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Innovation technology evaluation of effectiveness of antiagregates, anticoagulants, and fibrinolytics

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Recent evaluation of anticoagulant effects, which include antiagregants and fibrinolytics, is based on monitoring of hemostatic properties, according to the results of clotting, amidolytic, and immunferment methods. Despite the lack of sensitivity, complexity of standardization, long duration of sample preparation, and usage of citric plasma model, the evaluation of anticoagulant effects meets increasing growth in demand by clinical practice and expertise. However, in the evaluation of hemostasis and its reaction to conducting a therapy, the exclusion of the effects of formed elements of blood and endothelial cells (evaluation in plasma + long duration of sample preparation) leads to undercounting of the nuances of consistency of hemostatic potential (HP) (integrative element of complete cycle of hemocoagulation that provides necessary fluidity of blood and restriction of extravasation of its components in breakage or damage of vascular wall).

In our opinion, studies for the HP estimates should be carried out in the mode of Point-of-care testing. Only this approach allows certain evaluation of an interaction of elements of the system of regulation of red blood cell aggregation under the influence of unavoidable stressor (standardized contact activation). Only the whole blood sample, containing aliquots of endothelial producers (some of which implement effects in limited time interval), formed elements of blood, and factors of homeostasis, gives an opportunity of obtaining objective information about the “time slice” state of HP. In this regard, the development of a new technological apparatus of low-frequency piezoelectric tromboelastograph (hardware-software complex ARP-01M “Mednord”, Russia, registration certificate Rosreestr №2010/09767) allowed to reveal “lag time” of initial stages of whole blood clotting and identified the possibility of operational analysis and monitoring of specific and pleiotropic effects of anticoagulants.

The obtained results demonstrated the ability to detect changes of hemostatic potential in the process of whole blood clotting *ex vivo* in normal conditions and under the influence of anticoagulants (Point-of-care testing mode in modern clinical-laboratory trend - research personification). Also, the results have served as a basis for a paradigm shift of views on hemostasis as an aggregate participation of its territorially and functionally separated links: vascular-platelet, coagulative, anticoagulant and fibrinolytic.

From the position of a systematic analysis, hemostatic potential of whole blood is a resulting function of hemostasis (according to the definition), while ensuring of its consistency is determined by nonlinear time-consuming process of fibrogenesis with previously designated stages of initiation/amplification, propagation, lateral assembly, and formation of cross-linked fibrin.

Enzyme potential of endothelial intravascular continuum determines temporary determinant of nonlinearity of fibrogenesis. Without disputing the positional postulate of the primacy of thrombin in this process, it is essential to understand that its amount (level) or, most likely, its activity determines the completeness or incompleteness of fibrogenesis in conditions of limiting the rate of its formation by metabolic products of fibrinogen and producers of the vascular wall. Therefore, seconds and even milliseconds, required for the generation of thrombin, are sufficient for initiation of fibrogenesis, while its consistency is directly related to the intensity and magnitude of thrombin formation pool.

Biography

Maxim Solovyev, M.D., is a doctor of physical therapy and medical laboratory scientist in the Research Institute of Pharmacology of the Siberian Branch of the Russian Academy of Medical Sciences. In 2010, he graduated from Military Medical Institute of Tomsk. From 2010 through 2012, he worked as a deputy chief of medical department of rescue centre. In 2011, he conducted the research on the topic of “Pleiotropic effects of oral fibrinolytic in complex therapy of patients with ischemic heart disease: Angina pectoris, functional class I-II, circulatory collapse 0-1”. He is the author of 20 articles and monographs, including “Technology assessment and correction of endothelial dysfunction” that is co-authored with Dygai A.M., Udut V.V. and published by International Journal of Immunorehabilitation, Moscow, 2010 (p. 139-140). Since the end of 2013, he has been conducting a study about coagulation of blood.

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