PROPOSAL

Stability of whole blood samples for haematological measurements

Interested partners of EQALM, ENERCA and ICSH

Aims and purposes

In general haematological parameters have been measured from EDTA anti coagulated whole blood, shortly after drawing. During the last years, however, the increasing centralization of clinical laboratories into so called "Core Labs" has dramatically changed the time existing between the blood drawing and the measurement of haematological parameters and the preparation and staining of blood smears for blood cell morphology examination. This signifies that a high number of blood samples are generally transferred to long distance Core-Labs for performing the analytical measurements. In such conditions, if no careful control of temperature exists during blood storage, cell deterioration may invalidate the analytical results. This is so because when EDTA anti coagulated blood is stored at room temperature (20°C), red and white cell counts are maintained within acceptable limits of error for about 24 hours, but red cell indices (MCV, MCHC and MHC) are stable no more than 8 hours. When stored at 4 °C , this conservation time increases up to 48 hours for complete blood count (CBC) and until 24 hours for RBC indexes.

In 1982 the ICSH published the standardization of blood specimen collection procedure for reference values (1) but information concerning the influence of blood conservation on cell morphology examination from stained smears is limited to very few individual studies. Morphological changes of blood cells in EDTA anti coagulated blood begin after 30 minutes of drawing and they consist in granulocyte swelling, increases of band forms, and or loss of specific granulation sometimes associated with vacuolization, especially in eosinophils and monocytes. For red blood cells, the loss of membrane structure and function due to the decrease in ATP, may lead to an increase or decrease in MCV with the false appearance of macrocytosis or spherocytosis respectively. Accordingly, since reliable specimen collection and transfer to the laboratory are key elements for the quality of haematological tests, ICSH concludes that whole blood for haematological testing is unsuitable for long distance (2). Instrument's algorithms are, in general, capable to detect blood changes induced by storage mainly for the blood cell count and less for their l morphological or structural abnormalities leading to an increase of false positive or false negative results. Despite this knowledge, no studies exist on the effect of stability of EDTA anti coagulated whole blood for blood cell morphology examination in clinical practice. More recently, a standardized method has been published for preparation and examination of May Grünwald Giemsa (MGG) stained blood smears (3). In this paper it was assumed that the procedure is done within the first 4 hours of drawing. However the increasing transportation of human blood samples for CBC and WBC-Diff between different laboratories can be the cause of unreliable results and therefore of interferences with clinical diagnosis and at the end a significant increase of health costs.

This guideline intends to study the influence of time after drawing of CBC and blood cell morphological examination in order to avoid misinterpretation of results in the automated measurements or blood smears are performed out of permitted storage time after drawing.

Panel Members

A panel of experts in the field of laboratory haematology will be formed by interested partners in different European Countries. Panel members have to be experts in peripheral blood cell morphology

1. The panel members will meet virtually with email correspondence used as the primary communication method.
2. One on-site meeting will be necessary to discuss the outcome and final guideline recommendations

Logistics

Personal knowledge and expertise, together with study of the available published data, should lead the working group to a consensus-based definition of rules for standardized conditions for examining blood after drawing. A limited number of practical experiments should be carried out to explore specific aspects of the changing of haematological parameters and blood cell morphology with time of anti coagulated whole blood storage

Deliverables

1. Consensus Guideline for the effect of anti coagulated whole blood transport and conservation on automated and non automated haematological parameters
2. The Guideline should be in a format for website publication.
3. The Guideline should be submitted for publication in a specialised journal

References

(1) Hjelm M, Leyssen MHT, Tentori L, Verwilgen RL and IFCC expert panel.
Standardization of blood specimen collection procedure for reference values. International Committee for Standardization in Haematology (ICSH). International Comitee For Standardization In Haematology (ICSH). Clin lab Haemat. 1982, 4, 83-86.

(2) N.Tatsumi, S. Miwa, S. M. Lewisl, E. C. Gordon Smith.
Collection, Storage, and Transmission to the Laboratory for Hematological Tests. (Presidt,W. Hughes; Chairman Secret, O.W. van Assendelft. Int. J Hematol. 2002;75:261-268

(3) Vives Corrons, Albarede, S, Flandrin,G, Heller S, HorvathK, Houwen B, Nordin G, Sarkani E, Skitek M, Van Blerk M and Claude Libeer JC
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