

культивування пробіотиків у дезінтеграції мікроорганізмів. Антибіоплівочний ефект пробіотичних речовин відносно полірезистентних до антибактеріальних препаратів штамів (*Pseudomonas aeruginosa* PR, *Klebsiella pneumoniae* PR, *Lelliottia amnigena* (*Enterobacter amnigenus*) PR) має залежність від активності фільтратів *L. rhamnosus* GG та *S. boulardii* та від індивідуальної чутливості тест-культури збудників. Статистично значуще зменшення утворення біоплівок мікробними клітинами патогенів відбувалося при застосуванні метаболітів бактерій і грибів ($p < 0,03$). Високими антибіоплівочними властивостями володіє комбінація метаболітів сахароміцетів та лактобактерій, за винятком полірезистентної культури *K. pneumoniae*, у якій спостерігалась тенденція до зменшення біоплівкоутворення. Дезінтеграції *L. rhamnosus* GG і *S. boulardii* за своїми антибіоплівочними властивостями відносно даних збудників поступалися активністю.

Ключові слова: біоплівки, продукти метаболізму лактобактерій і сахароміцетів, полірезистентні до антибактеріальних препаратів грамнегативні мікроорганізми.

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пробиотиков в дезинтеграции микроорганизмов. Антибиопленочный эффект пробиотических веществ относительно полирезистентных к антибактериальным препаратам штаммов (*Pseudomonas aeruginosa* PR, *Klebsiella pneumoniae* PR, *Lelliottia amnigena* (*Enterobacter amnigenus*) PR) зависит от активности фильтрата *L. rhamnosus* GG и *S. boulardii* и от индивидуальной чувствительности тест-культуры возбудителей. Статистически значимое уменьшение образования биопленок микробными клетками патогенов происходило при применении метаболитов бактерий и грибов ($p < 0,03$). Высокими антибиопленочными свойствами обладает комбинация метаболитов сахаромикетов и лактобактерий, за исключением полирезистентной культуры *K. pneumoniae*, у которой наблюдалась тенденция к уменьшению биопленкообразования. Дезинтеграция *L. rhamnosus* GG и *S. boulardii* по своим антибиопленочным свойствам в отношении данных возбудителей уступали активностью.

Ключевые слова: биопленки, продукты метаболизма лактобактерий и сахаромикетов, полирезистентные к антибактериальным препаратам грамотрицательные микроорганизмы.

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ENERGY VALUE OF DIETARY INTAKE AND ITS CONFORMITY TO DAILY NEEDS IN YOUNG PEOPLE

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The paper presents the energy value of dietary intake of people with different body weight and its compliance with daily energy needs. 96 people of both gender aged 18-25 have been involved into the study. In the groups with normal body weight, overweight (body mass index of 25.00-29.99 kg/m²) and Class I obesity (body mass index of 30.00-34.99 kg/m²) nutritional status has been studied by the method of 24-hour nutrition reproduction, as well as basal metabolism and recommended daily energy dietary intake. The energy value of the dietary intake of the subjects of both gender with overweight and Class I obesity significantly exceeded the energy value of the dietary intake of controls. In the group with overweight, the level of positive energy balance in male subjects on a weekday was 16.02%, in male subjects and female subjects on a weekend day was 26.47% and 24.46%, respectively. In male subjects with obesity, the level of positive energy balance on a weekday was 20.09%, on a weekend day was 33.92%, whereas in female subjects with obesity it was 10.48% and 37.28% on a weekday and a weekend day, respectively. Strong to moderate correlation has been established between anthropometric and energy metabolism values.

Keywords: overweight, Class I obesity, energy value of dietary intake, energy metabolism, positive energy balance.

The work is a fragment of the research project "Comprehensive study of the pathogenetic role of M1 and M2 macrophages subpopulations in the development of chronic obstructive pulmonary disease for the development and justification of personalized therapy based on body weight", state registration No. 0117U005252.

The rapid increase in the number of overweight and obese people is attracting the attention of health professionals, since the above conditions are the precursors for the formation of a large number of diseases, namely, diabetes mellitus, metabolic syndrome, cardiovascular disease, diseases of the musculoskeletal system [8].

Recently, the nutrition pattern of the population worldwide has changed in the direction of the predominance of products high in fat and carbohydrates but poor in microelements and low quality nutrients. The current diet contains predominantly highly refined foods, long-term storage products, fast food, which contributes to the development of metabolic disorders, leading to overweight and obesity [9]. Young people may be one of the most vulnerable groups in terms of weight gain and obesity, given the numerous lifestyle factors that can potentially affect health [15]. These are energy imbalance, hypodynamia, significant emotional stress, chronic insomnia, irregular nutrition, inadequate distribution of the daily dietary intake, the presence of bad habits, etc. [5, 6].

Energy imbalance, caused by constant increased energy consumption with food and low levels of its expenditure is one of the main factors in the formation of overweight and obesity [10]. Information on studying the compliance of the energy value of the dietary intake with the energy needs of young people is quite limited.

The purpose of the study was to determine the energy value of the dietary intake of young people with different body mass and its compliance with daily needs.

Materials and methods. The study was conducted with the permission of the Commission on Bioethics of the Ukrainian Medical Stomatological Academy. Informed consent was signed by the subjects before the start of the study. 96 people of both gender aged 18-25 have been selected. Anthropometric parameters (height, body weight, waist circumference (WC) and thighs circumference (TC) and their ratio) were determined by standard methods.

Based on the BMI, calculated according to the equation: $BMI = W/H^2$, where W is body weight (kg), H is the height (m), the subjects have been assigned into three groups of 32 people. The control group involved subjects with normal weight with BMI of 18.50 - 24.99 kg/m², the group with overweight involved subjects with BMI of 25.00 - 29.99 kg/m², the group with Class I obesity involved subjects with BMI of 30.00 - 34.99 kg/m². All groups were gender-balanced.

To estimate the nutritional status of the subjects, the method of 24-hour reproduction of nutrition [4] on weekdays and weekend has been used. For optimal reproduction of information in the nutrition diaries, data on food consumption were recorded for the day before the survey and the next day off. The name, the meal composition, method of cooking, culinary processing was recorded. To estimate the amount of consumed food, the album with photos of main dishes, fast food and beverages was used, where each product was provided in different options in size and weight. During the survey, the subjects chose the appropriate option of products and dishes. The nutrient content and energy value were determined using the tables.

The value of the basal metabolic rate (BMR) was calculated by the Mifflin-St Jeor equation [13]: men: $BMR = 10,0 \times \text{body weight (kg)} + 6,25 \times \text{height (cm)} - 5,0 \times \text{age (years)} + 5$;

women: $BMR = 10,0 \times \text{body weight (kg)} + 6,25 \times \text{height (cm)} - 5,0 \times \text{age (years)} - 161$.

The recommended daily energy dietary intake to maintain the existing body weight was calculated by the EER equation [11]: Estimated Energy Requirement (EER) = BMR × PAC, where PAC is the physical activity coefficient. Data on the amount of daily physical activity were recorded by the respondents in the observation sheet. We used PAC of 1.4, which corresponds to the minimum energy expenditure.

The STATISTICA 10 software package (Stat Soft Inc, USA) was used for statistical processing of the resulting data. The arithmetic mean (M), its mean accuracy (m) was determined. Correlations of values were determined by Spearman correlation coefficient. The means were compared using the Student's t-test. The indices were considered statistically significant in $p < 0.05$.

Results of the study and their discussion. Taking into account the peculiarities of energy metabolism of men and women, the study groups were further divided by gender. Anthropometric studies have shown the following differences. The body weight of male subjects in the group with overweight and Class I obesity was by 29.70% and 53.98%, respectively, higher compared to controls and the body weight of female subjects in the group with overweight and Class I obesity was by 26.90% and 47.64%, respectively, higher compared to controls (table 1).

Table 1

Anthropometric values of the study groups (M±m)

Values	Men			Women		
	with normal body weight n=16	with overweight n=16	with Class I obesity n=16	with normal body weight n=16	with overweight n=16	with Class I obesity n=16
Age, years	19.50±0.56	19.88±0.42	20.94±0.60	19.31±0.45	19.13±0.39	20.25±0.46
Height, cm	177.63±1.01	180.78±1.53	181.53±0.85	165.94±1.56	166.25±1.25	165.19±1.70
Body weight, kg	69.41±1.29	90.03±2.19*	106.88±1.65***	60.73±1.28	77.06±1.18*	89.66±1.76***
BMI, kg/m ²	22.01±0.32	27.48±0.24*	32.49±0.38***	22.04±0.31	27.90±0.28*	32.78±0.27***
WC, cm	75.47±0.97	87.66±1.35*	100.16±1.24***	70.56±0.87	82.06±0.90*	90.22±1.42***
TC, cm	95.03±3.76	109.00±5.22*	115.00±5.38***	95.88±1.71	108.94±1.15*	117.78±1.26***
WC/TC ratio	0.79±0.01	0.81±0.01	0.87±0.02***	0.74±0.01	0.75±0.01	0.77±0.02

Notes herein after in Tables 1-3: * - $p < 0,05$ compared to individuals with normal body weight; ** - $p < 0,05$ compared to individuals with overweight.

BMI was by 24.85% and 47.61% higher in male subjects with overweight and Class I obesity, respectively, and by 26.59% and 48.73% higher in female subjects with overweight and Class I obesity, respectively, compared to controls ($p < 0.05$) (table 1). Importantly, the values of WC and TC in male and female subjects with overweight and Class I obesity were significantly higher compared to controls. The WC/TC ratio was by 10.13% higher in men with Class I obesity compared to controls ($p < 0.05$) (table 1).

The analysis of the dietary intake was performed in two days: a weekday and a weekend day, which can usually differ in the amount and mode of nutrition. The analysis of the nutritive value of daily dietary intake based on food diaries showed the following results (table 2). In male subjects with overweight, the energy value of dietary intake was by 27.04% on a weekday, and by 38.16% significantly higher on a weekend day, compared to controls. The energy value of dietary intake of male subjects with Class I obesity was by 42.89% higher on a weekday compared to controls ($p<0.05$). On a weekend day, male subjects with obesity consumed by 58.97% more calories compared to the control group ($p<0.05$) (table 2).

In the group of female subjects with overweight, the nutritive value was by 32.28% significantly higher the nutritive values in controls on a weekday and by 25.99% higher the values in controls on a weekend day (table 2).

Table 2

Energy value of daily dietary intake in the subjects (M±m)

Values	Men		
	with normal body weight n=16	with overweight n=16	with Class I obesity n=16
Energy value, kcal weekday	2475.16±260.11	3144.42±158.84*	3536.78±243.12*
Energy value, kcal weekend day	2480.98±176.58	3427.63±138.32*	3944.01±331.74*
Indices	Women		
Energy value, kcal weekday	1715.29±132.21	2268.97±99.997*	2578.03±59.60*.**
Energy value, kcal weekend day	2147.81±186.62	2706.01±136.70*	3203.35±131.72*.**

On a weekday, in the female subjects with Class I obesity, the energy value of consumed food was by 50.30% significantly higher the values of the controls and by 13.62% higher the values of the group with overweight (Table 2). Similarly, the nutritive value of the dietary intake on a weekend day was by 49.15% higher the values of controls and by 18.38% higher the values of the group with overweight ($p<0.05$).

The value of the basal metabolic rate has been determined to estimate the minimal energy required to maintain overall health. The value of the basal metabolic rate in male subjects with overweight was by 13.09% ($p<0.05$) higher the values of controls (Table 3). The value of the basal metabolic rate in obese subjects was by 22.90% and 8.67% higher the values of controls and group with overweight, respectively ($p<0.05$).

Table 3

The value of the basal metabolic rate and recommended daily dietary energy intake in the subjects of the study groups (M±m)

Values	Men			Women		
	with normal body weight n=16	with overweight n=16	with Class I obesity n=16	with normal body weight n=16	with overweight n=16	with Class I obesity n=16
basal metabolic rate, kcal/day	1711.72± 17.21	1935.82± 29.99*	2103.63± 21.05***	1386.80± 24.36	1553.06± 18.30*	1666.73± 28.60***
recommended daily dietary energy intake, kcal/day	2396.41± 24.09	2710.15± 41.99*	2945.09± 29.47***	1941.52± 29.90	2174.29± 25.62*	2333.43± 40.04***

In female subjects with overweight the basal metabolic rate was by 11.99% significantly higher the rate of controls (Table 3). In subjects with Class I obesity the basal metabolic rate was by 20.19% higher the rate of controls and by 7.32% higher the rate of the group with overweight ($p<0.05$).

The survey has shown that almost all subjects led a passive lifestyle and were not involved in active rest and physical activities, which gave us a basis for using the physical activity coefficient of 1.4 when calculating the recommended daily dietary energy intake. In male subjects with overweight, the value of recommended daily dietary energy intake was by 13.09% higher the value of controls ($p<0.05$). In the obese subjects the level of daily dietary energy intake was by 22.90% significantly higher the values of controls and by 8.67% higher the values of the group with overweight (Table 3).

In female subjects with overweight the value of the recommended daily dietary energy intake was by 11.99% higher the value of controls ($p<0.05$). In the obese subjects the daily dietary energy intake was by 20.19% higher the values of controls and by 7.32% higher the values of the group with overweight ($p<0.05$) (Table 3).

Subsequently, the comparison of the values of the recommended daily dietary energy intake and the rates of energy value of the dietary intake in controls of both gender showed no significant difference between the energy value of dietary intake on a weekday and a weekend day and recommended daily dietary energy intake (Table 4).

The difference between the recommended daily dietary energy intake and energy value of the dietary intake in the subjects of the study groups (M±m)

Values	Men			Women		
	with normal body weight n=16	with overweight n=16	with Class I obesity n=16	with normal body weight n=16	with overweight n=16	with Class I obesity n=16
Recommended daily dietary energy intake, kcal/day	2396.41± 24.09	2710.15± 41.99	2945.09± 29.47	1941.52± 29.90	2174.29± 25.62	2333.43± 40.04
Energy value, kcal Weekday	2475.16± 260.11	3144.42± 158.84*	3536.78± 243.12*	1715.29± 132.21	2268.97± 99.99	2578.03± 59.60*
Energy value, kcal weekend day	2480.98± 176.58	3427.63± 138.32**	3944.01± 331.74**	2147.81± 186.62	2706.01± 136.70 **	3203.35± 131.72**

Notes: * - $p < 0,05$ – compared between the values of recommended daily dietary energy intake and the values of energy value on a weekday;
** - $p < 0,05$ – compared between the values of recommended daily dietary energy intake and the values of energy value on a weekend day.

On a weekday, in male subjects with overweight and obesity the energy value of dietary intake was by 16.02% and 20.09%, respectively, higher the value of recommended daily dietary energy intake ($p < 0.05$). On a weekend day, in male subjects with overweight and obesity the energy value of dietary intake was by 26.47% and 33.92%, respectively, higher the value of recommended daily dietary energy intake ($p < 0.05$). On a weekend day, in female subjects with overweight the energy value of dietary intake was by 24.46% higher the value of recommended daily dietary energy intake (Table 4). In female subjects with Class I obesity the energy value of dietary intake on a weekday and a weekend day was by 10.48% and 37.28%, respectively, higher ($p < 0.05$).

Correlation analysis has been carried out to establish correlations between the study values. The findings of the analysis have shown strong positive correlations between the values of the basal metabolic rate/recommended daily dietary energy intake in male subjects of control group and body weight ($r = 0,920$, $p < 0,05$) and TC ($r = 0,926$, $p < 0,05$). The positive moderate correlations between the values of the basal metabolic rate and daily dietary energy intake were derived from the BMI ($r = 0,594$, $p < 0.05$) and WC ($r = 0,501$, $p < 0.05$).

Positive strong correlations between the values of the basal metabolic rate/ recommended daily dietary energy intake and the value of the body weight ($r = 0.991$, $p < 0.05$), WC ($r = 0.702$, $p < 0.05$) and TC ($r = 0.805$, $p < 0.05$) and moderate correlations with BMI ($r = 0.649$, $p < 0.05$) have been established in the group of male subjects with overweight. Positive strong correlations between the value of the basal metabolic rate and value of the body weight ($r = 0.970$, $p < 0,05$) and moderate correlations with BMI ($r = 0.553$, $p < 0.05$) have been noted in the group of male subjects with Class I obesity. The similar correlations between the value of the recommended daily dietary energy intake and the value of the body weight ($r = 0.970$, $p < 0.05$) and BMI ($r = 0,553$, $p < 0,05$) have been formed.

The formation of the correlations between the values of the basal metabolic rate and recommended daily dietary energy intake in female subjects of control group have been noted: positive strong correlations with body weight ($r = 0,938$, $p < 0,05$) and TC ($r = 0,786$, $p < 0,05$) and negative moderate correlation with the value of the WC/TC ratio ($r = -0,500$, $p < 0,05$). Strong positive correlations between the values of the basal metabolic rate/ recommended daily dietary energy intake and body weight ($r = 0,939$, $p < 0,05$) and ($r = 0,954$, $p < 0,05$) have been established in female subjects with overweight and Class I obesity, respectively.

The energy that a person receives from food should cover energy expenditure due to the energy value of nutrients. Taking into account such factors as the age, gender, body weight and height, type of activity, amount of load, nutrient value of the dietary intake should provide the physiological need of the body for energy balance.

Daily energy expenditure is determined on the basis of the basal metabolism, physical and mental activity, digestive processes and nutrient absorption expenditure. The findings of our study showed a significant difference in the actual energy consumption on a weekday from the recommended daily dietary energy intake in the male subjects with overweight and subjects of both genders with obesity. On a weekend day, subjects of both gender with overweight and obesity also consumed more energy than needed according to the recommended daily dietary energy intake. Excess energy gradually leads to the formation of a positive energy balance and weight gain, when fat accumulation occurs in fat depots. In the group with overweight, the level of positive energy balance in male subjects on a weekday was 16.02%, in male subjects and female subjects on a weekend day was 26.47% and 24.46%, respectively. In male subjects with Class I obesity, the level of positive energy balance on a weekday was 20.09%, on a weekend day was 33.92%, whereas in female subjects with Class I obesity it was 10.48% and 37.28% on a weekday and a weekend day, respectively.

The peculiarities of nutrition were noteworthy. In the subjects of both gender with overweight and obesity, the diet was monotonous, with no clear intervals between meals. In most subjects of these groups, the last meal was too late without enough intervals between the last meal and sleep. Excessive consumption of coffee, cakes, sandwiches, fast food and small amount of vegetables and fruits was observed. Respondents consumed food that was cooked outside home, in public facilities, more often on weekdays, though some respondents did this both on weekdays and weekend.

Currently, rather irrational diet and specificities, namely, late dinners, excessive consumption of carbohydrates and fats due to mostly high-calorie foods is characteristic to young people, which, along with the lack of proper knowledge on nutrition science and other factors contribute to weight gain and obesity [3,5]. On the other hand, poor physical activity, increasing exposure to hypokinesia and hypodynamics lead to decreased motor-visceral reflexes, slow metabolism. Working conditions, the nature of working activities, lack of willpower and/or lack of its detection in relation to appetite control, lack of conscious attitude to nutrition contribute to the development of nutritional disorders [3]. According to our data, weight gain and obesity leads to a decrease in quality of life at a young age [2].

Excessive nutrition alters the cellular metabolic repertoire. According to current data, macrophages are the key cells in maintaining adipocyte homeostasis and central mediators of adipose-induced inflammation in the adipose tissue and insulin resistance. The microenvironment of the adipose tissue influences the increase in proliferation of macrophages, which in turn cause its chronic inflammation, regardless of its number [7]. Adipose tissue macrophages demonstrate metabolic activation, as evidenced by correlations with BMI [12]. Low-intensity chronic inflammation in the adipose tissue leads not only to increase in the number of macrophages but also affects their properties, mediating the influence on adipocyte function, cytokine synthesis, signs of subpopulation phenotype [14]. Generally, inflammation, formed during obesity in the adipose tissue, can serve as a regulatory signal of energy metabolism at the local and systemic level [1].

Conclusion

Thus, the findings of the study show that the energy value of the dietary intake of subjects of both gender with overweight and Class I obesity significantly exceeds the energy value of the dietary intake of controls. The formation of a positive energy balance between the recommended daily dietary energy intake and the energy value of the dietary intake of subjects of both gender with overweight and obesity has been established. A positive energy balance requires physiological correction by reducing the consumption and energy value of food and increasing energy expenditure by increasing physical activity.

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Реферати

ЕНЕРГЕТИЧНА ЦІННІСТЬ ХАРЧОВОГО РАЦІОНУ ТА ЇЇ ВІДПОВІДНІСТЬ ДОБОВИМ ПОТРЕБАМ У МОЛОДИХ ОСІБ

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У роботі визначено енергетичну цінність харчового раціону осіб із різною масою тіла та її відповідність добовим потребам в енергії. Обстежено 96 осіб обох статей 18-25 років. У групах з нормальною масою тіла, з підвищеною (індекс маси тіла 25,00-29,99 кг/м²) та ожирінням I ступеня (індекс маси тіла 30,00-34,99 кг/м²) вивчався харчовий статус методом 24-годинного відтворення харчування, основний обмін та рекомендоване добове споживання енергії. Енергетична цінність харчового раціону осіб із підвищеною масою тіла та ожирінням I ступеня обох статей достовірно перевищувала енергетичну цінність раціону осіб контрольної групи. Рівень позитивного енергетичного балансу в групі з підвищеною масою тіла у робочий день становив 16,02% у чоловіків, у вихідний день 26,47% у чоловіків, 24,46% у жінок. У чоловіків з ожирінням рівень позитивного енергетичного балансу у робочий день становив 20,09%, у вихідний 33,92%, у жінок у робочий день 10,48%, у вихідний 37,28%. Між показниками антропометрії та енергетичного обміну виявлені сильні та середньої сили зв'язки.

Ключові слова: підвищена маса тіла, ожиріння I ступеня, енергетична цінність харчового раціону, енергетичний обмін, позитивний енергетичний баланс.

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ЭНЕРГЕТИЧЕСКАЯ ЦЕННОСТЬ ПИЩЕВОГО РАЦИОНА И ЕГО СООТВЕТСТВИЕ СУТОЧНЫМ ПОТРЕБНОСТЯМ У МОЛОДЫХ ЛИЦ

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В работе определена энергетическая ценность пищевого рациона лиц с разной массой тела и ее соответствие суточным потребностям в энергии. Обследовано 96 человек обоего пола 18-25 лет. В группах с нормальной массой тела, с повышенной (индекс массы тела 25,00-29,99 кг/м²) и ожирением I степени (индекс массы тела 30,00-34,99 кг/м²) изучался пищевой статус методом 24-часового воспроизведения питания, основной обмен и рекомендованное суточное потребление энергии. Энергетическая ценность пищевого рациона лиц с повышенной массой тела и ожирением I степени обоих полов достоверно превышала энергетическую ценность рациона лиц контрольной группы. Уровень положительного энергетического баланса в группе с повышенной массой тела в рабочий день составлял 16,02% у мужчин, в выходной день 26,47% у мужчин, 24,46% у женщин. У мужчин с ожирением уровень положительного энергетического баланса в рабочий день составлял 20,09%, в выходной 33,92%, у женщин в рабочий день 10,48%, в выходной 37,28%. Между показателями антропометрии и энергетического обмена выявлены сильные и средней силы связи.

Ключевые слова: повышенная масса тела, ожирение I степени, энергетическая ценность пищевого рациона, энергетический обмен, положительный энергетический баланс.

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Blood capillaries of rat renal glomeruli were studied 14, 50 and 100 days after the development of congenital hypothyroidism. It was found that on day 14 after the onset of hypothyroidism 7-day-old rats had a decrease in morphometric parameters of the number of capillaries and their area in comparison with age control in the absence of any marked morphological changes. In 45-day-old rats 50 days after the development of this pathology in glomerular blood capillaries changes in quantitative indicators had not reached critical values, while the presence of both destructive-dystrophic and compensatory processes were noted morphologically. 100 days after the development of pathology changes in blood capillaries became more pronounced than in the previous period. Destructive-dystrophic changes of a part of capillaries and the phenomena of necrosis and apoptosis were observed in the presence of compensatory-adaptive processes.

Key words: blood capillaries, kidneys, rats, congenital hypothyroidism.

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Congenital hypothyroidism is one of the most complex and important problems among endocrinological pathology in children leading to a dangerous developmental disorder of almost all organs and systems, and without timely diagnosis and treatment to severe disability of a child. According to neonatal screening data incidence of congenital hypothyroidism in Ukraine ranges from 1/2500 to 1/4000 of newborns and peaks in the regions with severe iodine deficiency [2]. At present fatal changes in the body, growth and development retardation of a child can be prevented by timely prescription of thyroid hormone replacement therapy, therefore the study of this pathology is relevant [4,5,12]. It is known that during embryogenesis thyroid hormones directly or indirectly affect the development and physiology of kidneys causing significant changes in renal function, such as decreased sodium reabsorption in the proximal tubules, impaired concentrating capacity of distal tubules, decreased uric acid excretion,