

N.Yu. Reznichenko, A.D. Dyudyun  
State Institution "Dnipropetrovsk Medical Academy of the Ministry of Health of Ukraine", Dnipro

## MAIN AGE-RELATED CUTANEOUS CHANGES IN MEN GROUNDED ON THE RESULTS OF ULTRASONIC DIAGNOSTICS

e-mail: n.reznichenkog@gmail.com

The purpose of the study was to investigate the ultrasonic characteristics of skin and blood flow in men of different age groups. 120 men aged from 25 to 64 years were examined. The reduction in thickness of the different layers of the skin in men of older age groups was fixed. Low levels of flow velocity (its maximum and average figures), as well as high resistance index and pulse activity index, were fixed in males of mature age. In cases when antioxidants, nootropics and angioprotectors were prescribed for prophylaxis, flow velocity (its maximum and average figures) increased in skin vessels, resistance index and pulse activity index decreased. It was shown that the use of antioxidants, nootropics and angioprotectors was effective for the prevention of skin aging and blood-flow violations in it in males of older age groups.

**Key words:** aging, skin, blood flow, men.

Н.Ю. Резніченко, А.Д. Дюдюн

## ОСНОВНІ ВІКОВІ ЗМІНИ ШКІРИ У ЧОЛОВІКІВ ЗГІДНО РЕЗУЛЬТАТІВ УЛЬТРАЗВУКОВОЇ ДІАГНОСТИКИ

Метою дослідження було вивчення ультразвукових характеристик шкіри та особливостей кровотоку у чоловіків різних вікових груп. Було обстежено 120 чоловіків у віці 25–64 роки. Встановлено зменшення товщини різних шарів шкіри у чоловіків старших вікових груп. Низькі рівні швидкості кровотоку (її максимальні та середні цифри), а також і високий індекс резистентності й індекс пульс-активності були встановлені у чоловіків зрілого віку. У випадках призначення антиоксидантів, ноотропів і ангіопротекторів з профілактичною метою швидкість кровотоку (її максимальні та середні цифри) зростали, а індекс резистентності та індекс пульс-активності знижувались. У дослідженні було доведено, що використання антиоксидантів, ноотропів і ангіопротекторів з профілактичною метою було ефективним для попередження старіння шкіри та порушень кровообігу в ній у чоловіків старших вікових груп.

**Ключові слова:** старіння, шкіра, кровообіг, чоловіки.

*The study is an initiative.*

An extremely important task of modern medical science is to preserve the health of the population. Various age violations are found in men, such as changes in the functional activity of different systems and organs. Age-related changes have a negative influence on health state, course of different diseases, life quality [3].

Aging has its reflection on many organs and systems, which is the reason for many diseases (especially dermatological diseases and age-related aesthetic defects). The main reasons for cutaneous age-related changes are metabolism and vascular violations. They are caused by many factors of endogenous and exogenous origin: alcoholism, smoking, environmental pollution, professional hazards, diet, hormonal violations, nervous system changes, including stresses and autonomic dysfunction. As a result, the changes in adaptation and homeostasis are seen, which is the reason for inflammation and other cutaneous pathologies [1, 2].

A lot of scientific articles present information about skin changes in females, which are caused by aging and a decrease in estrogens levels. Mainly, they show information about cutaneous changes in females of menopausal age. These aesthetic defects include wrinkles, skin atrophy, rosacea [4, 6]. Some scientific studies prove skin involution, which starts from the age of 35 years old. Scientists describe different phases of the menstrual cycle and the related changes in microcirculation [5].

On the other hand, there is not much information about blood flow and skin structure changes in males from different age groups. The study of Dudchenko MO shows the ultrasonography changes in the dermis, which are associated with aging [6, 8]. The author proves the association between age and increased thickness on exposed sites in cases of skin photoaging. However, the thickening of the skin is also fixed in young people, probably those who underwent increased ultraviolet exposure.

Tepluk NP showed the reduction of skin thickness as well as an increase of the subepidermal low-echogenic band thickness as a result of skin photodamage during echography [7, 8]. The authors proposed the use of methyl aminolevulinic acid under occlusion and exposure of red light for skin photodamage.

The ultrasound measurements showed the increase in the subepidermal low echo-genic band (SLEB) in all anatomic sites as well as a decrease in total skin thickness in males and females as a result of skin photoaging [9]. The scientists proposed the use of ablative fractional photothermolysis as an effective treatment of photoaging, which is rather an expensive method of correction.

Some studies show the effectiveness of mesotherapy for skin rejuvenation, proved by skin-targeted ultrasound [10]. The evaluation of age-related dermal changes and a SLEB was fixed in cases of skin aging

before the beginning of treatment. The thickness of the epidermis was not evaluated in the examined population.

To sum up, the literature review shows different age-related changes in males and females during ultrasound examination, which is probably the result of screening of population with both signs of natural skin aging and skin photoaging. The growing interest of males in a good look and prevention of skin aging prompted us to study the blood flow and main skin changes in males of different ages so that new prophylactic methods could be elaborated.

**The purpose** of the study was to establish the blood flow and skin thickness in men of different age groups and to evaluate the efficacy of the proposed methods of correction for blood flow violations in the skin.

**Material and methods of the study.** 120 men aged 25–64 years were examined. They formed four clinical groups according to the age of patients: I group – 25–34 years old (31 patients), group II– 35–44 years old (34 patients), group III – 45–54 years old (27 patients), group IV – 55–64 years old (28 patients). Inclusion criteria were as follows: male, aged 25–64 years, absence of dermatological diseases, signed informed consent. Exclusion criteria were signs of skin photoaging.

Ultrasound examination and dopplerography were performed according to the method of S.A. Vasilchenko et al. [3]. Such a non-invasive method of in vivo study of tissues, like ultrasound, compares favourably with the opportunity to quantify the structures of the skin and in the last 10–20 years has been actively developing due to the emergence of high-frequency sensors. Color Doppler Mode mapping was used for the evaluation of vascularization. The Ultrasound Diagnostic Apparatus SA 8000 Live (Medison) was used. Blood flow was measured in the temporal area. Average and maximal flow velocity, resistance index and pulse activity index were measured.

Table 1

Skin thickness according to males ages (mm) (M±m)

Thickness		Group I	Group II	Group III	Group IV
Frontal area	epidermis	0.145±0.002	0.130±0.002*	0.131±0.002*	0.125±0.002*
	dermis	1.91±0.02	1.71±0.02*	1.61±0.03*†	1.52±0.02*†‡
	dermis + epidermis	2.08±0.03	1.85±0.03*	1.80±0.04*	1.64±0.02*†‡
	hypoderm	0.89±0.02	0.87±0.02	0.79±0.02*†	0.76±0.03*†
Temporal area	epidermis	0.145±0.004	0.126±0.003*	0.126±0.004*	0.108±0.003*†
	dermis	1.97±0.02	1.61±0.02*	1.56±0.03*†	1.41±0.02*†‡
	dermis + epidermis	2.11±0.02	1.76±0.04*	1.71±0.03*	1.58±0.03*†‡
	hypoderm	0.89±0.02	0.88±0.02	0.79±0.01*†	0.78±0.02*†
Buccal area	epidermis	0.16±0.002	0.14±0.002*	0.14±0.004*	0.13±0.005*
	dermis	1.71±0.02	1.52±0.03*	1.53±0.03*	1.51±0.03*
	dermis + epidermis	1.85±0.02	1.66±0.03*	1.64±0.03*	1.61±0.04*
	hypoderm	1.17±0.02	1.14±0.02	1.08±0.02*	1.00±0.03*†‡
Chin area	epidermis	0.16±0.004	0.15±0.003	0.14±0.003*†	0.13±0.004*†
	dermis	2.21±0.02	1.92±0.04*	1.63±0.03*†	1.51±0.03*†‡
	dermis + epidermis	2.40±0.03	2.05±0.03*	1.81±0.04*†	1.67±0.03*†‡
	hypoderm	0.98±0.02	0.96±0.03	0.89±0.01*	0.82±0.02*†‡

Notes: \* – significant differences ( $p<0.05$ ) compared to results obtained in Group I; † – significant differences ( $p<0.05$ ) compared to results obtained in Group II; ‡ – significant differences ( $p<0.05$ ) compared to results obtained in Group III.

As no significant violations were fixed by dopplerography and ultrasound examination of the skin in males from group I and II during the first stage of examination, men aged 25–44 years did not need any prophylactic or corrective measures. We elaborated main methods of treatment for different age-related changes. We proposed the use of medication “Cratal” (BCPP, Ukraine) 1 tablet orally three times per day during 30 days and “Quercetin” (BCPP, Ukraine) 1 g orally 2 times per day during 30 days for men from group III, and “Tiocetam-forte” (Arterium, Ukraine) 1 tablet orally 3 times per day during 30 days for men from group IV.

Angioprotector was chosen because males from the third group had violations in blood flow. Nootropics and antioxidant drugs were chosen in order to normalize the changes in sympatho-adrenal and vagal-insular systems and in order to normalize blood flow in the whole body as well as skin in particular [6]. The use of nootropics can contribute to the normalization of interactions between different levels of the hypothalamic-pituitary-adrenal system, which can improve blood flow in the skin as well as in other organs.

The study was in line with the ethical principles of the Helsinki Declaration. The permission for the study was received from the Local Ethics Committee of State Institution “Dnipropetrovsk Medical Academy of the Ministry of Health of Ukraine”, Dnipro. All patients, who participated in the study, signed the informed consent form before the beginning of the study.

Data processing. For statistical counts paired Student's t-test was used. Shapiro-Wilk test was used for the check of data distribution (the significance level was 0.01). The differences between the data were considered reliable at  $p < 0.05$  (except the Shapiro-Wilk test). Statistical counts were done using software STATISTICA 6.1 (StatSoftInc., serial No. AGAR909E415822FA).

**Results of the study and their discussion.** The results of the ultrasonic examination of skin thickness in men from different groups are presented in table 1.

Male from elder age groups had reduced thickness of epidermis and dermis. It was particularly observed in the facial temporal area.

Dopplerography results, fixed in men from Groups I–IV were shown in table 2.

Table 2

**Dopplerography characteristics in males of different ages (M±m)**

Indices	Group I	Group II	Group III	Group IV
Maximum flow velocity, cm/s	6.05±0.07	6.10±0.03	5.91±0.04†	5.44±0.05*†‡
Average flow velocity, cm/s	3.62±0.03	3.58±0.05	3.51±0.03*	3.24±0.05*†‡
Pulse activity index, units	1.61±0.03	1.62±0.03	1.79±0.03*†	1.90±0.05*†
Index of resistance, units	0.96±0.02	0.93±0.02	1.04±0.03*†	1.21±0.04*†‡

Notes: \* – significant differences ( $p < 0.05$ ) compared to results obtained in Group I; † – significant differences ( $p < 0.05$ ) compared to results obtained in Group II; ‡ – significant differences ( $p < 0.05$ ) compared to results obtained in Group III.

Fig. 1 shows the changes of resistance index and pulse-activity index, as well as blood flow velocity. It also presents the results of the examination before the use of proposed prophylactic measures and after the prophylactic course.

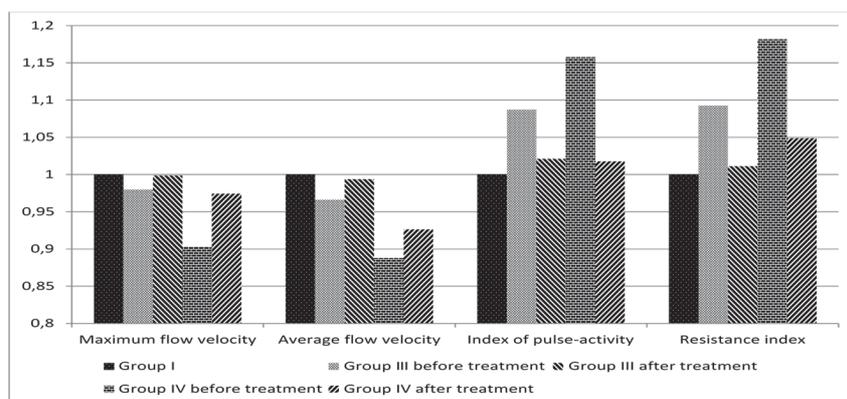


Fig. 1. Dopplerography indices in men of different ages (for convenience results of first Group were taken per 1).

Males with the signs of skin photoaging were excluded from our study, which resulted in the proven tendency for skin thinning with the increasing age. That is why our study shows the reduction in thickness of the different layers of skin in aging men [5].

When compared to the first and the second groups, no significant differences were found in the flow velocity and other blood flow indexes. Men from Group III showed high resistance index, high pulse-activity index and low flow velocity when compared with the first two groups. These data prove the violated blood vessels' elasticity. Very low figures of flow velocity were fixed in males from group III. These males also had very high resistance index and pulse activity index. The decrease of blood flow in men from Group III and Group IV was fixed in the study. These data grounded the need for elaboration of new methods of improvement of blood flow in men of elder age groups.

The use of angioprotectors in males from the third group led to the decrease in resistance index and pulse activity index, to the increase in the maximum and average flow velocity.

Nootropics and antioxidants used for prophylactic purposes in males of Group IV helped to reduce resistance index and pulse activity index, as well as to increase the flow velocity (its maximum and average figures).

These data show the efficacy of antioxidants, nootropics and angioprotectors for prophylactic purposes in males of mature age [7, 8].

## Conclusion

The investigation showed a decrease in the thickness of different skin layers in healthy males, caused by aging, as well as the violations in blood flow, which was proved by the decreased blood flow velocity and elevated resistance index and pulse activity index in 45–65 years-old males. The prescription of angioprotectors, antioxidants and nootropics for prophylactic purposes significantly improved blood flow in the skin of males aged 45–64 years.

## References

1. Abuzyarova YUN, Fodorova OV. Mekhanizmy stareniya kozhi. Aktualnyye problemy eksperimentalnoy i klinicheskoy meditsiny. 2017; 517–517. [in Russian]
2. Bolshunova AO, Monastireva DR, Zatolokina YeS. Osobnosti stroyeniya kozhi na raznykh etapakh postnatalnogo ontogeneza. Aktualnyye problemy eksperimentalnoy i klinicheskoy meditsiny. 2018; 427–427. [in Russian]
3. Vasilchenko SA, Tone NV, Kostenko LV, Burkov SG. Ultrazvukovaya diagnostika opukholey kozhi v planirovaniy obyema khirurgicheskogo vmeshatelstva. Sonoace-Ultrasound. 2012; 24:75–81. [in Russian]
4. Dudchenko MO, Vasylyeva KV. Osoblyvosti zmin shkiry v osib, yaki zlovzhyvayut sonyachnym ta shtuchnym oprominennyam. Dermatovenerologhyia. Kosmetologhyia. Seksopatologhyia. 2013; 1, 4:241–243. [in Ukrainian]
5. Reznichenko NYu. Vplyv nedostatnyoho vzhyvannya ovochiv i fruktiv na stan shkiry ta zahalnyi stan zdorovya cholovikiv. Zaporozhskyy medytsynskyy zhurnal. 2015; 88:83–86. [in Ukrainian]
6. Teplyuk NP, Lebedeva SV. Vozrastnyye izmeneniya nizhney treti litsa s uchetom anatomo-fiziologicheskikh aspektov i morfotipov stareniya kozhi. Rossiyskiy zhurnal kozhnykh i venericheskikh bolezney. 2020; 23(4), 258–264. [in Russian]
7. Teplyuk NP, Lebedeva SV. Neinvazivnyye metody issledovaniya kozhi pri razlichnykh morfotipakh stareniya. Uspekhi gerontologii. 2021; 34.4: 558–565. [in Russian]
8. Shepitko VI, Yeroshenko GA, Lysachenko OD. Vozrastnyye aspekty stroyeniya kozhi litsa cheloveka. Mir meditsiny i biologii. 2013. 9 (3-2 (40)), 091–097 [in Russian]
9. Glebova EE. A quality of life of women with age-related skin changes. Health of society. 2021; 8(6), 227–231. <https://doi.org/10.22141/2306-2436.8.6.2019.198394>

Стаття надійшла 16.01.2021 р.

DOI 10.26724/2079-8334-2022-1-79-121-126

UDC 616.9: 618.2-055

E.G. Sariyeva, I.A. Gafarov  
Azerbaijan Medical University, Baku, Azerbaijan

### INFORMATIVENESS OF BIOCHEMICAL INDICATORS IN THE DIAGNOSIS OF VIRAL HEPATITIS B AND C IN PREGNANT WOMEN

e-mail: elladasariyevaatu@mail.ru

The choice of the correct treatment tactics for HBV, HCV-infections is based on biochemical and immunological indicators. In this regard, the development of programs on a mathematical basis can be considered a rational and correct approach to solving the diagnostic problem. The aim of the research was to assess the informativeness of additional laboratory indicators in the diagnosis of viral hepatitis B and C in pregnant women. The investigation included 150 pregnant women: the main group – 100 pregnant women with hepatitis B and C, the control group – 50 practically healthy pregnant women. Were carried out serological studies, polymerase chain reaction, biochemical, immunological blood tests. The results of the study showed that, among the studied indicators, apolipoprotein A1 and IgG have the highest sensitivity and overall diagnostic value, IgG, IgM and microglobulin- $\nu$ 2 have the highest specificity, and the indicators of microglobulin- $\nu$ 2, IgG and IgM. Apolipoprotein A1 and IgG have the highest negative efficacy scores. The ratio of the accuracy of positive and negative results allows the use of indicators of total cholesterol, apolipoprotein A1, low-density lipoproteins, microglobulin- $\nu$ 2, iron, C-reactive protein, IgG, IgM as auxiliary diagnostic biomarkers of infection of pregnant women with hepatitis B and C.

**Key words:** pregnancy, HBV, HCV-infections, lipid metabolism indices, immunological biomarkers.

E.G. Сариева, I.A. Гафаров

### ІНФОРМАТИВНІСТЬ БІОХІМІЧНИХ ПОКАЗНИКІВ У ДІАГНОСТИЦІ ВІРУСНИХ ГЕПАТИТІВ В ТА С У ВАГІТНИХ

Вибір правильної лікувальної тактики при HBV, HCV-інфекціях ґрунтується на біохімічних та імунологічних показниках. У зв'язку з цим розробку програм на математичній основі можна вважати раціональним та правильним підходом до вирішення діагностичного завдання. Мета дослідження – оцінити інформативність додаткових лабораторних показників у діагностиці вірусних гепатитів В та С у вагітних. До дослідження включено 150 вагітних: основна група – 100 вагітних із гепатитом В і С, контрольна група – 50 практично здорових вагітних. Було проведено серологічні дослідження, полімеразну ланцюгову реакцію, біохімічні, імунологічні аналізи крові. Результати дослідження показали, що серед досліджуваних показників найбільшу чутливість і загальну діагностичну цінність мають аполіпопротеїн А1 та ІgG, найбільшу специфічність мають ІgG, ІgM та мікроглобулін- $\nu$ 2, а також показники мікроглобулін –  $\nu$ 2, ІgG та ІgM. Аполіпопротеїн А1 та ІgG мають найвищі негативні значення ефективності. Співвідношення точності позитивних та негативних результатів дозволяє використовувати показники загального холестерину, аполіпопротеїну А1, ліпопротеїдів низької щільності, мікроглобуліну- $\nu$ 2, заліза, С-реактивного білка, ІgG, ІgM як допоміжні діагностичні біомаркери інфекції вагітних при гепатитах.

**Ключові слова:** вагітність, ВГВ, ВГС-інфекції, показники ліпідного обміну, імунологічні біомаркери.

Hepatotropic infections, such as hepatitis B and C in pregnant women, often appear unapparent and do not appear as an increase in the activity of bilirubin and liver enzymes in the blood. Accordingly, it is impossible to assess the pathogenesis of these infections without using other serological methods.

Despite the fact, that hepatitis B and C during pregnancy are often asymptomatic, they can lead to the development of fibrosis in the liver. As the disease progresses, the elasticity of liver tissue decreases.