SEMINAR FOR PHYSICIANS
SEMINAR ZA LEKARE U PRAKSI

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Review article
Pregledni članci
UDC 579.61+587.7
https://doi.org/10.2298/MPNS2310299Z

OUR VIRUSES AND SAPROPHYTIC BACTERIA

NAŠI VIRUSI I SAPROFITSKE BAKTERIJE

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Summary

Introduction. The paper presents the facts about the inevitable presence of microbes in the human body and the key role of viruses in the evolution, shaping and development of the living world. **Contemporary research.** Experimental scientific research on mice, examining the influence of saprophytic bacteria on their physical activity and behavior through the produced N-lactoyl-phenylalanine substance, provides foundation for further research within the human population. **Discussion.** The above positive impact of viruses and the consequential risks of their presence on people's health are discussed along with the adverse cross-effects of planetary and human health arising from harmful behavior and wrong life habits of the contemporaries. **Conclusion.** Recommendations are given for preventive possibilities to avoid such risks and achieve good or satisfactory health both for each and every individual and the global community of people through a lifestyle in harmony with nature.

Key words: Microbiota; Viruses; Biological Evolution; Phenylalanine; Health; Risk Factors; Microbial Interactions

Sažetak

Uvod. U radu su iznete činjenice o nezaobilaznoj prisutnosti mikroba u ljudskom organizmu i ključnoj ulozi virusa u evoluciji, oblikovanju i razvoju živog sveta. **Savremena istraživanja**. Eksperimentalna naučna istraživanja na miševima o uticaju saprofitskih bakterija na njihovu fizičku aktivnost i ponašanje putem proizvedene N-laktoil-fenilalanin supstancije otvaraju prostor za dalja istraživanja i u humanoj populaciji. **Diskusija**. Raspravlja se o navedenom pozitivnom uticaju virusa kao i o posledičnim rizicima njihovog prisustva po zdravstveno stanje ljudi, o ukrštenim uticajima planetarnog i ljudskog zdravlja koji, u negativnoj konotaciji, proističu iz štetnog ponašanja i pogrešnih životnih navika savremenika. **Zaključak**. Date su preporuke za preventivne mogućnosti da se iste izbegnu, da se načinom života u skladu sa prirodom ostvari dobro ili zadovoljavajuće zdravlje, kako za svakog pojedinca tako i za celokupnu svetsku zajednicu ljudi.

Ključne reči: mikrobi; virusi; evolucija; fenilalanin; zdravlje; faktori rizika; interakcije mikroba

Introduction

Viruses shape the living world

Viral infections are the most prevalent human diseases and we live in a world of viruses that is incomparably diverse. Mammals alone can carry at least 320,000 different types of viruses, and when you add viruses that infect non-mammalian animals, plants, terrestrial bacteria, and every conceivable host, the total number is enormous. Despite their potential threat to the health of the living world, viruses also yield significant positive consequences for life on Earth as many of them bring adaptive benefits rather than harm. Viruses have also played a key role in initiating major evolutionary transitions [1, 2].

It is unusual that we learn about millennial events of vital importance for all people, which are evidently unfolding, only on the margins of our daily lives. Today, we know that microorganisms generate many chemical substances that affect the human body, physical and mental health, and consequently our behavior, which contribute to the onset and development of chronic heart diseases, type 2 diabetes, obesity, depression, anxiety, degenerative neurological diseases- the most common diseases of modern humanity.

About 8% of our current DNA originates from viruses that infected our ancient ancestors. These viruses integrated their genes into the ancestral genomes, and now, some of these genes play a key role in the early stages of embryo development and the placenta that surrounds the fetus. Today, we know that the two DNA strands derived from the proviruses, now found in the genomes of humans and other primates, are indispensable for pregnancy, and that the inception of life would not have been possible, and its continuity would be unattainable without their presence [1,3].

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Other genes co-opted from viruses also contribute to the growth of embryos, regulate the immune system, and occasionally resist malignancies. Moreover, there is viral DNA found among the genes of terrestrial animals, including humans, which aids in the recollection of the past by depositing memories and storing them in small protein bubbles within nerve cells. The impact of many chemical substances of microbes can rarely be fatal to the physical and mental health of people [1, 3, 4].

Contemporary research

Microbe genes affect the human body

The results of an experimental study comparing the behavior of a cohort of mice that exercised on a treadmill with mice that did not exercise revealed differences in the microbiome of intestinal microbes. The exercising mice had more bacteria that produced the chemical substance N-lactoyl-phenylalanine (Lac-Phe), a signaling molecule that, during the running, transmitted signals from the gut to the brain, stimulating the reward centers and motivating the exercising mice to reach their peak and continue running. In contrast, a different microbiome left the sedentary mice without such reward and in a static position. When the *exerciser's* gut microbiome was injected into the sedentary mice, they began running on a wheel and exercising.

It was concluded from the results of the above experiment that the same encouraging effect could likely be achieved in humans as a stimulus to activate physical activity, especially in a static population that lacks spontaneous motivation to engage in physical exercise - a habit of paramount importance for achieving and maintaining of good health [5].

Analysis of current knowledge about the consequential risks of harmful forms of behavior and wrong lifestyle habits for the planet and human health

Once thought of as mere saprophytes that use our bodies to get food and shelter, the trillions of microbes living on our skin and deep inside us are now recognized for their role in creating many chemicals that have a positive effect on our body. However, this understanding also reveals their role on the development and the onset of heart and blood vessel diseases, malignancies, type 2 diabetes, obesity, depression, anxiety and some degenerative neurological diseases. These conditions have been proven to develop into silent killers that collectively contribute to three out of five global deaths each year. We are aware of the fact that health is not everything, but also of the fact that everything is nothing without health as health is the foundation of life itself [6].

In addition, we must keep in mind that anything that happens on Earth is interconnected, therefore, we have a task to master the understanding of how individual health intertwines with the planetary health, and what to do in order to correct mistakes in human behavior towards the Planet and avoid or mitigate the related consequences for human health. Earth Day is marked as a day of people's awareness of environmental issues, and a reminder that establishing a correct awareness among people regarding our environment has never been more important than now.

The impacts of climate change on Earth, including phenomena like fires, stormy winds, floods, droughts, heat waves, rising sea levels, and the extinction of many living species, pose direct or indirect threats to the survival of everyone and everything, especially the most vulnerable representatives within each ecosystem. The pollution of the air with fossil fuels and the escalating emissions of carbon dioxide that consequently elevate air warming, are the cause of increasingly devastating fires and the massive emergence and development of more chronic diseases. Furthermore, the shifting of geographical and seasonal boundaries altering the habitats for ticks and mosquitoes, which are carriers of many infectious diseases that spread with the speed of the wind, endangers human health all over the Planet.

The events we are witnessing have complex and interconnected effects. The concept of planetary health confirms the inseparable link between the ecosystem and human health. Therefore, it becomes imperative to implement all necessary interventions urgently and effectively in order to prevent the negative consequences with increasingly frequent devastating outcomes.

How to prevent, suppress and/or eliminate the consequences of the mentioned risks for human health?

There are several ways to counteract and avoid the risk of unfavorable outcomes. Establishing and maintaining a healthy lifestyle for people is one possibility. It goes without saying that adherence to daily healthy lifestyle activities should be strictly exercised. The more preventive and/or curative measures are taken before application, the sooner the risk of unwanted consequences will be avoided or suppressed.

Organic vegetable and essential foods defeat inflammation. This also applies to physical activity, especially deep breathing exercises and weight management. Reducing abdominal fat removes the type of fat cells that produce pro-inflammatory chemicals, aiding thus to the reduction of the effect that sugar has on body weight. Then, enough invigorating sleep, giving up the habit of smoking, which results in a significant reduction in the level of inflammation within just a few weeks, and limiting the use of alcohol, with a note that small amounts of alcohol, such as up to two glasses of quality wine, particularly taken with fish, or a glass of natural spirit after a good meal, have health-protective benefits [3, 7].

The questions that yet need to be answered are whether contemporaries frequently adopt unhealthy lifestyle habits due to a lack of understanding and/or lack of focus on their harmful impact on health, or is it a failure to recognize the importance of preventive measures due to their simplicity and mandatory default?

Discussion

The paper emphasizes the essential role of viruses in shaping the evolution of ecosystems on Earth, a role that is crucial for the development and survival of the living world. Although viruses are feared as the cause of disease, discussions about them are just beginning to unfold in that context. Therefore, it is justified and reasonable to learn about them every day [2].

Changes are often necessary to correct previous wrong and often harmful behaviors and habits, whether individual or environmental. What works positively for one person may not necessarily work for another person. Will the orientation towards the choice of diet, exercise and the choice of commuting in the local environment be suitable to the specific requirements of a job, place of residence, educational and economic status, and individual character traits? In any case, the decision to start corrective procedures with goal setting is the way to a good life commitment [3, 8].

The latest experimental scientific study on mice examining the influence of saprophytic bacteria on their physical activity through the produced N-lactogi-phenylalanine substance, a signal molecule transmitted from the intestine to the brain's reward center, stimulating the response of increasing the activity that prompts its production, opens wide space for further research in the human population as well [5, 9].

Conclusion

If the gut microbiome can influence the motivation of animals to be very physically active, could the saprophytic microbiome also influence the motivation of people to use or avoid addictive substances, eat healthier foods, have more harmonious work and social communication, socialize better and easier, and do anything useful for themselves and others.

Correcting wrong and often harmful forms of behavior and other everyday life habits will trigger the decision about healthy lifestyle and a goal to a good life commitment.

Establishing coexistence with the natural environment and adopting a model of daily healthy living habits is recognized as a crucial measure to achieve good or, at least, satisfactory health condition. This approach is essential in counteracting the presence of chronic non-infectious systemic diseases, almost unavoidable and seemingly hidden silent killers that endanger human lives, and in ensuring health and protection against consequential damage to the organism.

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Rad je primljen 24. VII 2023.
Recenziran 30. XI 2023.
Prihvaćen za štampu 3. XII 2023.
BIBLID.0025-8105:(2023):LXXVI:9-10:299-301.