

'Latent' Neutrophilia

– what does it matter?

INTRODUCTION

Since the acceptance of SI Units as the way forward all those years ago, the (total) WCC of 4.0 – 11.0 just changed from cmm^3 to $10^9/\text{L}$, however the differential counts which had been reported as a percentage value were now being afforded an absolute value. In other words the quoted range for Neutrophils of 40 – 75% was now being quoted as $2.0 - 7.5 \times 10^9/\text{L}$, but 2.0 in respect of 4.0 is 50%, and 7.5 in respect of 11.0 is 68% , so somebody didn't do their sums right !!!!, no matter as this might only be a moot point, however the use of % values allows evaluation of differential counts relative to the WCC.

In many clinical situations an increase in total white cell count is a pathological / physiological response that allows the clinician to make an informed decision, so an obvious Neutrophil Leucocytosis is associated with an increase in total WCC.

However, there are situations where a patient can have a 100% increase in their WCC and the value is within the 'normal' range e.g. a value of 4.6 rises to 9.2 (100%) and the absolute Neutrophil Count will be normal at 6.90 (75%). These are the situations we are calling 'latent' Neutrophilia since the total WCC and the absolute count are within 'normal' ranges.

The question now arises – are we missing Neutrophilia when the actual increase is being masked by an apparently normal absolute value. The aim of this presentation is to heighten awareness of this situation.

REFERENCE RANGES

Author	Publication	WCC $\times 10^9/\text{L}$	Neutrophils $\times 10^9/\text{L}$	Neutrophils % value	Page (Ref)
Hall and Malia	Medical Laboratory Haematology (1984) Butterworths	4.0 – 10.0	2.5 – 7.5	None quoted	89
Dacie and Lewis	Practical Haematology 7 th Ed (1991) Churchill Livingstone	4.0 – 11.0	2.0 – 7.5	40 - 75	13
Dacie and Lewis	Practical Haematology 10 th Ed (2006) Churchill Livingstone	4.0 – 10.0	2.0 – 7.0	40 - 80	15
Bain	Blood Cells – a practical Guide 4 th Ed (2006) Blackwell Pub	3.7 – 9.5 (m) 3.9 – 11.1 (f)	1.7 – 6.1 1.7 - 7.5	None quoted	204
Rodak	Hematology; Clinical Principle and Application 3 rd Ed (2007) Saunders/ Elsevier	4.5 – 11.5	2.3 – 8.1	50 - 70	Inside cover
Moore Knight and Blann	Haematology Fundamentals of BMS Oxford Univ Press	4.0 – 10.0	2.0 – 7.0	None quoted	xiv

Table 1: Reference Ranges for Total White Cell Count and Neutrophils

MATERIALS AND METHODS

The analysers used in this evaluation

The Bon Secours Hospital uses a CellDyn Sapphire and flow cytometry is the technology for White Cell Count and Differential.

Beaumont Hospital used Sysmex technology (see below in SJH)

St James Hospital uses Sysmex XE 2100 and XE 5000 analysers and impedance technology with radio frequency is the principle for evaluation of White Cell Count and Differential.

Sixty sets of data were considered under the headings: WCC, Neutrophil Counts both Absolute and % values, age, gender, and clinical information (when available). The Table 2 below is a summary of our findings

M = 30 F = 30	WCC	Neut $\times 10^9/\text{L}$	% value	Age
Mean	6.629	5.465	82.805	69.217
Minimum	4.05	3.28	75	24
Maximum	9.3	7.46	91.4	91
Median	6.485	5.54	82.85	72
Mode	5.29	6.46	81	80
Std Deviation	1.43	1.12	4.29	16.15
Count	60	60	60	60

Table 2; Data Analysis of 60 patients with 'Latent Neutrophilia'

DISCUSSION

The WCC ranges from 4.05 to 9.3 $10^9/\text{L}$ and on inspection is considered normal by all sources of reference ranges in Table 1. and similarly the Absolute Neutrophil Count covers the range 3.28 to 7.46 $\times 10^9/\text{L}$ also covering the normal range. The main focus of this paper was to identify that although absolute neutrophil counts were normal their percent value is raised relative to the total count and this is evidenced by the mean of 82.8 % ranging from 75 to 91.4%.

Clinical (a selection from the 60 cases)	Gender	Age (yrs)
Cardiac patient	M = 6 F = 1	M; 63 to 83 F; 91
Oncology patient	M = 5 F = 4	M; 50 to 76 F; 35 to 52
Geriatric	M = 1 F = 4	M; 80 F; 85 to 89
Renal patient	M = 2 F = 2	M; 61 to 69 F; 54 to 59

Another observation in respect of this data was; there was no predominant clinical condition contributing to this 'latent neutrophilia' but the age profile ranged from 24 to 91, (see Table 2) however the modal age of 80 suggests that this phenomenon predominates in an older age group.

Many of the cases observed presented with an associated lymphopenia. While often un-investigated, persistent lymphopenia has been described in a wide range of disorders ranging from viral/bacterial or parasitic infections,. The ratio of neutrophil and lymphocyte counts - referred to as the NLCR – in place of their absolute values has been found to have higher value in predicting bacteraemia.^{1,2}

The limited scope of this paper is difficult to interpret, however it was spawned out of an idea by us in our role as educationalists to create awareness of data that might have clinical importance. The other point being that; we as a profession are in danger of being perceived as 'very highly paid button pushers' so it is incumbent on us as Scientists in Haematology to offer as best an interpretation of the data we generate by adding clinically useful comments, and we would venture to propose that interpretations of analyser profiles using the words (in cases such as these) "NEUTROPHIL LEUCOCYTOSIS – First presentation", or "PERSISTENT NEUTROPHIL LEUCOCYTOSIS" printed on a report would have more of an impact on our clinical colleagues than a numerical value lost in an array of values that constitute a report

1." Investigating an incidental finding of lymphopenia": Brass Dawn, McKay Pam, Scott Fiona. *BMJ* 2014;348:g1721

2." Lymphocytopenia and neutrophil-lymphocyte count ratio predict bacteraemia better than conventional infection markers in an emergency care unit" de Jager et al. *Critical Care* 2010, 14:R192

NOTE: The authors were involved in teaching Laboratory Haematology to 2nd year Medical Laboratory Science students [DT 204] in the Dublin Institute of Technology Kevin Street for the current academic year (2016).