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# DISTRIBUTION OF DENDRITIC CELLS IN THE PILOSEBACEOUS UNIT OF THE SCALP IN SUBVERSIVE ABSCESSING PERIFOLLICULITIS OF THE SCALP: IMMUNOMORPHOLOGICAL ASPECTS

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**Ключові слова:** *клітини Лангерганса, дендритні клітини, Т-лімфоцити, абсцедуючий перифолікуліт голови, хвороба Гоффмана, розсікаючий целюліт шкіри голови, абсцедуючий і підриваючий перифолікуліт голови, рубцеві зміни волосистої частини голови, рубцова алопеція, дерматологія, трихологія, хвороби волосся, патоморфологія шкіри, імуногістохімія*

**Abstract. Distribution of dendritic cells in the pilosebaceous unit of the scalp in subversive abscessing perifolliculitis of the scalp: immunomorphological aspects. Poslavska O.V., Statkevych O.L., Sviatenko T.V., Chekan S.M.** *Abscessing perifolliculitis of the scalp (Hoffmann's disease) is a rare but serious chronic purulent-inflammatory disease of the hair follicles, which leads to the formation of deep abscesses, cicatricial alopecia and a significant decrease in the quality of life of patients. Our observations of the increase in cases allow us to state the relevance of this problem today and the need for additional, more thorough study of the pathology of the immune system underlying this pathological process. In the skin, one of the leading places among the cells that maintain local immune homeostasis and initiate protective innate and adaptive immune responses is occupied by Langerhans cells or the so-called dendritic cells of the epithelium. The aim of the work is to investigate the number and location of skin dendritic cells (separately subpopulations of Langerhans cells and dermal dendritic cells) in subacute abscessing perifolliculitis of the head, with special attention to damage to the structures of the pilosebaceous unit of the skin. Biopsy material from patients diagnosed with abscessing perifolliculitis of the head (Hoffmann's disease) who underwent examination and treatment at the medical center of the private enterprise "Dzerkalo", Dnipro, Ukraine, was studied. All patients were male military personnel, whose age ranged from 20 to 51 years, the average age was 35.5±11.54 years. IHC was performed according to the TermoScientific (TS) protocols with primary antibodies to dendritic cells (CD1a, RTU). The Lab Vision Quanto (TS, USA) imaging system was used with the determination of the reaction using the DAB Quanto Chromogen (TS, USA) chromogen. Studies of the number and distribution of CD1a (+) cells (epidermal Langerhans cells and dermal dendritic cells) revealed significant differences in their accumulation and branching for the comparison groups. The greatest difference was demonstrated by areas of hair follicles where Langerhans cells were absent in the control group, namely in the internal root epithelial sheath, as well as in the hair dermal papilla (all $p<0.05$). In comparison, in abscessing perifolliculitis of the head, CD1a (+) cells actively accumulated in these areas with spread to areas around the sebaceous glands and muscles that lift the hair, with significant infiltration of all structures of the pilosebaceous unit and the surrounding dermis or hypodermis stroma. The average number of Langerhans cells among keratinocytes in the study group significantly exceeded the control group's indicators (26.07±11.51 cells compared to 6.02±11.51 cells, respectively ($p<0.05$)), and also demonstrated a wide network of branched processes. The stratified squamous epithelium in abscessing perifolliculitis of the head was characterized by acanthosis, hyperplasia, and increased mitotic activity. Accumulation of CD1a (+) cells in the internal root epithelial sheath and hair dermal papilla was observed only in the study group and was absent in the control group, ($p<0.05$). In the outer root epithelial sheath of pilosebaceous units around the hair follicle bud roller, the number of CD1a (+) cells in the study group significantly*

*exceeded the control group (31.44±8.86 cells compared to 4.84±1.12 cells, respectively (p<0.05)), due to which T-lymphocyte infiltration with prolonged inflammatory damage and alopecia is probably maintained in this area. A statistically significantly higher density of infiltration by CD1a (+) dendritic cells in the area of the excretory ducts of the secretory departments of the sebaceous glands in the study group compared to the control group (17.87±11.65 cells compared to 6.24±2.05 cells, respectively (p<0.05)) due to excessive antigenic stimulation may be the cause of sebaceous gland hyperplasia. The increased density of antigen-presenting cells such as CD1a (+) dendritic cells among the inflammatory infiltrate of the dermis in PCAS compared to the control group (52.50±16.77 cells compared to 6.87±3.13 cells, respectively (p<0.05)) indicates the active migration of these motile cells and the predominance of effector mechanisms of the immune response around the pilosebaceous units of the scalp.*

**Реферат. Розподіл дендритних клітин у пілосебаційній одиниці шкіри голови при підриваючому абсцедуючому перифолікуліті голови: імуноморфологічні аспекти. Послwoвська О.В., Статкевич О.Л., Святенко Т.В., Чекан С.М.** *Абсцедуючий перифолікуліт голови (хвороба Гофмана) є рідкісним, але серйозним хронічним гнійно-запальним захворюванням волосяних фолікулів, що призводить до утворення глибоких абсцесів, рубцевої алопеції та значного зниження якості життя пацієнтів. Наші спостереження щодо збільшення звернень дають змогу стверджувати про актуальність цієї проблеми на сьогодні та необхідність додаткового більш ретельного вивчення патології імунної системи, що лежить в основі цього патологічного процесу. У шкірі одне з провідних місць серед клітин, що підтримують місцевий імунний гомеостаз та ініціюють захисні вроджені та адаптивні імунні реакції, займають клітини Лангерганса, або так звані дендритні клітини епітелію. Мета роботи – дослідити кількість та особливості розташування дендритних клітин шкіри (окремо субпопуляцій клітин Лангерганса та дендритних клітин дерми) при підриваючому абсцедуючому перифолікуліті голови, з особливою увагою на ушкодження структур пілосебаційної одиниці шкіри. Досліджено біопсійний матеріал пацієнтів з діагнозом абсцедуючий перифолікуліт голови (хвороба Гофмана), що проходили обстеження та лікування на базі медичного центру приватного підприємства «Дзеркало», Дніпро, Україна. Всі пацієнти були чоловіками, вік яких коливався від 20 до 51 року, середній вік становив 35,5±11,54 року. ІГХ проводили за протоколами TermoScientific (TS) з первинними антитілами до дендритних клітин (CD1a, RTU). Використовували систему візуалізації Lab Vision Quanto (TS, США) з визначенням реакції за допомогою хромогену DAB Quanto Chromogen (TS, США). При дослідженні CD1a (+) клітин (клітин Лангерганса епідермісу та дендритних клітин дерми) були знайдені значні розбіжності в їх накопиченні та розгалуженні для груп порівняння. Найбільшу різницю демонстрували ділянки волосяних фолікулів, де в групі контролю клітини Лангерганса були повністю відсутні, а саме: у внутрішній кореневій епітеліальній піхві, а також у волосяному дермальному сосочку (всі p<0,05). Порівняно з цим при абсцедуючому перифолікуліті голови CD1a (+) клітини активно накопичувались у цих структурах з поширенням на ділянки навколо сальних залоз і м'язів, що піднімають волосину, зі значною інфільтрацією всіх компонентів пілосебаційної одиниці та строми дерми або гіподерми навколо. Середня кількість клітин Лангерганса серед кератиноцитів у групі дослідження значно перевищувала показники групи контролю – 26,07±11,51 клітини порівняно з 6,02±11,51 клітини відповідно (p<0,05), а також демонструвала широку сітку розгалужених відростків. Багатошаровий плоский епітелій при абсцедуючому перифолікуліті голови характеризувався акантозом, явищами гіперплазії та значним підвищенням мітотичної активності. Накопичення CD1a (+) клітин у внутрішній кореневій епітеліальній піхві та волосяному дермальному сосочку відмічалось тільки в групі дослідження і було відсутнє в групі контролю (p<0,05). У зовнішній кореневій епітеліальній піхві пілосебаційних одиниць навколо валика зародка волосяного фолікула кількість CD1a (+) клітин у групі дослідження значно перевищувала групу контролю – 31,44±8,86 клітини порівняно з 4,84±1,12 клітини відповідно (p<0,05), за рахунок чого, вірогідно, у цій ділянці підтримується Т-лімфоцитарна інфільтрація з тривалим запальним ушкодженням та алопецією. Статистично достовірно вища щільність інфільтрації CD1a (+) дендритними клітинами в зоні вивідних протоків секреторних відділів сальних залоз у групі дослідження, порівняно з групою контролю (17,87±11,65 клітини порівняно з 6,24±2,05 клітини відповідно (p<0,05)), через надмірну антигенну стимуляцію може бути причиною гіперплазії сальних залоз. Підвищена щільність таких антигенпрезентуючих клітин, як CD1a (+) дендритні клітини, серед запального інфільтрату дерми при абсцедуючому перифолікуліті, порівняно з контрольною групою (52,50±16,77 клітини порівняно з 6,87±3,13 клітини відповідно (p<0,05)), говорить про активну міграцію цих рухливих клітин і перевагу ефекторних механізмів імунної відповіді навколо пілосебаційних одиниць шкіри голови.*

Abscessive perifolliculitis of the scalp (Hoffmann's disease or Perifolliculitis capitis abscedens et suffodiens (PCAS)) is a rare but serious chronic purulent-inflammatory disease of the hair follicles, which leads to the formation of deep abscesses, cicatricial alopecia and a significant decrease in the quality of life of patients [1]. According to dermatological clinics, the frequency of visits for abscessed perifolliculitis is quite low compared to the total number of patients with pustular skin lesions. However, due to frequent relapses and ineffectiveness of standard antibacterial therapy, many cases remain insufficiently examined or incorrectly diagnosed [1, 2].

Given the chronic, often recurrent nature of the disease, its resistance to therapy and significant impact on the psycho-emotional state of patients,

further study of effective methods of diagnosis and treatment is an urgent problem of modern dermatology [3].

Due to the rarity of PCAS and the insufficient number of epidemiological studies, specific percentage prevalence rates in different countries have not been established. Unfortunately, there are no statistical data on the prevalence of dermatosis in Ukraine either. Further studies are needed to accurately determine the prevalence of abscessing perifolliculitis of the head in different regions of the world.

Our observations of the increase in cases allow us to state the relevance of this problem today and the need for additional, more thorough study of the pathology of the immune system underlying this pathological process [4].

In the skin, one of the leading places among the cells that support local immune homeostasis and initiate protective innate and adaptive immune responses is occupied by Langerhans cells (LCs) or the so-called dendritic cells (DCs) of the epithelium [5, 6].

LCs (DCs), described in 1868 by Paul Langerhans, are a subpopulation of active and motile dendritic cells with antigen-presenting functions that are present in the middle and upper layers of the stratified squamous epithelium. Previously, researchers distinguished them from epithelial cells by histoenzyme staining for adenosine triphosphatase. Also, electron micrographs show that DCEs lack tonofilaments, melanosomes, and desmosomes, but they do contain small vesicles, multivesicular bodies, and specific Langerin and Birbeck granules. In modern histological laboratories, DCEs can be detected in formalin-fixed, paraffin-embedded tissues by immunohistochemical (IHC) staining for S-100 protein or, more specifically, a marker for the CD1a antigen. Positivity for these markers confirms the dendritic nature of CLs. Such cells are called dendritic because during their development they grow branched processes to maximize their surface area and increase the exposure to antigens [5, 6, 7].

In general, all DC subpopulations have professional "antigen-presenting" abilities, but differ in origin, function, location and type of immune response. Namely, myeloid DCs are derived from monocytes and macrophages after the action of cytokines (for example, interleukins or granulocyte-macrophage colony-stimulating factor); plasmacytoid DCs, resembling plasma cells, do not express myeloid markers at all, but produce large amounts of type I interferon, probably in response to viral infections [8, 9].

An increase in CL and dermal DCs has been described in various inflammatory skin conditions, such as contact dermatitis, psoriasis, atopic eczema, etc. Therefore, the study of dynamic changes in skin DCs in PCAS will fill the gaps in understanding the pathogenesis of this disease.

Aim of the work – to investigate the number and location of skin dendritic cells (separately Langerhans cell subpopulations and dermal dendritic cells) in Perifolliculitis capitis abscedens et suffodiens, with special attention to damage to the structures of the pilosebaceous unit of the skin.

**MATERIALS AND METHODS OF RESEARCH**

The biopsy material of patients diagnosed with PCAS (Hoffmann's disease) who underwent examination and treatment at the medical center of the private enterprise "Dzerkalo", Dnipro, Ukraine was studied. All patients were male, whose age ranged from 20 to 51 years, the average age was 35.50±11.54 years. The diagnosis was made based on clinical, anamnestic, laboratory (clinical and biochemical blood tests), instrumental (trichoscopy and dermatoscopy), microbiological and pathomorphological studies (puncture punch biopsy with histological examination stained with hematoxylin-eosin). The control group included 5 samples of clean resection margins (conditional norm) of benign nevi of the scalp of men aged 34 to 48 years, the average age was 32.10±9.42 years (no statistically significant difference was found in comparison with the study group, $p>0.05$). The study was approved by the Biomedical Ethics Committee of the Dnipro State Medical University (Ukraine) (extract from the minutes of meeting No. 3 dated 16.11.2022) and conducted with the written consent of the patients and in accordance with the principles of bioethics set forth in the Declaration of Helsinki "Ethical Principles of Medical Research Involving Humans" and the "Universal Declaration on Bioethics and Human Rights (UNESCO)".

*Histological method of study***.** For histological study, 17 blocks of formalin-fixed and paraffin-embedded puncture punch biopsies were used: 12 from the study group and 5 from the control group, which were obtained from the archive of the Dnipropetrovsk Regional Clinical Hospital named after I.I. Mechnikov, DRC, in the period from April 2023 to February 2024. According to the histological structure, all observations were represented by the skin of the scalp, which corresponded to the structure of thin skin with long hair and contained 2 or more pilosebaceous units (hair follicles with adjacent sebaceous glands). In all cases, diagnostic and morphological signs were evaluated and confirmed by repeated examination by two independent pathologists. Sections 4 μm thick were made on a Microm HM-340 microtome, stained with hematoxylin and eosin according to the standard method [10].

*Immunohistochemical staining method.* Immunohistochemical staining was performed according to the TermoScientific (TS) protocols with primary antibodies to Langerhans cells (dendritic cells of the skin) (CD1a, RTU). The Lab Vision Quanto imaging system (TS, USA) was used with the reaction determination using DAB Quanto Chromogen (TS, USA) [11].

According to the recommendations of the TermoScientific (TS) protocols, the immunoreactivity of the CD1a marker was assessed as: (–) – negative, without staining of membranes, cytoplasm and cell nuclei, (+) – staining of membranes, cytoplasm and cell nuclei.

*Digital morphometry.* For the morphometric method, a Zeiss Primo Star – Axiocam ERC 5s microscope camera with licensed ZEN 2 blue edition software was used. The obtained informative fields of view were recorded in .jpg format and processed in the Fiji (ImageJ) program. The method of using digital morphometry to count dendritic cells was proposed by the authors Lombardo G.P. et al. (2024) [12]. To calculate the number of DC subpopulations in different areas of the skin, the ROI Manager tool was used (Analyse>Tools>ROI Manager>Measure) (Fig. 1).

*Statistical analysis* was performed in the R version 3.4.1 (2017-06-30); the R Foundation for Statistical Computing Platform: x86_64-w64-mingw32/x64 (64-bit) software environment under the GNU General Public License. The mean values of the study group and the control group due to the small number of samples in the groups were compared using a nonparametric test (Mann-Whitney U-test). M±SD – mean±standard deviation. The difference between subgroups was considered significant at $p<0.05$ [13].

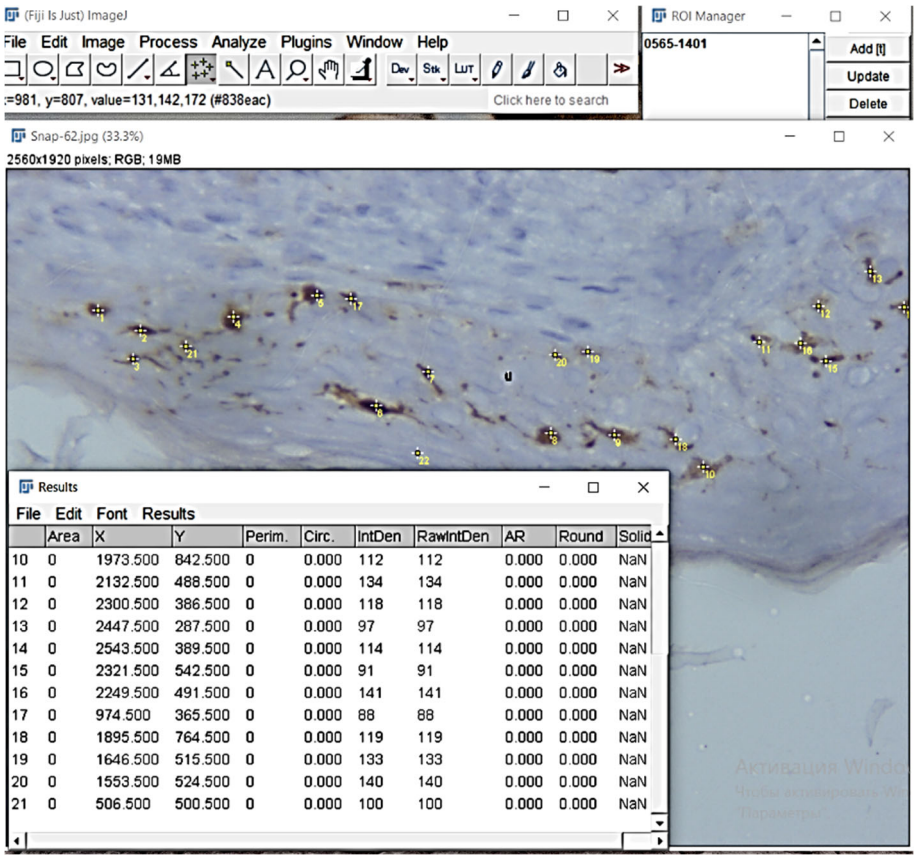


**Fig. 1. Using the ROI Manager tool in the Fiji digital image processing program (ImageJ) to calculate the number of Langerhans cells in the stratified squamous epithelium of the scalp (Analyse>Tools>ROI Manager>Measure)**

**RESULTS AND DISCUSSION**

In sections of scalp tissue stained with hematoxylin and eosin (H&E), in both study groups – patients with PCAS ($n_1$=12) and the control group with a conditional norm ($n_2$=5), Langerhans cells at high magnification demonstrated nuclei with a depressed "kidney-shaped" shape, darker in color compared to the surrounding keratinocytes, lying as if in lacunae (Fig. 2A, B, red arrows). However, this staining did not detect the dendritic structure of these cells at all, to indicate their activity in terms of antigen presentation.

At the same time, it is necessary to note the characteristic morphological changes of the stratified squamous epithelium of the scalp of patients with

PCAS: thickening of the epithelium of the damaged areas due to reactive acanthosis and expansion of the middle layer of the epithelium with active proliferation of keratinocytes (numerous mitotic figures are located above the basal and parabasal layers), which were not characteristic of the control group (Fig. 2A, B).

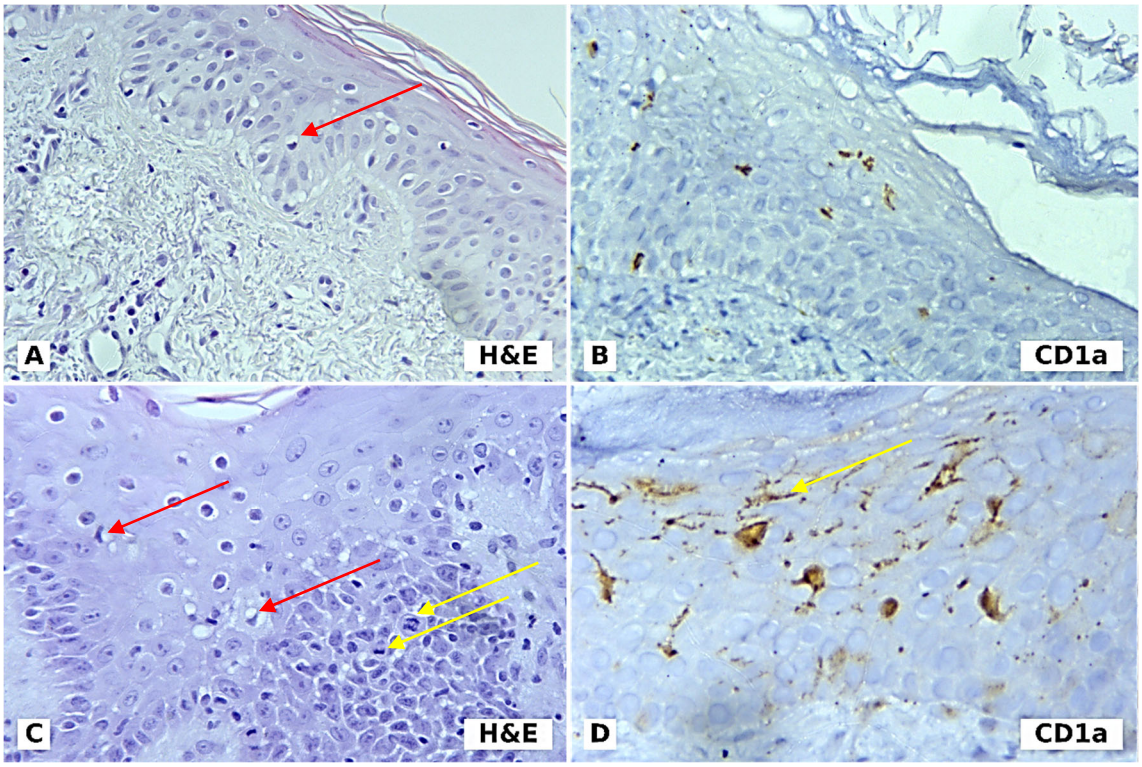


**Fig. 2. A. Control group (red arrow indicates Langerhans cells), H&E staining (×400).
B. Control group, mixed nuclear-cytoplasmic reaction of Langerhans cells with CD1a marker, IHC method with Mayer's hematoxylin (×400).
C. PCAS (red arrow indicates Langerhans cells, yellow arrows indicate mitotic figures), H&E staining (×400).
D. PCAS, branched network of numerous processes of Langerhans cells (yellow arrow), positive expression of CD1a marker, IHC method with Mayer's hematoxylin (×400)**

IHC study with the dendritic cell-specific marker CD1a made it possible to visualize these cells among keratinocytes with greater contrast, as well as to obtain information about the branching of their processes, which demonstrated a significant difference between the control group and the study group, with a significant increase in samples of PCAS (Fig. 2B, D). Also, in the control group and the study group, a difference was found in the number of Langerhans cells, which was calculated as the arithmetic mean ± standard deviation among 10 fields of view of each case at a magnification of ×400.

In the epidermis of the samples of the study group, the number of Langerhans cells ranged from 11 to 42 cells, and on average amounted to 26.07±11.51 cells, compared to the control group, these indicators ranged from 3 to 8 cells, and on average amounted to 4.02±2.34 cells. During the analysis of the expression of the CD1a marker in the samples of the control and study groups, a significant difference in the number and branching of the processes was found not only for Langerhans cells in the epidermis, but also for other dendritic cells localized in the dermis of the skin (separately in clusters of inflammatory infiltrate and around vessels) and in the structures of the pilosebaceous unit (external and internal root sheath, hair papilla, around the sebaceous gland), (Fig. 3). The data of DC measurements in different localizations were listed in Table.

When assessing the number and distribution of CD1a (+) cells (Langerhans cells and other dendritic cells), which provide antigen presentation and support the local immune response, it is necessary to note significant differences in their accumulation for the comparison groups. The greatest difference was demonstrated by areas of hair follicles where Langerhans cells were normally absent, namely in the internal root epithelial sheath, as well as in the hair dermal papilla (all $p<0.05$), (Table). In comparison, in abscessing perifolliculitis of the head, CD1a (+)

cells actively accumulated in these areas with spread to areas around the sebaceous glands and muscles that lift the hair with significant infiltration of all structures of the pilosebaceous unit (Fig. 3A-B). It should be noted that the areas of the sebaceous glands were infiltrated by CD1 (+) cells not only around the excretory ducts but also in the area of the secretory departments (glandular sacs), and CD1 (+) cells were also found between the basal cells of the terminal departments, which, due to the stimulation of T lymphocytes, is probably related to the formation of sebaceous hyperplasia.

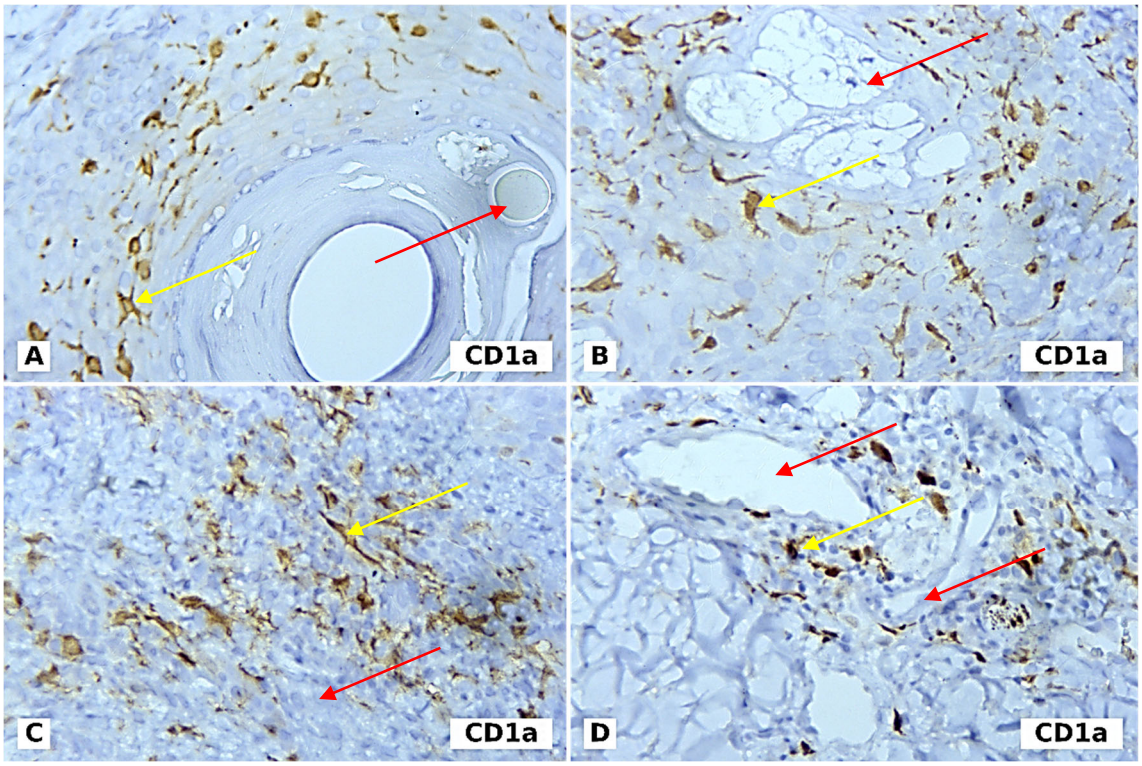


**Fig. 3. PCAS, mixed nuclear-cytoplasmic reaction of Langerhans cells with CD1a marker, IHC method with Mayer's hematoxylin (×400).**
**A. Hair follicle (hair shaft marked with a red arrow), accumulation of dendritic cells in the inner and outer hair sheath – yellow arrow.**
**B. Area of the sebaceous gland (red arrow), dendritic cells around are marked with a yellow arrow.**
**C. Accumulation of dendritic cells (yellow arrow), which make up at least a third among other inflammatory cells in the dermal infiltrates (red arrow).**
**D. Accumulation of dendritic cells (yellow arrow) around vessels, the lumens of which are marked with red arrows**

Also, a significantly higher number of CD1a (+) cells in abscessing perifolliculitis of the head was found in the connective tissue around the dermal bag of the hair papilla, around the vessels and in inflammatory infiltrates of the dermis (Fig. 3C-D).

Among dermatoses, abscessing perifolliculitis of the scalp occupies a special place due to its aggressive course and resistance to standard treatment methods. This disease occurs mainly in young men aged 20-40 years. Its frequency in the population remains low. Since the disease is often combined with other dermatoses, such as hidradenitis and conglobata acne, it is included in the spectrum of follicular occlusive syndromes, which complicates its diagnosis and treatment [2, 3, 14].

In general, due to the limited number of registered cases, it is impossible to provide accurate statistical data on the prevalence of this disease. According to our observations, the number of visits to the medical center of Professor Svyatenko by men with this pathology has recently increased. The doctors of the clinic drew attention to the seasonality of visits, namely, the number of visits in the winter-spring period is slightly higher than in the summer period. In our opinion, this can be explained by wearing warm hats, which provokes the mechanism of starting follicle occlusion. It is also noteworthy that among the men who applied, a part falls on men with the need to wear protective helmets professionally: military, construction workers and workers of the Ministry of Emergency Situations.

**Indicators of morphometric study of Langerhans cells and other dendritic cells in skin areas using the Fiji program, n, M±SD, Me [Q1; Q3]**

| Skin area | The average number of CD1a (+) cells, M±SD (Me [Q1; Q3]) | | |
|---|---|---|---|
| | study group, ($n_1$=12) | control group, ($n_2$=5) | p |
| Epidermis | 26.07±11.51 (19.50 [17.00; 38.75]) | 4.02±2.34 (2.54 [1.25; 6.75]) | p<0.05 |
| Dermal accumulations/inflammatory infiltrates of the dermis | 52.50±16.77 (57.50 [46.75; 61.00]) | 6.87±3.13 (7.00 [4.00; 9.25]) | p<0.05 |
| Areas around blood vessels | 30.50±2.12 (30.50 [29.75; 31.25]) | 2.30±0.89 (2.50 [1.25; 3.25]) | p<0.05 |
| Hair follicles: - external and internal root epithelial sheath | 31.44±8.86 (33.00 [28.00; 38.00]) | 4.84±1.12 (4.20 [3.00; 5.75]) (only the outer root sheath) | p<0.05 |
| - hair dermal papilla | 2.30±1.62 (2.80 [1.75; 4.25]) | - | p<0.05 |
| Sebaceous glands | 17.87±11.65 (13.50 [10.00; 21.75]) | 6.24±2.05 (6.50 [4.00; 7.75]) | p<0.05 |

**Notes:** n – number of samples; M±SD – mean ± standard deviation; (Me [Q1; Q3]) – (Mediana [Quantile 1; Quantile 3]); p – groups were compared using the Mann-Whitney U-test.

Studies of pathological processes leading to alopecia in men with abscessing perifolliculitis of the head focus on the cells that form the immune barrier in the skin, and how these cells interact with each other to form coordinated innate and adaptive immune responses [4].

Langerhans cells are the only professional antigen-presenting cells of the epidermis embedded in a layer of tightly packed keratinocytes that, in addition to forming a physical barrier, are also armed with an arsenal of danger-sensing receptors, including pathogen-recognition receptors TLR1-6 and TLR9, and Ca2+ channels that detect temperature, pressure, and osmotic changes. Once activated, keratinocytes initiate an immune response by releasing antimicrobial peptides and cytokines, which influence the activation and migration of skin immune cells, particularly DCs [6, 7].

The primary function of Langerhans cells is to deliver processed antigen obtained in the skin to T cells in the lymph nodes to initiate adaptive immune responses. However, the precise function of Langerhans cells in the development of adaptive immunity is not fully understood [8].

The accumulation of CD1a (+) cells together with CD3 (+) T-lymphocytes, which were obtained in a previous study and were characterized by a lower density of infiltration in the hypodermic granulomas around the hair follicles, compared with CD20 (+) B-lymphocytes, but a high density in the upper parts of the dermis and basal layers of the epidermis, as close as possible to Langerhans cells. And the accumulation of CD3 (+) cells in the outer root epithelial sheath was more significant, compared with CD20 (+) cells, and was also accompanied by infiltration of CD1a (+) cells. Thus, the accumulation of CD3 (+) T-lymphocytes, which were detected in PCAS in different parts of the pilosebaceous unit, was always maintained due to the antigen-presenting action of Langerhans cells, and consisted of CD4+ - T-helper/CD4+ - T-regulatory cells [15].

In the control group, CD1 (+) cells were also accompanied by accumulation of CD3 (+) cells at the epidermal-dermal junction, around the vessels, but never in the inner root sheath of the pilosebaceous unit.

**CONCLUSIONS**

1. The average number of Langerhans cells among keratinocytes in the study group significantly exceeded the control group's indicators of 26.07±11.51 cells compared to 4.02±2.34 cells, respectively (p<0.05), and also demonstrated a wide network of branched processes; in turn, the stratified squamous epithelium in abscessing perifolliculitis of the head was characterized by acanthosis, hyperplasia and increased mitotic activity.
2. The accumulation of CD1a (+) cells in the internal root epithelial sheath and hair dermal papilla was observed only in the study group and was absent in the control group, (p<0.05). In the outer root epithelial sheath of pilosebaceous units around the hair follicle bud roller, the number of CD1a (+) cells in the study group significantly exceeded the control group – 31.44±8.86 cells compared to 4.84±1.12 cells, respectively (p<0.05), due to which T-lymphocyte infiltration

with prolonged inflammatory damage and alopecia is probably maintained in this area.

3. Statistically significantly higher density of infiltration by CD1a (+) dendritic cells in the area of the excretory ducts of the secretory departments of the sebaceous glands in the study group compared to the control group (17.87±11.65 cells compared to 6.24±2.05 cells, respectively ($p<0.05$)) due to excessive antigenic stimulation may be the cause of sebaceous gland hyperplasia.

4. The increased density of antigen-presenting cells such as CD1a (+) dendritic cells among the inflammatory infiltrate of the dermis in PCAS compared to the control group (52.50±16.77 cells compared to 6.87±3.13 cells, respectively ($p<0.05$)), indicates the active migration of these motile cells and the predominance of effector mechanisms of the immune response around the pilosebaceous units of the scalp.

**Prospects for further research.** The continuation of the study of Hoffmann's disease requires information on the expression of androgen receptors in the structures of the pilosebaceous unit to refute or confirm the theory of hormonal dependence of chronic inflammation in this pathology.

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