Primary Sjögren's Syndrome

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In primary Sjögren’s syndrome high absolute numbers and proportions of B cells in parotid glands predict responsiveness to rituximab as defined by ESSDAI, but not by SSRI

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With great interest, we have read the article by Cornec et al. [1] regarding our paper ‘Towards personalised treatment in primary SJÖGREN’s syndrome (pSS): baseline parotid histopathology predicts responsiveness to rituximab treatment’ [2]. In essence, we showed in our paper that absolute numbers of CD20+ cells/mm² of parenchyma of parotid gland tissue are predictive for the responsiveness of patients with primary SJÖGREN’s syndrome (pSS) to rituximab (RTX) treatment. Cornec et al. argue that there is a discrepancy in outcomes presented in their study and our study [1], as they observed that a high proportion of minor salivary gland B cells predict absence of a clinical response to RTX [3]. As we will show and explain here, there is no inconsistency between the two studies and most of the apparent discrepancy is likely the result of differences in how the tissues are analyzed and how the disease activity is established.

1. Absolute numbers versus proportions of B cells and technique applied

A major difference in the two studies is how B cells are assessed in tissue sections of salivary gland biopsies of pSS patients before (and after) RTX treatment. We measured absolute numbers of CD20+ B cells/mm² of parenchyma, while Cornec et al. assessed the proportion of B cells [1,3]. Obviously, even when there is a change in absolute numbers of B cells in the tissue, the B/T cell ratio still can remain the same. Thus, although higher numbers of B cells, do not need to be reflected per se in higher proportions of B cells, we also found in our study that patients with higher absolute numbers of B cells in the glandular tissue, had a higher B/B+T cell ratio. Furthermore, responders to RTX, as defined by a decrease in European League Against Rheumatism EULAR SJÖGREN’s Syndrome Disease Activity Index (ESSDAI) score of ≥3 (ΔESSDAI≥3) at 12 weeks after treatment compared to baseline [4], had a higher B/B+T cell ratio compared to non-responders (Figure 1).

Nevertheless, there are some technical differences between the two studies that warrant some attention. We counted the absolute number of cells with HistoQuest software (version 3.5.3.0171, TissueGnostics, Vienna, Austria), a well-known and widely used image analysis software package within pathology. Since parotid gland biopsies include areas of fat and fibrous tissue and intra parenchymal lymph nodes, we excluded these areas manually from the analysis, in order to increase the accuracy of the data. We would like to emphasize that, as stated in the section on ‘Immunohistochemical analysis’ in the materials and methods of our article [2], the whole slide (except from fat and fibrous tissue) was evaluated and areas of interest were not electively chosen, as implied by Cornec et al. [1]. The methodology used by Cornec et al. is based on digital pixel counting procedure developed by Costa et al. [1,3,5]. We have some concerns about this method. First, with the method of Costa et al. extra-glandular areas are not excluded from the tissue specimen studied [5], which has the risk to include in the counting infiltrating cells located in areas of non-interest, e.g., intraparenchymal fat tissue, fibrous tissue, perineural tissue, etc. Second, although the number of pixels is reported to correlate to the manually counted cells [5], the exact number of pixels corresponding to one cell remains unknown. Moreover, although the B-cell proportions assessed with the method of Costa et al. correlate moderately to focus scores [5], the focus score does not give an indication about the severity of inflammation, as discussed in our paper [2]. As a consequence, when the area covered by a single focus at baseline is rather large, a clinically relevant decrease in the inflamed area is not necessary reflected by a decrease in focus score. Apparently the HistoQuest method of counting the absolute number of cells is more precise in these aspects. Thus, it would be interesting to know whether the results reported by Cornec et al. change if biopsies would have been analyzed with the HistoQuest software approach [3].

2. ESSDAI versus SSRI

Another factor that contributes significantly to the apparent difference between the two studies concerns the way disease activity has been defined. Cornec et al. pose that the discrepancy in outcomes can partially be attributed to ineffective-ness of RTX in improving systemic involvement as measured by ESSDAI [1]. This prompted them to develop and use the SJÖGREN’s Syndrome Response Index (SSRI), an index reflecting mainly the objective and subjective sicca symptoms [6]. When we applied the SSRI to classify patients as responder or non-responder, we were unable to detect any difference in our data in baseline CD20+ B-cells/mm² parenchyma between responders and non-responders (Figure 2). Importantly, the agreement between ESSDAI and SSRI in defining responders in our study was rather poor (κ=0.25, percentage of agreement 64%; data not shown). Based on these
findings, we conclude that it is evident that ESSDAI and SSRI measure different outcomes; the ESSDAI focuses on systemic disease activity and the SSRI mainly on sicca related complaints. In this respect, it is also worth mentioning that in our placebo treated patients, SSRI characterized 40% of the patients as responders, while ESSDAI only 11%. ESSDAI has been proven to be sensitive to measure the change in disease activity after therapeutic interventions and also showed that RTX was effective in our double-blind placebo-controlled RTX trial [4,7-10]. Thus, further validation is necessary for the SSRI.

3. Differences in general features

In addition to these two main aspects that result in the apparent discrepancies between the two studies, there are also some other differences that may influence differences in outcomes.

**Baseline ESSDAI:** Although the baseline ESSDAI scores were rather similar between the two studies (8 in our study and 10 in the TEARS study) only in our study the ESSDAI was prospectively evaluated [11,12]. In the TEARS study, the ESSDAI was retrospectively evaluated.

**Baseline salivary gland positivity:** Another major difference between the two studies is the positivity of salivary gland biopsy of the included patients; all patients in our study had a positive parotid gland biopsy at baseline, while only 64% of the patients included in the study by Cornec et al. had a positive minor salivary gland biopsy [1]. When excluding patients with a negative minor salivary gland biopsy from the study by Cornec et al., the median proportion of B-cells in responders would have been probably higher than in non-responders, which is in agreement with the conclusion of our study.

### Table 1: Comparison of two studies.

<table>
<thead>
<tr>
<th>STUDY</th>
<th>Cornec et al., 2015</th>
<th>Delli et al., 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome</strong></td>
<td>Proportion of B cells</td>
<td>Absolute number of CD20+ B-cells/mm² parenchyma</td>
</tr>
<tr>
<td><strong>Software</strong></td>
<td>Digital pixel counting software, developed by the same team [5]</td>
<td>HistoQuest software, version 3.5.3.0171, Tissuegnostics, Vienna, Austria</td>
</tr>
<tr>
<td><strong>Salivary gland</strong></td>
<td>Minor salivary glands</td>
<td>Parotid gland</td>
</tr>
<tr>
<td><strong>General features</strong></td>
<td>• Baseline ESSDAI: 10</td>
<td>• Baseline ESSDAI: 8</td>
</tr>
<tr>
<td></td>
<td>• Median age: 50.4 and 54.8 (± 9.5 &amp; ± 13.8)</td>
<td>• Median age: 43 (± 11 years)</td>
</tr>
<tr>
<td></td>
<td>• Baseline salivary gland biopsy positivity: 64%</td>
<td>• Baseline salivary gland biopsy positivity: 100%</td>
</tr>
<tr>
<td></td>
<td>• Baseline anti-SSA positivity: 80%</td>
<td>• Baseline anti-SSA positivity: 100%</td>
</tr>
</tbody>
</table>

**Parotid versus minor salivary gland biopsy:** The different histopathological characteristics observed in parotid and minor salivary gland biopsies complicate the comparison as, e.g., the B/T-cell ratio differs greatly. Minor salivary glands of healthy controls may have a physiological infiltrate that consists mainly of T-lymphocytes (and plasma cells), while parotid salivary gland tissue of healthy controls shows rarely a lymphocytic infiltrate. Although those differences have been shown by Pijpe et al. [13], there is still a need for larger studies focusing on the inherent differences in the histopathological characteristics of parotid and minor salivary gland tissue in both pSS patients and healthy controls.

4. Salivary gland ultrasound

Like Cornec et al., we also feel that ultrasound has merit in the diagnosis and assessment of the disease activity of pSS [1,14,15]. However, before making salivary gland ultrasound a standard in pSS diagnostics, disease monitoring and treatment evaluation, there are several questions that need to be answered first, i.e. the reliability of ultrasound in the evaluation of changes that occur in the major salivary glands of pSS patients, and the validity of ultrasound to detect the histopathologic changes occurring in the parotid tissue of patients (suspected) with pSS, in particular (direct comparison of ultrasonographic and histopathologic features).

From the abovementioned, it may be concluded that our study and the study of Cornec et al. differ in some respect [2,3], but do not present contradicting results.
Most likely, differences in assessment of patients’ responsiveness to RTX treatment by using different methods and techniques lead to different results and apparent differences (Table). Probably, by combining theirs and our analyses, we might even be able to more efficiently select patients at baseline, who probably will benefit from RTX treatment.

References


