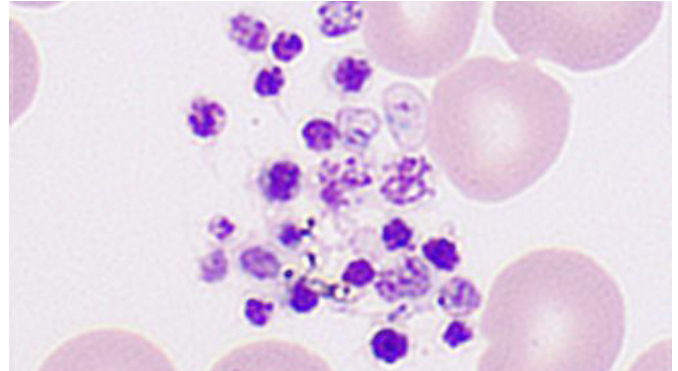


Chapter 2: One More Option to Solve EDTA-PTCP?

Ethylenediaminetetraacetic Acid - Pseudothrombocytopenia (EDTA-PTCP) is a laboratory artifact that may lead to an incorrect evaluation and unnecessary treatment of patients.

Which of the following method (or methods) would you take to correct platelet counts in case of an EDTA-induced platelet aggregation in thrombocytopenia?

- Recheck with blood smear and estimate the platelet count
- Recheck with addition of amikacin
- Recheck after warming at 37°C
- Recheck immediately dilution without any anticoagulant
- Reexamine on another hematology device
- Recheck with other anticoagulants



Professional clinical laboratory doctors pursue accuracy and truth with the highest sense of responsibility. Nowadays, some clinical studies have been conducted to explore EDTA-PTCP solutions, suggesting that Mindray hematology systems with SF Cube technology would be an option to effectively assist lab technicians in identifying correct platelet counts.



Mindray SF-Cube technology: An effective way for correcting platelet count in individuals with EDTA dependent pseudo thrombocytopenia

A Clinical Case Report

The patient here is a 32-year-old female with infertility. After the patient’s EDTA-anticoagulated blood was drawn, it was analyzed within fifty-five minutes, and it showed a low platelet count ($28 \times 10^9/L$). The test was done by the impedance method (PLT-I) on a popular brand’s hematology system (device A). Platelet aggregation was confirmed by microscopic examination of the smear, indicating pseudothrombocytopenia (PTCP). Shortly after, a reexamination of this sample was done using the CDR (PLT-O) method on the Mindray BC-6800Plus. The results showed a markedly higher platelet count with a value of $180 \times 10^9/L$.

It’s suspected that the low platelet count obtained by device A was due to EDTA-induced PTCP. So, the patient was asked to consent for an additional test using a blood sample tube with sodium citrate this time. Thirty minutes after the sample was collected it was then analyzed. The resulting platelet parameters of the blood samples run through various testing methods and devices are listed in Table 1.

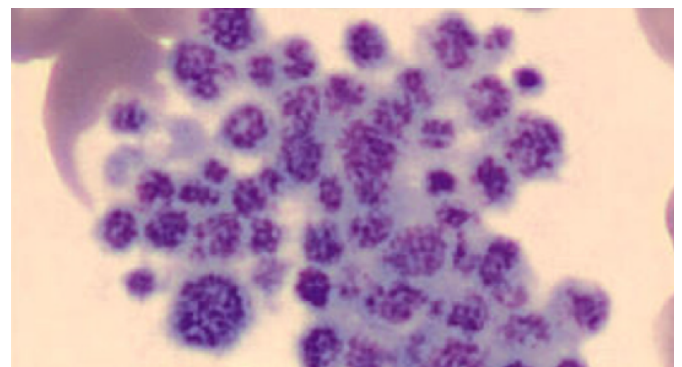


Table 1

Comparison of platelet parameters in EDTA and sodium citrate anticoagulant measured with different methods.

Platelet parameters	EDTA -anticoagulated		Sodium citrate-anticoagulated	
	PLT-I on device A	CDR (PLT-O) of Mindray BC-6800 Plus	PLT-F on device A	Neubauer chamber
Count ($\times 10^9/L$)	28	180	166	176
MPV (fL)	10.9	12.2	11.3	-
PDW (fL)	12.8	17.6	16.0	-

-. Not detected; MPV: mean platelet volume; PDW: platelet distribution width.

Further Comparison of Other Samples

Under microscopic evaluation of the blood smear, the EDTA-anticoagulated blood showed platelet aggregation while the sodium citrate-anticoagulated blood showed none. The blood samples were analyzed within four hours from the time of collection, according to the manufacturer’s instructions. In addition to that patient, the data from an additional five cases of EDTA-PTCP were collected and assessed (Table 2).

In the end, the author concludes: In patients with known or suspected EDTA-PTCP Mindray SF-Cube technology is a straightforward and effective way of determining the platelet count in EDTA-anticoagulated blood.

Cases	Platelet count (x10 ⁹ /L)			
	EDTA -anticoagulated		Sodium citrate-anticoagulated	
	PLT-I on device A	CDR (PLT-O) of Mindray BC-6800 Plus	PLT-F on device A	Neubauer chamber
1	86	322	292	300
2	12	133	195	173
3	29	345	334	326
4	14	192	179	185
5	77	227	236	260
Mean	44	244	247	249



Correction of spurious low platelet counts by optical Fluorescence platelet counting of BC-6800 hematology analyzer in EDTA-dependent pseudo thrombocytopenia patients

Identification and Characteristics of EDTA-PTCP Samples

Samples that triggered the “PLT aggregation” flag on the hematology analyzer showed a typical serrated irregularity and a zigzag tail (Figure 1) on the platelet histogram. Also, under microscopic evaluation, the presence of platelet satellitism, or giant platelets, is not seen.

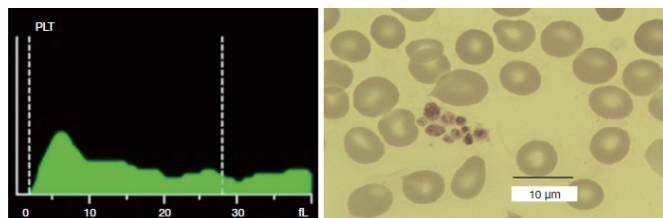


Figure 1: Typical platelet histogram and microscopic pictures of EDTA-PTCP samples. EDTA-PTCP, ethylene diamine tetraacetic acid-dependent pseudo thrombocytopenia.

Spurious Low Platelet Counts of BC-6800 by Optical Platelet Counting (PLT-O)

Twenty-three EDTA-PTCP samples in EDTA tubes (with platelet aggregation) were tested in the impedance (PLT-I (EDTA)) and reticulocyte channel of the Mindray BC-6800 (PLT-O (EDTA)). Interestingly, the PLT-O (EDTA) results were comparable to the platelet counts of the re-collected samples in citrate tubes (PLT-I (Citrate)), which proves that the PLT-O (EDTA) method can accurately adjust for the platelet aggregation issue caused by EDTA (Figure 2).

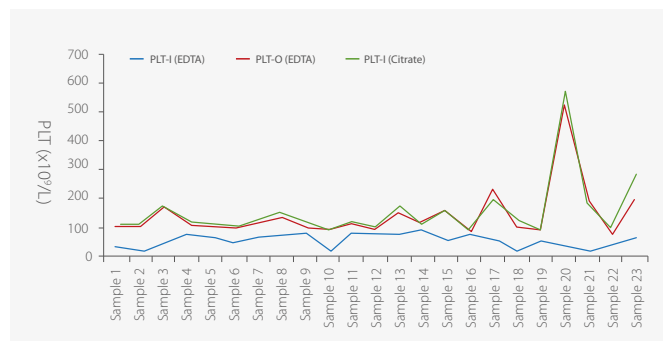


Figure 2: BC-6800’s optical fluorescence platelet counts of EDTA-PTCP samples in EDTA tubes were comparable with impedance platelet counts of EDTA-PTCP samples in citrate tubes. PLT-I (EDTA), impedance platelet counts of EDTA-PTCP samples in EDTA tubes; PLT-O (EDTA), optical fluorescence platelet counts of EDTA-PTCP samples in EDTA tubes; PLT-I (citrate), impedance platelet counts of EDTA-PTCP samples in citrate tubes; EDTA-PTCP, ethylene diamine tetraacetic acid-dependent pseudo thrombocytopenia.

One Mainstream Brand's Hematology System's EDTA-PTCP Dissociation Effect: Available with Fluorescent Dye Staining?

Optical fluorescence platelet counting is available in both high-end hematology analyzers (device B) and Mindray BC-6000 series hematology analyzers. In this method, a fluorescent dye is used to stain the nucleic acids in platelets, allowing the recognition of large platelets and excluding non-platelet particles such as erythrocyte debris, micro erythrocytes, or leukocyte debris.

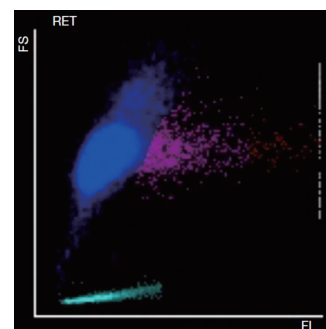
To verify whether the dissociation effect of optical fluorescence platelet counting was dependent on fluorescent dye staining, 17 of those 23 EDTA-PTCP samples in EDTA tubes were also tested on device B's reticulocyte channel and impedance channel. It was found that there was no significant difference between the platelet counts of reticulocyte channel and impedance channel (Figure 3). Only one of the 17 EDTA-PTCP samples showed a dissociation rate of more than 80%, with an average dissociation rate of 56% among all 17 EDTA-PTCP samples (Figure 3).



Figure 3: No dissociation effect of device B's optical fluorescence platelet counting on EDTA-PTCP patients. PLT-I (EDTA), impedance platelet counts of EDTA-PTCP samples in EDTA tubes; PLT-O (EDTA), optical fluorescence platelet counts of EDTA-PTCP samples in EDTA tubes; PLT-I (citrate), impedance platelet counts of EDTA-PTCP samples in citrate tubes; EDTA-PTCP, ethylene diamine tetraacetic acid-dependent pseudo thrombocytopenia.

Conclusion

In summary, the author concludes: Optical fluorescence platelet counting of the BC-6800 hematology analyzer is effective for the correction of spurious low platelet counts in EDTA-PTCP patients, and its dissociation effect on EDTA-PTCP samples is independent of fluorescent dye staining.



In the busy daily work of the laboratory, PTCP is an inevitable trouble. Mindray SF Cube technology provides PLT-O (based on nucleic acid fluorescent staining and done on the RET channel) to correct PLT counts when there is pseudo-platelet reduction due to EDTA. PLT-O is available on Mindray BC-6000 Series Auto Hematology Analyzer and the CAL 8000/6000 Cellular Analysis Line.

References:

- [1] J. Deng, et al. Mindray SF-Cube technology: An effective way for correcting platelet count in individuals with EDTA dependent pseudo thrombocytopenia. *Clinica Chimica Acta* 502 (2020) 99–101
- [2] Y. Bao, et al. Correction of spurious low platelet counts by optical fluorescence platelet counting of BC-6800 hematology analyzer in EDTA-dependent pseudo thrombocytopenia patients. *Transl Cancer Res* 2020;9(1):166-172

healthcare within reach

MINDRAY SOCIAL MEDIA CHANNELS

LinkedIn



www.mindray.com

P/N: ENG-HemaBook-PTCP-210285X5P-20200927

©2020 Shenzhen Mindray Bio-Medical Electronics Co.,Ltd. All rights reserved.

mindray
healthcare within reach