GEORGIAN MEDICAL NEWS

ISSN 1512-0112

No 6 (327) Январь 2022

ТБИЛИСИ - NEW YORK

ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

No 6 (327) 2022

Published in cooperation with and under the patronage
of the Tbilisi State Medical University

Издается в сотрудничестве и под патронажем
Тбилисского государственного медицинского университета

გამოიცემა თბილისის სახელმწიფო სამედიცინო უნივერსიტეტთან
თანამშრომლობითა და მისი პატრონაჟით

ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

ТБИЛИСИ - НЬЮ-ЙОРК

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 and The International Academy of Sciences, Education, Industry and Arts (U.S.A.) 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 и Международной академией наук, образования, искусств и естествознания (IASEIA) США 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 ВИНИТИ 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 ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

МЕДИЦИНСКИЕ НОВОСТИ ГРУЗИИ

Ежемесячный совместный грузино-американский научный электронно-печатный журнал
Агентства медицинской информации Ассоциации деловой прессы Грузии,
Международной академии наук, индустрии, образования и искусств США.
Издается с 1994 г., распространяется в СНГ, ЕС и США

Website:
www.geomednews.org

The International Academy of Sciences, Education, Industry & Arts. P.O.Box 390177,
Mountain View, CA, 94039-0177, USA. Tel/Fax: (650) 967-4733

Версия: печатная. **Цена:** свободная.
Условия подписки: подписка принимается на 6 и 12 месяцев.
По вопросам подписки обращаться по тел.: 293 66 78.
Контактный адрес: Грузия, 0177, Тбилиси, ул. Асатиани 7, IV этаж, комната 408
тел.: 995(32) 254 24 91, 5(55) 75 65 99
Fax: +995(32) 253 70 58, e-mail: ninomikaber@geomednews.com; nikopir@geomednews.com

По вопросам размещения рекламы обращаться по тел.: 5(99) 97 95 93

GEORGIAN MEDICAL NEWS
Monthly Georgia-US joint scientific journal published both in electronic and paper formats of the Agency of Medical Information of the Georgian Association of Business Press; International Academy of Sciences, Education, Industry and Arts (USA).
Published since 1994. Distributed in NIS, EU and USA.

CONTACT ADDRESS IN TBILISI

GMN Editorial Board
7 Asatiani Street, 4th Floor
Tbilisi, Georgia 0177

Phone: 995 (32) 254-24-91
995 (32) 253-70-58
Fax: 995 (32) 253-70-58

CONTACT ADDRESS IN NEW YORK

NINITEX INTERNATIONAL, INC.
3 PINE DRIVE SOUTH
ROSLYN, NY 11576 U.S.A.

Phone: +1 (917) 327-7732

WEBSITE
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
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. Корректура авторам не высылается, 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 compu-ter-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.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 საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ 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 შეღებვის 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 ფჩხილებში 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.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

GEORGIAN MEDICAL NEWS
No 6 (327) 2022

Содержание:

Gogunskaya I.V[1]., Zaikov S.V[1]., Tkhorovskyi M.A[2]., Plykanchuk O.V[2]., Bogomolov A.Ye[2].
STATUS OF THE COMPOSITION OF ALLERGENIC EXTRACTS FOR SKIN TESTING IN UKRAINE AND THE WAYS TO OPTIMIZE IT 7

Kopchak O., Hrytsenko O.
FEATURES OF GUT MICROBIOTA IN PATIENTS WITH MIGRAINE AND HEALTHY INDIVIDUALS.....13

Olena A. Hryhorieva[1]., Tetiana M. Matvieishyna.[1], Yuri Y. Guminskiy.[2], Oleksandra L. Lazaryk.[1], Andrii O. Svetlitsky[1].
GENERAL MORPHOLOGICAL CHARACTERISTICS OF GASTRO-INTESTINAL TRACT OF RATS WITH EXPERIMENTAL UNDIFFERENTIATEDDYSPLASIAOFCONNECTIVETISSUE…….....18

Trofimov N.[1], Kryshen V.[1], Korpusenko I.[1], Nor N.[1], Korpusenko E.[1], Makarenko A.[2]
PREOPERATIVE DONOR ZONES PREPARATION OF PERFORANT FLAPS BY TRAINING PERFORANT VESSELS WITH NEGATIVE PRESSURE…….....27

Olha S.Yurtsenyuk.
PECULIARITIES OF DIAGNOSTICS AND TREATMENT OF NONPSYCHOTIC PSYCHIC DISORDERS AMONG THE STUDENTS OF HIGHEREDUCATIONALESTABLISHMENTS…….....32

Dubivska SS., Hryhorov Yu.B., Lazyrskyi V.O., Goloborodko M.M.
DYNAMICS OF CHANGES IN 2,3 DIPHOSPHOGLYCERATE AND COGNITIVE DYSFUNCTION IN THE POSTOPERATIVE PERIOD IN PATIENTS WITH ABDOMINAL NEOPLASMS…….....36

PREOPERATIVE DONOR ZONES PREPARATION OF PERFORANT FLAPS BY TRAINING PERFORANT VESSELS WITH NEGATIVE PRESSURE

Trofimov N.[1], Kryshen V.[1], Korpusenko I.[1], Nor N.[1], Korpusenko E.[1], Makarenko A.[2]

[1]Dneprovsk State Medical University. Dnipro. Ukraine; [2]National Medical University. A.A. Bogomolets. Kiev. Ukraine.

Introduction. One of the key factors in achieving favorable treatment outcomes when planning reconstructive surgeries using perforant flaps is the choice of recipient vessels. The diameter of perforant vessels, on which flaps are most often formed, ranges from 1 to 1.5 mm. Their identification causes certain difficulties both at the planning stage and during the operation. Known methods of preoperative planning of perforant flaps using ultrasound sonography and Doppler, selective angiography, CT angiography [1-3]. A modern method of preoperative perforants location is dynamic infrared thermography, which makes it possible to identify perforant vessels after using functional tests [4-7]. The thigh area is the easiest area to eliminate a wound defect due to significant reserves of skin and soft tissues. That is why this site is widely used in plastic surgery for taking free microsurgical flaps, such as an anterolateral femoral flap (ALT flap) or a diagonal gracilis femoral flap (DUG flap) with a simple elimination of the donor zone [8-11]. At the same time, if there is a need for revascularization of open and initially infected deep anatomical structures, perforant local propellers, keystone flaps or free transplantation from remote donor sites can be used in this region [5,12,13].

The basis of our study was the task of preoperative preparation of donor areas by training arteries - perforants by applying the action of local negative pressure on the skin.

Purpose of research. Development of the most rational modes of action of negative pressure on the skin of the thigh for preoperative preparation of the donor zone for the formation of perforant flaps.

Materials and methods. The determination of the most rational modes of action of negative pressure on the skin of the thigh was carried out on a group of healthy volunteers (GHV) - 35 people: 17 women and 18 men aged 19 to 50 years. The studies were carried out on the basis of the burn department of the clinic in Dnipro, Ukraine in 2020-21. For preoperative location of perforants, dynamic infrared thermography (DIT) was used using a Flir ONE (USA) thermal imager for smartphones and tablets based on Android [7]. Local vacuum (VAC-action) was created using the AGAT-Dnepr negative pressure apparatus (Ukraine) by applying a polyurethane sponge to the anterior surface of the thigh.

Statistical data processing was carried out using a personal computer using software products STATISTICA 6.1 (StatSoftInc., serial no. AGAR909E415822FA) and Microsoft Excel (Microsoft Office 2016 Professional Plus, Open License 67528927) using methods of descriptive and analytical biostatistics and multivariate methods of statistical analysis [14,15].

Results and discussions. The examination was carried out in a room with a constant air temperature of 21-22°C, the subject was given a horizontal position and he adapted within 20 minutes. After adaptation, for better visualization of the projection zones of the perforant vessels, the skin of the anterior surface of the thigh was cooled by applying a gauze napkin 10 × 20 cm in size, folded in 10 layers, moistened with cold water at a temperature of 18-20°C for 15 minutes. After cooling, a thermal imaging examination was carried out, from 2 to 4 perforators were detected. After that, a local vacuum P = (-100 mm Hg) was created for 10 minutes. Then, immediately after the negative pressure apparatus was turned off, the perforant vessels were visualized and the number of perforants was counted using a thermal imager. The next stage of the study was aimed at increasing the negative pressure. The pressure varied from P = (-100 to -160 mm Hg), exposure time from 10 minutes to 20 minutes, 30 minutes, 60 minutes, 24 hours and 48 hours. The studies were carried out at the same time at the indicated time intervals - 60 seconds (immediately after the action of negative pressure); 20, 30, 60 minutes; after 24 and 48 hours. 60 seconds after the action of negative pressure on the anterior surface of the skin of the thigh, "hot zones" of an increase in local temperature are determined, with a temperature gradient ΔT=2.10 - 1.15 (95% 1.0 - 1.4) -30 minutes, the skin temperature drops to 31.19 (95% Confidence interval (CI) 32.0-32.6)°C, and against the background of this decrease, points of hyperemia appear 33.6 (95% 33.2-34.5)°C in different quantity, depending on the time and magnitude of the negative pressure, which persist for 24 - 48 hours (Fig. 1).

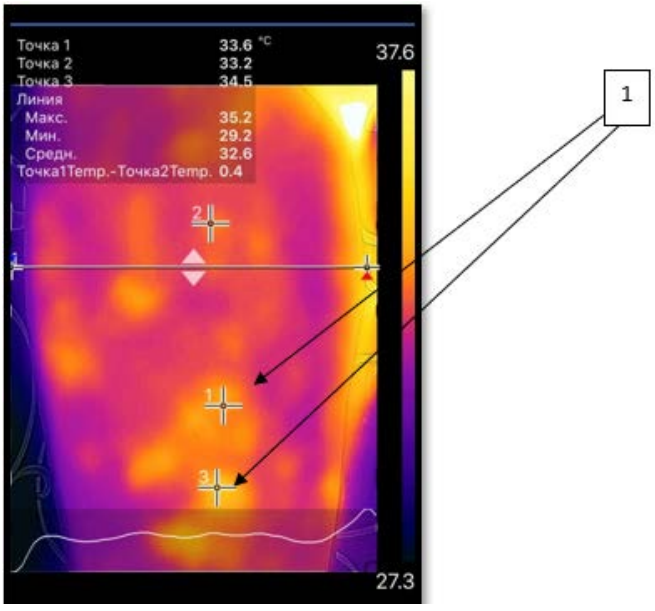

Fig.1. DIT of the skin of the anterior surface of the right thigh. The right thigh 30 minutes after the VAC-action, 10 perforants are determined.

As a result of the experiment, changes in the number of perforants depending on the duration of negative pressure were traced (Table 1).

The largest average number of perforants in the examined patients was observed after 30 minutes of VAC action - 12.0 (6.0; 12.0), which was statistically significantly higher compared to their number, which was detected after 10 minutes of negative pressure action ($p<0.001$). On average, according to the median values of 12 perforants after 30 minutes, the VAC-action remained after 20, 30 and 60 minutes after exposure and decreased only after 24 hours. Doubling the period of VAC - action to 60 minutes and no longer led to an increase in the number of perforants. Therefore, the optimal negative pressure time is 30 minutes when up to 10-12 perforants are opened. Accordingly, in the dynamics, depending on the time elapsed after the VAC- action, a pattern is observed: the largest number of perforants persists for 24 hours.

The number of certain perforants depends on the duration of the negative pressure: a direct strong relationship was found between the indicators ($rs=0.85$; $p<0.001$). Based on the results of the regression analysis, a non-linear power-law form of relationship between the duration of negative pressure and the number of perforants was revealed (Fig. 2), which was described by the equation ($p<0.001$):

$$y=11,23+0,22\times x-0,003\times x^2 \quad (1)$$

where y- is the number of perforants.

x- is the duration of the negative pressure in minutes.

Depending on the magnitude of the negative pressure, certain changes in the number of perforants were observed within 2 days (Table 2).

The smallest average number of perforants in the GHV group was observed at a pressure level of P= (-100 mm Hg) 24 hours after the VAC-action and at P=(-160 mm Hg) 48 hours later. The largest average number of perforants was detected at the pressure level P= (-130 mmHg) – 10.0 (8.0; 14.0), which was statistically significantly higher compared to their number under the negative impact of pressure P = (-100 mmHg) ($p<0.001$). The indicator was constant, the number of perforants was maintained during the entire observation period from 20 minutes to 48 hours.

Based on the results of the correlation analysis, the average strength of the correlation between the magnitude of the pressure of the VAC- action and the number of perforants was determined - $rs=0.56$ ($p<0.001$). According to the results of the regression analysis, the nature of the connection was refined, and it was determined that it has a non-linear power form of the connection (Fig. 3), which was described by the equation ($p=0.010$):

$$y=51,17-0,85\times x-0,031\times x^2 \quad (2),$$

where y- is the number of perforants.

x- is the level of negative pressure in mm Hg.

Thus, on the basis of the analysis, it was determined that the pressure P= (-130mm Hg) is the most optimal for opening perforants (10-12 pieces). What can be useful for using local negative pressure to "train" the perforant vessels of the donor site for 2-3 days before the transplantation of the perforant flap. VAK-action promotes the opening of perforants and improves blood supply to the donor area.

Perforant flaps are a step forward in the repair of soft tissue defects, they have opened a new era in reconstructive surgery and provide very important advantages in reconstructive surgery. However, there are risk factors that cause various complications. Therefore, when planning reconstruction, great attention should be paid to tissue blood supply [7,11,12]. Examination of the patient in the preoperative period most often begins with physical methods: determining the pulse, color, turgor, capillary filling of the skin. Additional information can be obtained using a handheld portable audio doppler. A well-known technique for preoperative location of perforants using dynamic infrared thermography (DIT) is a study with a

Table 1. Determination of perforants depending on the time of the VAC-action in the GHV (n=35) following the data of DIT - Me (25%; 75%).

VAC- action time	The number of perforants after the action of negative pressure after a certain period of time					
	60 seconds	20 minutes	30 min	60 min	24 hours	48 hours
10 min	3,0 (1,0; 3,0)	3,0 (3,0; 4,0)	3,0 (3,0; 3,0)	3,0 (2,0; 3,0)	3,0 (1,0; 3,0)	3,0 (1,0; 3,0)
20 min	4,0 (3,0; 4,0)	4,0 (4,0; 5,0)	4,0 (2,0; 4,0)	4,0 (1,0; 4,0)	2,0 (1,0; 3,0)	2,0 (0,0; 2,0)
30 min	12,0 (10,0; 12,0)*	12,0 (8,0; 12,0)*	12,0 (6,0; 12,0)*	12,0 (5,0; 12,0)*	10,0 (6,0; 11,0)*	8,0 (6,0; 8,0)*
60 min	8,0 (4,0; 8,0)*	8,0 (8,0; 10,0)*	8,0 (6,0; 8,0)*	8,0 (4,0; 8,0)*	6,0 (3,0; 7,0)*	4,0 (2,0; 4,0)
24 hours	6,0 (3,0; 6,0)*	7,0 (6,0; 8,0)*	6,0 (4,0; 6,0)*	6,0 (3,0; 7,0)*	4,0 (3,0; 4,0)	4,0 (2,0; 4,0)
48 hours	6,0 (2,0; 6,0)*	6,0 (6,0; 8,0)*	6,0 (2,0; 6,0)*	4,0 (2,0; 6,0)	4,0 (2,0; 4,0)	4,0 (1,0; 4,0)

*Note. * – p<0.001 according to the Wilcoxon test compared with a level in 10 minutes of VAC-action.*

Table 2. The number of perforants depending on the pressure value of the VAC - actions in the GHV (n=35) according to the DIT data - Me (25%; 75%).

Pressure level (mmHg)	The number of perforants after the action of negative pressure after a certain period of time					
	60 seconds	20 minutes	30 minutes	60 minutes	24 hours	48 hours
-100 mmHg	4,0 (2,0; 6,0)	4,0 (3,0; 6,0)	4,0 (3,0; 5,0)	4,0 (2,0; 5,0)	3,0 (2,0; 3,0)	3,0 (1,0; 3,0)
-110 mmHg	4,0 (2,0; 6,0)	4,0 (4,0; 5,0)	4,0 (2,0; 7,0)	3,0 (1,0; 4,0)	2,0 (1,0; 3,0)	2,0 (0,0; 2,0)
-120 mmHg	10,0 (8,0; 14,0)*	10,0 (8,0; 12,0)*	8,0 (6,0; 9,0)*	8,0 (4,0; 9,0)*	4,0 (3,0; 6,0)	4,0 (2,0; 5,0)
-130 mmHg	10,0 (7,0; 15,0)*	10,0 (8,0; 14,0)*	10,0 (6,0; 13,0)*	10,0 (5,0; 12,0)*	10,0 (4,0; 11,0)*	10,0 (3,0; 11,0)*
-140 mmHg	6,0 (3,0; 8,0)	6,0 (5,0; 8,0)	6,0 (4,0; 7,0)	6,0 (3,0; 7,0)	4,0 (3,0; 5,0)	4,0 (2,0; 5,0)
-160 mmHg	6,0 (2,0; 7,0)	6,0 (5,0; 8,0)	6,0 (4,0; 7,0)	4,0 (2,0; 6,0)	4,0 (2,0; 6,0)	3,0 (1,0; 4,0)

*Note. * – p<0.001 according to the Wilcoxon test in comparison with a level at P=-100 mm Hg.*

x- is the duration of the negative pressure in minutes.

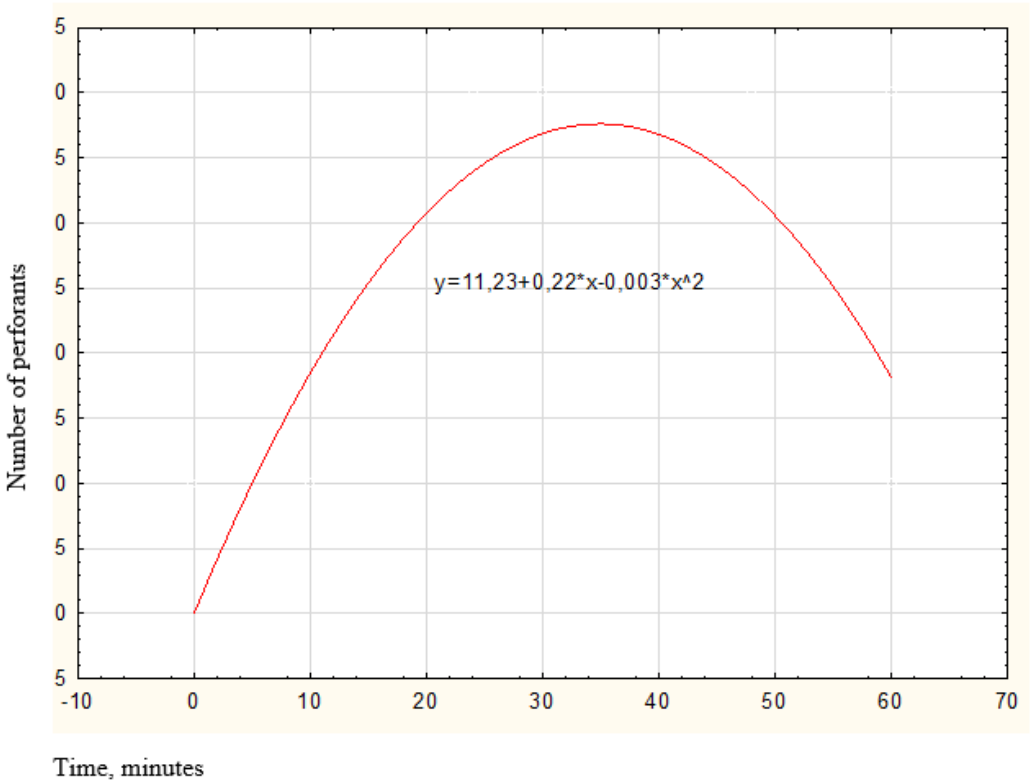

Fig.2. Relationship between the duration of negative pressure and the number of perforants in the examined GHV (n=35).

x- is the level of negative pressure in mm Hg.

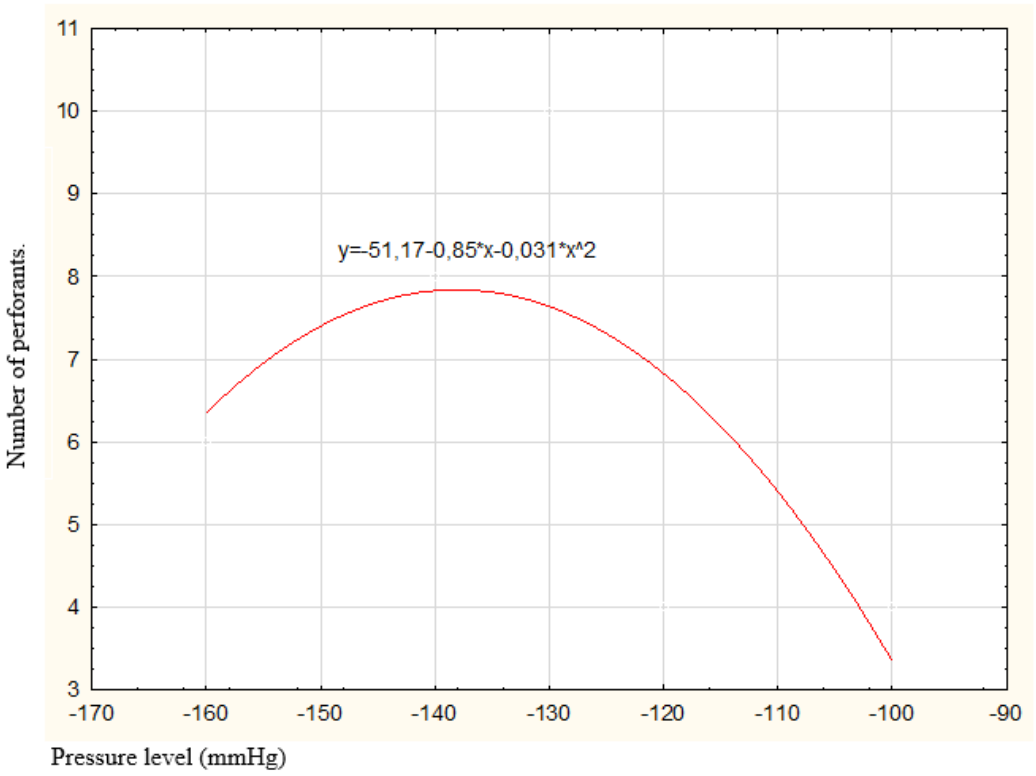

Fig.3. Relationship between the level of negative pressure and the number of perforants in the examined GHV (n=35).

thermal imager after using functional samples: cooling, heating, pressure. To create a uniform starting situation for the skin area, the use of cold or heat is recommended. The technique for applying cold has been described by de Weerd et al. [16]. The method was based on cooling the skin area to 20-22°C. After 60 seconds, hot spots appeared against the background of cooling. After 1-2 minutes, they merged with neighboring angiosome perforants. Thus, perforants up to 1 mm in diameter were visualized. Cooling ensures that only those areas that are best supplied with blood become noticeable hot spots a few minutes after the cold is removed [3-5,16]. Reducing the number of so-called "false hot spots" is critical to the accuracy of this method. Vacuum therapy is one of the treatments used to improve wound healing. The main pathogenetic mechanism of action of low-dose negative pressure is a change in local blood circulation, which is based on the ability of a local vacuum to create a directed movement of fluid, which provides optimal conditions for improving microcirculation [5,7,13]. In our opinion, the action of negative pressure is an important factor in enhancing blood flow in perforasomes, which contributes to an increase in dynamic zones due to the “opening” of perforants of the second and third levels.

Conclusion.

1. VAC-action promotes the opening of perforants of the second, third level and thereby improves the blood supply to the donor area.
2. Pressure P= (-130mm Hg) and time of 30 minutes are the most optimal modes of action on the skin of donor sites for opening perforants (10-12 pcs).
3. The use of local negative pressure against the background of cooling would be useful for training perforant vessels of the donor site during 2-3 days before the flap transplantation, which could reduce development of postoperative complications rate.

REFERENCES

1. Hyunsuk Peter Suh, Youngchul Kim, Youngchul Suh, Joon Pio Hong. Multidetector computed tomography (CT) analysis of 168 cases in diabetic patients with total superficial femoral artery occlusion: is it safe to use an anterolateral thigh flap without CT angiography in diabetic patients? J Reconstr Microsurg. 2018; 34: 65-70.
2. Joo Myong Paik, Jai-Kyong Pyon. Risk Factor Analysis of Freestyle Propeller Flaps. J Reconstr Microsurg. 2017; 33:26-31.
3. Joon Pio Hong, Changsik John Park, Hyunsuk Peter Suh Importance of Vascularity and Selecting the Recipient Vessels of Lower Extremity Reconstruction. J Reconstr Microsurg. 2021; 37:083-088.
4. Kolacz, Szymon, Moderhak, Mateusz, Jankau, Jerzy. New perspective on the in vivo use of cold stress dynamic thermography in integumental reconstruction with the use of skin-muscle flaps. Journal of Surgical Research. 2017; 212:68-76.
5. Naohiro Ishii, Tomoki Kiuchi, Takahiro Uno, Yuichiro Uoya, Kazuo Kishi. Effective Salvage Surgery of a Severely Congested Propeller Perforator Flap Using a Postoperative Delay Technique and Negative-Pressure Wound Therapy. The International Journal of Lower Extremity Wounds. 2020;19:86-88.
6. Thiessen F, Tondu T, Vermeersch N., Cloostermans B. Dynamic infrared thermography (DIRT) in Deep Inferior Epigastric Perforator (DIEP) flap breast reconstruction: Standardization of the measurement set-up. Gland Surgery. 2019; 8:799-805.
7. Patent for useful model № 143213, UA, IPC A61B 5/01 (UA) Method of preoperative preparation of donor zones for plastics of defects of covering tissues. Sliesarenko S.V., Badiul P.O., Korpusenko E.I., Nor N.M. 2020.
8. Badiul P.O., Sliesarenko S.V. Reconstruction of extensive soft tissue defects using an anterolateral thigh perforator flap. Surgery of Ukraine. 2017;3:12-19.
9. Koshima I.Perforator flaps concept, history and evolution of the use of anterolateral thigh flap (ALT). Reconstructive and plastic surgery issues. 2020;2: 5-12.
10. Sliesarenko S.V., Badiul P.O., Hong J.P., Sliesarenko K.S., Korpusenko E.I. Basic principles and modern reconstruction algorithm for combined injuries of the lower extremities. Plastic, reconstructive and aesthetic surgery. 2017;3-4: 49-74.
11. Sliesarenko S.V., Badiul P.O. [Perforator flaps in reconstructive surgery]. Atlas. Dnipro: ART-PRESS. 2021; 552.
12. Frank J DellaCroce, Chief Editor, James Neal Long What are the possible complications of perforator flap breast reconstruction? Medscape.2022
13. Yingchao Yin , Ruipeng Zhang, Shilun Li, Jialiang Guo , Zhiyong Hou, Yingze Zhang. Negative-pressure therapy versus conventional therapy on split-thickness skin graft: A systematic review and meta-analysis. Int. J. Surg. 2018;50:43-48.
14. Lang TA, Sesik M. How to describe statistics in medicine. A guide for authors, editors and reviewers. 2nd ed. per. from English V.P. Leonova, editor. Moscow: Practical Medicine, 2016: 480.
15. Rebrova O.Y. Statistical analysis of medical data. Application of the STATISTICA application package. Moscow: Media-Sphere; 2006:312.
16. Sven Weum, Alexander Lott, Louis de Weerd . Detection of Perforators Using Smartphone Thermal Imaging. Plast. Reconstr. Surg. 2016;138:938e-940e.

PREOPERATIVE PREPARATION OF DONOR ZONES OF PERFORANT FLAPS BY THE METHOD OF TRAINING PERFORANT VESSELS WITH NEGATIVE PRESSURE

Trofimov N.[1] , Kryshen V.[1], Korpusenko I.[3], Nor N.[1], Korpusenko E.[1] , Makarenko A.[2]

[1]Dneprovsk State Medical University, Department of General Surgery. Dnipro. Ukraine.

[2]National Medical University. A.A. Bogomolets. Kiev. Ukraine.

[3]Dneprovsk State Medical University, Department of Surgery №3. Dnipro. Ukraine.

Summary. One of the key factors in achieving favorable treatment outcomes when planning reconstructive surgeries using perforant flaps is the choice of recipient vessels. Their

identification causes certain difficulties both at the planning stage and during the operation. The aim of the study was to develop the most rational modes of action of negative pressure on the skin of the thigh. For preoperative preparation of the donor zone for the formation of perforant flaps, a local vacuum (VAC - action) was used, which was created using a negative pressure apparatus "AGAT-Dnepr" (Ukraine) by applying it to the anterior surface of the thigh. Preoperative location of perforants was performed using a Flir ONE (USA) thermal imager for smartphones and tablets based on Android. The studies were carried out on a group of healthy volunteers - 35 people: 17 women and 18 men aged 19 to 50 years on the basis of the burn department of the clinic in Dnipro, Ukraine in 2020-21. at the same time at the specified time intervals - 60 seconds (immediately after the action of negative pressure); 20, 30, 60 minutes; after 24 and 48 hours. The highest average number of perforants in the examined patients was observed after 30 minutes of VAC- action - 12.0 (6.0; 12.0), which was statistically significantly higher compared to their number, which was detected after 10 minutes of negative pressure action ($p<0.001$). On average, according to the median values of 12 perforants after 30 minutes, the VAC action remained after 20, 30 and 60 minutes and decreased only after 24 hours. Doubling the period of VAC - action to 60 minutes and no longer led to an increase in the number of perforators. Therefore, the optimal negative pressure time was 30 minutes when up to 10-12 perforants are opened. The smallest average number of perforants was observed at the pressure level P=(-100 mmHg) 24 hours after the VAC-action and at P=(-160 mmHg) 48 hours later. The largest average number of perforants was detected at the pressure level P= (-130 mmHg) – 10.0 (8.0; 14.0), which was statistically significantly higher compared to their number under the negative impact of pressure P =(-100 mmHg) ($p<0.001$). The indicator was constant, the number of perforators was maintained during the entire observation period from 30 minutes to 48 hours. The action of local negative pressure contributed to the opening of perforants of the second and third levels and thus improved blood supply to the donor area. Pressure P= (-130 mm Hg) and time of 30 minutes was the most optimal mode of action on the skin of the anterior surface of the thigh, since 10 to 14 perforants were determined. The use of local negative pressure against the background of cooling may be useful for "training" the perforant vessels of the donor site for 2-3 days before surgery to reduce postoperative complications.

Keywords. Reconstructive surgery, negative pressure, perforant flaps, donor sites, dynamic thermography, blood flow.