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Platelet Function Testing by Aggregometry; Approved Guideline

This document provides concrete, standard procedures for using aggregometry to assess platelet function in patient specimens with the intent to achieve greater uniformity of results.

A guideline for global application developed through the Clinical and Laboratory Standards Institute consensus process.

Clinical and Laboratory Standards Institute

Advancing Quality in Health Care Testing

Clinical and Laboratory Standards Institute (CLSI, formerly NCCLS) is an international, interdisciplinary, nonprofit, standards-developing, and educational organization that promotes the development and use of voluntary consensus standards and guidelines within the health care community. It is recognized worldwide for the application of its unique consensus process in the development of standards and guidelines for patient testing and related health care issues. Our process is based on the principle that consensus is an effective and cost-effective way to improve patient testing and health care services.

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A document is published as a standard, guideline, or committee report.

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Guideline A document developed through the consensus process describing criteria for a general operating practice, procedure, or material for voluntary use. A guideline may be used as written or modified by the user to fit specific needs.

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The CLSI voluntary consensus process is a protocol establishing formal criteria for:

- the authorization of a project
- the development and open review of documents
- the revision of documents in response to comments by users
- the acceptance of a document as a consensus standard or guideline.

Most documents are subject to two levels of consensus—"proposed" and "approved." Depending on the need for field evaluation or data collection, documents may also be made available for review at an intermediate consensus level.

Proposed A consensus document undergoes the first stage of review by the health care community as a proposed standard or guideline. The document should receive a wide and thorough technical review, including an overall review of its scope, approach, and utility, and a line-by-line review of its technical and editorial content.

Approved An approved standard or guideline has achieved consensus within the health care community. It should be reviewed to assess the utility of the final document, to ensure attainment of consensus (ie, that comments on earlier versions have been satisfactorily addressed), and to identify the need for additional consensus documents.

Our standards and guidelines represent a consensus opinion on good practices and reflect the substantial agreement by materially affected, competent, and interested parties obtained by following CLSI's established consensus procedures. Provisions in CLSI standards and guidelines may be more or less stringent than applicable regulations. Consequently, conformance to this voluntary consensus document does not relieve the user of responsibility for compliance with applicable regulations.

COMMENTS

The comments of users are essential to the consensus process. Anyone may submit a comment, and all comments are addressed, according to the consensus process, by the committee that wrote the document. All comments, including those that result in a change to the document when published at the next consensus level and those that do not result in a change, are responded to by the committee in an appendix to the document. Readers are strongly encouraged to comment in any form and at any time on any document. Address comments to Clinical and Laboratory Standards Institute, 940 West Valley Road, Suite 1400, Wayne, PA 19087, USA.

VOLUNTEER PARTICIPATION

Health care professionals in all specialties are urged to volunteer for participation in CLSI projects. Please contact us at customerservice@clsi.org or +610.688.0100 for additional information on committee participation.

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Abstract

Clinical and Laboratory Standards Institute document H58-A—*Platelet Function Testing by Aggregometry; Approved Guideline* provides concrete, standard procedures for using aggregometry to assess platelet function in patient specimens and samples, with the intent to achieve greater uniformity of results by laboratories following these guidelines. Descriptions of light transmission aggregometry, whole blood impedance aggregometry, and shear-flow technologies are provided so both long-time and new users may establish consistent, reproducible platelet function testing programs in their laboratories.

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Contents

Contents (Continued)

Foreword

Platelets play a vital role in hemorrhagic, thrombotic, and vascular ischemic disorders. Antiplatelet therapy (APT) is regarded as "the cornerstone of treatment" for various coronary conditions,[1] giving dramatic rise to the introduction of new antiplatelet drugs. This in turn has increased the interest among clinicians and laboratorians to use various tests of platelet function. One such method is platelet aggregometry, a common technology that has been part of clinical laboratory practice for over 40 years. Yet, surprisingly, platelet aggregometry has largely been performed without globally accepted performance standards. Consequently, customized procedures and reagents are frequently used, often making it difficult to obtain consistent results.

This guideline provides concrete, standard procedures for using aggregometry to assess platelet function in patient specimens and samples with the intent to achieve greater uniformity of results by laboratories following these guidelines. Descriptions of light transmission aggregometry (LTA), whole blood impedance aggregometry, and shear-flow technologies are provided so both long-time and new users may establish consistent, reproducible platelet function testing programs in their laboratories. Laboratories are advised to consult the instrument manufacturer regarding country-specific registration and/or clearance, eg, US Food and Drug Administration 510(k) clearance, CE mark.

Key Words

Antiplatelet therapy (APT), impedance aggregometry, light transmission aggregometry (LTA), low and high shear, platelet activation, platelet aggregation, platelet function testing

Platelet Function Testing by Aggregometry; Approved Guideline

1 Scope

This guideline specifies requirements/recommendations for specimen collection, preexamination considerations, patient preparation, sample processing, testing, result analysis, and quality control (QC) in relation to platelet function testing by aggregometry using light transmission aggregometry (LTA), whole blood impedance aggregometry as well as low and high shear technologies. It covers anticoagulants, specimen storage and transport temperatures, sample selection for various methodologies, establishment of reference intervals, result reporting, result analysis, assay validation, and troubleshooting. The intended users of this guideline are clinicians, hospital and reference laboratorians, manufacturers, and regulatory agencies. This guideline is not intended for use with global hemostasis, platelet counting, flow cytometry, home testing, point-of-care, or research systems. This guideline does not address therapeutic guidance or interpretive guidelines.

2 Introduction

Platelet function testing has been a part of clinical laboratory practice since early in the 20th century. Hundreds of publications have defined healthy and pathologic platelet activity using numerous methodologies, such as the *in vivo* bleeding time, platelet aggregometry techniques, measurement of granular content and release, assessment of membrane surface markers, evaluation of signaling pathways, and *in vivo* platelet survival. Yet, despite this vast wealth of information, no clear direction exists to guide setting minimum performance standards among laboratories performing platelet function testing. Establishing such a path is critical, given the role of platelets in both hemorrhagic and thrombotic conditions and the rising significance of antiplatelet therapy (APT) in controlling platelet function across a broad spectrum of vascular disorders. The goal of this guideline is to set minimum requirements for the performance of platelet function testing when using LTA, whole blood impedance aggregometry, and shear-flow technologies.

3 Standard Precautions

Because it is often impossible to know what isolates or specimens might be infectious, all patient and laboratory specimens are treated as infectious and handled according to "standard precautions." Standard precautions are guidelines that combine the major features of "universal precautions and body substance isolation" practices. Standard precautions cover the transmission of all infectious agents and thus are more comprehensive than universal precautions, which are intended to apply only to transmission of blood-borne pathogens. Standard and universal precaution guidelines are available from the US Centers for Disease Control and Prevention.[2] For specific precautions for preventing the laboratory transmission of all infectious agents from laboratory instruments and materials and for recommendations for the management of exposure to all infectious disease, refer to CLSI document M29.[3]

4 Terminology

4.1 A Note on Terminology

CLSI, as a global leader in standardization, is firmly committed to achieving global harmonization wherever possible. Harmonization is a process of recognizing, understanding, and explaining differences while taking steps to achieve worldwide uniformity. CLSI recognizes that medical conventions in the global metrological community have evolved differently in the United States, Europe, and elsewhere; that these differences are reflected in CLSI, ISO, and CEN documents; and that legally required use of terms, regional usage, and different consensus timelines are all challenges to harmonization. In light of this,