Validation of the “OTHERS” parameter on the Sysmex XE-2100 as a predictor for the presence of activated B-lymphocytes in the peripheral blood

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The “OTHERS” parameter on the Sysmex XE-2100 is reported as both a percentage and an absolute value and numerically represents an abnormal leucocyte population with a high RNA content (1). Morphologically activated B-lymphocytes are lymphoplasmacytoid cells and plasma cells (2). The presence of activated B-lymphocytes in the peripheral blood occurs during an early response to infection (2). The aim of this project was to validate the “OTHERS” parameter as a measurement of activated B-lymphocytes in the peripheral blood, along with making recommendations to the departmental film review protocol.

Peripheral blood samples from 130 patients were analysed on the XE-2100. The “OTHERS” percentage values obtained for each sample were compared with a 100 cell differential performed using CellVision DM96 and a manual 200 cell differential performed using light microscopy. It was ensured that all samples were from patients without haematological malignancies, because these patients may have leucocytes present in their peripheral blood which are not activated B-lymphocytes but are also present in the abnormal population that is reported as the “OTHERS” value (1). Samples from paediatric patients younger than two years of age were also not used in this project as activated B-lymphocytes, which appear in the peripheral blood, are activated in the marginal zone of the spleen and this region of the spleen is often underdeveloped until two year of age; as a result B-lymphocytes are not optimally activated (1,3).

Comparison studies with the “OTHERS” percentage value gave a poor correlation ($R^2 = 0.3173$) against the DM96, whilst a good correlation ($R^2 = 0.6673$) was found with light microscopy. Due to a gold standard such as flow cytometry being unavailable for use the XE-2100 was used as a reference method for sensitivity calculations. The sensitivities of the DM96 and light microscopy differentials for detecting activated B-lymphocytes were 32% and 69% respectively. However, when calculated using data from samples with an “OTHERS” percentage value of 1.0 or greater the sensitivities were 79% for the DM96 and 100% for light microscopy. Although activated B-lymphocytes were detected in the peripheral blood when the “OTHERS” percentage value was as low as 0.2%.

It was concluded that the “OTHERS” parameter can be used as an indicator for the presence of activated B-lymphocytes in the peripheral blood in individuals without haematological malignancies and in those greater than two years of age. Detection of activated B-lymphocytes in the peripheral blood is routinely done by examining blood films using a light microscope, however this method is time consuming and maybe inaccurate in part due to the presence of low numbers of activated B-lymphocytes in the peripheral blood (2). Therefore the acceptance of the “OTHERS” value as a reportable parameter would result in decreased turnaround time and increased accuracy for the quantification of activated B-lymphocytes. The presence of activated B-lymphocytes in the peripheral blood is a result of the first B-lymphocyte response to foreign antigen, therefore the “OTHERS” parameter could potentially become a useful diagnostic tool in differentiating between infection and inflammation (1). The “OTHERS” parameter may also aid in establishing the stage of infection as there is a greater elevation in activated B-lymphocytes during the healing phase compared with the acute phase, however, further studies are required to evaluate its usefulness (1).

Recommendations made to the film review protocol:

- When the “OTHERS” percentage value is 1.0 or greater there can be confidence that activated B-lymphocytes are present in the peripheral blood.
- The sensitivity of the “OTHERS” parameter in detecting activated B-lymphocytes in the peripheral blood may however be as low as 0.2%, but further studies are needed to confirm this. Therefore, the blood film should be scanned for activated B-lymphocytes when the “OTHERS” percentage value ranges from 0.2-0.9.
- When the “OTHERS” percentage value is 0.0 or 0.1 there can be confidence that either activated B-lymphocytes are absent from the peripheral blood or present in clinically insignificant numbers.

A 100 cell differential performed using the DM96 is routinely performed on blood films at Canterbury Health Laboratories, the results of this project show that this method of performing a differential has a low sensitivity for detecting activated B-lymphocytes. Therefore, it is recommended that peripheral blood films should be scanned for activated B-lymphocytes when the 100 cell differential performed using the DM96 is negative and the “OTHERS” percentage value is 0.2 or greater.

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Author contributions
Emma Cochrane carried out the project and was the primary author. Kenneth Beechey conceived and supervised the project and contributed to writing of the article. The authors have no conflicts of interest to declare.

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