Comparison data of blood coagulation process, investigated by ultrasonic impulsive coagulograph and electrocoagulometer

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Introduction

Recent publications discussed possibilities to investigate by ultrasound composition and age of blood clot [1.,3], to measure plasma coagulation time [2], to diagnose the deep vein thrombosis [4] and etc. This show the large interest to ultrasound. The scientists of Prof. K. Baršauskas Ultrasound Research Centre of Kaunas University of Technology and Institute of Cardiology of Kaunas Medicine University developed a new method for investigation of biological fluids properties. The result of this work is the ultrasonic impulsive coagulograph. The results of the first experiments are discussed.

Method

Blood coagulation course investigations ware carried out by the new ultrasonic impulsive coagulograph. Its technical characteristics and principle of work are described in [5]. The same blood was investigated by the electrocoagulometer H-333. Its technical characteristics and principle of operation are described in [5] and by the agregometer Chrono-long. The latter apparatus is based on a turbidimetrical principle. The device is used to measure platelet aggregation by detecting the transmission of light through a stirred platelet-rich-plasma (PRP) to which an aggregating agent has been added. It is the most useful test of platelet function now available. This model is a dual channel unit which can run tests on two plasma samples simultaneously.

The platelet agregation' is a term used to denote the adherence of one platelet to another. The phenomenon can by induced by adding aggregating agents to PRP which is being continually stirred. The process can be measured spectrophotometrically and the rate and degree of aggregation can be an indicator. PRP is slightly turbid due to the presence of platelets in suspension. When an aggregating agent is added, the turbidity decreases because of the clumping action of the platelets. When a light beam passes through the PRP which is being stirred in a cuvette and kept at constant 37°C, the light passing through increases. This increase in transmitted light is measured and recorded on a linear strips of aggregation. Platelet aggregation will vary with different aggregating agents and with their concentrations. We used different aggregating agents: ADP (epinephrinum) 3.8 μmol/l, ADR (adrenalinum) 3 μmol/l. Were calculated intensity , time and velocity of aggregation.

Results

There is a possibility to measure exactly the times of coagulation on set and the end by electrocoagulometer H-333. Because of this we compare results obtained by the electrocoagulometer and the ultrasound coagulograph. Details of these results are discussed in [5]. There we only mention, that onsets and ends of blood coagulation, investigated by both apparatus correlated mutually. So, the same biochemical and physical processes are fixed by both apparatus. It is interesting and this fact: blood coagulation onset and end are fixed a 0.3 after 0.1 min. and faster obtained by the ultrasound coagulograph. It coincide with described results[6].

The blood of patients different age and patology was investigated by the ultrasound coagulograph and by the agregometer. We discovered correlation between parameters of platelet aggregation and Kn, Kt, LRP amplitudes (Fig.1), duration of retraction and duration of blood

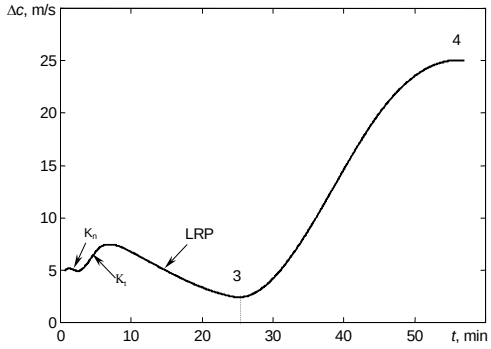

Fig.1 **Curve of blood coagulation process, investigated by ultrasoud coagulograph: K_n- negative phase of blood coagulation, K_t- positive phase of blood coagulation, LRP- period of latint retraction**

Table 1 **Coefficients of corelation**

	Kn amplitude	Kt amplitude	LRP amplitude	Duration of retraction	Amplitude of retraction	Duration of coagulation
Velocity of platelet aggregation	0.72	-0.69	-0.65	0.496	-0.026	-0.66
Intensity of platelet aggregation	0.091	-0.16	-0.56	0.89 p<0.05	-0.62	-0.36

coagulation, described in [6]. Because of this the same quantities were calculated in our case (Table 1). The data obtained show to us, that the biggest correlation is between the aggregation intensity and duration of retraction. Enough big correlation is between the platelet aggregation rate and Kn, Kt amplitudes, between the platelet aggregation intensity and duration of retraction. It is interesting, that signs between coefficients of correlation in Table 1 coincide with signs, obtained in [6]. These data are preliminary and unreliable statistically.

Conclusions

It seems tendency of correlation between the described parameters. It is necessary to perform more experiments in order to get statistically reliable results.

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Kraujo krešėjimo proceso eigos, tirtos ultragarsiniu impulsiniu koagulografu ir elektriniu koagulometru, duomenų palyginimas

Reziumė

Darbo tikslas buvo nustatyti naujo prietaiso impulsinio ultragarsinio koagulografo, sukurto KTU prof. K. Baršausko ultragarso mokslo centre, elektrinio koagulometro bei agregometro Chrono-long parametrų koreliacijos tendencijas. Straipsnyje aptariami gauti rezultatai.