Differential white blood cell counts: A comparison between automated pathology and darkfield microscopic fresh capillary blood analysis

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Background:

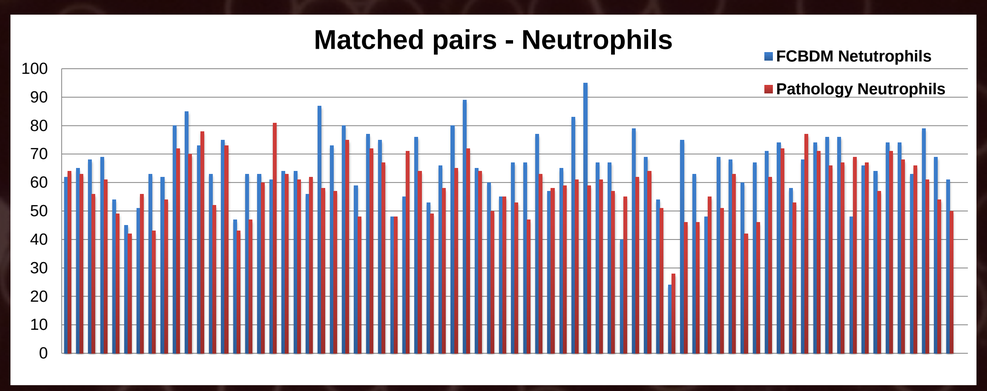
Darkfield microscopy has been utilised since the 1930's to investigate transparent and unstained specimens in health care, dentistry and microbiology [1,2]. Darkfield microscopic analysis of fresh capillary blood (FCB-DM) has been widely used in Integrative Medicine in Australia, USA and Europe [3]. In this technique, a drop of capillary blood is examined under a darkfield microscope immediately after extraction. Parameters such as erythrocyte and leukocyte size, shape and morphology can be easily observed, but the accuracy of quantitative analysis is yet to be established.

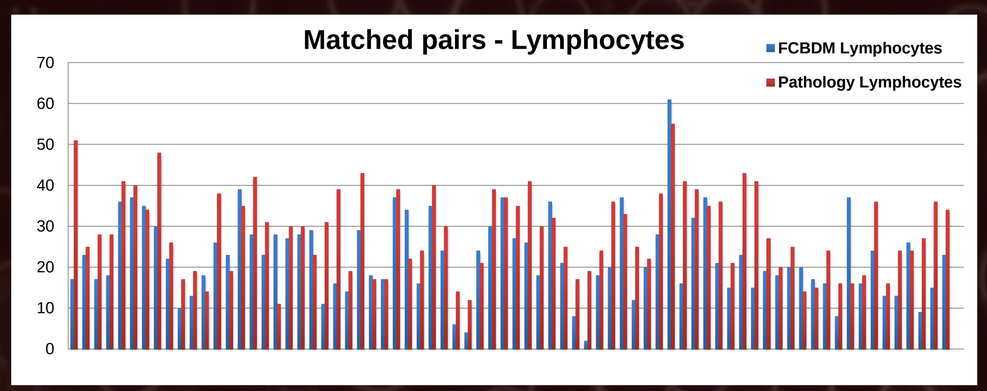
Method:

This study investigated how white blood cell differential counts performed with FCB-DM correlated to commercial pathology automated white blood cell counts. Ethics approval was granted on January 10th 2012, by the Southern Cross University Ethics Committee reference number ECN-12-002. Retrospective data was collected from a Naturopathic clinic in Brisbane during 2011. Seventy-three cases were selected with automated blood pathology taken within 4 days of FCB-DM being performed.

Results:

Clear correlations between white blood cell counts performed by pathology and FCB-DM were observed in neutrophil (t = 5.594; SEM = 1.222; P < 0.0001), lymphocyte (t = 5.700; SEM = 1.110; P < 0.0001) and basophil (t = 5.401; SEM = 0.065; P < 0.0001) populations in the patients. FCB-DM counts of neutrophils were slightly higher on average (M = 66.0 11.855) than the automated pathology reports (M = 59.2 10.066). The mean difference between the monocyte counts (t = 0.596; SEM = 0.544; p = 0.553) and eosinophil counts (t = 0 .410; SEM = 0.198; p = 0.683) were found to be not statistically significant.





Discussion:

The slightly higher mean of neutrophil counts in FCB-DM follows the trend in the literature between venous and capillary neutrophil populations, where neutrophil populations were reported to be 8.9% higher in capillary than venous blood [4]. Monocytes and eosinophils are only mobile in the blood for short periods of time before migrating into the tissue. This rapidly changing concentration in blood may well have an impact on the correlations. The Pathology monocyte counts failed the normality distribution, which may have also affected the accuracy in the pairing. The distance in time between the tests being performed potentially affects the correlations, but the small numbers in the sample groups of this study were insufficient to confirm this.

Conclusion:

The data suggests FCB-DM provides a clinically useful indication of a patient's differential white blood cell count. Clear correlations between white blood cell counts performed by pathology testing and FCB-DM were observed for neutrophils, lymphocytes and eosinophils populations in the patients studied.

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References:

1. Chambers, W., T.J. Fellers, and M.W. Davidson. *Darkfield illumination*. 2012 [cited 2011 November 12th 2011]; Available from: http://www.microscopyu.com/articles/stereomicroscopy/stereodarkfield.html
2. Macnab, R.M., *Examination of bacterial flagellation by dark-field microscopy.* Journal Of Clinical Microbiology, 1976. **4**(3): p. 258-265.
3. Vitetta, L., et al., *The live blood analysis technique.* Journal of the Australasian Integrative Medicine Association, 2005. **24**.
4. Schalk, E., K. Scheinpflug, and M. Mohren, *Capillary blood count analyses in clinical practice: a safe, reliable and valid method.* Laboratoriums Medizin, 2009. **33**(5): p. 303-309.