

# GEORGIAN MEDICAL NEWS

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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии  
საქართველოს სამედიცინო სიახლენი

## GEORGIAN MEDICAL NEWS

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**GMN: Georgian Medical News** is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

**GMN: Медицинские новости Грузии** - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

**GMN: Georgian Medical News** – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

### WEBSITE

[www.geomednews.com](http://www.geomednews.com)

## К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman (Кириллица)**, для текста на грузинском языке следует использовать **AcadNusx**. Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - <http://www.spinesurgery.ru/files/publish.pdf> и [http://www.nlm.nih.gov/bsd/uniform\\_requirements.html](http://www.nlm.nih.gov/bsd/uniform_requirements.html) В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректур авторам не высылаются, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

**При нарушении указанных правил статьи не рассматриваются.**

## REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or computer-printed on a single side of standard typing paper, with the left margin of 3 centimeters width, and 1.5 spacing between the lines, typeface - **Times New Roman (Cyrillic)**, print size - 12 (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: [http://www.nlm.nih.gov/bsd/uniform\\_requirements.html](http://www.nlm.nih.gov/bsd/uniform_requirements.html)  
[http://www.icmje.org/urm\\_full.pdf](http://www.icmje.org/urm_full.pdf)

In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

**Articles that Fail to Meet the Aforementioned  
Requirements are not Assigned to be Reviewed.**

## ავტორთა საქურაღებოლ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დაიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx**. შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შედეგის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფხიხლებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

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## THE ROLE OF COENZYME COQ10 AND VITAMIN E IN PATIENTS WITH BETA-THALASSEMIA MAJOR IN BAGHDAD CITY POPULATION

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### Abstract.

Our study aimed to evaluate the level of coenzyme (CoQ10) in the plasma of human which suffered from beta-thalassemic major disease and vitamin E concentration in comparison to control cases. We included 90 (60  $\beta$ -TM patients and 30 persons for control groups). The range of age (15-40 years) during the period from December 2022 to March 2023, and the study included patients previously diagnosed with beta-thalassemia major from Medical City and Karama Hospital. The level of serum CoQ10 in the patients was 2.02 ng/ml and in the control, groups were 3.55 ng/ml. The difference was statically high between the two groups ( $P < 0.001$ ). Likewise, our study includes the concentration of vitamin E in the study groups (patients 2.29 ng/ml and for control cases 7.25 ng/ml). The results highlight that there was a highly significant difference between the two groups ( $P < 0.001$ ). In conclusion, for both  $\beta$ -TM patients and control groups, the results show that the two parameters CoQ10 and vitamin E were highly significant difference ( $P < 0.001$ ) which means there were lower antioxidant capacities as demonstrated by the results of our new study.

**Key words.** CoQ10, vitamin E,  $\beta$ -TM patients.

### Introduction.

The clinical manifestations of thalassemia, a hereditary haemoglobin condition defined by decreased or missing globin chain production, are asymptomatic to those with severe chronic anaemia that needs transfusions and iron chelating medication for the rest of their lives [1]. In the world,  $\beta$ -thalassemia is a heterogeneous collection of genetic hemoglobinopathies that are autosomal recessive diseases and are marked by irregularities in the globin chain of the haemoglobin [2]. This decrease in red blood cell activity causes chronic anaemia, considerable morbidity, and a shorter lifespan in comparison to the general population. People with severe anaemia are required to receive continuous red blood cell transfusions as well as periodic iron chelation in order to prevent iron excess [3]. Transfusion-dependent (TDT), the most severe type of disease, necessitates lifelong blood transfusions (BT), a dangerous course of therapy [4].

Coenzyme Q10 (CoQ10) is a vitamin-like chemical that can be found in every cell, which is why it is also known as ubiquinone. In addition to playing a vital role in the production of energy, CoQ10 is also considered to be the most effective antioxidant for membranes [5]. It does this by acting as a scavenger for free radicals as well as preventing the oxidation of lipids and proteins [6]. CoQ10 is a naturally occurring antioxidant that is also a cofactor that is required for the creation of cellular energy [7]. In contrast, A decreased or nonexistent production of beta-globin chains, which are necessary for the production of haemoglobin, the protein that is present in red blood cells and is responsible for transporting oxygen throughout the body, is a hallmark of the genetic blood disorder known as beta-thalassemia major

[8]. Thalassemia beta sufferers' levels of CoQ10 were found to be lower when compared to those of healthy individuals [9]. The requirement for blood transfusions may be reduced in thalassemia patients who take CoQ10 supplements [10].

Vitamin E is an antioxidant that protects cells from the harm that might be caused by free radicals, this vitamin may be stored in the body's fat [11]. Additionally, it is essential for maintaining immune system function and repairing DNA damage [12]. As an antioxidant, vitamin E plays a crucial function in protecting the body from harmful chemicals called free radicals, which have been linked to the development of cancer, cardiovascular disease, and dementia [13]. People with beta-thalassemia frequently experience high levels of oxidative stress, which can lead to tissue damage and inflammation, Vitamin E, a potent antioxidant, may help beta-thalassemia sufferers endure less oxidative stress [14]. In individuals with beta-thalassemia major, vitamin E administration decreased lipid peroxidation and enhanced red blood cell activity [15].

### Materials and Methods.

A cross-sectional study selected 90 samples aged 15-40 from Medical City and Karama Hospital, divided them into two groups, and applied the required test to measure important parameters that support our study. The study was implemented during the period from December 2022 to March 2023, and the study included patients previously diagnosed with beta-thalassemia major. According to the agreed protocol, a group of thalassemia patients who take blood every two weeks, especially patients before they were weight, height, medications used, blood transfusion duration, place of residence, risk factors, and illnesses.

**Sample Collection:** The blood samples were drawn from the vein. Iodine was used to disinfect the venipuncture site, and then five millilitres 5ml of blood was drawn from each participant and placed in a plane tube without anticoagulant; the blood was allowed to clot for 15-20 minutes; the sample was centrifuged for at least 10 minutes at 3000 rpm to separate the serum; the serum was then stored in Eppendorf tubes at  $-20^{\circ}\text{C}$ .

### Results.

In this cross-sectional study, the present study's results showed that the patient's age was a minimal lower than that in the control group. The result was statistically no significant ( $P < 0.114$ ) (Table 1).

The minimum age in patients was 15 years, while in controls was 16, and the maximum age for both groups was 40.

The present study revealed that the level of serum CoQ10 in the patients was lower than that in the control group. The difference was statically highly significant ( $P < 0.001$ ) (Table 2).

The present study revealed that the level of vitamin E in the patients was lower than that in the control group. The difference was statically highly significant ( $P < 0.001$ ) (Table 3).



**Table 1.** Descriptive statistics of age in study groups.

Age (years)	Patients group	Control group
Mean	22.75	24.87
Std. Deviation	6.693	5.865
Minimum	15.00	16.00
Maximum	40.00	40.00
P value	0.11 <sup>4NS</sup>	

NS: no statistical significance (p>0.05).

**Table 2.** Level of CoQ10 in the study groups.

CoQ10 level (ng/ml)	Patients group	Control group
Mean	2.02	3.55
Std. Deviation	0.88	1.62
P value	<0.001	

**Table 3.** Level of vitamin E in the study groups.

Vitamin E level (ng/ml)	Patients group	Control group
Mean	2.29	7.25
Std. Deviation	1.69	2.79
P value	<0.001	

## Discussion.

The results of the current study, which examined the impact of antioxidants in patients with transfusion-dependent thalassemia major, showed that the average age of the patient group was marginally lower than that of the control group and that there was no statistically significant difference between them.

The present study revealed that the level of serum CoQ10 in the patients was lower than that in the control group (P<0.001), as presented in Table 2. Our result agrees with previous studies Salman et al. [16], found that Antioxidant molecules, on the other hand, may defend the organism against oxidative stress. Low amounts of coenzyme Q10 were found in our analysis of thalassemia major (TM) patients with varied ferritin levels, among other enzymatic and non-enzymatic antioxidants [16].

CoQ10 is an important component of the electron transport cycle, which is responsible for the production of adenosine triphosphate (ATP), the standard unit of cellular currency [17]. Patients with thalassemia may have a decline in energy production as a result of their red blood cells faulty activity [18]. Supplementing with CoQ10 may increase cellular energy production, which might reduce certain signs and symptoms of fatigue and sluggishness [17].

In other studies, conducted by Gholam et al. [19]. After using CoQ10 pills, serum ferritin levels drastically decreased. Kalpravidh et al. discovered that beta thalassemia was not a factor in our results. Patients were given 100 mg/day of CoQ10 for six months, however, there were no changes in the amount of serum ferritin they had [19].

The present study revealed that the level of vitamin E in the patients was lower than that in the control group (P<0.001), as presented in Table 3. This supported the results of the previous study conducted by Haghpanah et al. [15]. As a consequence of this, those who had beta-thalassemia had blood levels of vitamin E that were seventy percent lower than those of children who did not have the illness [15].

Our result agrees with Hamed et al [20]. Forty thalassemia patients who got both vitamin E and deferoxamine (DFX) had a 50.97% decrease in their transfusion requirements after 6 months, compared to those who received just DFX. These outcomes may have been avoided, at least in part, if vitamin E had been used to prevent erythrocyte hemolysis [20].

An elevated iron fraction triggered lipid peroxidation due to oxidative stress, leading to a low vitamin E level. The body needs more antioxidants to scavenge these generated radicals [21]. Vitamin E may prevent erythrocyte membrane damage by neutralizing free radicals on the RBC membrane, reduced erythrocyte half-life due to a lack of vitamin E increases the risk of hemolysis [22].

A previous study by Althanoon et al. [23], who have found that, a considerable increase in blood vitamin E levels was seen in the treatment group compared to no meaningful changes in the control group after vitamin E supplementation [24].

## Conclusion.

In conclusion, the findings of our new study revealed that there was a highly significant difference (P<0.001) in the two parameters, CoQ10 and vitamin E, between  $\beta$ -TM patients and control groups. These results indicate that both groups exhibited lower antioxidant capacities. Antioxidants play a crucial role in protecting our cells from oxidative stress, which can lead to various health issues.  $\beta$ -TM patients, who suffer from beta-thalassemia major, a genetic blood disorder characterized by abnormal haemoglobin production, are particularly susceptible to oxidative stress due to the imbalance between free radicals and antioxidants in their bodies. The lower levels of CoQ10 and vitamin E observed in  $\beta$ -TM patients suggest that their antioxidant defence mechanisms may be compromised. This finding underscores the importance of adequate antioxidant intake for individuals with  $\beta$ -TM, as it may help mitigate the damaging effects of oxidative stress. Additionally, the significant difference observed in the control group further highlights the need for maintaining optimal antioxidant levels in the general population. Further research is warranted to explore potential interventions or dietary modifications that could enhance antioxidant capacities in both  $\beta$ -TM patients and the general population.

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