

The BD Technical Services Department receives many questions about our products. To address these questions we have developed a news bulletin "Tech Talk" to be sent out periodically.

**Q:** We just found out that BD makes two different citrate tube concentrations a 3.2% and 3.8%. We've been using both interchangeably. Can we do this and what are the differences in APTT and PT results?

**A:** The assumption is that you have collected a quality sample following proper handling conditions<sup>1</sup>. Sodium citrate concentrations can have significant effects on APTT and PT assay results especially when results are outside of the normal range and responsive reagents are used\*. Laboratories should determine their normal range of APTT and PT based on one citrate concentration and must consistently use this concentration for all patient samples until a new normal range is developed. NCCLS recommends the use of 3.2% citrate concentration<sup>2</sup>.

Potential issues between 3.2% and 3.8% sodium citrate concentrations are as follows:

- When responsive reagents (ex. Actin FS, Innovin) are used, statistical differences in APTT and PT test results between the two citrate concentrations will occur.
- The PT test is consistently higher when responsive reagents and 3.8% sodium citrate are used.
- Normal ranges for APTT and PT may shift higher when 3.8% citrate is compared to 3.2% citrate with responsive reagents. Less variation in the normal ranges occur between the citrate concentrations when nonresponsive reagents (ex. Actin, Thromboplastin C<sup>+</sup>) are used.
- When nonresponsive reagents are used, varying the citrate concentration has little clinical significance except with patients receiving IV heparin therapy\*.

Normal Range - Citrate Effects				
Citrate Concentration	Actin FS APTT	Innovin PT	Actin APTT	Thromboplastin C+ PT
3.2%	22-31	8.6-10.7	23-33	12-14
3.8%	24-33	9.2-11.4	22-31	11-14
$\rho$	<.001	<.001	Non-significant	Non-significant

\*The reference article used for this bulletin conducted studies on the variability and interchangeability of 3.2% and 3.8% citrate concentrations on five populations: healthy volunteers, hospitalized patients not receiving anticoagulant therapy, patients receiving intravenous (IV) heparin therapy, or receiving both IV heparin and oral anticoagulant therapy, and outpatients receiving oral anticoagulant therapy. Please refer to this paper for information on these study groups<sup>3</sup>.

**Reference:**

1. Adcock, Dorothy M; Kressin; Marlar, Richard A PhD; *Preanalytical Variables in the Routine Coagulation Laboratory*. ASCP Teleconference Series Sep. 12, 2000; Program No. 6064
2. NCCLS - *Guidelines, Collection, Transport and processing of Blood Specimens for Coagulation Testing and General Performance of Coagulation Assays*; Approved Guideline - Third Edition, H21-A3; Vol 18 No. 20; 5.2.1 December 1998.
3. Adcock, Dorothy M; Kressin; David C; Marlar, Richard A PhD; *Effect of 3.2% vs 3.8% Sodium Citrate Concentration on Routine Coagulation Testing*. Am J Clin Pathol. 1997; 107:105-110

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