CURRENT STRATEGIES OF USING MAJOR NON-ANTIBODY IMMUNITY SYSTEMS AGAINST DISEASES ACCOMPANYING COVID-19

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Abstract. The main dominated factors and strategies of non-antibody immunity (the human innate and others, microbial probiotic) aimed at maintaining and strengthening health in connection with the pandemic disease COVID-19 are considered and currently systematized. An integrated current evaluation of the non-antibody immunity is given and preventive and therapeutic approaches to its use for combating diseases accompanying COVID-19 (or on the ‘it’s background) are indicated. Innate immunity is considered as the basic and deep support for the antibody level immunity as the higher and super-structure. The concept of increasing sensitivity to be infected with COVID-19 in population groups depending on the presence and/or the progress of spectrum pathologies and diseases and in connection with the waves of the pandemic COVID-19 is proposed.

Annotación. Rассмотрены и систематизированы факторы и стратегии неантителного (врожденного и микробного - пробиотического) иммунитета, направленные на поддержание и укрепление здоровья в связи с пандемической болезню COVID-19. Дан интегрированная оценка неантителного иммунитета и указаны профилактические и терапевтические подходы к его применению в борьбе с болезнями, сопровождающими (проявляющимися на фоне) COVID-19. Неантителный иммунитет рассматривается как глубинный и базисный, поддерживающий антителный как надстроенный. Предложена концепция повышения чувствительности к COVID-19 (снижения порога восприимчивости к вирусным инфекциям) у групп населения в связи с прогрессированием спектра появившихся и прогрессирующих патологий и болезней на фоне пандемии COVID-19 и в связи с волнами пандемии.

Ключевые слова: COVID-19; Гликонъюгаты; Контактные системы; Распознавание; Сопутствующие болезни; Не антителный иммунитет.

Abbreviations

ACE-2: angiotensin converting enzyme of type 2
CLR: C-type lectin receptors
Gc: Glycoconjugates
MBL: mannan binding protein
MBP: mannan binding lectin
NK: natural killers
PRR: pattern recognition receptors
TLR: Toll like receptors
There are cases of stable protection of persons or patients (genetically determined by the presence of the significant protective T-cell population status) against the development or complications of the body pathologies and diseases in conditions (against the background) of COVID-19 and weakened antibody immunity. In this regard, there is increasing interest in the role and potential of the diversity of anti-COVID-19-systems of the non-antibody immunity (NAI).

The goal is to systematize the factors, status and potential of NAI on the basis of our own data [1-12] and to propose current strategies against pathologies and diseases which can accompany COVID-19.

Therapeutic functional macro-targets in connection with COVID-19

Molecular, receptor and network (cascade) targets are distinguished in connection with COVID-19 against the background of congenital and acquired disbalance of protective and other vital systems (in brackets - therapeutic approaches, factors and strategies for correction):

1) Initiated and other early key molecular-receptor acts of mutual inter-pattern recognition in contacts of "COVID-19—Human cells of the first contact": interaction of the exposed SARS-CoV-2 glycoprotein S1 variants (mutations of which are taking into account upon development of almost all modern vaccines against COVID-19) with receptors of the type "Lectins—Carbohydrates/ glycans/ glycoconjugates (Gc)" (contribution of inter/ supra-molecular/ensemble pattern specificity within the "Virus—Human“ system, taking into account the involvement of the initiated signal assemblies as di/tri- and multimers; connection of events in contacts with further prevention of infection).

2) Response to COVID-19 of all protective and physiologically important systems of innate immunity of the body, requiring preventive and therapeutic support and strengthening:

*Renin—Angiotensin system with the participation of receptor angiotensin-converting enzyme (ACE-2) - exopeptidase EC 3.4.15.1 (ACE-2 inhibition localized in lesions, use of shortened ACE-2 as a pathogen acceptance antagonist);
*Kallikrein—Kinin system (localized inhibition in contacts by synthetic bradykinin derivatives);
*blood coagulation system (inhibition by heparin, heparan sulfate, other glyco-sulfates, including low molecular weight, at the level of cellular and tissue reception);
*complement system (inhibition of cascades of reactions involving natural Gc: mannan-binding protein and lectin – MBP and MBL, (di/oligo)sialyl-binding proteins - factor-H and its systemic natural derivatives; inhibition of constituents of the C3- and C5-cascades; control of the C1-inhibitor level in blood and tissues, especially upon diagnostics of marker precursors of thromboembolic processes);
*anti-hypoxia system of the body (erythropoietins against hypoxia of blood, organs and tissues, as well as to support other physiologically important functions of healthy status of organs).

3) The personal NAI metabolic axes interacting to COVID-19:

*Communication of the complement and blood coagulation systems in the direction of "Complement—Anti-thrombosis" (communications as therapeutic purposes for controlling the balance of activation of coagulation and platelet cascades, inhibition of fibrinolysis, stimulation of endothelial cells with the result of prevention of thromboembolism);
*Complement—Renin-angiotensin communications (supportive therapy strategies involving each of the optimized systems);
*Complement—Kallikrein-kinin communications (ensuring and improving the reliability and depth of protection of the co-functioning of both systems);
*communication "Complement—Other protection and life support systems” through complement receptors, including those common to complement and blood clotting (complement as a universal node of management, a means of achieving accelerated balanced regulation by several systems simultaneously).

4) Lectin supersystems of human protection with probiotic and postbiotic actions that complement innate immunity (integration of probiotic and postbiotic molecular cellular systems into a single protection as a "network-within-a-network" of the metabolome and interactome).

5) Systems of the C-type lectin receptors (CLR), pattern-recognizing receptors (PRR) and Toll-like receptors (TLR, TLR-2 and TLR-4 as preferential examples) – a single universal Gc-recognizing supersystem of cellular innate immunity (CLR and TLR as targets for managing pools of anti-COVID-19-NK- and other T-cell populations); recognizing glycopatterns/Gc populations of NK cells against tumors against the background of hidden/ latent processes occurring in the body / weakened epidemiologically significant viral infections.

Seasonal changes in the functioning macro-systems of the patients 65+ in connection with COVID-19

We analyzed the changes in the dominant sensory physiologically active macrosystems (mainly eye vision and skin status) in the conditions of the COVID-19 pandemic and, using the example of patients 65+, proposed a concept of changes in connection with concomitant COVID-19 pathologies and diseases. The concept includes ideas about the accumulation of errors in the functioning of the body with each next wave of the COVID-19 pandemic disease, leading to the appearance of new and strengthening of existing pathologies and diseases associated with COVID-19 as a result of the progressive and virus-involving distorted "mapping" and functioning of organs and tissues and, thereby, lowering the threshold doses of initiation of subsequent mixed infections associated with COVID-19, primarily manifested in relation to dominant sensory contact macrosystems. The waves act as modulators of the population diversity and severity of the types of pathologies and diseases accompanied by COVID-19.
The consequences of the impact of the waves of the COVID-19 pandemic may be: * higher sensitivity to COVID-19 in population groups over the age of 60-65 years; * consistent (as the pandemic continues in the world) decrease in the age of patients ("rejuvenation" of populations) with increased sensitivity to diseases accompanied by COVID-19; * an increase in the number of patients with enhanced and/or prolonged partially or completely (for certain and selective pathologies) irreversible post-COVID-19 syndrome; * decrease of the interval between the waves of the pandemic (disurbance of the season wave rhythms); increase in the number of mortalities associated with the waves of COVID-19 (contribution of accompanied diseases). The results indicate the need for timely diagnosis and prognostication of pathologies and diseases in connection with COVID-19 to conduct dispensary visual and other combined monitoring of changes in the functioning of the dominant contact and internal physiologically significant macro-systems of individuals and patients.

**Conclusion**

Factors and strategies of NAI, complementary to the antibody immunity, aimed at maintaining and strengthening the health of individuals and patients due to the possible presence of SARS-CoV-2 in the body are considered. These data indicate an important role of NAI in counteracting viral, microbial and mixed infections and diseases caused by them, which are intensified under the conditions of COVID-19. At the same time, NAI manifests itself as a basic deep sub-network that supports antibody immunity as a scaffold superstructure.

**References**


MRI RESEARCH OF THE CAUSES OF DYSTROPHIC PROCESSES IN THE SPINE

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Abstract. The aim of the study was to search for organic changes in the tissues of the spine, which are the cause of pain syndromes in the back and spine.

Method. MRI was used to diagnose the condition of the muscular corset of the spine and conditions of the identified disorders with the localization of pain syndromes in the back and the localization of dystrophic manifestations in the vertebrae and intervertebral discs.

Results. In 70 patients who underwent MRI of areas with pain syndromes in the back, it was shown that dystrophic manifestations in the spine are preceded by spastic conditions of the intervertebral muscles, leading to disruption of trophism (nutrition and regeneration) of the vertebrae and intervertebral discs, as well as the spine, the development of pain syndromes.

The localization of spastic conditions of the intervertebral muscles coincides with the areas in which people experience pain, caused, according to most neurologists, by osteochondrosis of the spine. Osteochondrosis of the spine as a dystrophic process is a consequence of the spastic conditions of the muscles that cause disturbances in the trophism of the vertebrae and intervertebral discs.

Conclusions: Spinal osteochondrosis is not a disease, but an irreversible dystrophic process in the vertebrae and intervertebral discs. The reasons for the development of dystrophic processes and back pain are spastic conditions in the intervertebral muscles.

Keywords: spine, pain syndromes, MRI, osteochondrosis, muscles, spastic conditions.

Introduction

The problem of osteochondrosis concerns not only doctors trying to treat pain syndromes in the back and joints, but also every person. Dystrophic processes in the spine are a manifestation of premature aging of human bone and cartilage tissues.

Osteochondrosis of the spine according to the theory of Ya. Yu. Popelyansky is credited with many neurological syndromes in the spine and throughout the body [4]. The term “osteochondrosis of the spine” has practically become synonymous with back pain. MRI studies have shown that the term “osteochondrosis” corresponds only to dystrophic changes in the vertebral bodies and intervertebral discs. In 1995 in Vienna at the congress of vertebrologists and orthopedists G. Wolf presented a report. He cited the results of a study of 50,000 patients with lumbosacral radiculopathy. Of these, 40% of patients with changes on radiographs did not have clinical neurological manifestations. On the contrary, 40% of patients had clinical neurological symptoms without radiological symptoms. J. Braceford [6], having analyzed 10,000 X-ray studies for lumbar pain, found osteochondrosis only in 10% of cases. The diagnosis, which until recently did not raise doubts - "discogenic radiculitis", "lumbosacral radiculitis" or "radiculopathy" - was declared untrue [1,2].

From the point of view of anatomy, neither osteochondrosis of the spine, nor herniated discs can cause pain syndromes in the back, spine and extremities. However, neurological syndromes in the back can be caused by "tunnel effects" - compression of the spinal nerves [3]. At the conference - a school for doctors called "Back pain - an interdisciplinary problem", held at the 1st Moscow Medical University in 2015 was presented as the main conclusion on the results of the conference, adopted by all leading experts, the following conclusion: Osteochondrosis of the spine is not involved in the occurrence of pain syndromes in the back. In 80% of cases, the causes of pain in the spine are not known and are not associated...