ORDERING INFORMATION

Cat. №	Product
HC-T2-F	Thrombodynamics Analyser System T2-F (fibrin registration only)
HC-T2-T	Thrombodynamics Analyser System T2-T (fibrin and thrombin registration)
HC-TDX-10	Reagents kit for 10 fibrin measurements
HC-PLS-10	Reagents kit for 10 fibrin and thrombin measurements

The product was launched in the European market as a RUO device at the beginning of 2014.

Thrombodynamics Analyser System is sold in Russia from the end of 2012. Thrombodynamics assay has already been approved for clinical use in Russian Federation.

We help clinicians to succeed, providing clear and reliable estimation of patients coagulation state, thus giving an ability to prevent thrombotic or bleeding comlications.

Partners

Switzerland
ENDOTELL AG
info@endotell.ch
www.endotell.ch

Benelux
NODIA
info@nodia.com
www.nodia.com

UK and Channel Islands
Quadratech Diagnostics Ltd
quadratech@btinternet.com
www.quadratech.co.uk

Austria and Germany
CoaChrom Diagnostica GmbH
info@coachrom.com
www.coachrom.com

Don't find your local distributor?
Do not hesitate to contact us:
mail@hemacore.com

www.thrombodynamics.com
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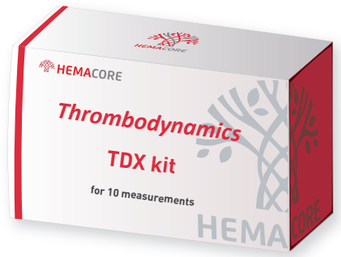
HEMOSTASIS & THROMBOSIS BEYOND BIOCHEMISTRY
NEW GLOBAL VIEW

THROMBODYNAMICS ASSAY

SPATIAL DYNAMICS OF FIBRIN CLOT GROWTH



THROMBODYNAMICS-4D ASSAY

SPATIAL DYNAMICS OF THROMBIN GENERATION & FIBRIN CLOT GROWTH

Research Use Only. Not for use in diagnostic procedures.

SPATIAL DYNAMICS OF COAGULATION

Thrombodynamics is the only laboratory test with adequate physiological model based on the up-to-date understanding of the spatial aspects of in vivo coagulation process.

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Unlike other routine coagulation assays the fibrin clot growth process in thrombodynamics assay develops in space and time rather than only in time.

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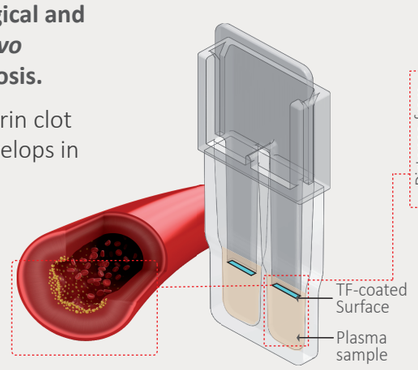
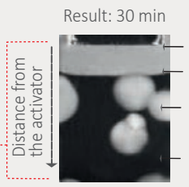


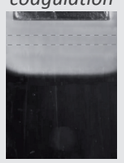


Tlag [min], Lagtime
V [um/min], Growth rate
CS [um], Clot size
Tsp [min], Spontanous clots formation time

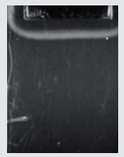
Thromb Res. 2015:
HEMOSTASIS AND THROMBOSIS BEYOND BIOCHEMISTRY: ROLES OF GEOMETRY, FLOW AND DIFFUSION

COAGULATION STATES AND FIBRINOLYSIS

Thrombodynamics is both a qualitative and quantitative evaluation of the coagulation status and fibrinolysis. Clot formation/lisys process is registred by a CCD camera and then calculated.

	Normal	*Hypo-coagulation*	*Hyper-coagulation*	*Severe hyper-coagulation*
				
Tlag [min], Lagtime	(0,6 - 1,5)	4,8	0,9	1
V [um/min], Growth rate	(20-29)	15	40	35
CS [um], Clot size	(800-1200)	694	2000	1600
Tsp [min], Spontanous clots formation time	(> 30)	–	–	15

In addition to the fibrin clot growth thrombodynamics allows quantifying the clot lysis process in presence of plasminogen activators. Lysis process follows clot propagation and starts inside the formed clot. Further coagulation propagation is simultaneous with the lysis process.

In progress: 30 min	Result: 60 min
	

LOT [min], Lysis onset time	26,8
LP [%/min], Lysis progretion	3,6

Talanta 2018:
THROMBODYNAMICS, A NEW GLOBAL COAGULATION TEST: MEASUREMENT OF HEPARIN EFFICIENCY

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EFFECT OF ANTICOAGULANTS

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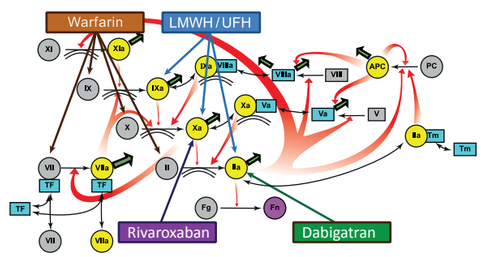
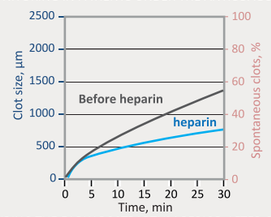
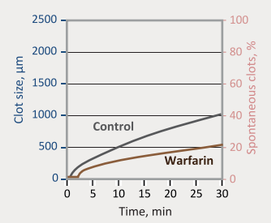


PLOS ONE 2018:
THROMBODYNAMICS—A NEW GLOBAL HEMOSTASIS ASSAY FOR HEPARIN MONITORING IN PATIENTS UNDER THE ANTICOAGULANT TREATMENT

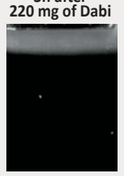


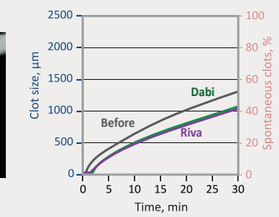
	0,06 IU/ml of heparin	Before heparin
V	16	35,2
Tlag	0,8	1
Tsp	None	None
Vi	31,8	63
CS	751	1 367
D	19 716	19 640

J Perinat Med 2017:
THE LABORATORY CONTROL OF ANTICOAGULANT THROMBOPROPHYLAXIS DURING THE EARLY POSTPARTUM PERIOD AFTER CESAREAN DELIVERY



	Warfarin	Control
V	12	24
Tlag	2,7	1,1
Tsp	None	None
Vi	26,9	42,1
CS	543	995
D	18 102	31 955





	3h after 220 mg of Dabi	Before Dabi/Riva	2h after 10mg of Riva
V	29,8	31,5	27,5
Tlag	2,2	1,1	1,8
Tsp	None	None	None
Vi	45,7	57,8	44,1
CS	1 075	1 284	1 042
D	31 251	32 826	30 426

MAIN PARAMETERS AND INTERPRETATION

Tlag, [min] - Lag-time - time between contact of plasma sample with activator and start of clot growth. This parameter is sensitive to the initial stage of blood coagulation and reactions of the extrinsic pathway. Prolongation of this parameter is caused by hypocoagulation of differing nature: deficiency of factors VII and X, (direct thrombin or factor Xa inhibitors, vitamin K antagonists). Shortening is rarely observed, and can be due to different causes of hypercoagulation.

Vi, [um/min] - Initial rate of clot growth - calculated on the interval 2-6 minutes after the beginning of clot growth, also describes initial stages of clot growth but it is spatial elongation rather than local increase of thrombin concentration. A low Vi indicates differing hypocoagulation states (factors VII or X deficiency, anticoagulant agents – factor Xa inhibitors, thrombin inhibitors, vitamin K-antagonists, UFH and LMWH). A high Vi indicates differing hypercoagulation states.

Vst, [um/min] - Rate of clot growth - is the average rate of clot growth calculated on the interval 15-25 min after the beginning of clot growth. If there are no spontaneous clots Vst and V are equal. In the presence of active spontaneous clotting Vst is not calculated. This parameter characterizes the propagation stage of blood coagulation and it is sensitive to all coagulation cascade reactions, including the contact pathway and excluding the initiation reactions of the extrinsic pathway. Decreased Vst indicates various different hypocoagulation states (factors V, VIII, IX, X, XI or thrombin deficiency; anticoagulant agents – vitamin K antagonists, UFH and LMWH). Increased Vst value indicates different hypercoagulation states.

Tsp, [min] - Spontaneous clots - formation time - is the time that spontaneous clots appear in the sample volume which had no initial contact with the activating insert, characterizes clotting independent of the activator surface. Under normal condition, no spontaneous clotting is observed. Spontaneous clotting is induced by circulating activators, active coagulation factors and microparticles. Indicates a high pro-thrombotic tendency.

CS, [um] - Clot size - at the 30th minute of measurement. It is sensitive to all major components and processes of blood coagulation, because it is defined by both Tlag and rate of clot growth.

D, [a.u.] - Clot density - parameter reflects firmness and structure of a formed clot. It reflects quantity and biological activity of fibrinogen, but cannot replace direct measurement of fibrinogen concentration. Sensitive to fibrinogen (concentration and polymerization ability) and factor XIII activity.

Ast, [Activity Unit/L] - Stationary amplitude of thrombin peak - as thrombin generation propagates in space as a moving peak (Dashkevich et al, Biophys J 2012), height of this peak is calculated as a maximal activity of thrombin in the fibrin formation zone which moves from the activator while clot grows. The parameter characterizes the propagation stage of blood coagulation.

Vt, [um/min] - Rate of thrombin peak propagation- characterizes the propagation stage of blood coagulation, sensitive to changes in intrinsic pathway of blood coagulation; factors VIII, IX, XI, V, X and thrombin concentration and also to phospholipid vesicles concentration in plasma.

ETP_ATG, [AU*min/L] - Thrombin potential, **Cmax_ATG, [AU/L]** - Maximum concentration, **Tmax_ATG, [min]**- Time to thrombin peak - are calculated on the activating surface and similar to homogeneous Thrombin Generation Test parameters.

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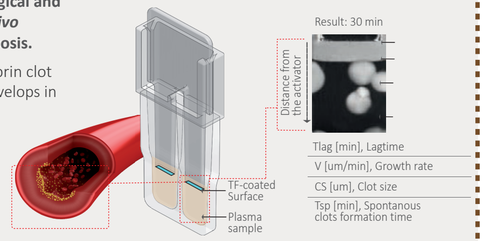

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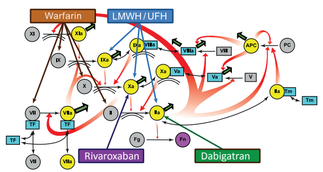

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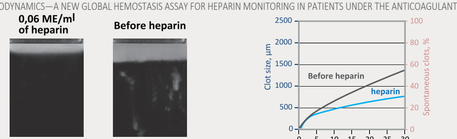

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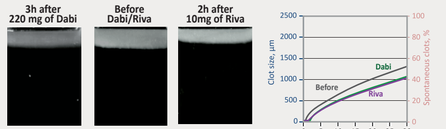

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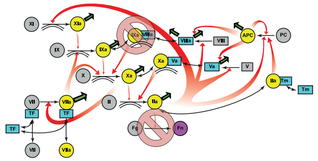
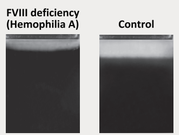
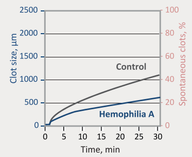
COAGULATION FACTOR DEFICIENCIES

In cases of hemophilia, i.e. deficiency of fVIII or IX, the intrinsic tenase does not work normally impairing propagation of the clot.



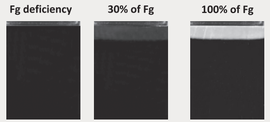




	FVIII deficiency (Hemophilia A)	Control
V	12,9	25,2
Tlag	1,1	0,9
Tsp	None	None
Vi	28,9	48,7
CS	601	1 058
D	17 302	18 159

Biochim Biophys Acta. 2002:
HEMOPHILIA A AND B ARE ASSOCIATED WITH ABNORMAL SPATIAL DYNAMICS OF CLOT GROWTH

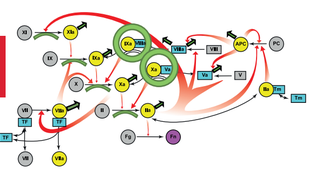
The Thrombodynamics results for fibrinogen deficient plasma which was spiked with different concentrations of fibrinogen are shown below. In the case of deficiency no clot is observed, increases of fibrinogen concentration result in increases of clot density.

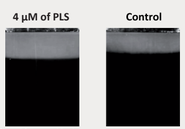


	Fg deficiency	30% of Fg	100% of Fg
D	0	8 000	28 500

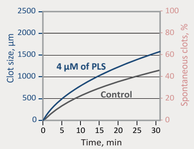
PHOSPHOLIPID SURFACE AND PLATELETS

In the thrombodynamics assay platelet free plasma is used with no phospholipids added. But for some application it is possible to introduce additional phospholipid surfaces. For example artificial phospholipid vesicles or platelets.

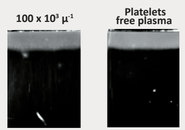


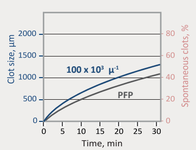


The vesicle composition is: PS:PC:PE = 20:20:60 molar ratio



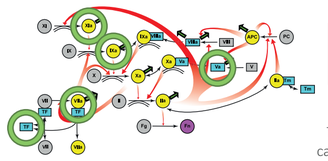
	4 µM of phospholipids	Control
V	36,5	26,6
Tlag	0,9	0,9
Tsp	None	None
Vi	71,3	58,8
CS	1 525	1 161
D	16 120	20 622



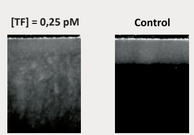


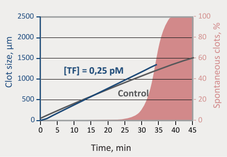
	100 x 10³ µ⁻¹	PFP
V	31,4	28,0
Tlag	0,7	0,8
Tsp	None	None
Vi	54,9	52,7
CS	1 293	1 175
D	14 110	17 398

PROCOAGULANT AGENTS



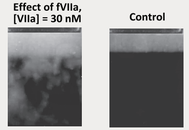
The presence of TF in plasma increases clot growth rate and can result inthe formation of spontaneous clots in the plasma.

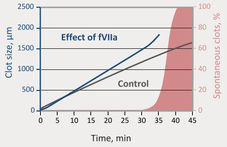




	[TF] = 0,25 pM	Control
V	39,7	34
Tlag	2,4	1,6
Tsp	28	None
Vi	48,8	46,7
CS	1 202	1 119
D	16 616	19 311

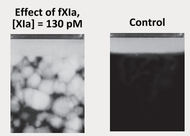
Factor VIIa is used as a bypassing agent in hemophilia treatment. It causes changes in clot formation similar to TF.





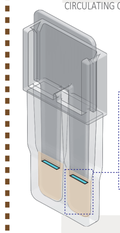
	Effect of fVIIa	Control
V	49,3	34
Tlag	0,9	1,6
Tsp	35,4	None
Vi	51,9	46,7
CS	1 452	1 119
D	12 949	19 311

If fXIa is present the clot growth rate is increased and spontaneous clot formation is observed.



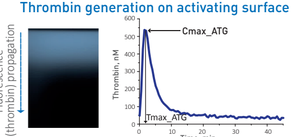
	Effect of fXIa	Control
V	81,4	26
Tlag	0,9	0,9
Tsp	12,4	None
Vi	81,4	51,1
CS	-	1 088
D	27 501	20 622

PLOS ONE 2014:
CIRCULATING CONTACT-PATHWAY-ACTIVATING MICROPARTICLES TOGETHER WITH FACTORS IXA AND XIA INDUCE SPONTANEOUS CLOTTING IN PLASMA OF HEMATOLOGY AND CARDIOLOGIC PATIENTS



THROMBIN GENERATION

Thrombin generation on activating surface



In addition to the registration of spatial fibrin clot growth from the TF-bearing surface Thrombodynamics-4D allows monitoring spatial dynamics of thrombin generation using an AMC-based fluorogenic substrate.

BIOPHYSICAL JOURNAL 2018:
SENSITIVITY AND ROBUSTNESS OF SPATIALLY DEPENDENT THROMBIN GENERATION AND FIBRIN CLOT PROPAGATION

Spatial thrombin propagation from coagulation activator