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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

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გამოიცემა თბილისის სახელმწიფო სამედიცინო უნივერსიტეტთან
თანამშრომლობითა და მისი პატრონაჟით

ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

ТБИЛИСИ - НЬЮ-ЙОРК

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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.

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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.

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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.

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

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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.

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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).

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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).

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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.

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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.

Содержание:

HISTOLOGICAL EVALUATION OF THERAPEUTIC EFFECTS OF DEXPANTHENOL COMPOSITION WITH CERAMIDES IN RATS WITH SKIN BURN INJURY

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Burn injury is one of the most common types of traumatic damage and most serious pathological condition that occurs in humans. Annually 6 mln. people with burns apply for medical help in the world [16].

The processes occured in response to burn injury combine microcirculatory disorders such as hypoxia and necrosis of tissue, release of inflammatory mediators leading to development of metabolic and neurohormonal disorders with subsequent dysfunction of all organs and systems [2,12].

According to international classification of diseases in case of deep burns (III-A stage) all layers of epidermis and dermis are destroyed. Self-epithelization possible only in case of uncomplicated wound healing due to remaining of skin derivatives (hair follicles, sebaceous, sweat glands) in deep layers of dermis within 3-4 weeks. In case of skin destruction below papillary dermis skin restoring integrity always occurs through formation of coarse-fiber connective tissue - scar [4,10]. The most common type of scar is hypertrophic (up to 70%) in burn injuries [14]. The direction of collagen fibers in hypertrophic scars is not linear, and nodes are formed of fibers where collagen is laid more densely [4,10]. Appearance of rough scars, especially on exposed areas of body, often leads to decrease in quality of life, to development of psycho-emotional disorders [4,9].

Today, in Combustiology, thermal burns are not only urgent medical problem but they are sociol-economic one due to long period of hospitalization, high cost of drug therapy and / or surgical treatment of burn wounds [6,13].

Stimulation of wound healing is difficult process where intermittent or inadequate treatment of wounds may lead to poor scar formation [17]. Today in modern Combustiology methods aimed to fill newly epidermis of skin defect are used which are based on stimulation of epidermal cell proliferation for wound treatment [15].

Full structure restoring of epidermal barrier at burn injury is possible due to understanding its structure and dynamics of functioning. That is why drugs, containing plastic material for reconstruction of epidermis open new perspectives in medicine.

Ceramides (40-50%), cholesterol (20-25%), cholesterol sulfate (5-10%) and free fatty acid (15-20%) are known to be the main lipid matrix components of skin barrier [5]. This work is dedicated to experimental study aimed at introducing natural components of skin (ceramids) to existing wound-healing agents (dexpanthenol) for optimization of burns healing.

The purpose of these studies is histological evaluation of wound healing processes in terms of burn injuries during their treatment based on dexpanthenol with ceramides composition.

Material and methods. In experiment we used 48 white male rats weighing 200-240 g. Experimental animals were divided into 4 groups (n=12): group 1 - control pathology (CP), animals with burns that were not treated; 2-4 groups – were animals with burns treated with 0.2% ceramides cream; 5% dexpanthenol cream and 0.2% ceramides; Bepanten® cream containing 5% dexpanthenol («Bayer AG Konsyumer Kerr», Switzerland), respectively. Cream was applied in experimental dose of 15 mg/cm^2 once a day.

Products containing ceramides have been developed by prof. M. O. Lyapunov. Chemical composition of Ceramidies LS – glikoceramides (65-100%), cholesterol (1-3%), phospholipids (25-38%) are elements of drugs and they are similar to human skin composition by 4/5. According to manufacturer «Cognis», they bring endogenous ceramides, that improves balance of moisture, elasticity and firmness of skin and restore its barrier properties.

A burn injury modeling in animals was provided under tiopental anesthesia (30 mg/kg) on depilated skin area on backs of experimental rats, at distance 1.5 cm from back bone burn was made. A special heated device was used for this purpose. It was a round metal plate 2.5 cm in diameter. The temperature of hot plate was 200 ^{0}C and contact lasted 10 seconds [8]. This method allowed to obtain standard burns that meet parameters of III-A stage burns clinical classification by size and depth of damaged skin.

Studies were conducted in compliance with rules of Bioethics according to requirements of European Convention for laboratory animals Protection (c. Strasbourg, 1986) and IV-th National Congress on Bioethics (m. Kyiv, 2010). Euthanasia of animals was carried out by chloroform overdose according to covenants of bioethics.

For histological studies samples of burn skin were taken on 9-th and 18-th day after modeling of burn pathology and all material was fixed in 10% neutral formalin solution. They were dehydrated in spirits of increasing concentration, and poured into cellodin-paraffin. Samples were stained with hematoxylin and eosin. Microscopic examination of micropreparations was carried out with help of microscope Mikros 400 (Austria) and Microphotography of images with a digital camera Nicon Col Pix 4500. Photos were processed on a Pentium 4GHz computer on basis Nicon View 5 program.

Histological level of healing intensity (severity of necrotic layer, degree of maturity of granulation tissue and epithelialization surface) was assessed by 5-point scale in the state of burn wounds in animals of different experimental groups for comfortable comparison. The main criteria for semiquantitative visual assessment of capacity histochemical reactional capasity on a scale of evaluation was provided: no indication - 0 points; poorly intensive - 1 point; moderately intensive - 2 points; intensive - 3 points; very intensive - 4 points. The degree of granulation tissue maturity in burn wound was evaluated by saturation of cellular material mainly by material of hematogenous cells or cells of fibroblast origin along with severity and vascularization as well as reduction of vessel characteristics fiber formation (proliferation of fibroblasts, blood vessels and reduction fiber formation characteristic of more mature tissue).

Results of research were processed by modern statistical methods using «Statistica 6.0» programs. Reliability of intergroup differences was installed via using parametric and nonparametric methods. Level of accepteble differences was $p \leq 0,05$ [7].

Results and their discussion. Results of histological examination showed that on 9-th day after burn modeling in rats of CP group surface of wound was covered with thick crust that sometimes was broken away. Cavity of wounds was filled with pus, sanious fibrous exudate, necrotic tissue. Proliferation of round cell elements could be observed in subcutaneous adipose tissue sometimes (Fig. 1a). Often deepening area of necrosis in subcutaneous adipose tissue and muscle fibers - the secondary necrosis of tissues was observed in central areas of wounds. Emergence of very small cells of newly formed blood capillaries and a few young fibroblasts appeared in loose connective tissue adjacent to the layer of muscle fibers (Fig. 1 b). Under burn wound necrotic tissue was newly formed blood vessels with delicate granulation tissue and a high content of cells, including fibroblasts. Fiber formation was not intensive. Boundary epithelization of thickened epidermal basal cells surrounding the wound areas was noticed in shape of small thin skin stripe penetrating under or between necrotic tissues (Fig. 1 c,d).

After 18 days of treatment dense healing crust was absent in 83.3% of rats samples. Burn wound some was reduced in size. Surface layers were of remaining defects was different by severity necrotic mass with fibrinous components. Middle and bottom layers of burn wounds in central zone were filled with vascularized tissue rich on fibroblasts granulation. Fibrylohenesis is visible at the bottom in wounds. Collagen fibers were thin, parallel to the surface of wound. On boundary areas wound tissue of collagen fibers content was increased and looked like fibrous. The process of epithelium regeneration was rather slowly in most rats (Fig. 1 e, g, h). Only one rat of this group had totally healed burn wounds with formed fibrous scar and small fester areas formation of fibrous scar with small cells festers. Recovery of individual hair follicles was presented and contraction was perfofmed (Fig. 1f).

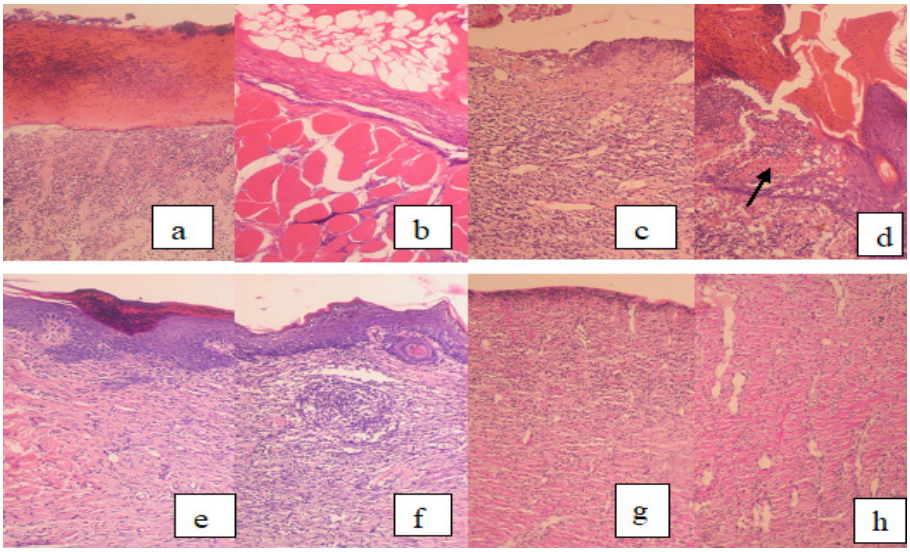

Fig. 1. State of burn wounds in rats that were not treated on 9-th day after injury. Central zone: wound filled with sanious fibrinous exudate; necrotic tissue, covered with thick crust (a); depth of necrosis in subcutaneous tissue and in muscle fibers (b), non intensive fiber formation (c); insufficient boundary epithelization (d). Burn wound of untreated rats on 18-th day after injury. Insignificant boundary epithelization, fibrous scar on the former site of defect, visible contraction (e), fester site (f). Distinctiveness of fiberformation in central area of wound (g - less) and boundary (h - more). Hematoxylin and eosin. (a, b, d, e, f) x100. Pikrofuksyn by Van Ghyson. (c, g, h) x 100

After treatment of burn wounds by dexpanthenol with ceramides cream on 9-th day of experiment central area of burn wound contained granulation tissue with a large number of newly formed blood vessels, cellular elements, including space oriented fibroblasts in 33.33% of rats. Granulation tissue was covered with thin layer of fibrin, infiltrated with degraded leukocytes. Sometimes with remained cells of subcutaneous tissue were seen under the area of granulation. Here, signs of more mature fiberfomation tissue were regested.. Bottom parts of wounds were developed by fibrous connective tissue with blood capillaries and a definite number of cellular elements (Fig. 2 a-d). Sequestration of necrotic mass was clearly traced in hypodermis of 50% of animals. There was a dense diffuse infiltration round cells elements mixed with fibroblasts; visible strands of granulation tissue on the border with adjacent layers along defect layers; fiberformation of different number of blood vessels in subcutaneous adipose tissue of central areas in burn wounds (Fig. 2 b). In all cases blood vessels filled with erythrocytes, which, indicated their good permeability, restored blood flow in paranecrotic area. In lumen there were white blood cells that indicated their migration, lysis of necrotic tissue in wound, faster cleaning of wound. In boundary places of burn wounds granulation tissue had more mature character and good boundary epithelization surface in majority of rats. On boundary of burn wound skin areas had reduced symptoms of traumatic inflammation. Even in rat, which state of burn wounds was identical not treated one (16.66%), there was precence of small cells of newly formed blood capillaries and evidence of cell proliferation (Fig. 2 d).

On 18-th days of treatment with dexpanthenol and ceramides cream intensive formation of connective tissue was continued in all groups of rats. Fiber connective tissue with average amount of thinwalled vessels and cells filled up to 2/3 of wound volume in central areas. Surface units of newly formed tissue had less mature character and were covered with remains of detritus. In the peripheral zones of burn wounds visible connective tissue was formed, which structure was close to dermis (Fig. 2 g, h). Renewed skin derivatives were seen sometimes. Rate of epithelial regeneration was better. Regenerated epithelium was thickened and obligate layers of epidermotsyts were visible (Fig. 2 e, f).

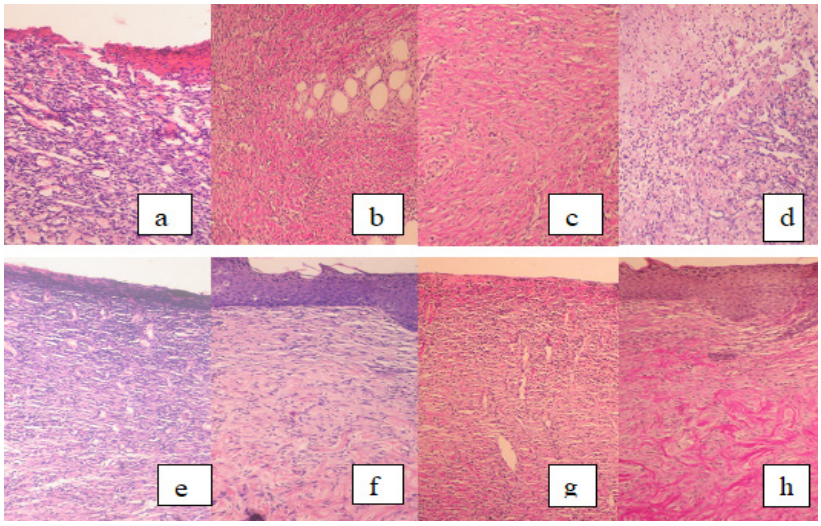

Fig. 2. Burn wounds in rats treated with dexpanthenol and ceramides cream on 9-th day after injury. The central zone: wound filled with granulation tissue rich in blood vessels (a); intensive fiber formation in granulation tissue of hypodermis (b); connective tissue character of wound (c), area of cells with newly blood vessels, proliferation signs were seen among structureless mass in area of necrosis (d). On 18-th day after injury burn wounds in rats treated with dexpanthenol and ceramides cream: newly formed tissue different that filled cavity of defect (e - central zone); formed connective tissue similar in structure to dermis (f - peripheral zone), surface covered by thickened regenerated epithelium; different content of collagen fibers in tissue which filled central zone of wound defect (g); bunch of collagen fibers in newly formed tissue (h). Hematoxylin and eosin (a, d, e, f), Pikrofuksyn by Van Ghyson. (B, c, g, h) x 100

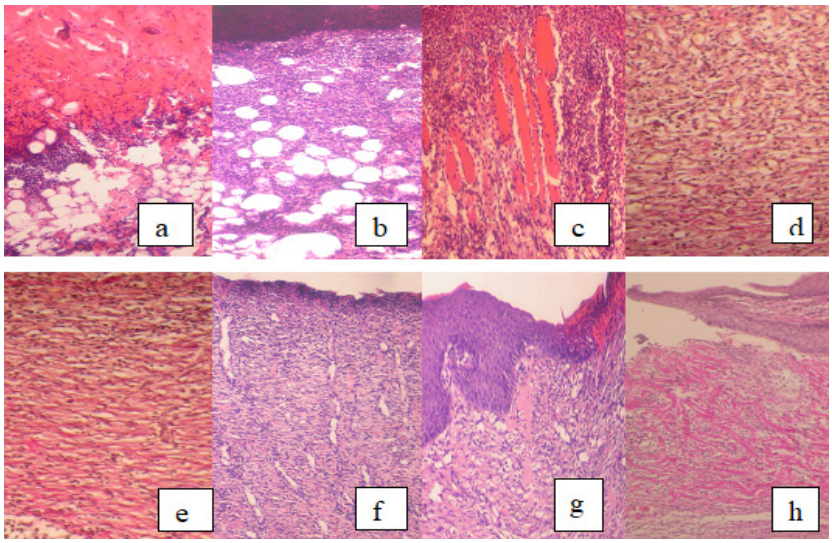

Fig. 3. Burn wounds in rats treated with ceramides cream, on 9-th day after injury, necrosis of epidermis, dermis and hypodermis (a), dense-cells macrophagal leukocyte infiltration of hypodermis (b) parts of muscle fibers (c). Hematoxylin-eosin x 100. Different levels of fiberformation (d - less; e - more). Pikrofuksyn by Van Ghyson. x 100. Burn wounds in rats treated with ceramides cream on 18-th day after injury, granulation tissue in defect cavity with signs of fiberformation, incomplete reduction of vessels (f); intensive regeneration of epithelial layer (g); beneath epithelium collagen fibers which are collected in bunches that have normal spatial orientation (h). Hematoxylin-eosin. x 100

Condition of burn wounds in rats was significantly fluctuated after 9 days of ceramides cream applying. In one rat (16.66%) condition of burn wounds was the same as in CP group (Fig. 3 a). In 33.33% cases fibrous-purulent and fibrous-ichor exudate - tissue detritus were seen on wound surface of animals. Hypodermis and muscle fiber fragments were infiltrated densely by macrophages and leukocytes under detritus (Fig. 3 b, c). Cavity of wound in remaining 50% of rats was filled with dense-cells granulation tissue with a small amount of thin-walled blood vessels, with distinct fiberformation. Boundary epithelization surface was clearly visible on boundary zones (Fig. 3 d, e).After 18 days of ceramides cream application wound was filled with granulation tissue with distinct fiberformation characteristics (preserving parts of blood vessels), with good rate of epithelium regeneration. Regenerated epithelium brought to thickening of granulation collagen fibers which became gathered in bunch with normal for dermis spatial orientation (Fig. 3 f, h).

After treatment with comparison drug - cream «Bepanten» on 9-th day 66.66% rats tissue condition in burn wound was neutral in comparison with animals treated with dexpanthenol and ceramides cream and cream with ceramides. The depth of defect

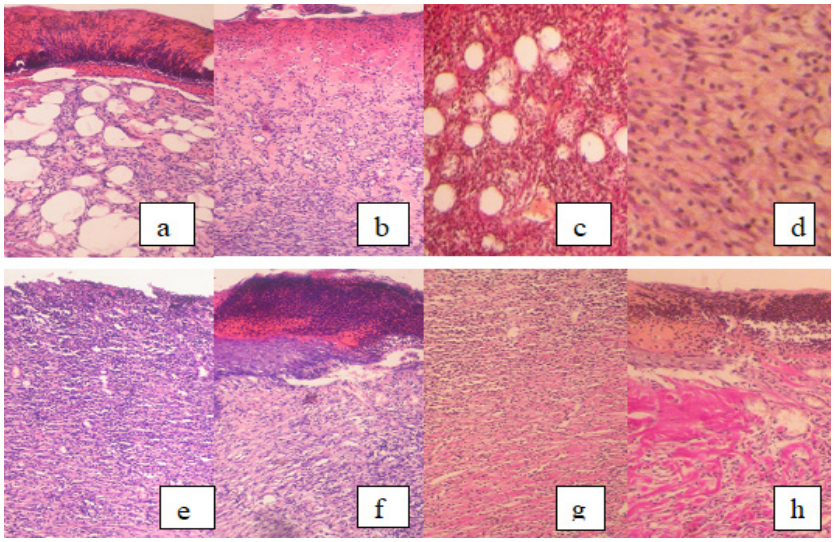

Fig. 4. Burn wound in rats treated with "Bepanten" cream on 9-th day after injury. Central zone: round-cells infiltration of hypodermis with remnants of degraded elements was seen beneath fibrinous ichos part (a); blood vessels were seen through remnants of necrotic fibers, at bottom of wound fibroblasts are located in order (b). Hematoxylin and eosin. x 100. Reasonable initial signs of fiberformation in granulation tissue cells (c); no sign of fiberformation (d). Pikrofuksyn by Van Ghyson. x 200. Burn wounds in rats treated with "Bepanten" cream on 18-th day after injury. Central zone: different level of granulation tissue maturity (e), different intensity of fiber formation (g); peripheral zone: differentiation of layers in regenerated epithelium, connective and granulation nature of newly formed tissue (f), state of collagen matrix in wound (h). Hematoxylin and eosin, (ef), Pikrofuksyn by Van Ghyson. (Gh) x 100

Table. Semiquantitative histological evaluation of burn wounds healing in rats, points, Q_{25}-Q_{75}, n=6

Indexes	Days of treatment	Experimental groups			
		Control pathology	Cream with dexpanthenol and ceramides	Cream with ceramids	"Bepanten" cream
Thickness of of necrotic layer	9	3,20±0,29 3.5 (2.25 - 4)	1,10 ± 0,28 */** 1 (1 - 1)	2,10 ± 0,31 * 2 (1.25 - 2.75)	2,50 ± 0,17 2.5 (2 - 3)
	18	1,30 ± 0,21 @ 1 (1 - 2)	-	0,30 ± 0,15 */@ 0 (0 - 0.75)	0,60 ± 0,22 */@ 0.5 (0 - 1)
Level of granulation tissue maturity	9	0,60 ± 0,22 0.5 (0 - 1)	2,20 ± 0,13 * 2 (2 - 2)	1,50 ± 0,31 * 2 (1 - 2)	1,10 ± 0,35 1 (0 - 2)
	18	1,80 ± 0,20 @ 2 (1.25 - 2)	3,20 ± 0.20 */**/@ 3 (3 - 3.75)	2,60 ± 0,22 */@ 2.5 (2 - 3)	2,30 ± 0,15 @ 2 (2 - 2.75)
Intensity of epithelialization	9	0,60 ± 0,24 1 (0 - 1)	2,00 ± 0,00* 2 (2 - 2)	1,40 ± 0,24 1 (1 - 2)	1,20 ± 0,20 1 (1 - 1)
	18	1,60 ± 0,24 2 (1 - 2)	3.00 ± 0.00 */**/@ 3 (3 - 3)	2,40 ± 0,24* 2 (2 - 3)	2,20 ± 0,20 2 (2 - 2)

*note: * - significant deviation from control pathology group, p<0.05; ** - significant deviations according to comparison drug, p<0.05; @ - significant deviation on 9-th day of experiment, p<0.05*

was reduced, growth of epithelium was presented and wound was filled with hypodermis where round-cells infiltration, granulation tissue cells with moderate initial signs of fiberformation were seen in different areas (Fig. 4 a). Condition of wounds in remaining animals compared with CP group (Fig. 4 b, d).

After 18 days of «Bepanten» cream applying more mature character of granulation tissue in central areas of defects was noticed and regenerated collagen matrix of connective tissue in peripheral areas of burn wounds was fixed too (Fig. 4 e, f). Newly formed epithelial layer, which covered wound defect area, was thicken and differentiation of layers was seen. After 18 days of "Bepanten" cream applying more mature character of granulation tissue in central areas of defects was noticed and regenerated collagen matrix of connective tissue in peripheral areas of burn wounds was fixed too (Fig. 4 e, f). Newly formed epithelial layer, which covered wound defect area, was thicken and differentiation of layers was seen.

Semiquantitative assessment of histological signs of healing (intensty of necrotic layer, maturity of granulation tissue, epithelization of wound) on bases of point system given in Table.

The results of semiquantitative assessment of therapeutic effects of dexpanthenol with ceramides cream on the 9-th day of experiment: increase of newly formed tissue maturity that filled defect was 3.7 times, acceleration intensity of edge epithelialization was

3.3 times. Surface of wound is covered with less intensive necrotic layer, that proves more active cleaning of wound. All these features are significantly dominated in comparison with control pathology. On the 18th day of experiment granulation tissue turned into fibrous, that had intensive epithelization on surface, which was avidence of more completed healing process.

Application on ceramides only improves histological signs of healing compared with CP group, but it is less efficient than complex application with dexpanthenol. Comparison drug turn out have less healing properties than dexpanthenol with ceramids cream and cream with ceramides according to semiquantative assessment.

Thus, we can conclude on basis of obtained microscopic data that control rats, which an experimental burn wounds were healed naturally, changes of necrotic-inflammatory character were observed on 9-th day. Formation and maturation of granulation tissue, its transformation into fibrous tissue, regeneration of epithelium was gradually activated on 18-th day .

Signs of regeneration in wounds were clearly seen after using of dexpanthenol cream with ceramides on 9-day after injury. Contrary to rats in CP group level of wound cleaning was accelerated a lot. Majority of rats had wounds filled with granulation tissue, main components of which were vertical vascular loops, fibroblasts became main cellular elements. Epithelium regeneration was accelerated too. Reorganization processes of granulation tissue and maturation of scar tissue were observed on 18-th day. All these factors created the decrease in size and intensity of wound epithelialization.

Use of cream with ceramides accelerated process of wounds regeneration in most rats after 9 days of treatment. Maturation and reconstruction of newly formed tissue, regeneration of epithelium were observed in comparison with CP group on 18-th day of treatment. But positive effect of ceramids on burn wounds healing process in case of monotherapy was decreased in comparison with dexpanthenol combination (especially on 9-th day of treatment).

«Bepanten» cream - comparison drug was less active in both periods of experiment than creams containing combination of dexanthenol and ceramides. According to semiquantitative assessment drug for comparison is inferior to effects of dexpanthenol and deramides cream and cream with deramides.

Thus, result of histological evaluation perform intensity of therapeutic action in such order: dexpanthenol with ceramides cream < cream with ceramides < cream “Bepanten”.

Complex research conducted proved that ceramides influence on healing process and their adding to dexpanthenol is sutable because they have different intensity and mechanism of reparative activity.

Tissue damaged tissue has a needs for construction (proteins, carbohydrates, lipids, water), energy and nutrition (including pantothenic acid) materials, because they are involved in variety of biochemical processes, which accelerate them and due to it restore injured tissue. Thus, from sientific data it is known that dexpanthenol with local application is quickly absorbed by skin, turning into pantothenic acid, which is part of coenzyme acetyl-CoA and plays an important role in cellular metabolism (ATP synthesis, acetylglucosamine and mucopolysaccharides, waste products demination of amino acids, metabolism optimization of fatty acids and phospholipids). Pantothenic acid accelerates cell division along with restorative properties due to which adds strength to collagen fibers that restores skin detects anti-inflammatory (being involved in anti-inflammatory hormones synthesis) and imunomodulating (stimulates of antibodies formation) effects [1].

Main components of ceramides are hlikokeramidy, cholesterol, phospholipids. Glycoceramids, which have endogenous glycoceramids content, save energy for biological material building (for synthesis of these substances) making important contribution to restoration of epidermis. Phospholipids and cholesterol make impact on recovery of lipid bilayer of cell membrane. Special attention was paid to the fact that moisturizing helps recovery process because it prevents from excessive drying of tissue necrosis that avoids development of scar deformations [3, 11]. In moist environment transporting of substances (histamine, serotonin, prostaglandins and nutrients) becomes easier and helps to growth factors (epidermal, fibroblast), hormones (aldosterone, corticoids), immune cells (neutrophils, lymphocytes, monocytes). Dermis cells have easier access to intercellular interaction, excretion of extracellular matrix and cytokines and they accelerate proliferation of keratinocytes and endothelial cells [3,11].

Conclusion. Histological confirmation of therapeutic effects of ceramides, which include dexpanthenol in their composition, was obtained in research presented.

Rationality of using ceramids, which provide healing without rough scars formation, was proved.

Prospects and cost-effective methods, which can increase efficiency of burn injuries treatment, were suggested.

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SUMMARY

HISTOLOGICAL EVALUATION OF THERAPEUTIC EFFECTS OF DEXPANTHENOL COMPOSITION WITH CERAMIDES IN RATS WITH SKIN BURN INJURY

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The objective of our research was histological evaluation of therapeutic effects in case of burn injury in rats.

Experiment was conducted on 84 test rats with burn injury of III-A stage. Therapeutical effect of studied medicines was evaluated using histological methods.

Results achived gave evidence that on 18-th day of treatment with ceremids cream and dexpanthenol with ceramids cream the level granulation tissue maturing increased by 1,4 and 1,7 times and intensity of burn injury epithelization rose by 1,5 and 1,9 times in comparison with non-treated animals. Therapeutic effect of dexpanthenol with ceramids cream significantly overcome action of «Bepanten» cream.

Thus, experiment done proved efficiency of ceramids use in cream composition with dexpanthenol as one of the therapeutic methods aimed at increase of skin burn injury healing activation.

Keywords: burn injury, dexpanthenol, ceramids, healing injury.

РЕЗЮМЕ

ГИСТОЛОГИЧЕСКАЯ ОЦЕНКА ЛЕЧЕБНОГО ДЕЙСТВИЯ КОМПОЗИЦИИ ДЕКСПАНТЕНОЛА С КЕРАМИДАМИ ПРИ ОЖОГОВОЙ ТРАВМЕ КОЖИ У КРЫС

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Целью исследования явилась гистологическая оценка лечебного действия композиции декспантенола с керамидами в условиях ожоговой травмы. Опыт проведен на 84 экспериментальных крысах, у которых вызвали ожог кожи IIIA степени. Лечебное действие исследуемых препаратов оценивали с использованием гистологических методов исследования.

Результаты проведенных исследований показали, что на 18 день лечения ожогов кремом с керамидами и кремом декспантенол с керамидами достоверно повысилась степень созревания грануляционной ткани в 1,4 раза и 1,7 раза и выраженность эпителизации раневого дефекта в 1,5 раза и 1,9 раза, соответственно, в сравнении с нелеченными животными. Лечебное действие крема декспантенола с керамидами достоверно превышало действие крема «Бепантен».

Таким образом, проведенные исследования подтверждают целесообразность введения керамидов в состав крема с декспантенолом, как одного из лечебных методов повышения эффективности заживления ожоговых травм кожи.

რეზიუმე

კერამიდების შემცველი დექსპანტენოლის კომპოზიციის სამკურნალო მოქმედების ჰისტოლოგიური შეფასება ვირთაგვების კანის დამწვრობის ტრავმის დროს

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კვლევის მიზანი იყო კერამიდების შემცველი დექსპანტენოლის კომპოზიციის სამკურნალო მოქმედების ჰისტოლოგიური შეფასება კანის დამწვრობის ტრავმის პირობებში.

ცდა ჩატარდა 84 ექსპერიმენტულ ვირთაგვებზე IIIA ხარისხის კანის დამწვრობით. გამოსაკვლევი პრეპარატების სამკურნალო მოქმედება შეფასდა კვლევის ჰისტოლოგიური მეთოდების გამოყენებით.

ჩატარებული კვლევების შედეგებმა აჩვენა, რომ კერამიდების შემცველი კრემით და კერამიდების შემცველი დექსპანტენოლის კრემით დამწვრობის მკურნალობის მე-18 დღეს მომწიფდა გრანულაციური ქსოვილი (1,4-ჯერ და 1,7-ჯერ) და ჭრილობის დეფექტის ეპიტელიზაცია (1,5-ჯერ და 1,9-ჯერ, შესაბამისად) ცხოველთა საკონტროლო ჯგუფთან შედარებით. კერამიდების შემცველი დექსპანტენოლის კრემის სამკურნალო მოქმედება სარწმუნოდ აღემატება კრემ „დეპანტენი“-ს სამკურნალო მოქმედებას.

ამგვარად, ჩატარებული კვლევები ადასტურებს დექსპანტენოლის კრემში კერამიდების შეყვანის მიზანშეწონილობას კანის დამწვრობის ტრავმის შეხორცების ეფექტურობის ამაღლების მოზნით.