# Morgellons Disease as a Multisystem Problem: Analysis of Hypotheses, Scientific Evidence, How Artificial Intelligence Helps

**Viktoriia Shapovalova** (Doctor of Pharmaceutical Sciences, Professor, Private Scientific Institution "Scientific and Research University of Medical and Pharmaceutical Law", Public Organization "Association of Medical and Pharmaceutical Law", both – Ukraine)
https://orcid.org/0000-0003-4770-7292
Corresponding author: Viktoriia Shapovalova
(e-mail: v.shapovalova@srumpl.org)

Received: September 02, 2025
Published: October 01, 2025

**Abstract.** Morgellons disease is a rare and controversial disease. It combines dermatological, infectious, and psychiatric manifestations. It is characterized by the formation of skin lesions with filaments emanating from the tissues. Also, by sensory phenomena in the form of a crawling or stinging sensation under the skin. As well as systemic symptoms, including chronic fatigue and cognitive disorders. The article analyzes the literature and clinical reports that highlight the infectious and psychiatric hypotheses, morphological and biochemical features, sociocultural factors, and problems of diagnosis and treatment. It is established that Morgellons disease remains uncertain in the nosological classification, which complicates the creation of unified approaches to its management. At the same time, the need for a multidisciplinary, multisystemic approach that integrates dermatology, infectious diseases, biochemistry, microbiology, clinical diagnostics, immunology, psychiatry, and psychology is emphasized. The conclusion is made about the urgent need for conducting systematic studies of etiology and pathogenesis, developing standardized diagnostic criteria and therapeutic protocols, as well as overcoming the stigmatization of patients. The help of artificial intelligence opens new opportunities for early diagnosis of Morgellons disease through the analysis of large arrays of clinical and laboratory data, recognition of dermatological images and prediction of the course of the disease. The use of machine learning algorithms contributes to more accurate differential diagnosis between infectious, dermatological, and psychiatric manifestations, which helps to minimize false diagnoses. The use of artificial intelligence in telemedicine and clinical practice of Morgellons disease allows for a personalized approach to treatment, optimizing the choice of therapeutic strategies and monitoring the effectiveness of treatment. The integration of artificial intelligence technologies into research and clinical practice is considered a promising direction for overcoming diagnostic and therapeutic difficulties in Morgellons disease.

**Keywords:** Morgellons disease, dermatological manifestations, infectious hypothesis, psychiatric hypothesis, diagnostics, treatment, stigmatization, telemedicine, artificial intelligence.



**Introduction.** Infectious pathology in the modern world continues to be one of the leading causes of morbidity and mortality. In recent decades, there has been not only an increase in the prevalence of known infections, but also the emergence of new diseases that pose a serious challenge to the health care system. Over the past forty years alone, more than forty new infectious nosologies have been registered, which confirms the relevance of global monitoring and study of new pathological conditions [1].

Morgellons disease was first registered in the USA in 2001. When a child had ulcers from which fibers of unknown nature were released. Today, the clinical picture includes severe itching, a feeling of crawling under the skin, the formation of abscesses, from which threadlike filaments of various colors emerge, which after healing leave scars and depigmented spots. In addition to dermatological manifestations, patients often complain of muscle cramps, insomnia, chronic fatigue syndrome, decreased performance, and psychoemotional disorders [2]. The problem is that there is still no unified view on the nature of Morgellons disease. Some researchers associate it with infectious agents. Others consider it a manifestation of a mental disorder close to delusional parasitosis. Morgellons disease is characterized by skin infection, which ultimately leads to wounds and a deterioration in the quality of life. Studies on this condition are insufficient and contradictory, which creates difficulties for doctors in its understanding, diagnosis, and treatment. Morgellons disease is

an underdiagnosed nosology due to the lack of established recommendations on pathophysiology and treatment. Patients tend to pull fibers from skin lesions and place them in a matchbox, hence the term "matchbox symptom". The diagnosis is made by exclusion, requiring extensive examination to exclude secondary causes and differential diagnosis. Treatment is largely based on the use of antipsychotic drugs with or without cognitive behavioral therapy [3, 4].

The impact of Morgellons disease on the quality of life of patients makes it imperative to adequately identify, diagnose, and treat it. The lack of standardized diagnostic criteria and insufficient evidence base complicate the diagnosis and choice of therapy, which emphasizes the relevance of further research.

**The purpose of the study** was to summarize modern scientific ideas about Morgellons disease, analyze existing hypotheses regarding its etiology and pathogenesis, study clinical manifestations, and diagnostic approaches, and outline the main problems and contradictions in the interpretation of this pathology, which necessitate further comprehensive research.

**Materials and methods.** The work used data from scientific publications, clinical studies, and review articles on Morgellons disease. Sources include the results of epidemiological observations, histological and molecular analyses, clinical case reports, and literature reviews covering the period from 2002 to 2024. Publications from international databases (PubMed, PMC, Scopus), as well as open educational and medical resources were analyzed.

The research methodology is based on a comparative analysis of various scientific approaches: the infectious hypothesis (Borrelia, Agrobacterium, the fungus Dictyostelium discoideum), the psychiatric concept (classification as delusional parasitosis), as well as the results of microscopic and immunohistological studies of filaments. To form conclusions, a systematic review of the available data, their critical generalization and comparison with modern international recommendations were used.

Fig. 1 shows the research design: scientific hypotheses for the study of Morgellons disease.

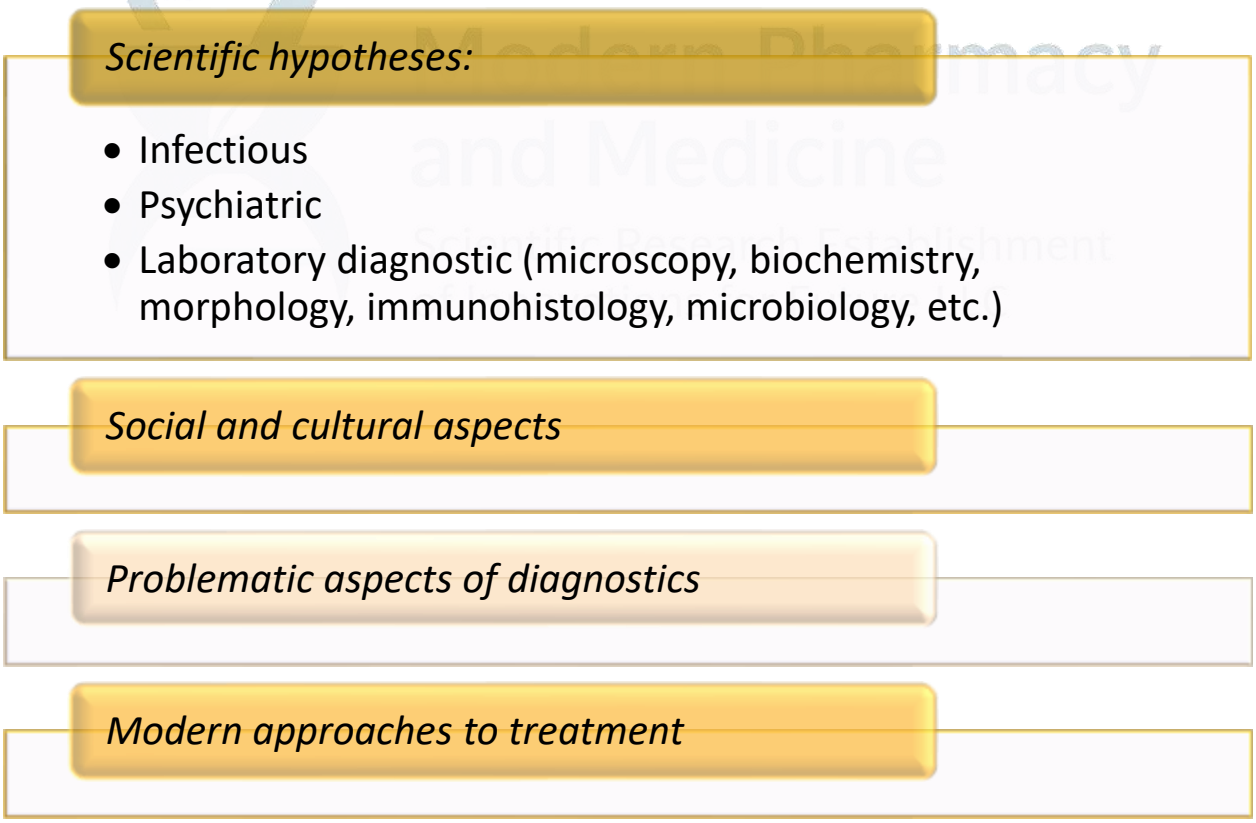


**Fig. 1.** Research design: scientific hypotheses for the study of Morgellons disease.

The study of the article is a fragment of research works of Private Scientific Institution "Scientific and Research University of Medical and Pharmaceutical Law" and State Enterprise "Ukrainian Scientific Pharmacopoeial Center for Quality of Medicines" on the topic "Interdisciplinary research into the quality system, standardization, validation, certification, safety and availability of medicines" (state registration number 0125U001529, implementation period 2025-2033); Private Scientific Institution "Scientific and Research University of Medical and Pharmaceutical Law" and Danylo Halytsky Lviv National Medical University on the topic "Diagnosis, treatment, pharmacotherapy of inflammatory, traumatic and onco-thoracic pathology using instrumental methods" (state registration number 0125U000071, implementation period 2025-2031); Private Scientific Institution "Scientific and Research University of Medical Pharmaceutical Law" on the topic "Multidisciplinary research of post-traumatic stress disorders during war among patients (primarily combatants)" (state registration number 0124U002540, implementation period 2024-2029); Private Scientific Institution "Scientific and Research University of Medical and Pharmaceutical Law" and European Wellness Biomedical Group on the topic "Multimodal innovative research of digital medical technologies by using approaches and methods of evidence-based medicine, quantum medicine, bioquantum medicine, bioquantum therapy, artificial intelligence, bioresonance, proton-plasma, frequency wave, electronic-pulse, bioregenerative, information mathematical methods of diagnostics, therapy, evidence-based pharmacy, pharmacotherapy of health disorders according to ICD-11 (oncological, allergic, immunological, infectious, addictive, cardiological, comorbid, covid, post-covid, long-covid, etc.) based on medical and pharmaceutical law" (state registration number 0125U002484, implementation period 2025-2033).

**Results and discussion.** A review of the scientific literature shows that Morgellons disease remains one of the most controversial pathologies in modern medicine. It has been established that in some studies it is considered an infectious disease, due to the detection of Borrelia or Agrobacterium DNA in patient samples. Cases of keratin and collagen hyperproduction by follicular cells have also been described [5, 6].

Morgellons disease can be characterized as a physical disease of a person with often accompanying delusions in adults. All case histories confirm that behavioral abnormalities occur only after the appearance of physical symptoms. The identified abnormalities include both immunodeficiency and markers of chronic inflammation. Patient data indicate an infectious origin of the disease. This pathology is interpreted as a psychiatric syndrome close to delusional parasitosis. This is argued by the presence of neurotic or depressive disorders in most patients [7].

Morgellons disease is a new multisystem disease. It is characterized by inexplicable dermopathy and the formation of filaments on the skin. Despite the evidence that indicates an infectious process and that the lesions are not self-induced, there are hypotheses that this disease is illusory. Clinical observations, chemical, microscopic, immunohistological studies of patients with Morgellons disease are presented. They conclude that Morgellons disease with skin lesions is not self-induced or psychogenic. Filaments associated with this disease originate from epithelial cells of patients. This confirms the hypothesis that fibers consist of keratin and are products of keratinocytes [8].

Morgellons disease is a rare and controversial disease. It is characterized by dermatological symptoms. Includes dermatological slow-healing skin lesions. Patients report sensations of crawling by ants, bites, and contamination by inanimate objects. There are different views on its etiology. Some scientists associate Morgellons disease with Lyme disease. Other scientists consider it as a variant of illusory infection. It can be assumed that psychiatric and environmental factors can contribute to the development of the disease. The relationship of Morgellons disease with the abuse of psychoactive substances, infectious agents, and the influence of Internet communities on the formation of perception is being studied. It has been established that the evidence base regarding the pathogenesis of the disease is insufficient. Morphological studies reveal skin lesions characteristic of chronic dermatoses or parasitic infections, but in most cases, it is not possible to identify a single pathogen. Most of the fibers released from the skin of patients consist of keratin and collagen, which may be the result of abnormal activity of keratinocytes. At the same time, several works emphasize the

absence of parasites or bacterial agents. This indicates the multifactorial nature of the disease. The only objective sign is unusual subcutaneous fibers. The etiology of Morgellons disease is unknown. Low doses of antipsychotic drugs are considered effective [9].

Fig. 2 shows skin lesions due to Morgellons disease.

**Fig. 2.** Morgellons disease [10].

Therefore, the impact of Morgellons disease on the quality of life of patients is significant, but often ignored. Approaches to the treatment of Morgellons disease vary due to the limited amount of data. This leads to significant diagnostic, clinical, social, and psychological difficulties. Patients often face stigmatization, refusal of specialized care, and distrust of medical professionals. This situation increases the psycho-emotional burden of the disease, forms a chronic course with pronounced cognitive and somatic disorders. It is necessary to emphasize the importance of an interdisciplinary, multisystem approach that is patient-centered and considers both physical and psychological aspects.

*Review of the literature, existing hypotheses, and scientific evidence*

*Infectious hypothesis*

Several studies consider the possibility of an infectious origin of Morgellons disease. One of the arguments in favor of this hypothesis is the detection of Agrobacterium DNA in tissue samples from patients. This potentially indicates the ability of this microorganism to interact with human cells and produce cellulose-like fibers [11].

An important area of scientific discussion is the relationship between Morgellons disease and Lyme disease, caused by infection with Borrelia burgdorferi. Some researchers point to the detection of Borrelia in skin and blood biopsies of patients. This confirms the possible involvement of this pathogen in the pathogenesis. The similarity of clinical symptoms of both pathologies is also noted, including skin lesions, arthralgias and neuropsychiatric manifestations [8, 12].

Some researchers hypothesize that the disease is fungal in nature. According to experimental observations, the lesions may be associated with the activity of mucous membranes, particularly Dictyostelium discoideum. It is assumed that the spores of these microorganisms in a closed environment form nodular structures that cause severe itching and skin damage. By 2016, it became known that there are 6 types of particles detected in patients: 1) ribbon-like fibers; 2) rounded fibers;

3) capsules; 4) grains; 5) worm-like particles; 6) star-shaped particles. Although this hypothesis does not yet have a sufficient evidence base, it remains relevant for further research [13].

*Psychiatric hypothesis*

Another scientific approach to explaining the nature of Morgellons disease is associated with psychiatry. Some researchers attribute this condition to the group of delusional disorders, to delusional parasitosis. With this classification, symptoms, in particular the feeling of insects crawling under the skin and the appearance of "fibers", are considered the result of false sensory and cognitive perceptions that do not have an infectious origin [14, 15].

It has been established that a significant proportion of patients with this pathology have neurological and psychiatric comorbidities. Among neurological disorders, a high level of headaches, visual aberrations, tinnitus, short-term memory deficits, and emotional lability was observed. Among psychiatric disorders, most previous psychiatric diagnoses were noted: bipolar disorder; obsessive-compulsive disorder, and schizophrenia. In each case, medical records indicated that the skin symptoms and signs preceded or occurred simultaneously with the appearance of emotional signs, with an emotionally "normal" time in the life of each patient before Morgellons disease. Anxiety and depressive disorders, cognitive impairments were also observed. In some cases, a high percentage of psychostimulant and psychoactive substance use was found among this group of patients, which may affect the formation of sensory hallucinations and exacerbate the course of mental disorders [16].

Thus, the psychiatric hypothesis explains Morgellons disease as a variant of a psychiatric disorder that combines sensory illusions, cognitive deficits, and behavioral abnormalities. However, the final attribution of this syndrome to exclusively psychiatric diseases remain debatable due to the presence of biological findings that may indicate an infectious component.

*Laboratory diagnostic hypothesis*

Studies have shown that one of the key features of Morgellons disease is the presence of specific filaments that are visualized in the skin of patients. Morphological analysis has shown that these fibers are not foreign textile particles, but have an endogenous cellular origin. It has been established that they consist mainly of collagen and keratin and are formed because of increased activity of keratinocytes and disorders in the processes of cell regeneration. Such filaments are described as multi-colored structures that are localized in the dermis and can sprout through the skin, creating characteristic clinical manifestations. Cellulose microfibrils, cell motility and organization of plasma membrane proteins change in parallel during climax in Dictyostelium discoideum. Pre-stem cells of Dictyostelium discoideum during climax contribute cellulose to two different structures: the stem tube and the stem cell wall. It has been shown that two different types of intramembrane particle aggregates are found in the plasma membranes of cells synthesizing these different forms of cellulose [17].

Biochemical studies demonstrate characteristic changes in laboratory parameters of patients. Among them, a decrease in the number of CD56 and CD57 cells is noted, which may indicate a violation of immune regulation. An increase in the level of C-reactive protein as a marker of the inflammatory process is detected. As well as an imbalance of metabolic parameters: an increase in the concentration of calcium, insulin, and glucose in the blood with a simultaneous decrease in the level of magnesium and potassium. Such changes may reflect both chronic inflammation and metabolic disorders that form the clinical picture of Morgellons disease [8, 16-18].

*Social and cultural aspects*

Social and cultural aspects have a significant impact on the perception and dissemination of information about Morgellons disease. An important role in shaping perceptions of this pathology is played by online communities and support groups, where patients actively share their experiences, photos, and results of self-treatment. Such platforms create a space for interaction, but at the same time contribute to the spread of inaccurate information, which can strengthen patients' conviction that the disease has an infectious origin, even in the absence of confirmed scientific evidence. Researchers

emphasize that the role of digital communities in this context is twofold: they provide psychological support, but can also strengthen the phenomenon of "self-diagnosis" and the consolidation of pathological beliefs [19].

The socio-psychological and medical challenge of Morgellons disease is the stigmatization of patients in the professional environment. Many doctors view this pathology exclusively as a psychiatric disorder. They lead to distrust, devaluation of patients' complaints, and limited access to comprehensive care. Such a situation deepens the psychological suffering of patients, creates a sense of isolation, and can contribute to the development of depressive or suicidal tendencies. Therefore, consideration of the sociocultural dimension of the disease is key to developing more patient-sensitive approaches to diagnosis, clinical laboratory studies, and treatment [20].

Problematic aspects of diagnosis

Diagnosis of Morgellons disease remains a difficult task to date. There are no single standardized criteria, tests, or protocols that could unambiguously confirm or refute the presence of this disease. In clinical practice, individual laboratory and instrumental methods are often used. However, their results do not have a sufficient evidence base.

Fig. 3 summarizes the clinical manifestations of Morgellons disease.

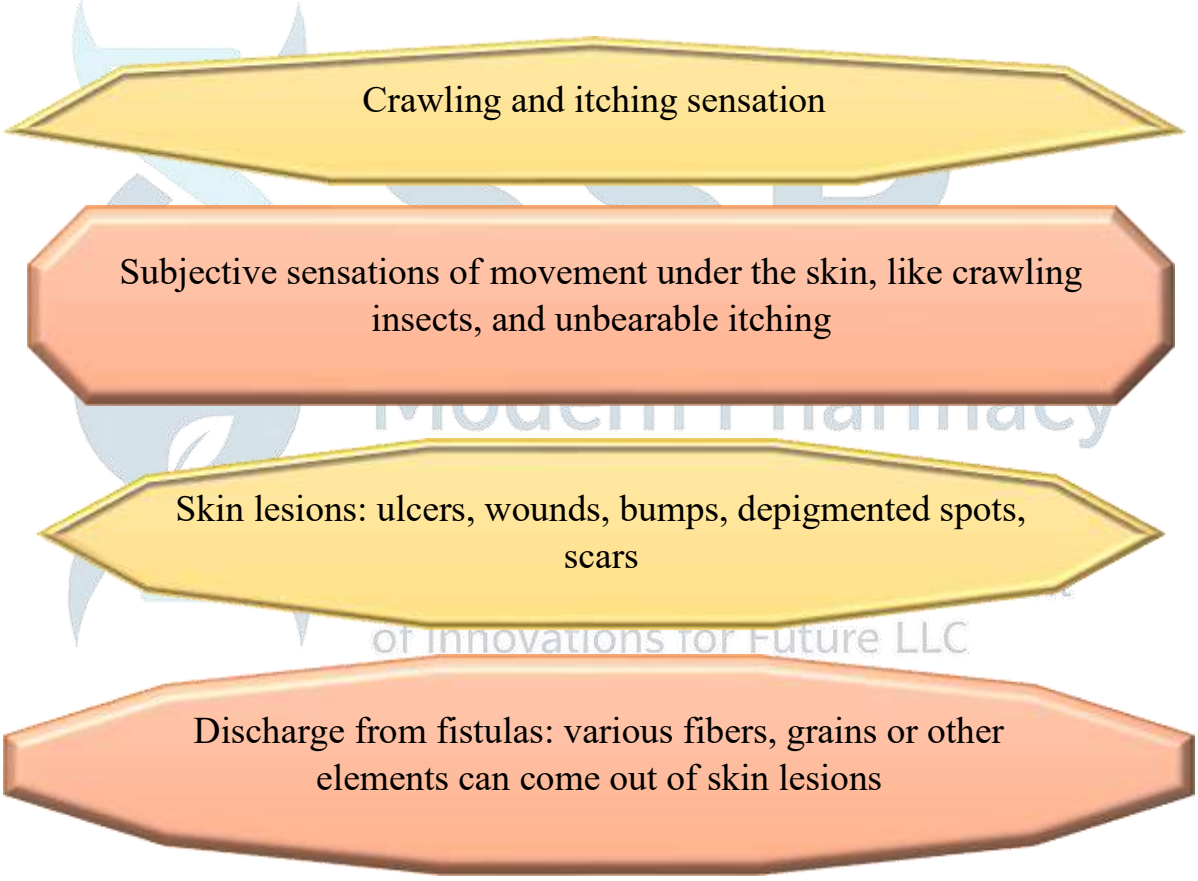


**Fig. 3.** Clinical manifestations of Morgellons disease.

Fig. 4 shows an algorithm for diagnosing Morgellons disease.

Since Morgellons disease is not officially recognized, treatment is often aimed at relieving symptoms and excluding other causes of the disease.

A significant problem is the need to distinguish Morgellons disease from delusional parasitosis. Symptoms, particularly a crawling, biting, or burning sensation, as well as the presence of fibers in wounds, can be interpreted as a psychiatric disorder. At the same time, a significant part of the research indicates a possible infectious or multifactorial nature of the pathology, which complicates the establishment of a final diagnosis [3, 21].

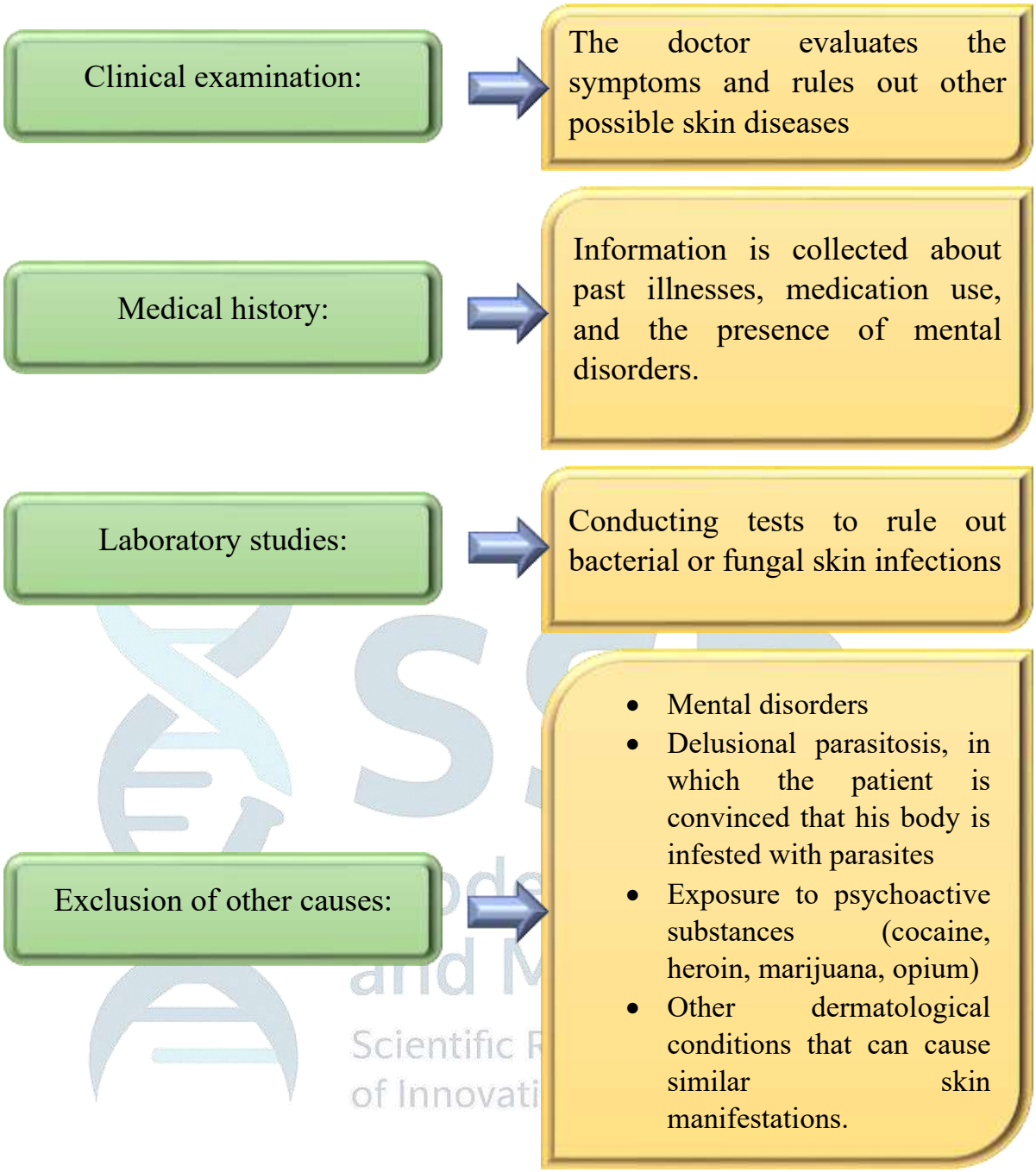


**Fig. 4.** Diagnostic algorithm for Morgellons disease [3, 9].

Additional difficulties arise due to the limitations of instrumental research methods. The use of microscopy and polymerase chain reaction allows the detection of fragments of deoxyribonucleic acid of potential pathogens or morphological features of filaments. However, these data are not always reproducible and cannot be considered as universal diagnostic criteria. Patients with Morgellons disease do not have a clear idea of their condition and are reluctant to see psychiatrists. This can prevent proper treatment and leads to the fact that dermatologists are the only doctors conducting their treatment [2, 22].

Morgellons disease is a controversial and poorly described complex of symptoms, including skin lesions and somatic symptoms, primarily "fibers" on the skin. Thanks to widespread coverage in the mass media and the Internet, more patients are turning to dermatologists. Some medical workers assume that the basis of this symptom complex is an unknown infectious agent. However, there is no available evidence to support this statement. Laboratory indicators that could reflect the infectious process (for example, elevated leukocyte level, erythrocyte sedimentation rate, C-reactive protein)

are usually normal. Biopsies often show only non-specific signs, such as acute and chronic inflammation with erosion or ulceration. Patients with Morgellons disease, as a rule, do not understand the essence of their disease and reject the need for psychiatric care. A careful examination of the patient's skin and its fragments is necessary to exclude the true pathological process and establish a trusting relationship. The ideal option is a supportive, non-conflict approach. The most effective treatment of the patient is carried out by a team of specialists from different specialties, including dermatologists, psychiatrists, and consultants [23].

Further research into Morgellons disease is needed, as well as large-scale population studies to develop adequate treatment methods. This indicates the need to create more reliable and comprehensive diagnostic and treatment protocols that would combine clinical, laboratory and psychiatric assessments.

*Modern approaches to treatment*

Currently, the treatment of Morgellons disease does not have unified clinical protocols, which is due to the lack of a clear etiological concept. Therapy is mainly aimed at relieving symptoms and improving the quality of life of patients. Proper skin care is important, including the use of antiseptic solutions, anti-inflammatory agents, and healing ointments to help reduce the severity of lesions and prevent secondary infections.

If an infectious etiology is suspected, antibiotic therapy may be considered. Drugs active against Borrelia spp. In some studies, the use of antibiotic therapy has demonstrated clinical improvement. However, the evidence base for such approaches remains limited and does not allow us to recommend antibiotics as a standard treatment for Morgellons disease [24].

In cases where symptoms are associated with psychiatric disorders, antipsychotic drugs are used. Studies show the effectiveness of low doses of antipsychotics in reducing the sensation of crawling and itching. However, adherence to such treatment remains low due to patients' belief in the exclusively somatic nature of the disease. This creates additional barriers to successful therapy [25].

Treatment of Morgellons disease is challenging. Antipsychotic medications (amisulpride, risperidone) are often prescribed in combination with antipruritic medications (topical corticosteroids) and oral antibiotics (for secondary infections). Phototherapy is also used to treat pruritus. Currently, there is insufficient evidence to support the benefits of psychotherapy. It is important to listen to and understand the patient's suffering while working together to manage the symptoms. Optimal therapeutic outcomes are achieved with a multidisciplinary approach [26, 27].

Analysis of scientific sources indicates significant inconsistency in data on the nature of Morgellons disease. Some researchers consider it as an infectious process associated with Borrelia spp. or other microorganisms, which is confirmed by the detection of filaments of cellular origin. Other scientists treat the disease as a variant of delusional parasitosis, emphasizing psychiatric comorbidities and cognitive disorders. Differences in research results are due to both methodological problems and different sample composition, which does not allow reaching a single point of view [28, 29].

Further multisystem and interdisciplinary studies are of key importance for determining the etiology and pathogenesis of the disease. It is necessary to develop unified diagnostic standards that would include both dermatological and psychiatric assessments, using modern molecular biological methods. Such studies will allow not only to identify a possible infectious factor, but also to assess the psycho-emotional state of patients, which will allow to form a comprehensive vision of the disease.

The prospects for studying Morgellons disease lie in the integration of knowledge and practice of various specialties – dermatology, infectious diseases, and psychiatry. Such an interdisciplinary approach will contribute to a better understanding of a complex phenomenon, will allow to optimize diagnostic algorithms and increase the effectiveness of treatment. At the same time, it is important to consider socio-cultural aspects, including the problem of stigmatization, because only a combination of biological, psychological, and social factors can provide a comprehensive explanation of this condition.

Thus, the nature of Morgellons disease remains controversial, and the results of research are ambiguous.

Given the complex and multifactorial nature of the disease, the most promising is a multisystem and multidisciplinary approach, which includes the cooperation of dermatologists, infectious disease specialists, psychiatrists, biochemists, microbiologists, immunologists, clinical diagnosticians, medical psychologists, rehabilitation specialists, public health specialists, other professionals, and health care specialists. This approach allows you to consider both physiological and psychoemotional aspects of the patient's condition, which is key to increasing the effectiveness of treatment and reducing physical, psychological, social, cultural, gender stigma.

*How can artificial intelligence help solve the problem of Morgellons disease?*

Artificial intelligence can significantly accelerate and improve research and clinical care for patients with suspected Morgellons disease through several complementary approaches. Thus, automated analysis of clinical and dermatoscopic images allows the detection of subtle textural and color changes in the skin that are difficult to recognize visually. Thus, it increases the objectivity of diagnostics [34].

The use of metagenomics and deep learning methods makes it possible to search for unknown pathogenic or microbial signatures in biological samples of patients and to detect possible microbial markers or contaminations [35].

The integration of phenotypic, clinical, and molecular data using machine learning algorithms contributes to the stratification of patients, the identification of subtypes and the prioritization of diagnostic hypotheses, which is especially important for rare and poorly defined diseases [36].

Methods of natural language processing and the analysis of large arrays of patient messages in forums and social networks make it possible to detect patterns of symptoms, patient concerns and signals regarding the effectiveness or undesirable effects of treatment. This can guide further clinical studies and increase the patient-centeredness of research [37].

Further use of artificial intelligence in telemedicine and telepharmacy in solving the multisystem problem of Morgellons disease is promising for research into multicenter validation of models, development of transparent methods for interpreting results, ensuring guarantees of ethical use of data, with due attention to representativeness of samples to avoid misinterpretations and diagnostic errors [38].

**Conclusions.** Morgellons disease remains a poorly understood and controversial condition, for which there is no single scientific consensus. Despite numerous studies, the nature of this disease has not yet been definitively determined: some scientists see it as an infectious process, while others consider it as a psychiatric syndrome. Such inconsistency significantly complicates clinical practice and creates obstacles to the formation of effective treatment strategies. Multisystem, multidisciplinary studies aimed at in-depth study of the etiology and pathogenesis of Morgellons disease are necessary. An important task is the development of unified diagnostic criteria and therapeutic protocols that will consider both dermatological and psychiatric aspects. The problem of physical, psychological, social, cultural, gender stigmatization of patients in the medical environment requires special attention, which complicates access to high-quality medical and pharmaceutical care and worsens the prognosis. The formation of a patient-centered model of medical care, based on a multidisciplinary approach and comprehensive support, is a necessary condition for increasing the efficiency of diagnostics and treatment of this complex pathology. A promising direction is the integration of artificial intelligence technologies, which allows to increase the accuracy of diagnostics, identify possible biomarkers, optimize therapeutic strategies, and form more patient-centered approaches to the treatment of Morgellons disease.

**Declaration of conflict interest**. The author declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

**Funding.** Private Scientific Institution “Scientific and Research University of Medical and Pharmaceutical Law partially funded the study” (Award No. 2024-1g, DOI: 10.70521/grant.ptsd.2024-1g).

**Data availability statement**. The datasets analyzed during the current study are available from the corresponding author on reasonable request.

**References.**

1. Pearson M. L., Selby J. V., Katz K. A. et al. Clinical, epidemiologic, histopathologic and molecular features of an unexplained dermopathy. PLoS One. 2012. Vol. 7. No. 1. e29908. DOI: https://doi.org/10.1371/journal.pone.0029908
2. Middelveen M. J., Fesler M. C., Stricker R. B. History of Morgellons disease: from delusion to definition. Clinical, Cosmetic and Investigational Dermatology. 2018. Vol. 11. P. 71–90. DOI: https://doi.org/10.2147/CCID.S152343
3. Kemperman P. M. J. H., Vulink N. C. C., Smit C. et al. Review of literature and clinical practice experience for the therapeutic management of Morgellons disease. Journal of the European Academy of Dermatology and Venereology. 2024. Vol. 38. Iss. 7. P. 1300–1304. DOI: https://doi.org/10.1111/jdv.19831.
4. Jalbout J., Sati H., Ghalloub P. et al. Morgellons disease: a narrative review. Neurological Sciences. 2024. Vol. 45. No. 6. P. 2579–2591. DOI: https://doi.org/10.1007/s10072-024-07361-7.
5. Blay J., Costes V., Bernard Guillot B. et al. Post Laser-amelanotic pattern of lentigo maligna: pitfalls in diagnosis and treatment of pigmented facial lesions of unknown nature. Journal of Clinical & Experimental Dermatology Research. 2012. Vol. 3. Iss.5. DOI: https://doi.org/10.4172/2155-9554.1000161.
6. Savely V., Leitao M., Stricker R. The mystery of Morgellons disease: infection or delusion? American Journal of Clinical Dermatology. 2006. Vol. 7. Iss. 1. P. 1-5. DOI:10.2165/00128071-200607010-00001
7. Harvey W., Bransfield R., Mercer D. et al. Morgellons disease, illuminating an undefined illness: a case series. Journal of Medical Case Reports. 2009. No. 3. P. 8243. DOI:10.4076/1752-1947-3-8243
8. Middelveen M.J., Rasmussen E.H., Kahn D.G. et al. Morgellons disease: a chemical and light microscopic study. Journal of Clinical & Experimental Dermatology Research. 2012. Vol. 3. Iss. 1. P. 1-8. DOI: https://doi.org/10.4172/2155-9554.1000140
9. Savely V., Stricker R. Morgellons disease: analysis of a population with clinically confirmed microscopic subcutaneous fibers of unknown etiology. Clinical, cosmetic and investigational dermatology. 2010. No.3. P. 67-78. DOI: https://doi.org/10.2147/ccid.s9520
10. Dermatology Nurses' Association. Morgellons disease: a mysterious disease. Dermatology Advisor. 2022. November 7. URL: https://www.dermatologytimes.com/view/morgellons-disease-a-mysterious-disease
11. Middelveen M., Stricker R. Filament formation associated with spirochetal infection: a comparative approach to Morgellons disease. Clinical, Cosmetic and Investigational Dermatology. 2011. No. 4. P. 167-177. doi: https://doi.org/10.2147/CCID.S26183
12. Chun-Yeung Y. Etiology of Yan (Morgellons) disease: a new plant-like infectious organism from Brazil and its skin manifestations. Clinical Medicine Insights: Dermatology (en-usa). 2012. No. 5. P. 13—20. DOI: https://doi.org/10.4137/CMD.S9496
13. Chernysh E.V., Plekhov V.A. Morgellons disease is a new infectious disease. Materials of Zaporizhzhya State Medical University. 2016. URL: https://dspace.zsmu.edu.ua/bitstream/123456789/5553/1/2016_SAMF_134.pdf
14. Wymore R.S. Statement of Morgellons disease: Center for the investigation of Morgellons disease. URL: https://www.thenmo.org/
15. Andreychyn M., Bighunyak V., Demyanenko V. The mysterious Morgellons disease. Clinical Immunology, Allergology, Infectology. 2010. No. 5-6. P. 34-35. URL: https://kiai.com.ua/ua/archive/2010/5-6%2834-35%29/pages-5-10/taiemnicha-hvoroba-morgeloniv
16. Harvey W.T., Bransfield. R.C., Mercer D.E. et al. Morgellons disease, illuminating an undefined illness: a case series. Journal of Medical Case Reports. 2009. No. 3. P. 8243. DOI: https://doi.org/10.4076/1752-1947-3-8243

17. Grimson M.J., Higler C.H., Blanton R.L. Cellulose microfibrils, cell motility, and plasma membrane protein organization change in parallel during in culmination in Dictyostelium discoideum. Journal of cell Science. 1996. No. 109. P. 3079-3087. URL: https://pubmed.ncbi.nlm.nih.gov/9004042/
18. Kellett C: Sir Thomas Browne and the Disease called the Morgellons. Annals of Medical History. 1935. Vol. 7. Iss. 5. P. 467-479. URL: https://pmc.ncbi.nlm.nih.gov/articles/PMC7942326/
19. Wikipedia contributors. Morgellons. Wikipedia. The Free Encyclopedia. Last modified 25.08.2025. URL: https://en.wikipedia.org/wiki/Morgellons
20. Savely V., Stricker R. Morgellons disease: the mystery unfolds. Expert Review of Dermatology. 2014. Vol. 2. Iss. 5. P. 585-591. https://doi.org/10.1586/17469872.2.5.585.
21. Bottaro A. Rare skin diseases. Verywell Health. 2024. URL: https://www.verywellhealth.com/rare-skin-diseases-5096005
22. Jungyoon O., Seon P., Jungyoon M. et al. Morgellons disease. Annals of Dermatology. 2017. Vol. 29. Iss. 2. P.223-225. URL: https://pmc.ncbi.nlm.nih.gov/articles/PMC5383751/
23. Robles D., Olson J., Combs H. Et al. Morgellons disease and delusions of parasitosis. Am J Clin Dermatol. 2011. No.12. P.1–6. DOI: https://doi.org/10.5021/ad.2017.29.2.223
24. Wikipedia contributors. Delusional parasitosis. Wikipedia, The Free Encyclopedia. Last modified 25.08.2025. URL:https://en.wikipedia.org/wiki/Delusional_parasitosis
25. Savely V., Leitao M., Stricker R. The mystery of Morgellons disease: infection or delusion? Am J Clin Dermatol. 2006. Vol.7. Iss. 1. P.1-5. DOI: https://doi.org/10.2165/00128071-200607010-00001
26. Naidoo A., Lepping P., Tan E. Morgellons disease. DermNet NZ. 2024. URL: https://dermnetnz.org/topics/morgellons-disease
27. Söderfeldt Y, Groß D. Information, consent and treatment of patients with Morgellons disease: an ethical perspective. Am J Clin Dermatol. 2014. No.15. P. 71-76. DOI: https://doi.org/10.1007/s40257-014-0071-y
28. Wildner M. Kennen Sie Morgellonen? Gesundheitswesen. 2009. No. 71. P. 795-796. DOI: https://doi.org/10.1055/s-0029-1242727
29. Wong J.W., Koo J.Y. Delusions of parasitosis. Indian J Dermatol. 2013. No. 58. P. 49-52. DOI: https://doi.org/10.4103/0019-5154.105309
30. Hylwa S.A., Foster A.A., Bury J.E. et al. Delusional infestation is typically comorbid with other psychiatric diagnoses: review of 54 patients receiving psychiatric evaluation at Mayo Clinic. Psychosomatics. 2012. Vol. 53. Iss.3. P. 258-265. DOI: https://doi.org/10.1016/j.psym.2011.11.003.
31. Gartner A.M., Dolan S.L., Stanford M.S. et al. Hypnosis in the treatment of Morgellons disease: a case study. Int J Clin Exp Hypn. 2011. Vol. 59. Iss. 2. P. 242-249. DOI: https://doi.org/10.1080/00207144.2011.546263.
32. Reid E.E., Lio P.A. Successful treatment of Morgellons disease with pimozide therapy. Arch Dermatol. 2010. Vol. 146. Iss. 10. 1191-1193. DOI: https://doi.org/10.1001/archdermatol.2010.276.
33. Middelveen M.J., Mayne P.J., Kahn D.G. et al. Characterization and evolution of dermal filaments from patients with Morgellons disease. Clin Cosmet Investig Dermatol. 2013. No. 6. P. 1-21. DOI: https://doi.org/10.2147/CCID.S39017.
34. Salinas M. P., Sepúlveda J., Hidalgo L. et al. A systematic review and meta-analysis of artificial intelligence versus clinicians for skin cancer diagnosis. npj Digital Medicine. 2024. Vol. 7. P. 125. DOI: https://doi.org/10.1038/s41746-024-01103-x
35. Roy G., Prifti E., Belda E. et al. Deep learning methods in metagenomics: a review. Microbial Genomics. 2024. Vol. 10. Iss. 4. P. 001231. DOI: https://doi.org/10.1099/mgen.0.001231
36. Wojtara M., Rana E., Rahman T. et al. Artificial intelligence in rare disease diagnosis and treatment. Clinical and Translational Science. 2023. Vol. 16. P. 2106–2111. DOI: https://doi.org/10.1111/cts.13619
37. Spies E., Flynn J.A., Oliveira N.G. et al. Artificial intelligence-enabled social media listening to inform early patient-focused drug development: perspectives on approaches and strategies.

Frontiers in Digital Health. 2024. Vol. 6. P. 1459201. DOI: https://doi.org/10.3389/fdgth.2024.1459201
38. Shapovalova V. Telemedicine and Telepharmacy in Modern Healthcare: Innovations, Medical Technologies, Digital Transformation. SSP Modern Pharmacy and Medicine. 2025. Vol.5. Iss. 3. P.1-19. URL: https://doi.org/10.53933/r7f5xj91