Case Report

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Mimicry of Symptomatic Dermographism: A Case Series of Atypical Presentations

Natalia P. Maltseva [1,2,*], Yury V. Zhernov [3,4,5,6], Ksenja A. Riabova [2,7] and Aysa Y. Nasunova [2,8]

[1] State Research Center of Dermatovenereology and Cosmetology, Ministry of Healthcare of the Russian Federation, 107076 Moscow, Russia
[2] Fomin Clinic, 119192 Moscow, Russia
[3] A.N. Sysin Research Institute of Human Ecology and Environmental Hygiene, Centre for Strategic Planning and Management of Biomedical Health Risks of the Federal Medical and Biological Agency, 119121 Moscow, Russia
[4] Department of General Hygiene, F. Erismann Institute of Public Health, I.M. Sechenov First Moscow State Medical University of the Ministry of Healthcare of the Russian Federation (Sechenov University), 119435 Moscow, Russia
[5] Department of Preventive Medicine, Reaviz Moscow Medical University, 117418 Moscow, Russia
[6] Center for Medical Anthropology, N.N. Miklukho-Maclay Institute of Ethnology and Anthropology of the Russian Academy of Sciences, 119017 Moscow, Russia
[7] Laboratory of Immunopathology, Department of Clinical Immunology and Allergy, I.M. Sechenov First Moscow State Medical University of the Ministry of Healthcare of the Russian Federation (Sechenov University), 119048 Moscow, Russia
[8] Department of Allergology and Immunology, Russian Medical Academy of Continuous Professional Education of the Ministry of Healthcare of the Russian Federation, 125993 Moscow, Russia
* Correspondence: maltseva.natalia.p@gmail.com; Tel.: +7(910)4756625

Abstract

Symptomatic dermographism (SD) is the most common form of chronic inducible urticaria, typically presenting with pruritic, linear wheals that appear within minutes after stroking the skin and resolve within 30 minutes. However, not every linear urticarial eruption following friction or scratching is true SD. We present three clinical cases initially misdiagnosed or suspected as classic SD, but which after detailed evaluation proved to be different entities. The first case was an atypical follicular subtype of SD itself, with a false-negative initial FricTest. The second case was cholinergic dermographism — a rare variant of cholinergic urticaria requiring two concurrent triggers (sweating and stroking) — in a patient with hyperhidrosis. The third case was flagellate dermatitis caused by consumption of inadequately cooked Shiitake mushrooms, with lesions persisting for days and no response to antihistamines. These cases highlight that even a characteristic linear wheal pattern is not pathognomonic for SD. A thorough history, recognition of atypical morphologies, and appropriate provocation testing (including combined triggers when needed) are essential to avoid diagnostic pitfalls and initiate effective therapy.

Keywords: symptomatic dermographism; dermographic urticaria; Shiitake dermatitis; cholinergic dermographism; FricTest

1. Introduction

Symptomatic dermographism (SD), also known as urticaria factitia or dermographic urticaria, is the most frequently encountered form of chronic inducible urticaria (CIndU), accounting for 3–27% of cases. Its prevalence in the general population is estimated at 0.12% [1–4]. However, recent epidemiological data suggest a significantly higher figure, reaching 3.2% [5]. In SD, pruritus is the primary symptom, with skin lesions appearing only after scratching [6]. The clinical features of SD

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have been described in the literature as the ability to "write on the skin," referring to the classic presentation of linear urticarial elements that follow the path of the irritating trigger [7]. Angioedema or systemic symptoms are uncommon in this type of urticaria [8,9]. SD lesions typically appear within 5 minutes of trigger exposure and resolve within 30 minutes [10]. Isolated clinical cases of atypical presentations, including follicular dermographism, have been described; however, even in this variant, characteristic linearity is preserved [11]. The severity of clinical manifestations is directly proportional to the patient's individual sensitivity threshold and the intensity of the trigger stimulus [12]. In individuals with a low threshold, symptoms may arise even in response to accidental touch, friction from clothing, scratching, contact with a water jet, or even physical exertion [13,14]. The duration of SD is usually long-standing, exceeding 2 years [15–17].

Many aspects of SD pathogenesis remain poorly understood; however, the role of immunoglobulin E (IgE) and mast cells has been demonstrated through passive serum transfer experiments and changes in vasoactive mediator (particularly histamine) levels following the reaction [18,19]. Diagnostic approaches primarily involve provocation testing that mimics a stroking stimulus. Any blunt object, such as a spatula or pencil, as well as specialized instruments such as the FricTest or dermographometer, may be used [12,20,21]. The latter are preferred, as they not only verify the diagnosis but also allow determination of the patient's individual sensitivity threshold to the trigger [22]. Atypical forms, such as those described for other types of CIndU – cold-induced and cholinergic urticaria – have not been reported for SD. However, Spanish researchers have attempted to establish SD phenotypes [23]. Interesting observations exist regarding the association between SD activity and food intake [24,25]. Several studies suggest a possible family history [6,26].

Despite the specificity of its clinical manifestations, the diagnosis of SD may sometimes require a differential diagnostic workup [27]. Similar symptoms may result from red dermographism, contact dermatitis, flagellate dermatitis, or atypical forms of other CIndU such as cholinergic dermographism and cold-dependent dermographism. Red (or simple) dermographism – which often accompanies chronic skin conditions associated with xerosis – differs from SD by the absence of infiltration and pruritus [28]. Pathological lesions in contact dermatitis (either irritant or allergic) have a characteristic trigger, persist on the skin for extended periods (several days or even weeks), and typically tend to recur [29–31]. A similar resolution timeline is seen in flagellate dermatitis associated with the consumption of inadequately cooked Shiitake mushrooms (Lentinus edodes) [32]. This specific dermatitis, caused by their ingestion, has become increasingly common in recent years [33,34]. It is characterized by intense pruritus and linear erythematous papules that persist on the skin for several days [35,36]. More complex differential diagnostic issues arise with other forms of CIndU, where the duration of urticarial elements also typically does not exceed one hour [2,7]. In such cases, distinctive features include the need for multiple concurrent triggers: in cold-dependent dermographism – stroking of cooled skin; in cholinergic dermographism – scratching the skin in the setting of increased sweating [37–40]. Provocation testing plays a key role in verifying these conditions [12]. Differential diagnosis is further complicated by the rarity of the discussed atypical forms (as epidemiological data are absent in the global literature).

In most cases, SD therapy with non-sedating antihistamines at standard or high doses is effective [41,42]. Data on the efficacy of monoclonal antibodies against immunoglobulin E (IgE) exist, but this therapy is not officially registered for this indication [43,44].

2. Case 1: Follicular Subtype of Symptomatic Dermographism

A 56-year-old male, patient N. Over the preceding six months, following a stressful situation, he began experiencing skin pruritus, which intensified in the evening and upon skin irritation or friction. Four months prior, he consulted an allergist, and a skin friction test was performed using a specialized FricTest instrument, yielding a negative result (Total Fric Score [TFS] = 0 points). Non-sedating antihistamines were recommended, but he did not take them regularly. Subsequently, he noted symptom progression, with linear skin lesions appearing after scratching or friction. The SD-QoL score was 58 points. A repeat skin stroking test was performed, yielding a positive result (TFS =

 doi:10.20944/preprints202605.0747.v1

4 points). Clinical assessment revealed linear wheals as well as small round urticarial elements arranged in a linear pattern (Figure 1). All lesions resolved spontaneously within 30 minutes. They did not occur in the absence of a provoking trigger. Following lifestyle modification and daily therapy with a standard dose of bilastine (20 mg/day) , near-complete symptom control was achieved. After one month of treatment, the TFS was 1 point and the SD-QoL score was 9 points.

Figure 1. Follicular subtype of symptomatic dermographism.

3. Case 2: Cholinergic Dermographism

A 34-year-old male, patient A. The patient had a long-standing sweating disorder manifesting as hyperhidrosis and was under the care of a neurologist for this condition. Hyperhidrosis was additionally triggered by stressors, staying in a hot room, and visiting a bathhouse or sauna. Over the preceding five months, he also began experiencing two types of skin lesions: small round elements and linear elements. He noted that minimal friction – touching, light rubbing by clothing, or contact with a water jet – was sufficient to induce their appearance. Upon initial medical consultation, a stroking test using a spatula was performed, with no reaction observed (testing was conducted in a procedure room). He took bilastine 20 mg without significant positive effect. The patient reported no other possible provoking factors. He did not experience symptoms during physical exertion associated with intensive sweating. Upon repeat skin stroking testing using the FricTest, a positive result was obtained, with a TFS of 1 point. During interpretation of the test, numerous small punctate urticarial elements up to 2 mm in diameter were observed on the skin of the tested forearm (Figure 2). The linear urticarial element, interpreted as a positive provocation test reaction, initially consisted of similar lesions that subsequently coalesced to form a single urticarial element. Given the need for simultaneous exposure to two triggers for symptom manifestation, the cutaneous process was diagnosed as a rare atypical form of cholinergic urticaria – cholinergic dermographism. Following dose escalation of bilastine to twice the standard dose (40 mg), a positive response was observed, with the patient occasionally experiencing isolated lesions; overall, urticaria symptoms were controlled.

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Figure 2. Atypical form of cholinergic urticaria – cholinergic dermographism.

4. Case 3: Shiitake (Flagellate) Dermatitis

A 46-year-old female, patient M. She presented with numerous linear skin lesions, predominantly on the back, accompanied by intense pruritus. The patient had returned from a trip to Central Asia five days prior, with symptoms developing three days after her return (Figure 3). The patient reported no possible provoking factors and was not taking any medications. These symptoms were a first-time occurrence. Family members who accompanied the patient on the trip were healthy. A general practitioner recommended enterosorbents, levocetirizine, and topical dimetindene gel. The patient experienced no positive response to therapy. Due to intense pruritus, she scratched her skin vigorously, resulting in sleep disturbance. Testing for scabies was negative. The Prurigo Control Test (PCT) score was 3 points. Detailed history taking revealed that before flying home, the patient had consumed noodle soup with Shiitake mushrooms at a café. Flagellate dermatitis was suspected. Symptomatic therapy was initiated: levocetirizine 5 mg, topical betamethasone dipropionate 0.05% cream, and emollients containing Cica. The skin process resolved within 10 days.

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Figure 3. Flagellate dermatitis caused by Shiitake mushroom consumption.

5. Discussion

The presented clinical cases demonstrate the heterogeneous origin of similar clinical manifestations. Each of the discussed cases could clinically have been interpreted as a classic presentation of SD. However, upon closer examination and investigation, different diagnoses were established.

In the first case, the diagnosis of SD would not have been verified without repeated FricTest administration. The initial negative result may be explained by the absence of clinically manifest lesions at the time of testing. Cases have been described where pruritus initially precedes the cutaneous process in SD [6]. Repeat testing demonstrates high urticaria activity [21]. Also notable in this patient is the specific morphology of the cutaneous process, characterized by the coalescence of small round urticarial elements into lines, whereas primary linearity of wheals is typical for SD [7,12]. Shelley et al. described similar clinical presentations in four patients [11]. It is possible that atypical forms occur in SD, as they do in other CIndU variants such as cold and cholinergic urticaria; this question requires further investigation [37–39,45–50].

The comorbidity of cholinergic urticaria and various sweating disorders has been described by some researchers [51–53]. However, such associations have been reported for hypohidrosis and anhidrosis. In Case 2, conversely, hyperhidrosis was observed. The onset of lesions immediately manifested as two types of skin elements, the development of which required the concurrent influence of two triggers: a factor provoking increased sweating and a stroking stimulus. This observation likely explains the negative result of the initial skin stroking test, which was performed in a procedure room where the ambient temperature was relatively low (+20°C), and the patient did not exhibit increased sweating. Atypical forms of cholinergic urticaria are very rare, with isolated clinical cases reported in the global literature; cholinergic dermographism is mentioned in only one study [40]. Further challenges in verifying atypical forms arise from the difficult-to-implement conditions of provocation testing, which requires simultaneous exposure to multiple provoking factors. Such adapted tests are not standardized, and there is a high risk of false-negative results and the development of acute reactions during testing [2,12]. This clinical case certainly warrants additional interest and requires further follow-up.

Case 3 demonstrates the presentation of flagellate dermatitis, a condition that was previously quite rare but has become more widespread in recent years, and which can be caused by dishes containing inadequately cooked Shiitake mushrooms [34]. This condition is a variant of food hypersensitivity to lentinan, a polysaccharide found in shiitake mushrooms (Lentinula edodes) [54]. Shiitake mushrooms, a component of the national cuisines of Asian countries, have become a popular food product worldwide in recent decades. The cutaneous process clinically resembled SD manifestations; however, in contrast to SD, the lesions persisted on the skin for several days and did not respond to the administered treatment [33]. Detailed history taking led to the identification of the trigger – Shiitake mushroom consumption [36]. In this patient, the development of secondary irritant dermatitis due to persistent intense skin scratching cannot be ruled out, which may have further exacerbated the initial problem. It is also worth noting that other food hypersensitivity, such as scombroid food poisoning, can present with urticarial eruptions, including linear or confluent wheals in some cases [55].

Symptomatic dermographism, despite its fairly specific manifestations, has several clinically similar conditions and, possibly, atypical presentations in some patients. These issues complicate diagnostic approaches and delay the achievement of symptom control. Awareness and knowledge of differential diagnoses will enable more rapid and effective patient care in real-world clinical practice. Through this publication, we aim to draw attention to such ambiguous situations and demonstrate the importance of detailed history taking and provocation testing.

 doi:10.20944/preprints202605.0747.v1

6. Conclusion

Symptomatic dermographism, despite its characteristic linear wheals, is not always the correct diagnosis when such morphology is present. As demonstrated by the three clinical cases presented here, a linear urticarial pattern can be mimicked by an atypical (follicular) variant of SD itself, by cholinergic dermographism (requiring two concurrent triggers), and by non-urticarial conditions such as Shiitake flagellate dermatitis.

The key lessons from these cases are: (1) a negative initial provocation test does not definitively rule out SD, especially if testing is performed during a quiescent phase; (2) in atypical presentations, the possibility of combined trigger forms (e.g., cholinergic dermographism) should be considered, and customized provocation testing may be required; (3) detailed dietary and travel history is essential to identify mimickers such as Shiitake dermatitis, which do not respond to antihistamines and have a prolonged course.

Clinicians should maintain a high index of suspicion for these and other SD mimickers. A systematic approach — including repeat or adapted provocation testing, careful morphological assessment, and thorough history taking — is critical to avoid misdiagnosis and to initiate appropriate treatment without delay.

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Abbreviations

The following abbreviations are used in this manuscript:

CIndU	Chronic inducible urticarial
IgE	Immunoglobulin E
PCT	Prurigo Control Test
SD	Symptomatic dermographism
SD-Qol	Quality of life of Symptomatic dermographism
TFS	Total Fric Score

References

1. Zuberbier, T. et al. The international EAACI/GA²LEN/EuroGuiDerm/APAAACI guideline for the definition, classification, diagnosis, and management of urticaria. Allergy 77, 734–766 (2022).
2. Magerl, M. et al. The definition, diagnostic testing, and management of chronic inducible urticarias — the EAACI/GA(2) LEN/EDF/UNEV consensus recommendations 2016 update and revision. Allergy 71, 780–802 (2016).
3. Li, J. et al. Epidemiology of urticaria in China: a population-based study. Chin. Med. J. In press (2022).
4. Seo, J.H. et al. Epidemiology of urticaria including physical urticaria and angioedema in Korea. Korean J. Intern. Med. 34, 418–425 (2019).

 doi:10.20944/preprints202605.0747.v1

5. Kulthanan K, Bernstein JA, Rudenko M, Salameh P et all. The Prevalence of Symptomatic Dermographism: Results of the International UCARE PREVALENCE-D Study. Allergy. 2026 Feb;81(2):468-479. doi: 10.1111/all.70047
6. Kulthanan K, Bernstein JA, Rudenko M, Salameh P, et all. Factors Associated with Symptomatic Dermographism: Findings from the UCARE PREVALENCE-D Study. Am J Clin Dermatol. 2026 Mar 17. doi: 10.1007/s40257-026-01015-4.
7. Abajian, M., Schoepke, N., Altrichter, S., Zuberbier, T. (2014). Physical urticarias and cholinergic urticaria. Immunology and allergy clinics of North America, 34(1), 73–88. https://doi.org/10.1016/j.iac.2013.09.010
8. Ornek Ozdemir S, Kuteyla Can P, Degirmentepe EN, et al. A comparative analysis of chronic inducible urticaria in 423 patients: Clinical and laboratory features and comorbid conditions. J Eur Acad Dermatol Venereol 2024; 38:513.
9. Zhang L, Peng C, Li J. Shedding light on dermographism: a narrative review. Int J Dermatol. 2024 Aug;63(8):999-1006. doi: 10.1111/ijd.17102.
10. Kontou-Fili K, Borici-Mazi R, Kapp A, et al. Physical urticaria: classification and diagnostic guidelines. An EAACI position paper. Allergy 1997; 52:504.
11. Shelley WB, Shelley ED. Follicular dermographism. Cutis 1983; 32:244.
12. Maurer M, Fluhr JW, Khan DA. How to approach chronic inducible urticaria. J Allergy Clin Immunol Pract 2018;6:1119-1130.
13. Matthews CN, Kirby JD, James J, Warin RP. Dermographism: reduction in weal size by chlorpheniramine and hydroxyzine. Br J Dermatol 1973; 88:279.
14. Ertaş R, Yücel MB, Türk M, Ketenci Ertaş Ş, Kocatürk E. Physical Exercise Improves Symptomatic Dermographism. Clin Transl Allergy. 2025 Jul;15(7):e70083. doi: 10.1002/clt2.70083.
15. Schoepke N, Młynek A, Weller K, Church MK, Maurer M. Symptomatic dermographism: an inadequately described disease. J Eur Acad Dermatol Venereol. 2015 Apr;29(4):708-12. doi: 10.1111/jdv.12661.
16. Liu L, Wang X, Wang W, Wang B, Li L. Symptomatic dermographism in Chinese population: an epidemiological study of hospital-based multicenter questionnaire survey. Curr Med Res Opin. 2022 Jan;38(1):131-137. doi: 10.1080/03007995.2021.1984220.
17. Taşkapan O, Harmanyeri Y. Evaluation of patients with symptomatic dermographism. J Eur Acad Dermatol Venereol. 2006 Jan;20(1):58-62. doi: 10.1111/j.1468-3083.2005.01372.x.
18. Murphy GM, Zollman PE, Greaves MW, Winkelmann RK. Symptomatic dermographism (factitious urticaria)-passive transfer experiments from human to monkey. Br J Dermatol 1987; 116:801.
19. Newcomb, R. W. & Nelson, H. Dermographia mediated by immunoglobulin E. Am. J. Med. 54, 174–180 (1973).
20. Magerl M, Borzova E, Giménez-Arnau A, et al. The definition and diagnostic testing of physical and cholinergic urticarias-EAACI/GA2LEN/EDF/UNEV consensus panel recommendations. Allergy 2009; 64:1715
21. Gutsche A, Metz M, Munoz M, Wong K et all. Assessing the reliability of the FricTest 4.0 for diagnosing symptomatic dermographism. Clin Transl Allergy. 2024 Nov;14(11):e70005. doi: 10.1002/clt2.70005.
22. Mlynek A, Vieira dos Santos R, Ardelean E, et al. A novel, simple, validated and reproducible instrument for assessing provocation threshold levels in patients with symptomatic dermographism. Clin Exp Dermatol 2013; 38:360.
23. Prados-Castaño M, Reguero Capilla M, Menéndez-Rivero E, Ruiz Del Barrio L. Phenotypes in Symptomatic Dermographism. Actas Dermosifiliogr. 2025 Dec 17;117(5):104566. English, Spanish. doi: 10.1016/j.ad.2025.104566.
24. Yücel MB, Ertas R, Türk M, Muñoz M, Atasoy M, Maurer M. Food-dependent and food-exacerbated symptomatic dermographism: New variants of symptomatic dermographism. J Allergy Clin Immunol. 2022 Feb;149(2):788-790. doi: 10.1016/j.jaci.2021.07.030.
25. Ertaş R, Türk M, Yücel MB, Muñoz M et all. Eating Increases and Exercise Decreases Disease Activity in Patients With Symptomatic Dermographism. J Allergy Clin Immunol Pract. 2023 Mar;11(3):932-940. doi: 10.1016/j.jaip.2022.11.041.

 doi:10.20944/preprints202605.0747.v1

26. Jedele KB, Michels VV. Familial dermographism. Am J Med Genet. 1991 May 1;39(2):201-3. doi: 10.1002/ajmg.1320390216.
27. Komarow HD, Arceo S, Young M, Nelson C, Metcalfe DD. Dissociation between history and challenge in patients with physical urticaria. J Allergy Clin Immunol Pract. 2014 Nov-Dec;2(6):786-90. doi: 10.1016/j.jaip.2014.07.008.
28. Warin RP. Factitious urticaria: red dermographism. Br J Dermatol 1981; 104:285.
29. Cvetkovski RS, Zachariae R, Jensen H, et al. Prognosis of occupational hand eczema: a follow-up study. Arch Dermatol 2006; 142:305.
30. Lee JY, Effendy I, Maibach HI. Acute irritant contact dermatitis: recovery time in man. Contact Dermatitis 1997; 36:285.
31. Alinaghi F, Bennike NH, Egeberg A, et al. Prevalence of contact allergy in the general population: A systematic review and meta-analysis. Contact Dermatitis 2019; 80:77.
32. Albuscheit, N.; Riedemann, H.; Aljehani, W. G.; Yazdi, A. S. Shiitake dermatitis: a type IV allergic hypersensitivity reaction to raw mushrooms. Eur J Dermatol. 2020, 30(3), 316–317.
33. Nette D, Rogowska P, Sławińska M. Flagellate Dermatitis Induced by Shiitake Mushrooms-Clinical Features of a Rare but Characteristic Entity. Diagnostics (Basel). 2026 Feb 26;16(5):692. doi: 10.3390/diagnostics16050692.
34. Stephany MP, Chung S, Handler MZ, Handler NS et all. Shiitake Mushroom Dermatitis: A Review. Am J Clin Dermatol. 2016 Oct;17(5):485-489. doi: 10.1007/s40257-016-0212-6. Erratum in: Am J Clin Dermatol. 2016 Dec;17(6):709. doi: 10.1007/s40257-016-0225-1.
35. Gofman, J.; Shapiro, L.; Elias, M. D. Recognizing Flagellate Erythema in Skin of Color: A Case of Shiitake Dermatitis. Cureus 2024, 16(3), e55437.
36. Sudy, E.; Urbina, F. Shiitake dermatitis: clinical forms of presentation. Int J Dermatol. 2023, 62(5), e278.
37. Kaplan AP. Unusual cold-induced disorders: cold-dependent dermographism and systemic cold urticaria. J Allergy Clin Immunol 1984;73:453-456.
38. Wanderer AA. Cold urticaria syndromes: historical background, diagnostic classification, clinical and laboratory characteristics, pathogenesis, and management.J Allergy Clin Immunol 1990;85:965-981.
39. Matthews CN, Warin RP. Cold urticaria and cold precipitated dermographism. Br J Dermatol 1970;82:91.
40. Mayou S.C., Kobza Black A., Eady R.A., Greaves M.W. Cholinergic dermographism // Br J Dermatol. 1986. Vol. 115, N 3. P. 371–377.
41. Pereira ARF, Motta AA, Kalil J, Agondi RC. Chronic inducible urticaria: confirmation through challenge tests and response to treatment/einstein_journal/ 2020.
42. Kulthanan K, Ungprasert P, Tuchinda P, Chularojanamontri L et all. Symptomatic Dermographism: A Systematic Review of Treatment Options. J Allergy Clin Immunol Pract. 2020 Oct;8(9):3141-3161. doi: 10.1016/j.jaip.2020.05.016.
43. Maurer M, Schutz A, Weller K, Schoepke N, et al. Omalizumab is effective in symptomatic dermographism—results of a randomized, placebo controlled trial. J Allergy Clin Immunol 2017.
44. Maurer, M., Metz, M., Brehler, R., Hillen, U.,et all. (2018). Omalizumab treatment in patients with chronic inducible urticaria: A systematic review of published evidence. The Journal of allergy and clinical immunology, 141(2), 638–649.
45. Murphy GM, Black AK, Greaves MW. Persisting cholinergic erythema: a variant of cholinergic urticaria. Br J Dermatol. 1983 Sep;109(3):343-8.
46. Bizjak, M.; Košnik, M.; Dinevski, D.; Thomsen, S.F et al. Risk factors for systemic reactions in typical cold urticaria: Results from the COLD-CE study. Allergy 2022, 77, 2185–2199
47. Oda, Y.; Fukunaga, A.; Tsujimoto, M.; Hatakeyama, M. et al Combined cholinergic urticaria and cold-induced cholinergic urticaria with acquired idiopathic generalized anhidrosis. Allergol. Int. 2015, 64, 214–215.
48. Wanderer AA. Systemic cold urticaria (atypical acquired cold urticaria). J Allergy Clin Immunol 1991;87:137-138.

 doi:10.20944/preprints202605.0747.v1

49. Maltseva, N.P.; Riabova, K.A.; Zhernov, Y.V. Cold and Cholinergic Urticaria: Predictors of Anaphylaxis and Therapeutic Approaches—What We Know and What We Do Not Know? Immuno 2025, 5, 44. https://doi.org/10.3390/immuno5040044
50. Maltseva, N. P., Ryabova, K. A., Zhernov, Y. V., & Sebekina, O. V. (2024). Aspects of pathogenesis, differential and modifying approaches in cholinergic urticaria. Russian Journal of Allergy, 21(4), 479-491.
51. Fukunaga A, Oda Y, Imamura S, Mizuno M, Fukumoto T, Washio K. Cholinergic Urticaria: Subtype Classification and Clinical Approach. Am J Clin Dermatol. 2023 Jan;24(1):41-54.
52. Kim JE, Jung KH, Cho HH, et al. The significance of hypersensitivity to autologous sweat and serum in cholinergic urticaria: cholinergic urticaria may have different subtypes. Int J Dermatol. 2015:54(7): 771–777.
53. Nakamizo S., Egawa G., Miyachi Y., Kabashima K. Cholinergic urticaria: Pathogenesis-based categorization and its treatment options // J EurAcadDermatol Venereology. 2012. Vol. 26, N 1. P. 114–116.
54. Zhernov YV, Vysochanskaya SO, Sukhov VA, Zaostrovtseva OK, Gorshenin DS, Sidorova EA, Mitrokhin OV. Molecular Mechanisms of Eosinophilic Esophagitis. Int J Mol Sci. 2021 Dec 7;22(24):13183. doi: 10.3390/ijms222413183.
55. Zhernov, Y.V.; Simanduyev, M.Y.; Zaostrovtseva, O.K.; Semeniako, E.E.; Kolykhalova, K.I.; Fadeeva, I.A.; Kashutina, M.I.; Vysochanskaya, S.O.; Belova, E.V.; Shcherbakov, D.V.; et al. Molecular Mechanisms of Scombroid Food Poisoning. *Int. J. Mol. Sci.* 2023, *24*, 809. https://doi.org/10.3390/ijms24010809.