

Editorial

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Editors-in-Chief

Although interest in blood coagulation processes has accompanied humanity since ancient times, the mechanisms and clinical management of coagulation-related issues have historically been poorly understood. In recent decades, hemostasis and thrombosis have seen spectacular advancements that have transformed clinical practice. This issue of the journal includes contributions in several areas relevant to our field, specifically bleeding disorders, thrombosis, coagulation laboratory techniques, and the application of artificial intelligence to hemostasis.

Bleeding disorders: an unresolved challenge

From hemophilia A and B and other plasma coagulation defects to hereditary or acquired platelet disorders, bleeding disorders pose a significant diagnostic and therapeutic challenge. Recent years have seen a revolution in the treatment of these entities, including improvements in coagulation factor replacement therapy with extended-action agents, the introduction of bispecific antibodies, the development of rebalance therapies, and the emergence of gene therapy. This range of options brings us closer to the possibility of individualizing treatments for optimal patient management.

Similarly, in the management of thrombocytopathies, the development of advanced testing for platelet function has improved our diagnostic capacity, although treatment remains limited, often focused only on

nonspecific hemostatic agents. Basic and translational research is crucial for better therapeutic options.

This issue includes two collaborative articles on bleeding disorders, one on mild hemophilia A and B and another on immune thrombocytopenia treatment. Collaboration within cooperative groups is essential, especially in the management of rare diseases.

Thrombosis and antithrombotic treatment: an era of progress and hope

Although there have been remarkable advances in thrombosis and antithrombotic treatment, much work remains. The introduction of vitamin K antagonists in the mid-20th century marked a paradigm shift in thrombosis prevention, providing an effective means for controlling thromboembolic risk. The development of direct oral anticoagulants heralded a new era characterized by greater safety, ease of use, and reduced monitoring needs, revolutionizing the management of thromboembolic disease. Although significant progress has been made in antiplatelet therapy, there remains ample room for improvement in all aspects of antithrombotic treatment, including drugs and health care organization. Currently, new lines of anticoagulant drugs are in the pipeline, with the most promising being the inhibitors of the intrinsic coagulation pathway. Additionally, the multidisciplinary model of specific antithrombotic treatment units is being discussed and defined, with accreditation as a step toward excellence.

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From a thrombosis biology perspective, we are in a phase of expanding knowledge, highlighting the relationship between thrombosis and the immune system and inflammation, from the well-known antiphospholipid syndrome to immunothrombosis phenomena and anti-platelet factor 4 syndromes.

This issue presents a case report of an antiphospholipid syndrome progressing from silent to catastrophic antiphospholipid syndrome, challenging the notion of “innocent” antiphospholipid antibodies in some patients.

The hemostasis lab: toward an era of diagnostic precision

The hemostasis laboratory is a cornerstone in diagnosing and monitoring thrombotic and bleeding disorders. From the classic prothrombin time and activated partial thromboplastin time tests to more modern thrombin generation assays and platelet function analyses, we have come a long way in characterizing coagulation disorders.

Currently, new technologies and methodologies such as proteomics and next-generation sequencing are revolutionizing the lab diagnostic capabilities with increasing precision.

The true challenge lies in integrating these data into everyday clinical practice. Integrated diagnostic models combining conventional laboratory parameters with emerging biomarkers and artificial intelligence-based algorithms have the potential of transforming how we diagnose and treat thrombotic and bleeding disorders.

A.I. not only facilitates handling large datasets but also enables the identification of hidden correlations among diverse clinical factors, suggesting more effective therapeutic strategies.

This issue presents an original study evaluating a paired testing strategy for lupus anticoagulant diagnosis, which was found to be technically useful and economically favorable.

Looking ahead: new tools and an comprehensive vision

One of the main challenges is managing thrombotic and bleeding risk in increasingly complex patients. The identification of biomarkers and the genetic profile associated with characteristics of each individual is driving intense research with the goal of providing increasingly personalized prophylaxis and treatments toward precision medicine.

The rise of A.I. brings a new tool for analyzing complex data. Its ability to process large volumes of data in real-time by integrating genetic, proteomic, functional, and other information may potentially redefine diagnostic and predictive precision, allowing for quicker, more detailed identification of analytical patterns and drug response. In this way, we expect predictive models that optimize patient diagnosis and treatment to be more readily developed.

This issue includes an article evaluating the application of A.I. for comparing results from two treatments for immune thrombocytopenia.