

New guide to whole blood viscoelastic assays: hemostasis, testing, cases, and applications

October 2023—*New this month from CAP Publications is Whole Blood Viscoelastic Assays in Clinical Diagnosis: An Illustrated Case-Based Guide. Viscoelastic testing was designed to determine the cause of intraoperative or trauma-related bleeding to guide hemostatic therapy. CAP TODAY asked the book's editor, Oksana Volod, MD, about the guide. Her answers follow, and a sample chapter is available [here](#).*

Dr. Volod is professor of pathology and director of the coagulation consultative service, Cedars-Sinai Medical Center, Los Angeles.

Are whole blood viscoelastic assays in common use today?

The invention of thromboelastography (TEG), the first viscoelastic assay (VEA), predates the description of the activated partial thromboplastin time test in 1953, originating in Germany in 1948. However, widespread adoption of VEA in clinical laboratories occurred only after the introduction of a cell-based model of hemostasis in 1994, which emphasized the crucial roles of platelets and tissue factor in hemostasis. Initially, VEA found limited applications in liver transplantation and cardiac surgeries.

The conventional plasma-based coagulation testing proved challenging for managing patients in various critical clinical scenarios, such as trauma, intraoperative obstetric care, and intensive care. The COVID-19 pandemic dramatically increased the demand for promptly assessing the hemostasis of COVID-19 patients and effectively addressing their coagulation-related complications.

Recent advancements in next-generation VEAs like ROTEM Sigma, TEG 6s, and Quantra have made it possible to perform these tests at the patient's bedside, leading to a broader range of clinical applications. This development has attracted considerable interest from clinicians, laboratory professionals, and hospitals alike.

What prompted you to put this guide together, who is it written for, and is there any similar book on the market?

The project got its start during my tenure on the CAP Hemostasis and Thrombosis Committee during discussions on the rising interest in VEA and the lack of a textbook. I was entrusted to lead the project by the then committee chair and vice chair, Drs. Dong Chen and Andrew Goodwin.

My fascination with VEA traces back to my residency, where I completed an elective rotation in coagulation at the Royal Free Hospital in London, renowned as one of Europe's largest hemophilia centers. It was during this period that I was first introduced to VEA, specifically the TEG. Subsequently, I invested a substantial amount of time and effort over the course of 20 years to acquire an in-depth understanding of various VEAs and their applications.

The primary objective of this book is to offer a thorough yet succinct manual to individuals engaged in viscoelastic testing. It covers aspects such as comprehending hemostasis, the practical application, and the interpretation of VEA across diverse clinical settings. This book caters to a broad audience, including pathologists, clinicians, laboratory scientists, perfusionists, nurses, as well as trainees who depend on viscoelastic testing for patient care and decision-making.

Many articles have been published detailing VEA and its potential applications. However, to the best of my knowledge, this is the inaugural book of its kind on the subject.

The book's first section is an overview of hemostasis physiology, conventional assays, and therapeutic agents, and the second section is devoted to the various FDA-approved viscoelastic assays. Tell us about the third section consisting of case studies and the fourth section on clinical applications.

The book's third section is dedicated to case studies, encompassing various hemostatic disorders in which viscoelastic assays prove valuable. These case studies encompass the clinical histories of real patients, results

from traditional and viscoelastic assays, as well as in-depth discussions and reviews of relevant literature. The structured case-oriented format enables authors to explore real-life scenarios and provide accurate diagnoses and interpretations of VEA in correlation with conventional coagulation tests. Each case incorporates pertinent research articles, guidelines, and expert insights, ensuring a comprehensive discussion of the most current evidence-based practices.

In the concluding portion of the book, readers will find an up-to-date exploration of the clinical applications of viscoelastic assays across multiple domains, encompassing areas such as pregnancy, trauma, cardiac surgery, liver transplantation, and neonatal care. Chapters that are dedicated to pregnancy, cardiac surgery, and liver transplantation are supplemented with relevant case studies. Furthermore, where available, transfusion algorithms based on viscoelastic assays are incorporated. Literature on the use of VEA in neonatal care is limited. Dr. Jun Teruya and his coauthors not only address the clinical application of VEA in neonatal cases but also provide valuable information regarding reference ranges in neonatal patients, addressing one of the most common questions I encounter.

What can you tell us about the more than 20 contributors to the book?

The book owes its existence to an exceptional team of authors with expertise in hemostatic disorders and VEAs, including current and former members of the CAP Hemostasis and Thrombosis Committee (Drs. Chen, Goodwin, and Teruya, and Drs. Huy Pham, James Isom, David Unold, Neil Harris, John Olson, Kristi Smock, Karen Moser, Geoffrey Wool, Mandy VanSandt) and Quality Practices Committee (Dr. Paul Lindholm). Several other pathologists, handpicked by them as coauthors (Drs. Lance Williams, Christina Barriteau, Sumire Kitahara, Erica Swenson, Rasleen Saluja, Amir Navaei, and Amit Gokhale), played a crucial role.

To address the CLIA regulatory requirements for VEA validation, I extended an invitation to Anna Hamilton, our former laboratory quality assurance manager.

Lastly, Dr. Julie Wegner, a recognized expert in the field with extensive experience in TEG and extracorporeal technology, made significant contributions to two chapters of the book.

What is most important for the reader to learn from and take away from your book?

It is my hope that readers will perceive this book as a comprehensive yet concise tool that allows them to refresh their knowledge of hemostasis, understand the FDA-approved and off-label clinical applications of their chosen VEA, and learn how to interpret different VEA results within the context of a patient's medical history.□

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