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Effect of EDTA K2 and K3 anticoagulants on the complete blood count measured by hematological analyzer

The complete blood count (CBC) is a laboratory investigation widely used in general clinical practice. In routine practice, blood collection using EDTA blood tubes is recommended for the CBC investigation. In laboratory medicine, pre-analytical quality control is very important, as pre-analytical error is the most common error in practice.¹ An interesting case study is presented of an aberrant CBC result due to the use of EDTA anticoagulant. A medical laboratory consulted on a problem of aberrant CBC results. The ward physicians notified the laboratory of an unacceptable change in the reported mean corpuscular volume (MCV) of a patient during a daily monitoring of the response to treatment of infection. The laboratory investigated the problem on the automated hematology analyzer. The laboratory had used the same automated hematology analyzer, Technicon H*3, for all CBC investigations. The laboratory is certified for ISO15189 with routine quality control of all laboratory processes, hence there was no problem related to the EQA and IQC program of the investigation. The question remained "what was the exact cause of the problem?". From the close observation and pathway analysis of the CBC investigation within this laboratory, it was seen that the CBC blood samples from the ward are collected by the physicians on the ward and sent directly to the laboratory for analysis. In depth investigation revealed that there are two types of blood collection EDTA tubes in the ward, EDTA K2 and EDTA K3. In everyday practice, the medical personnel on the ward use both kinds of tubes for blood collection.

It was therefore suspected that the problem of the aberration of MCV results among patients on the ward might be due to the use of different anticoagulants. There is some evidence indicating the EDTA K2 might affect the

MCV result. Lower MCV has been observed with EDTA K3 anticoagulation (typically a -0.1 to -1.3% difference is mentioned).^{2,3} Goossens et al noted that "MCV is not influenced by K3EDTA concentrations up to ten times normal, while K2EDTA, at high concentrations, results in a slight increase in MCV, as measured with three of the instruments²". In addition, it has also been reported that "the difference in MCV between K2EDTA and K3EDTA was more marked under the condition of lower blood pH⁴". Hence, in cases with sepsis or severe infection with a trend towards decreased blood pH, a significant difference in MCV between measurements using EDTA K2 and EDTA K3 might be expected.

In conclusion, in this case, the reason for the aberration in the laboratory results could have been due to the use of different EDTA blood collection tubes on different days. The comparison between the two laboratory results might lead to some confusion for the physician in charge in this case. It is therefore recommended that single type of EDTA blood collection tube is used for smooth monitoring of the patient. This case might not be unusual or rare but it is not widely known by general practitioners.

V. Wiwanitkit

Wiwanitkit House, Bangkhuae, Bangkok, Thailand

ABSTRACT

Επίδραση των αντιπηκτικών EDTA K2 και K3 στις μετρήσεις της γενικής αίματος στους αιματολογικούς αναλυτές

V. WIWANITKIT

Wiwanitkit House, Bangkhuae, Bangkok 10160, Ταϊλάνδη

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Corresponding author:

V. Wiwanitkit, Wiwanitkit House, Bangkhae, Bangkok 10160, Thailand
e-mail: wviroj@yahoo.com

