canonical germinal center marker in follicular lymphoma (FL); loss or down-expression has been increasingly described in extranodal, leukemic, and higher-grade FL subsets, but its clinicopathologic significance remains poorly characterized due to fragmented small-cohort data.

Methods

We performed a systematic review and meta-analysis following the PRISMA protocol, searching PubMed, Embase, and Scopus from inception through January 2026 for studies reporting CD10 loss or down-expression in follicular lymphoma. After screening, we identified four cohorts with extractable prevalence data and a total of 648 patients for the primary meta-analysis.

Random-effects models were used to estimate pooled prevalence, and subgroup analyses evaluated associations with extranodal disease. Sensitivity analyses incorporated additional grade-stratified, gastrointestinal, leukemic-phase, and biologically enriched cohorts, using both immunohistochemistry- and flow cytometry-based definitions of CD10 loss with heterogeneous cutoff thresholds across studies.

Figure 1. CD10 loss / down-expression in follicular lymphoma



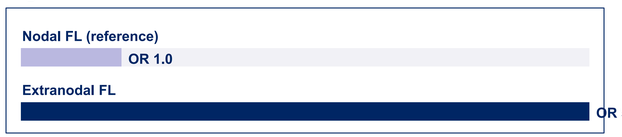
Results

14.2%
Pooled CD10 loss prevalence (95% CI, 10.1–19.6%)

OR 5.65
Extranodal vs. nodal odds of CD10 loss (95% CI, 2.64–12.07)

Four cohorts with extractable prevalence data (n=648) showed a pooled CD10 loss prevalence of 14.2%. Extranodal FL showed significantly higher odds of CD10 loss than nodal disease, an approximate 2–3-fold enrichment. CD10-negative FL was further associated with higher-grade morphology, reduced BCL2 rearrangements, and alternative molecular features including BCL6 abnormalities.

Figure 3. CD10 loss is enriched in extranodal FL

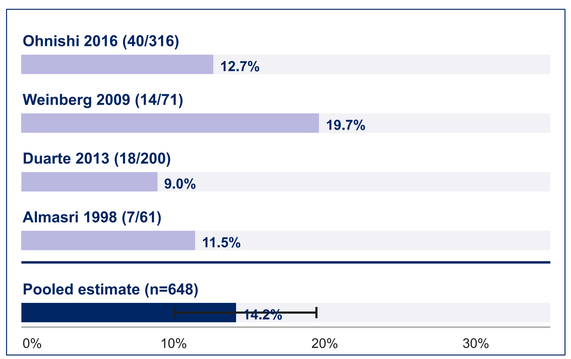


Pooled OR 5.65 (95% CI, 2.64–12.07): an approximate 2–3-fold enrichment relative to overall FL prevalence.

Table 1. Primary meta-analysis cohorts

Study	Population	n	Loss (n/N)
Ohnishi 2016	GI + nodal FL	316	40/316
Weinberg 2009	Nodal + extranodal FL	71	14/71
Duarte 2013	Young adult FL	200	18/200
Almasri 1998	FL cohort (flow cytometry)	61	7/61

Figure 2. CD10 loss prevalence by cohort and pooled estimate



Bars show observed CD10 loss prevalence per primary cohort. The pooled row shows the random-effects estimate with its 95% CI (whisker). Scale is 0–35%.

Table 2. Sensitivity and subgroup cohorts

Study	Subtype	n	Loss (n/N)
Eshoa 2001	Grade-stratified FL	26	6/26
Goodlad 2004	Extranodal FL	15	2/15
Shia 2002	GI FL	26	2/26
Karube 2007	CD10−/MUM1+ FL	141	Enriched subset
Younes 2010	FL patterns	127	Not extractable

Conclusions

CD10 loss occurs in a meaningful subset of follicular lymphoma and is enriched in extranodal presentations, suggesting a biologically distinct subset that deviates from the classic germinal center phenotype rather than a rare immunophenotypic exception.

These findings may have relevance within evolving WHO5 and ICC classification frameworks, which increasingly recognize biologic heterogeneity and variant forms of FL, including extranodal and t(14;18)-negative subtypes.

References

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