proteins' oxidizability in vitro in conditions of incubation with the Fenton system components appearing to be increased: the carbonyl proteins increase was higher than in the group of control ($p \leq 0,05$). In the OS conditions at CAP the non-repair bitirozin cross-links and oxidized tryptophan – redox sensitive amino acids' oxidation products, accumulation in plasma was registered.

Conclusion

The accumulation of POM carbonyl products in plasma and blood cells, DG content and antioxidant enzymes decrease testifies to the expressed oxidative imbalance, developing in the CAP debut, in the system of functional proteins of the cell, that influences the pulmonary parenchyma state and worsens the disease course.

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UREA AND α-KETOGLUTARAT SPONTANEOUSLY FORM DEHYDROHYDANTOIN-5-PROPIONIC ACID IN VITRO

[1]Kozlov V.A., [2]Mat'kov K.G., [2]Lyschikov A.N.
[1]Cheboksary state pedagogical university,
[2]Chuvash state university
Cheboksary, Russia

By development of solutions for organs preservation we have found out, that solution EWS-1 (electrolyte water stabilization) does not prevent slices swelling in the test 24 hour incubations at +4°. Nevertheless, after addition 5мМ α-ketoglutarat in EWS-1 and storages of this solution 24 hours at +4°C, it prevented a cortical kidney slices swelling authentically more effectively, than just prepared [1, 2]. Therefore we have assumed, any EWS-1 solution components enter a chemical reaction with formation of one or several derivatives possessing antiedematous action. The most probable candidates to us seem carbamide and α-ketoglutarat as carbamide falls into chaotropic compounds and it is inclined to formation ureid group. The ureid group, in particular, is present at all basic anticonvulsants of some derivatives of a hydantoin and in Karbamazepinum. All these compounds possess uniform property of chaotropic connections: to change physical and chemical properties of biological membranes, and to correct membranes permeability for Na^+ and K^+. Besides hydantoins, possibly, prevent the brain swelling it previous development of the next epileptic attack.

Our experiments with the same medium, but for the lack of one of these compounds have appeared the indirect demonstration of what urea and α-ketoglutarat enter chemical reaction and form new compound. The solution containing both and urea and α-ketoglutarat preventioned a cortical kidney slices swelling at a hypothermal incubation (24 h at +4° C) whereas in a solution without one of these two compounds slices have swelled. [1, 2]. Us were it is carried out the given research with the purpose of revealing of this hypothetical substance.

Materials, methods and research volume

Synthesis of required compound has been carried out in several ways:

1) urea (extra pure (EP)) and α-ketoglutarat (EP) (on 0,1 M of each compound) containing equimolar quantities the solution has been heat uped on a water bath up to 80°C with the subsequent cooling on air;

2) urea and α-ketoglutarat equimolar quantities were incubated 24 hours at ambient temperature;

3) urea and α-ketoglutarat equimolar quantities were incubated 24 hours at +4°C;

The synthesized bond has received working name KM-1. The synthesized compound chemical structure has been certain by a NMR 1H spectroscopy method. For this purpose crystals KM-1 have been received by means of spontaneous evaporation within 2-3 months. The NMR 1H spectrum has been registered on device Bruker DRX-500 with a working frequency 500,13 MHz as the dissolvent has been used DMSO – d6. The internal standard was GMDS.

The experience with kidneys slices hypothermal incubation. As mother substances are natural animal metabolites their not enzymatic or enzymatic interaction in vivo with formation studied is possible KM-1. For check of this assumption we have spent experience on a hypothermal incubation (+4°C, during 24 hour) rats kidney cortical slices in mediums EWS-1 and EWS-1b (Tab. 1). On 5 mm either α-ketoglutarat (EP), or L-argignin (EP), or an ornithine (EP) have been brought in these solutions. Besides the hypothermal incubation of sections in medium EWS-HT with a concentration gradient has been spent KM-1 (0,1; 0,5; 1,0; 2,0; 5,0; 10,0 mM). pH mediums measurement has been carried out by means of pH-meter Piccolo plus. In total for experiences of 20 white not purebred rats-mans have been used, it a kidney mass was 140-160 g. Rats contained on a vivarium standard ration. Rats have been subjected to an ethereal euthanizing before kidney withdrawal. Rats' decapsulate kidneys quickly have been cut on thin cross-section at ambient temperature. Up to 20 sections have been prepared from each kidney on the average. Immediately after a rifling all sections have been weighed on torsion balances and, besides after an incubation.

Table 1. Composition of incubating mediums, mM

To form a	EWS-1	EWS-1b	EWS-HT
NaCl (EP)	48,4	48,4	63,4
KCl (EP)	48,81	48,81	48,81
$CaCl_2$ (EP)	2,25	2,25	2,25
KH_2PO_4 (EP)	1,19	1,19	1,19
$MgSO_4 \cdot 7H_2O$ (EP)	1,19	1,19	1,19
$NaHCO_3$ (EP)	25,0	25,0	–
CH_3COONa (EP)	16,6	16,6	5,0
Mannitol (EP)	260,0	260,0	260,0
Carbamide (EP)	50,0	–	50,0
pH	7,85	7,85	8,4 (without KM-1)

Slices hydratation research. Slices hydratation have been research a gravimetry method on water loss at desiccation in a dry-heat case and expressed in dry tissue kg/kga.

Statistical analysis. The received digital stuff has been treated in Excel 2003 by descriptive statistics methods. As parameter of slices hydration distribution was close to normal the received digital material has been processed with t-test use. Data are presented in the M±m form, where m – an average mistake. Authentic distinction was accepted at $p<0,05$.

Results and their discussion

Synthesis during a urea colorless solution and α-ketoglutarat got a straw-coloured shade. Reaction proceeded both at heating, and at a room temperature, and at +4°C, reaction kinetic it was not researched by us. According to NMR 1H spectroscopy, the synthesized connection has been identified as 3(2,5 dioxo-3-imidazolin-4-silt) propionic acid (KM-1). It the gross formula $C_6H_6N_2O_4$, M.w.=170,116.

This substance of NMR 1H the spectrum is characterized by two multiplets presence of the methylene protons with chemical shifts 1,9 m.d. Both 2,25 m.d. And a singlet of an imide proton with d=8,1 m.d. Apparently, in water solution at pH=7,0 compound exists in the zwitterion form, and at acidifying a solution it can pass from lactam forms in lactim. On chemical structure the it compound by us meets dehydrogidantoin-5-propionic acid. Relatives on structure compounds are hydantoin-5-propionic acid [3] and 4 (5)-imidazolon-5 (4) propionic acid [4], formed at the person, primates and rats during a histidine katabolism. Hydantoin-5-propionate – a termination products of a histidine exchange, it formed in an alternative path its katabolism from 4-imidazolon-5 propionic acids at FAD participation [3]. Theoretically, in vivo it can be transformed in dehydrogidantoin-5-propionate to dehydrogenation reactions with participation NAD^+, $NADP^+$ or FAD. In view of that dehydrogenase reactions reversible, hydantoin-5-propionates synthesis from dehydrogidantoin-5-propionates is possible.

Proceeding from that synthesis of dehydrogidantoin-5-propionates can proceed in soft conditions (in vitro), it can be formed in some fabrics, both is spontaneous, and enzymatic, we have assumed. Mother compounds rather high concentrations are present at a liver and a kidney. In both bodies urea and α-ketoglutarat are synthesized (at deamination, glutamate transamination or in citric cycle). For check of our assumption of dehydrogidantoin-5-propionates endogenic synthesis we inycubated rats kidney slices in initial medium where there was no urea, but there was α-ketoglutarat (Tab. 2). The bold font evolves the mediums which contain all substrates, ureas necessary for synthesis.

Table 2. Kidney slices hydratation depending on presence or absence at medium of a urea combination or its precursors L-arginine and α-ketoglutarat, N=12, n=44 on the control and over each medium variant

Intact slices	2,97±0,04	
Slices incubated in medium: EWS-1	3,54±0,05	p<0,0001 to intact slices
EWS-1b	3,55±0,03	p<0,0001 to intact slices
EWS-1b + α-ketoglutarat	4,13±0,015	p<0,0001 to intact slices & p<0,001 to EWS-1 & EWS-1b
EWS-1 + α-ketoglutarat	3,11±0,05	p<0,0001 to EWS-1 & EWS-1b
EWS-1b + arginin	3,48±0,085	p<0,0001 to intact slices
EWS-1b + arginin and α-ketoglutarat	3,06±0,04	p<0,0001 to EWS-1 & EWS-1
EWS-1b + ornitin	3,46±0,07	p<0,0001 to intact slices
EWS-1b + ornitin and α-ketoglutarat	4,61±0,19	p<0,0001 to intact slices & p<0,001 to EWS-1 & EWS-1b

EWS-1 containing urea badly preventions a kidney slices swelling and after 24 h of an incubation at +4°C, 19 % a set of water, in comparison with intact sections of the same kidney are observed. In medium EWS-1b of a not containing urea the swelling size was similar. Addition in EWS-1b 5 mM α-ketoglutarat strengthens hydration more than in 2 times, this phenomenon the reason has not been researched by us. Nevertheless, 5 mM α-ketoglutarat by EWS-1 addition was a swelling prevented, statistical differences with intact sections were not observed, and in relation to EWS-1 and EWS-1b the swelling is authentic below. The urea precursor arginine 5 mM addition in EWS-1b does not cause any effect, the slices hydratation is comparable to a swelling in EWS-1 and EWS-1b. But an arginine introduction together with α-ketoglutarat also effectively warns a swelling, as well as α-ketoglutarat introduction on EWS-1. To similarly arginine, the 5 mM ornithine does not influence a slices swelling size in EWS-1b. However 5 mm α-ketoglutarat addition does not a swelling prevention, but moreover strengthens it which even is more, than only at one α-ketoglutarat presence in EWS-1. It is apparent, that effect absence is caused by in a kidney the ornitine cycle is reduced, unlike a liver. Ornitincarbomoilase activity low (the ferment catalyzing citrulline formation from an ornithine and carbomoilphosphate) that is why an ornithine does not participate in urea synthesis. Whereas in a kidney arginase activity is high, it catalyzing hydrolytic arginine decomposition up to urea and an ornithine,.

Thus, in urea absence case in incubating medium for endogenous synthesis, a condition urea synthesis case is reduces α-ketoglutarat dehydrating effect. In our opinion, it obliquely proves a dehydrogidantoin-5-propionate synthesis opportunity from urea and α-ketoglutarat in a kidney cortical.

Studying has shown influences KM-1 on a kidney slices hydration parameters, that it compound prevents a slices swelling effectively and concentration-depending in parameters from 2,0 up to 10 mM (Tab. 3).

Table 3. A kidney slices hydratation dependence on KM-1 concentration in medium EWS-HT, N=8, n=18 on the control and over each medium variant

Intact slices	2,67±0,02
EWS-HT without KM-1	3,07±0,05**
EWS-HT with KM-1 0,1 mM	3,03±0,05**
0,5 mM	3,04±0,06*
1,0 mM	3,01±0,05*
2,0 mM	2,82±0,03*
5,0 mM	2,74±0,05
10,0 mM	2,64±0,04

* p<0,01, ** p<0,001 to intact slices

Dehydrogidantoin-5-propionate existence in alive objects the biological expediency can be explained by urea linkage necessity for inhibiting effect depression its high concentrations on cellular ferments. Presumably, dehydrogidantoin-5-propionate can participate in maintenance pH cells, binding or giving protons by formation donnornoacceptor connections with the second nitrogen atom, or as an olefinic linkage tearing up result. For example, introduction 5 mM KM-1 on EWS-HT causes depression pH from 8,4 up to 6,9. Interreacting through a carboxyl with the lysine rest of amino group by protein, dehydrogidantoin-5-propionate can chemically modify protein, variating its functional activity. Probably, dehydrogidantoin-5-propionate somehow takes part in kidney cells protection and a liver against a swelling at a water balance change, for example, at drink. It directly follows from our experiments with kidney slices swelling prophylaxis. Carrying out of researches before a unknown metabolic path of formation dehydrogidantoin-5-propionate in biological objects and an establishment of its physiological role is necessary

Conclusions

1. Urea and α-ketoglutarat are capable in a wide temperature range to dehydrogidantoin-5-propionate spontaneous formation in vitro.

2. In without urea medium α-ketoglutarat is a kidney slice swelling causes. At urea presence or arginine its metabolic precursor α-ketoglutarat prevents a kidney slice swelling in the hypothermal incubation test.

3. Dehydrogidantoin-5-propionate prevents a kidney in the hypothermal incubation test without dependence from urea presence.

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ULTRASOUND IMAGING DISTINGUISHES BETWEEN NORMAL AND WEAK MUSCLE

Koryak Yu. A.
Department of Neurophysiology & Countermeasures, State Scientific Center – Institute of Biomedical Problems RAS, Moscow, RUSSIA

Introduction

A number of studies have documented that the microgravity environment encountered during spaceflight or simulated by using models of weightlessness induces alterations in skeletal muscle function [3, 10, 14]. In the absence of weight-bearing activity, strength loss is the most evident consequence of atrophy. Moreover, showed that muscle strength decreased during bed-rest or immersion and suggested that the loss of strength [11, 13] was due primary to muscle atrophy [4, 15]. Muscle atrophy has been shown to be pronounced in the lower limb muscles [17], and it has of ten been observed that the reduction of strength is greater than that of muscle size [17, 19]. Therefore, these observed changes following a period of immobilization may cause changes in fascicle length.

Most skeletal muscles in humans are more or less pennated [8], in which muscle fibres are arranged at an angle with respect to the line of action of the muscle The angle of muscle fibres with respect to the tendon action line is an important functional characteristic of the muscle. A large pennation angle allows more contractile material to be placed along the tendon increasing the muscle's force generating capacity, results in a less efficient force transmission through the tendon and results in a reduced fibre length, compromising shortening velocity and excursion range [7]. Pennation angle changes proportionally as a function of isometric contraction intensity.

Muscle architecture, i.e. geometrical arrangement of fibres within a muscle, has been shown to have a substantial influence on the force-generating capabilities of the muscle [9]. This angulation (pennation angle) has been shown to affect force transmission from muscle fibres to tendon, and hence muscle force generation [8, 9]. The architecture of a skeletal muscle is an important determinant of its functional characteristics [8]. Human muscle architecture may be studied noninvasively *in vivo* both at rest and during muscle contraction, by using real-time ultrasonography [9]. Indeed, several investigators [5] have demonstrated that during isometric contractions muscle architecture undergoes remarkable changes. Changes in fiber length by contraction are thus expressed as fascicle length changes

In an attempt to improve our understanding of *in vivo* changes of muscle architecture, modern imaging techniques have been used [5, 9, 18]. Real-time ultrasonography enables *in vivo* muscle scanning and offers promise for a realistic determination of changes in muscle architecture [9]. Real-time ultrasonic (US) measurements were taken in the present study in the triceps surae (TS) muscle in healthy man and patients. In this report, we have studied by means of ultrasonography the relationships between architectural parameters [lengths fascicles (L), and pennation angles (Θ) of fascicles, and muscle thickness (H)] and level of force exerted in highly-subjects and patient with consequences of cerebral palsy. The purpose of our research work was to determine *in vivo* changes in pennation angle and fibre length in each muscle of the triceps surae complex [gastrocnemius medialis (GM), gastrocnemius lateralis (GL) and soleus (SOL)], both at rest and moment produced voluntarily during an isometric ankle plantarflexion. We employed real-time ultrasonography to visualize fascicles *in vivo*.

Methods

Subjects

Thirty subjects participated in this study. These subjects were assigned to two groups. The first group of subjects consisted of 8 healthy men (avg. age = 52±3.6 years), and the second group of subjects was composed of 22 patients men and women (avg. age = 55±3.4 years). Prior to the experiment, the details and possible risks of the protocols were explained to the subjects and written informed consent was obtained from each of them.

Ultrasound scanning

The longitudinal US images of the medial (MG) and lateral (LG) gastrocnemius muscles were obtained at 30% proximal level of lower leg (the distance between the lateral malleolus of the fibula and the lateral condyle of the tibia), and soleus (SOL) muscles were obtained at 50% of the distance between the poplitealcrease and the center of the lateral malleolus the using the B-mode ultrasound apparatus (Sonoline Elegra, Siemens, Germany). Briefly, the measurements were carried out while the subjects stood with their weight evenly distributed between both legs. The mediolateral widths of the MG and LG muscles were determined by ultrasound over the skin surface, and the position of one-half of the width was used as a measurement site. The echoes from interspaces of fascicles and from the superficial and deep aponeurosis were visualized [16].

A real-time B-mode US apparatus (Sonoline Elegra, Siemens, Germany) with a 7.5-MHz linear-array probe (with 80-mm scanning length) was used to obtain sagittal images of the GM, GL and SOL, at rest and at 50 % of plantarflexor MVC at the neutral ankle position. A transducer with a 7.5-MHz scanning head was placed perpendicular to the tissue interface. The scanning head was coated with water-soluble transmission gel, which provided acoustic contact without depressing the dermal sur-