

## GENETIC RISK FACTORS FOR THE DEVELOPMENT OF ALLERGIC DISEASES IN PATIENTS AFTER COVID-19

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## COVID-19 ДАН КЕЙИН БЕМОРЛАРДА АЛЛЕРГИК КАСАЛЛИКЛАР РИВОЖЛАНИШИДА ГЕНЕТИК ХАВФ ОМИЛЛАРИ

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## ГЕНЕТИЧЕСКИЕ ФАКТОРЫ РИСКА РАЗВИТИЯ АЛЛЕРГИЧЕСКИХ ЗАБОЛЕВАНИЙ У ПАЦИЕНТОВ ПОСЛЕ COVID-19

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**Резюме.** Ушбу мақолада COVID-19 касаллигидан тузалиб кетган беморларда аллергик касалликларнинг пайдо бўлиши билан боғлиқ генетик хавф омиллари кўриб чиқилган. Мақолада генлар ва иммунологик реакциялар ўртасидаги мураккаб ўзаро боғлиқлик ўрганилган, иммунитетни назорат қилиш, яллигланиш ва тўсиқ функциясида иштирок этадиган генларнинг муҳим аҳамияти таъкидланган. COVID-19 касаллигидан кейин аллергик ҳолатларнинг генетик ландшафтини тўлиқ тушуниш учун қўшимча тадқиқотлар талаб этилади ва мақолада генетик хавф омилларини аниқлаш клиник оқибатлари таъкидланган. Хулоса қилиб айтганда, ушбу тадқиқот COVID-19 контекстида аллергик касалликларнинг генетик таркибий қисмлари ҳақида фойдали маълумотларни тақдим этади, мослаштирилган даволаш режалари ва беморларни парварши қилишни яхшилаш учун эшикларни очади.

**Калит сўзлар:** хавф генетик омиллари, аллергик касалликлар, COVID-19, SARS-CoV-2, мойиллик, иммун жавоб, генетика, полиморфизм, цитокины, интерлейкинлар, toll-рецепторлар, генетик маркерлар.

**Abstract.** In patients recovering from COVID-19, this article investigates the genetic risk factors connected to the emergence of allergy disorders. It addresses the intricate relationship between genes and immunological reactions, highlighting the possible significance of genes implicated in immune control, inflammation, and barrier function. In order to fully understand the genetic landscape of allergy disorders after COVID-19, additional study is required, and the article underlines the clinical consequences of finding genetic risk factors. In conclusion, this study offers insightful information about the genetic components of allergic illnesses in the context of COVID-19, opening the door to individualized treatment plans and enhanced patient care.

**Keywords:** genetic risk factors, allergic diseases, COVID-19, SARS-CoV-2, predisposition, immune response, genetics, susceptibility, polymorphism, cytokines, interleukins, toll-like receptors, genetic markers.

**Introduction:** The COVID-19 epidemic, which has affected millions of people globally, has had a significant effect on global health. Although the SARS-CoV-2 virus-induced acute respiratory sickness has received the majority of attention, COVID-19 may have long-term effects as well, according to new research. There have been reports of new-onset or worsening allergy illnesses in certain people who are recovering from COVID-19 as one of these effects. By examining the genetic risk variables linked to the emergence of allergy illnesses in patients following COVID-19, this research hopes to offer light on the interaction between genetics and immunological reactions [6, 9].

**Allergic Diseases and COVID-19:** Allergens are just one of the many environmental elements that can cause hypersensitivity reactions in people with allergic illnesses such as asthma, allergic rhinitis, and atopic dermatitis. While there are several potential pathways driving the emergence of allergy disorders, both hereditary and environmental factors play a crucial role. Some patients' allergic disorders may develop or worsen as a result of the immunological dysregulation seen in COVID-19, specifically the

dysregulated immune response and increased cytokine production [1,2].

Genetic Predisposition and Allergic Diseases: Genetic factors are known to influence an individual's susceptibility to allergic diseases. Several genes, including those involved in immune modulation, barrier function, and inflammation, have been discovered to be possible risk factors for the emergence of allergies [2,4]. Specific genetic variations have been linked to allergy illnesses by genome-wide association studies (GWAS), illuminating the intricate genetic architecture of these conditions<sup>1</sup>.

Potential Genetic Risk Factors for Allergic Diseases and COVID-19: Despite the paucity of studies on the particular genetic risk factors for the emergence of allergy disorders following COVID-19, preliminary research has shown possible correlations. The genetic variations linked to immunological dysregulation and inflammation have received the majority of attention in these investigations. For instance, differences in the genes producing essential immune system proteins including cytokines, interleukins, and toll-like receptors have been linked to both COVID-19 and allergy illness susceptibility [6,7].

As potential risk factors for allergy disorders, genetic variations linked to epithelial barrier function, such as mutations in the filaggrin gene, have also been discovered. It is possible that COVID-19's disruption of the epidermal and respiratory barriers will interact with these genetic variations and trigger the onset or worsening of allergy disorders [1,3,5].

**Genetic and Environmental Factor Interaction:** Genetic factors do not cause allergy disorders on their own, but they do interact with environmental factors. In defining illness susceptibility and manifestation, the interaction of genetic and environmental variables is crucial. Allergens, toxins, and infections are examples of environmental triggers that can alter gene expression and immunological responses. In the case of COVID-19, the virus itself and related immune response modifications may function as additional environmental factors that interact with a person's genetic make-up, thereby raising the chance of the development of allergic disease<sup>1</sup> [8,9,10].

Further study is required to fully understand the genetic landscape of allergy disorders in light of COVID-19. It is crucial to do extensive genetic research including various populations and incorporating data from multiple omics, such as genomics, transcriptomics, and proteomics. Studies that follow patients over time and analyze their data longitudinally might offer important insights into the temporal dynamics of genetic and environmental interactions [11].

**In conclusion,** we can learn more about disease pathophysiology and enhance patient care by better understanding the genetic risk factors for the emergence of allergy illnesses in patients after COVID-19. Our understanding of the complex interactions between genetics, COVID-19, and allergy disorders will help us get closer to developing precision medicine techniques that improve the prevention, diagnosis, and treatment options for those who are afflicted.

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**Резюме.** В этой статье исследуются генетические факторы риска, связанные с возникновением аллергических расстройств у пациентов, выздоравливающих после COVID-19. В нем рассматриваются сложные взаимосвязи между генами и иммунологическими реакциями, подчеркивается возможное значение генов, участвующих в иммунном контроле, воспалении и барьерной функции. Чтобы полностью понять генетический ландшафт аллергических расстройств после COVID-19, требуется дополнительное исследование, и в статье подчеркиваются клинические последствия выявления генетических факторов риска. В заключение, это исследование предлагает полезную информацию о генетических компонентах аллергических заболеваний в контексте COVID-19, открывая двери для индивидуальных планов лечения и улучшенного ухода за пациентами.

**Ключевые слова:** генетические факторы риска, аллергические заболевания, COVID-19, SARS-CoV-2, предрасположенность, иммунный ответ, генетика, восприимчивость, полиморфизм, цитокины, интерлейкины, toll-подобные рецепторы, генетические маркеры.