Blood Cell Analysis with the Moxi Z

Introduction - Variations in core blood cell metric such as white blood cell (WBC) counts and mean corpuscular volume (MCV) can be important indicators of pathologies including infection, anemia, poisoning, and disease. By applying established preparation protocols to whole blood samples, Moxi Z can generate important metrics from blood samples for non-clinical analysis including red blood cell (RBC) counts, mean corpuscular volume (MCV), white blood cell (WBC) total counts and peripheral blood mononuclear cell (PBMC) size distributions and counts.

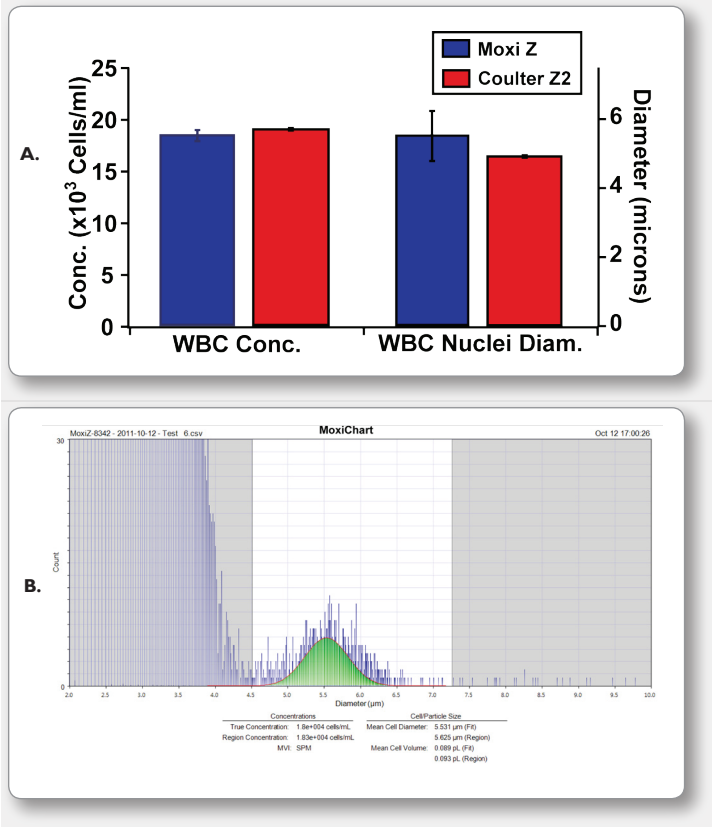


Figure 1 – WBC Total Counts – 45 µL of whole blood was diluted in 15 ml of Orflo Diluent. Cells were lysed through addition of 4 drops of ZAP-oglobin (Beckman Coulter) lytic reagent and mixture through gentle inversion. After ~1 minute post-lysis, WBC nuclei counts were analyzed on both the Moxi Z (Type M cassette, SPM mode) and the Coulter Z2 cell counters. (A) Counts and measured diameters were determined to be statistically identical (T-test, $p<.05$). (B) A MoxiChart exported image showing a representative WBC histogram transferred from the Moxi Z unit via Bluetooth.

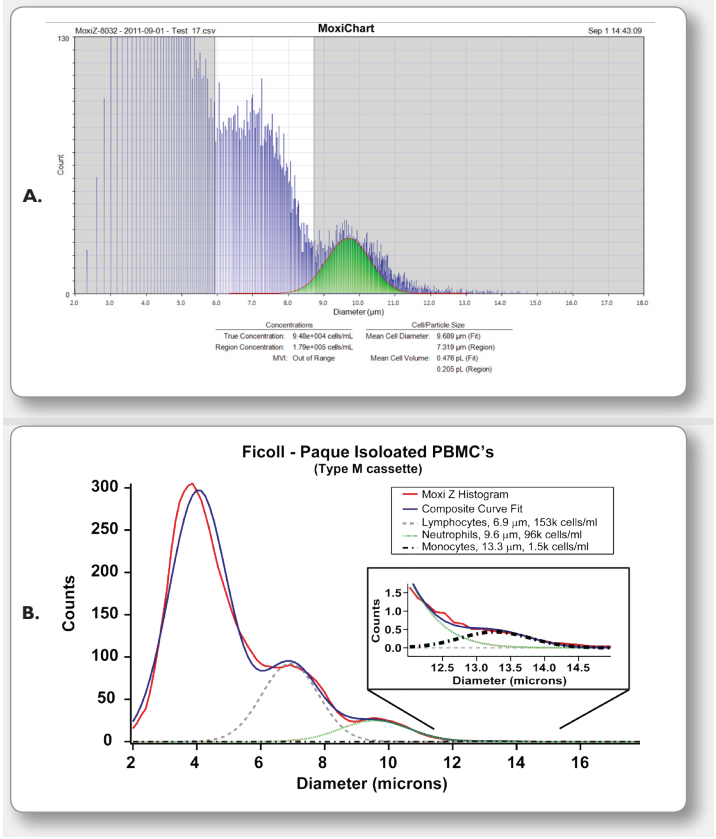
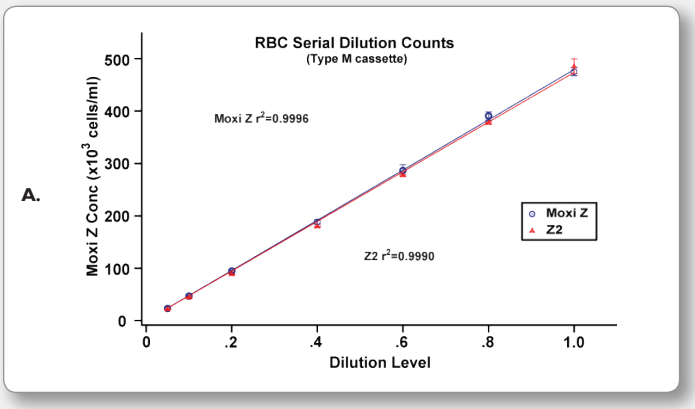
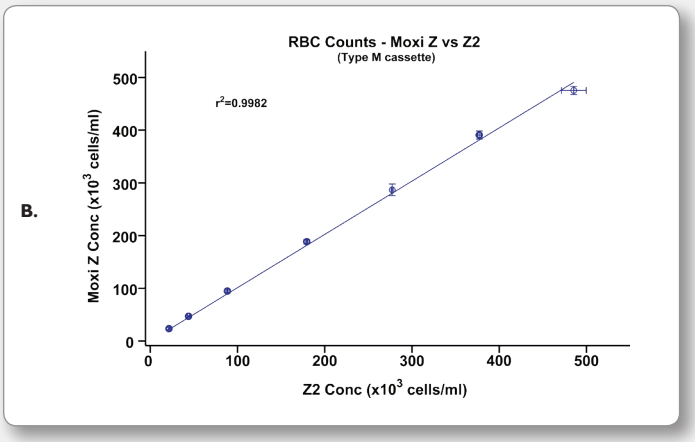
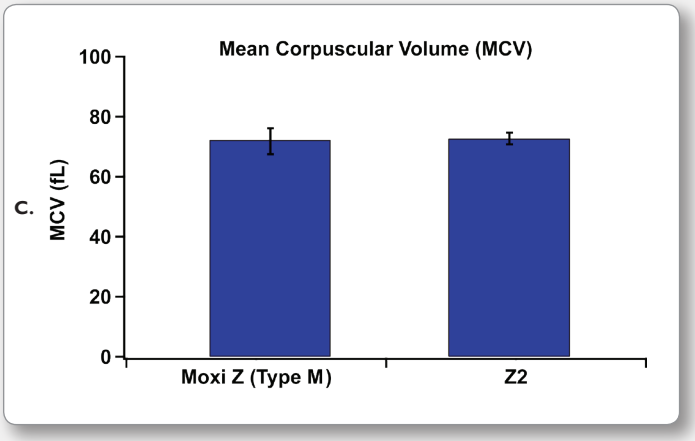


Figure 2 – PBMC Size Analysis – PBMC's were isolated via an established gradient centrifugation protocol (GE Healthcare Instructions 28-4039-56-AC) using Ficoll – Paque Premium (GE Life Sciences) cell preparation media. Diluted PBMC samples were measured in the Moxi Z using Type M cassettes in normal acquisition mode with horizontal rescaling of the diameter axis to 2 - 18 microns. A) Raw histogram transferred from the Moxi Z unit to a PC using Bluetooth and displayed with the MoxiChart application. The green region indicates the default curve-fit region and the associated count and size information are listed below. Multiple population counts and sizes could also be individually measured by selecting "gating mode" (on either the Moxi Z unit or MoxiChart) and manually adjusting the gated region (non-grayed area in (A) above) appropriately. B) Bluetooth-transferred .csv files were separately loaded in a data analysis application (Wavemetrics IGOR Pro) and analyzed. Multiple curve-fitting allowed for more advanced analysis of cell populations including extraction of more precise population counts and size information.







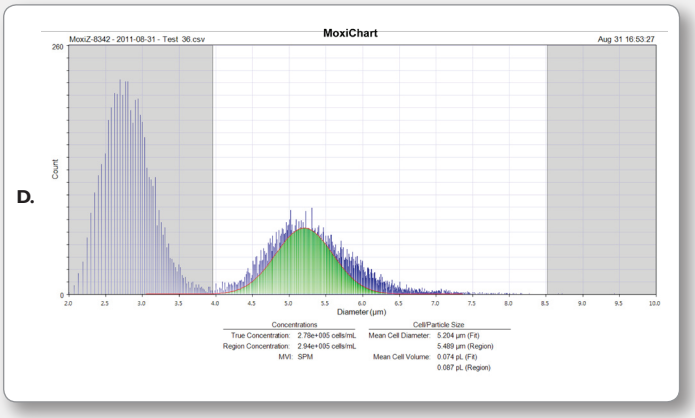


Figure 3 – RBC Counts and MCV – Fresh whole blood was diluted ~10,000:1 to establish an initial concentration of ~500k cells/ml and measured on both the Moxi Z (Type M cassette, SPM mode) and the Coulter Z2 (100 micron aperture, .1 mL metered volume, gating > 25 fL) cell counters for concentration and MCV. Serial dilutions with isotonic media (Orflo Diluent) were subsequently prepared using calibrated pipettes. The linearity of the Moxi Z measurements with respect to the calibrated dilutions (A) as well as the high-end Coulter Z2 measurement (B) highlights the precision and accuracy of the system. C) Comparisons of the RBC counts to The Moxi Z count and sizing (MCV) results similarly matched those of the Z2 System with a high degree of precision. D) A MoxiChart exported image showing a representative RBC histogram transferred from the Moxi Z unit via Bluetooth.