Leukaemia Section
Short Communication

T-cell/histiocyte rich large B-cell lymphoma

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Abstract

Although T-cell/histiocyte rich large B-cell lymphoma (THRLBCL) is an aggressive diffuse large B-cell lymphoma (DLBCL), its morphology can resemble nodular lymphocyte predominant Hodgkin lymphoma (NLPHL). These two entities are closely related: both diseases contain neoplastic cells with similar morphologic and immunophenotypic features but differ with respect to their architecture and the nature of the reactive background.

Due to the overlapping features between THRLBCL and NLPHL, it is sometimes impossible to distinguish these two entities; thus, "grey zone" lymphoma is used to define some of those cases.

Because of the morphologic and immunophenotypic similarities between THRLBCL and NLPHL, it is possible that these two entities may represent different stages of the same disease.

A possible biological relation of THRLBCL with NLPHL has been suggested. Overlapping recurrent genetic abnormalities (gain of 4q and loss of 19p) might be the genetic link between THRLBCL and NLPHL.

Keywords
THRLBCL; grey zone lymphoma; NLPHL

Clinics and pathology

Disease
T-cell/histiocyte rich large B-cell lymphoma (THRLBCL) is an aggressive diffuse large B-cell lymphoma (DLBCL) that morphologically can resemble nodular lymphocyte predominant Hodgkin lymphoma (NLPHL), a rare indolent type of Hodgkin lymphoma (HL). Interestingly, some studies suggest that THRLBCL and NLPHL are closely related, based on the overlap which occurs in the 'grey zone' between these two entities (Lim et al., 2002; Boudova et al., 2003; Vanhentenrijk et al.; 2006; Zhao et al., 2008; Hartmann et al., 2013). Due to the overlapping features between NLPHL and THRLBCL, it is sometimes impossible to distinguish these two entities; thus, "grey zone" lymphoma is used to define some of those cases (Rudiger et al., 1998; Boudova et al., 2003; Zhao et al., 2008).

Whereas the 2008 WHO monograph termed as "NLPHL, THRLBCL-like" cases of NLPHL that progress to a diffuse T-cell-rich pattern (De Wolf-Peeters C et al., 2008), the 2016 revision recommend the designation of "THRLBCL-like transformation of NLPHL" for those cases (Swerdlow et al., 2016).
**Epidemiology**

THRLBCL usually affects middle aged men (Hartmann et al., 2015).

**Pathology**

THRLBCL and NLPHL diseases contain neoplastic cells with similar morphologic and immunophenotypic features but differ with respect to their architecture and the nature of the reactive background.

In the THRLBCL there are few large neoplastic B cells scattered in a background of non-neoplastic T cells with histiocytes (De Wolf-Peeters C et al., 2008; Carbone et al., 2010). The neoplastic cells may resemble centroblasts, immunoblasts, lymphocyte-predominant (LP) Hodgkin cells, or classic Hodgkin Reed-Sternberg (HRS) cells (Lim et al., 2002; Carbone et al., 2010). The pattern of involvement in lymph nodes is usually diffuse or may be vaguely nodular, in absence of aggregates of follicular dendritic reticulum cells (FDC).

**Immunophenotype**

Neoplastic cells of THRLBCL express CD45 and B-cell antigens, are strongly positive for BCL6, are negative for CD30 and CD15, and are not infected by EBV (Achten et al., 2002; Lim et al., 2002).

**Background**

Small B cells are virtually absent in THRLBCL, and T cells with a follicular helper T-cell phenotype (CD57 and/or PD1) are not numerous and do not form rosettes around the neoplastic B cells. Presence of granzyme B positive and Tia1 positive T cells is restricted to primary THRLBCL (Table 1).

The background in NLPHL is composed of large meshworks of FDC filled with B cells, histiocytes and numerous germinal center CD4 positive T cells. These T cells specifically express CD3, CD4, PD1, and MUM1/IRF4. Tia1 and CD40L positive CD3 T cells are absent. PD1-ring is a feature commonly seen in NLPHL (Carbone et al., 1995; Carbone et al., 2002; Poppema et al., 2008) (Table 1).

NLPHL may evolve to a completely diffuse T-cell-rich proliferation lacking any follicular dendritic cells which would be consistent with a THRLBCL.

### Table 1 Comparative expression of molecular markers and cell microenvironment

|                      | NLPHL | THRLBCL |
|----------------------|-------|---------|
| **Expression of molecular markers** |       |         |
| CD15                 | -     | -       |
| CD30                 | Usually - | or +    |
| EMA                  | +     | Usually +|
| CD20                 | +     | +       |
| CD79a                | +     | +       |
| IRF4                 | +     | or +    |
| EBV                  | -     | Usually -|
| **Cell microenvironment** |       |         |
| T-cells              | -or + | +       |
| B-cells/B and T-cells| +     | -       |
| CD57 + rosetting T-cells | + or - | -       |
| CD40L + rosetting T-cells | -      | -       |
| MUM1 + rosetting T-cells | +      | -       |
| Histiocytes          | -or + | +       |
| DRCs meshworks       | +     | -       |
**Prognosis**

This B-cell lymphoma is usually aggressive with a prognosis more close to DLBCL than NLPHL (Younes et al., 2014). The treatment outcomes of THRLBCL are similar to those of DLBCL. The addition of rituximab to CHOP seems to be helpful for the management of THRLBCL, as it is for DLBCL (Kim et al., 2014).

**Genetics**

Note

A biologic continuum has been supported by gene expression profiling (GEP) studies ([brune et al., 2008] that have demonstrated a surprisingly high similarity of LP cells to the tumor cells of THRLBCL, with deregulation of pro- or anti-apoptotic genes (CASP2, ATM, and TRAF5) and putative oncogenes. Comparative Genomic Hybridization (CGH) studies revealed a significantly higher number of genomic imbalances in NLPHL than in THRLBCL with only a few overlapping recurrent genetic abnormalities (gain of 4q and loss of 19p). These overlapping abnormalities might be the genetic link between NLPHL and THRLBCL ([Rüdiger et al., 1998; Zhao et al., 2008]). In conclusion, GEP and array CGH studies have shown similarities between NLPHL and THRLBCL, suggesting a relationship to each other, in spite of other major differences. ([Hartman et al., 2015; Swerdlow et al., 2016].)

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