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The Capillary Hematocrit

D. L. Baker, D.V.M.

A hemogram is of value in small animal practice as an aid to diagnosis, an index to prognosis, and a guide to therapy. It may be helpful in establishing a diagnosis or in confirming a tentative diagnosis. The blood picture may reflect the course of the disease and the effectiveness of therapy before other signs become apparent.

The hematocrit is an integral part of a complete hemogram. One of the simplest and the most accurate methods for the detection and the measurement of the degree of anemia is the estimation of the volume of packed red blood cells. This is accomplished by centrifuging blood until there is maximal packing of the cells. The micro method is particularly suitable as a screening procedure in small animal practice. No special technical skill or standardization of reagents or equipment is necessary. The determination of the volume of packed red blood cells can be accurately and rapidly performed on venous blood using heparin-lined capillary tubes and a high speed centrifuge designed for this purpose.

Heparinized capillary tubes may be charged with blood directly from the patient or well mixed blood containing ethylenediamine tetra-acetate (EDTA) or ammonium and potassium oxalate may be drawn into plain microcapillary tubes for the hematocrit determinations. Two tubes are filled to within one inch of the end. The empty end is either (1) sealed by carefully heating in a flame, (2) plugged with clay, or, (3) capped with small plastic caps made for this purpose. If a flame is used one should be careful to obtain a tight seal without undue distortion of the tip and without heating the blood. Two tubes for a given patient are placed opposite each other in the slots in the centrifuge head with the sealed end against the outside rubber rim. The top is secured and the lid closed. The samples are then centrifuged at a high speed for a few minutes as recommended by the manufacturers of the centrifuge. The details varying somewhat with the kind of machine employed. After centrifugation, the percentage length of the column of packed red cells is easily read.

The microhematocrit yields results which are comparable to those obtained by the Wintrobe or larger graduated tube methods. The micro method is most accurate; the amount of blood required is minimal; the time required for the complete procedure is short and the cost of the easily charged, disposable tubes is very nominal.

The accuracy of hematocrit values may in turn be compared with other measurements of blood. A ± 2% margin of error

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is considered acceptable in hematocrit determination but in comparison there may be a \( \pm 20\% \) error in the erythrocyte count or an error of up to 50\% in the hemoglobin determination. The hematocrit is a good index of the number of circulating erythrocytes in most anemias and is of still greater aid in determining the necessity for transfusion because of its accuracy. Likewise, the hematocrit is a reasonably good indirect index of circulating hemoglobin and is considerably more reliable as an index of hemoglobin level than is the total erythrocyte count. An approximation of the total erythrocyte count of canine blood can be obtained by dividing the hematocrit reading by six. An estimation of the grams of hemoglobin per 100cc of blood may be obtained by dividing the hematocrit by three. It is to be noted that these are approximations and that as such the margin of error through transposing of values is potentially multiplied. As such these values are not critically comparable to those obtained through direct methods of determination.

One should not attempt to evaluate the buffy coat in capillary tubes. It may contain thrombocytes and nucleated red cells in addition to the leucocytes. The correlation between the height of the column of leucocytes and the true leucocyte count is most usually very poor. The hematocrit values of different tissues vary, blood in the small vessels of the body having a lower value than that of the large vessel or heart blood. The site of venipuncture should, therefore, be standardized for greater accuracy in evaluating hematocrit readings. Any data obtained from the analysis of a blood sample must be interpreted in light of the state of water balance of the patient. The sudden loss of greater than physiologically normal amounts of water from the body results in immediate concentration of the blood. Many of the blood values including the hematocrit are increased. Later, water is given up from the reserve stores in muscle and skin and the blood returns to an essentially normal state of hydration. If fluids are administered intravenously, abnormally low hematocrit values may occur as hemodilution takes place in restoration of normal body hydration. The average venous blood hematocrit for the dog is 45\( \pm 10\% \). The average for the cat is 37 to 40.

**BIBLIOGRAPHY**


**Public Relations is Your Duty**

Public relations is the task of every member of the AVMA according to Mr. Heinz R. Kuehn, director of AVMA Public Information.

Members of the AVMA in their daily work have more public contacts than any appointed public relations man could hope to achieve. For this reason the veterinarian's image will and should be that of the veterinarian in the community. Is the image you're creating one you would want people to have of our profession?

The AVMA's program to stimulate local participation in public information was featured in the September 24 issue of Public Relations News, a weekly international public relations bulletin for executives.

**CORRECTION**

In Issue number 3, Volume XXIV of the *Iowa State University Veterinarian* page 153 on “The Epidemiology of Johne’s Disease” in the first paragraph line 9, the sentence should read “Since the natural incubation period has NEVER been determined. . . .”