Performance evaluation of an impedance-based point-of-care haematology analyser using floating discriminators in the analysis of equine blood samples

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Introduction
In critical care, reliable and fast patient-side analysis of erythrocytes, leukocytes, and platelets is essential for appropriate diagnosis and clinical management.

Because of the great physical individual variations in blood cells, an impedance-based haematology analysing system using floating discriminators for the differentiation of blood cell populations designed specifically for veterinary applications has been developed, Medonic™ CA620 VET / HESKA® CBC-Diff™ Veterinary Hematology System (Boule Medical, Stockholm, Sweden).

In human hematology, this approach has proven to be more accurate than the use of fixed discriminators, especially for pathological samples. In veterinary hematology with its large range of species, breeds and types, floating discriminators and specifically modified veterinary reagents are necessities for high accuracy.

The purpose of this study is to evaluate the accuracy of this Veterinary hematology analysing system using floating discriminators, and to manual microscopic differential counts of white blood cells.

Materials and Methods
• Fresh EDTA-blood samples from 350 horses in CellDyn correlation study
• 40 horses in manual microscopic count correlation study
• Clinical cases: from healthy to severely ill, assuring a wide range of values within the studied parameters
• Parameters studied: white blood cell count (WBC), lymphocyte count (LYM), granulocytic count (GRAN) and platelet count (PLT), red blood cell count (RBC), mean cell volume (MCV), hemoglobin concentration (HGB), and hematocrit (HCT)

Methods:
• Medonic CA620 VET / HESKA® CBC-Diff™ Veterinary Hematology System (Boule Medical, Stockholm, Sweden) using the impedance principle for cell counts and sizes (part WBC diff) with a system of reagent formulation, floating thresholds, and analytical algorithms designed for veterinary hematology, and spectrophotometry for HGB
• Cell-Dyn® 3500 (Abbott Laboratories, North Chicago, IL, USA), a reference instrument used in large veterinary labs, using the impedance principle for cell counts and size, and light scatter for WBC differential information and spectrophotometry for HGB
• Manual microscopic differential counts of white blood cells

Results and Discussion
The correlation between the two different instruments was excellent for the red and white blood cell parameters (see Illustrations).

Total counts of WBC, LYM, and GRAN had R-squared values of 0.98, 0.97, and 0.98, respectively. For PLT, it was 0.58, R-squared values for RBC, HGB, HCT, and MCV in horses blood samples were 0.98, 0.97, 0.93, and 0.96, respectively.

Also in comparison to the manual method, the correlation was good. The percentages of LYM and GRAN showed RF of 0.79 and 0.74, respectively.

Platelet analysis is difficult in all instrument systems including the Cell-Dyn® analyzer because of variable platelet and erythrocyte size overlap, and aggregate formation. Therefore, the platelet concentration correlation observed for horses was satisfactory. Both methods are regarded as useful in screening for clinically important thrombocytopenia.

Summary and Conclusion
The performance of Medonic VET Hematology System using floating discriminators and reagents designed for veterinary application was interpreted as very good.

The tested hematology analyser proved to be a useful and reliable tool for the veterinary practice dealing with hematology in horses.

Floating discriminators, what is it?
Floating discriminators allows an adaptive classification of cells. This is important because of the individual physical variation of blood cells. In contrast, systems with pre-set fixed discriminators often fail to identify cells correctly.

Image: Diagram showing the comparison of WBC, LYM, GRAN, and PLT counts between Medonic VET and CellDyn.
Comparison of standard haematologic parameters determined on an impedance-based point-of-care haematology analyser using floating discriminators and an automated haematology analyser commonly used in veterinary reference laboratories

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In critical care, reliable and fast patient-side analysis of red and white blood cells as well as platelets is essential for appropriate diagnosis and management. Because of the great physical variations in blood cells from different individuals, an impedance-based haematology analyser using floating discriminators for the differentiation of blood cell populations designed specifically for veterinary applications has been developed. In human haematology, this approach has proven to be more accurate than the use of fixed discriminators, especially for pathological samples. In veterinary haematology with its large range of breeds and types within each species, floating discriminators is a necessity for high accuracy.

The purpose of this study is to compare results from Medonic CA620 VET (Boule Medical, Stockholm, Sweden), an impedance-based haematology analyser giving a 3-part differential of white blood cells, to results from Cell-Dyn 3500 (Abbott Laboratories, North Chicago, IL, US), a haematology instrumentation used in many veterinary reference laboratories.

Blood samples from 42 dogs and 42 cats that were clinical cases at animal hospitals were collected to assure a wide range of values within the studied parameters. These included red blood cell count (RBC), mean cell volume (MCV), haemoglobin concentration (HGB), haematocrit (HCT), white blood cell count (WBC), lymphocyte count (LYM), granulocyte count (GRAN) and platelet count (PLT). Standard within run precision testing was also performed.

Correlation between the two different instruments was good. R-squared values for RBC, MCV, HGB, HCT, WBC, LYM, GRAN, and PLT in dog blood samples were 0.98, 0.83, 0.99, 0.94, 0.94, 0.74, 0.88, and 0.88, respectively, and for cat blood samples they were 0.97, 0.91, 0.98, 0.95, 0.99, 0.92, 0.99, and 0.58. Within run precision correlation of variance (%CV) for RBC, MCV, HGB, HCT, WBC, and PLT in dog blood were 1%, 1%, 1%, 5%, and 5%, respectively.

Performance of the impedance-based haematology analyser using floating discriminators designed for veterinary application was interpreted as very good. With the good precision and high accuracy, it proved to be a useful and reliable tool for the veterinary practice dealing with haematology in dogs and cats.

**Floating discriminators, what is it?**

Floating discriminators allows an adaptive classification of cells. This is important because of the individual physical variation of blood cells. In contrast, systems with pre-set fixed discriminators often fail to identify cells correctly.