

MICRONUTRIENTS – EFFECTIVE TOOLS AGAINST VIRAL INFECTIONS

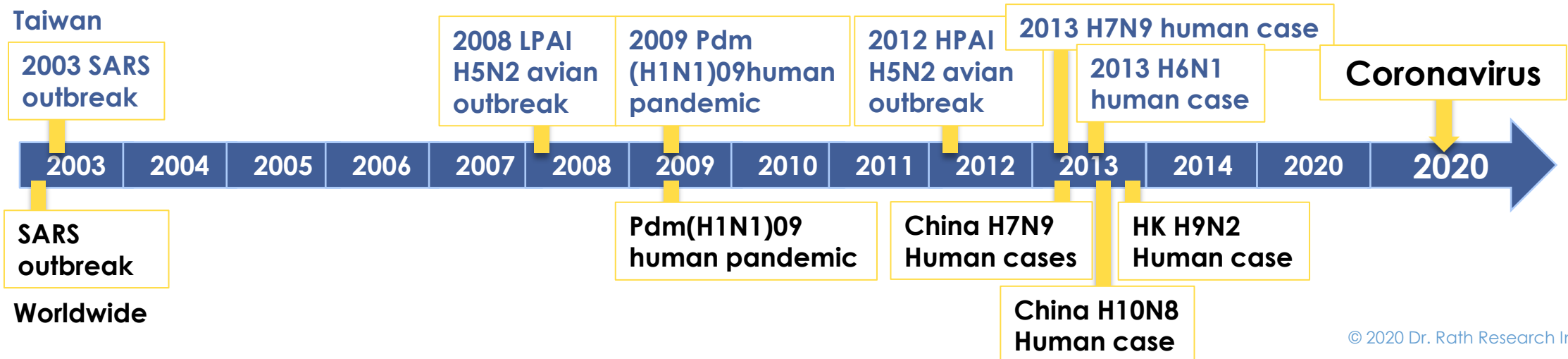


A GROWING THREAT OF VIRAL INFECTIONS

We are constantly exposed to viruses in our environment. Viral illnesses affecting humans have been ranging from a common cold appearing seasonally in various parts of the world, and epidemics of swine or bird flu, to hepatitis and AIDS.

With a recent outbreak of the coronavirus COVID-19, the world is facing another threat that mobilizes efforts to find an effective treatment for it before more lives are threatened .

While discussions center around finding an effective anti-viral drug or a vaccine, the world seems to forget that our body and its resources are the most effective weapon against viral flu in all its forms.



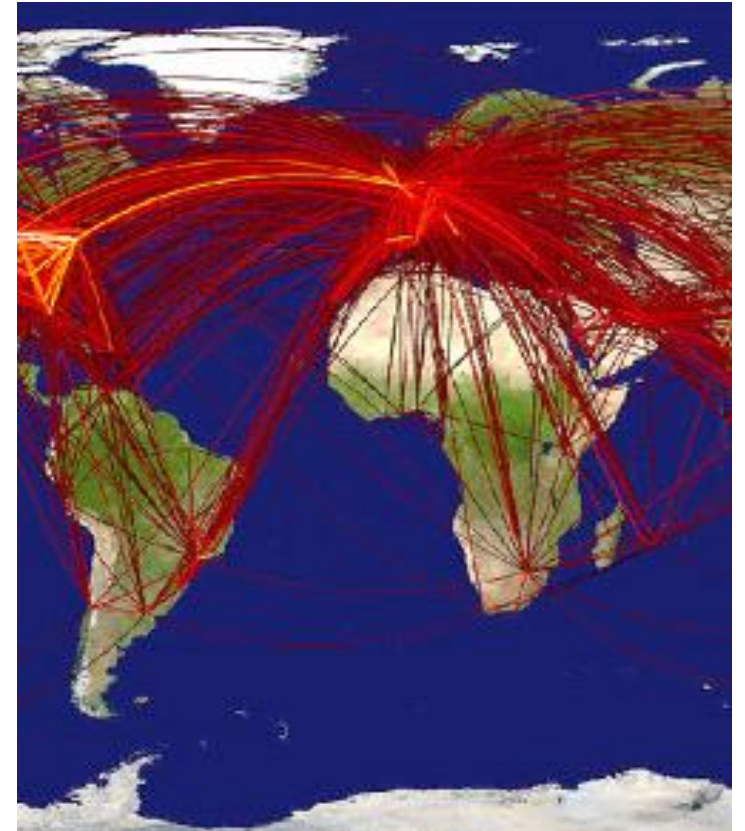
CONNECTIVITY AROUND THE WORLD – VIRUSUS CAN SPREAD BETWEEN CONTINENTS WITHIN HOURS

Over the years all cycles of viral epidemics have been fought against and conquered by our own immune systems.

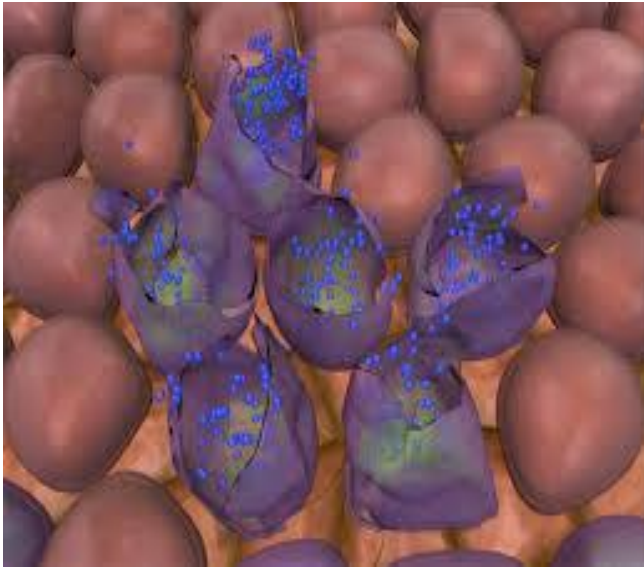
Pharmaceutical drugs and medical procedures are not effective against viruses, as they can only help in lessening symptoms of a disease but do not eliminate the viruses themselves.

Therefore it is imperative to enhance our body's natural ability to fight and eliminate viral infections. Micronutrients are essential tools in supporting our immunity and the natural control of infectious agents.

In order to protect yourself and your loved ones it is important to learn about the basis of viral infections and how to enhance the natural mechanisms that our body uses to fight them.



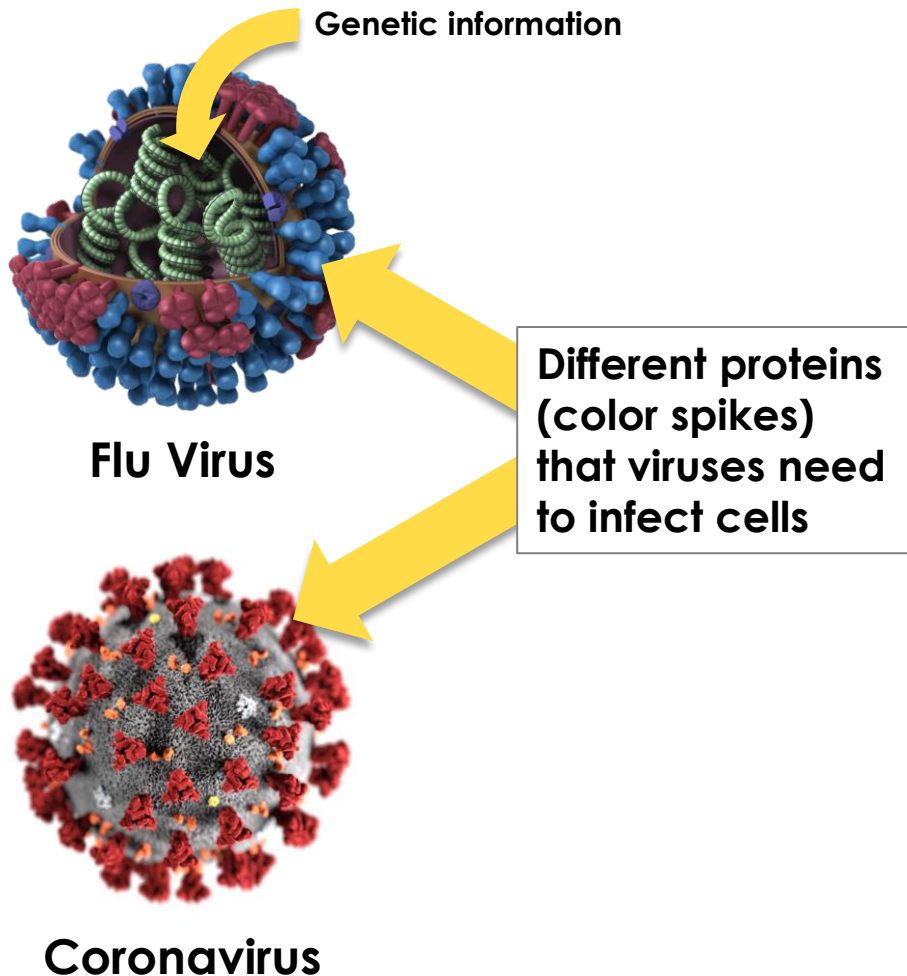
THIS KNOWLEDGE CAN SAVE YOUR LIFE



Viruses multiply inside cells until the cells explode, releasing more viruses to infect other cells

- **What is a virus**
- **How viruses infect and spread in the body**
- **The tools our body uses in fighting infections**
- **How our body utilizes different micronutrients in the course of infection**
- **How micronutrients can control key stages of viral infections – scientific support from the Dr. Rath Research Institute**
- **What you can do**

WHAT IS A VIRUS



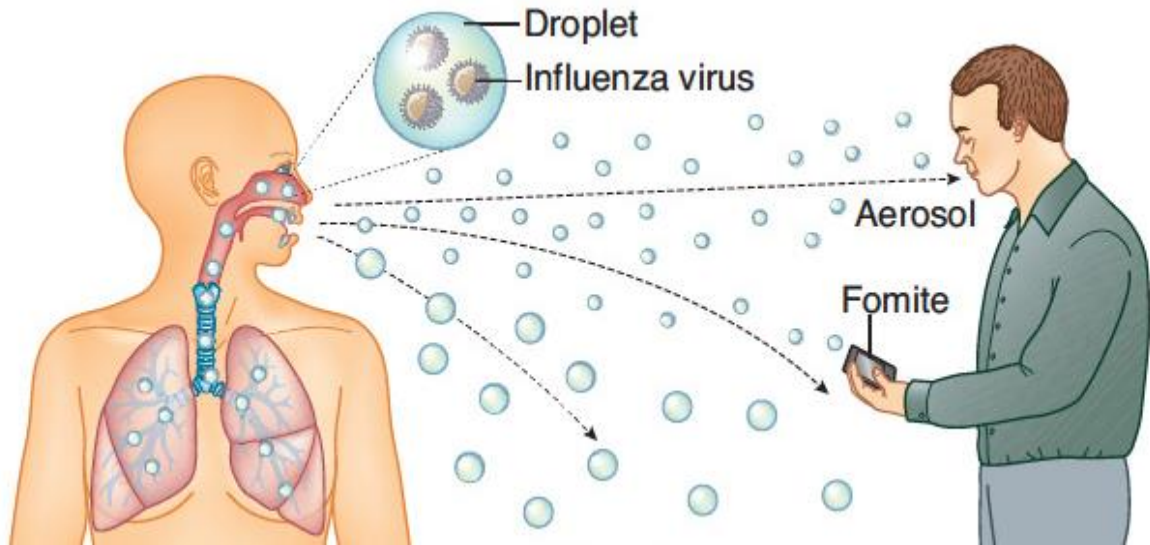
Viruses are tiny infectious agents that can only multiply when they get inside the cells of a host (e.g. animals, plants, and even bacteria).

They are made of genetic material (DNA or RNA), surrounded by proteins and other components that help them get through the cell membrane and inside of a host's cells.

Once inside a cell, viruses hijack its biological systems so that they can multiply until they destroy the cell and spread through the body.

Our immune system and our body's nutritional reserves are engaged in fighting viruses all the way. But if viruses are not stopped, they can damage our body's organs and become lethal.

HOW VIRUSES INFECT OUR BODY



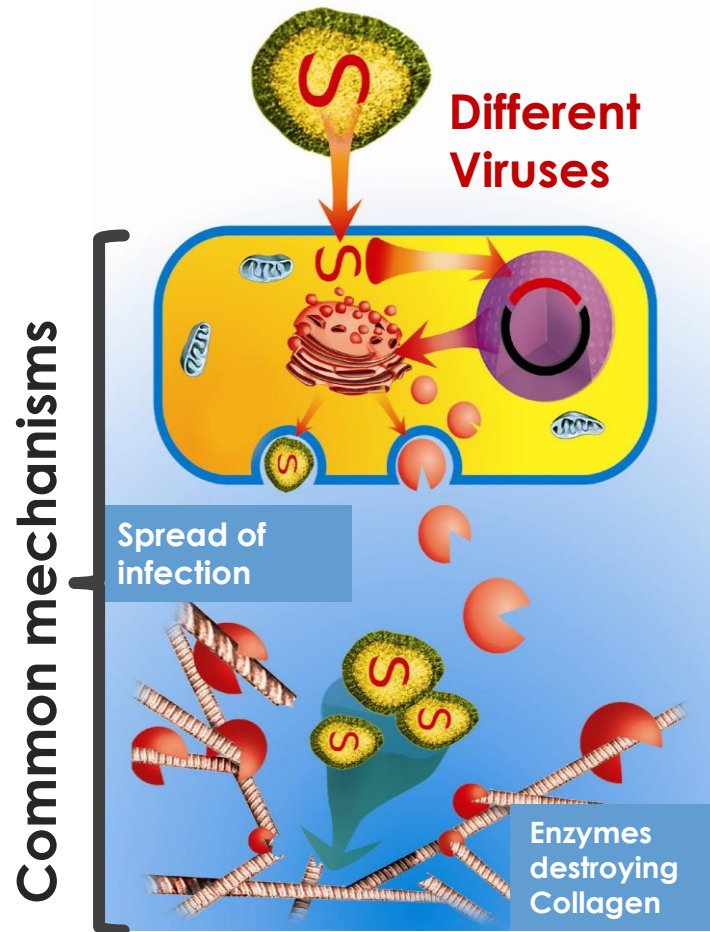
Viruses can enter us through the nose, mouth or breaks in the skin. Once inside, they find a host cell to infect. For example, cold and flu viruses will attack cells that line the respiratory or digestive tracts. The human immunodeficiency virus (HIV), which causes AIDS, attacks the T-cells of the immune system.

In most viral infections our immune system fights off the virus.

Antibiotics are not effective against viruses and most anti-viral medicine helps only in controlling the symptoms. Micronutrients are the most effective way to improve immunity and fight pathogens.



DIFFERENT VIRUSES – THE SAME MECHANISM OF INFECTION



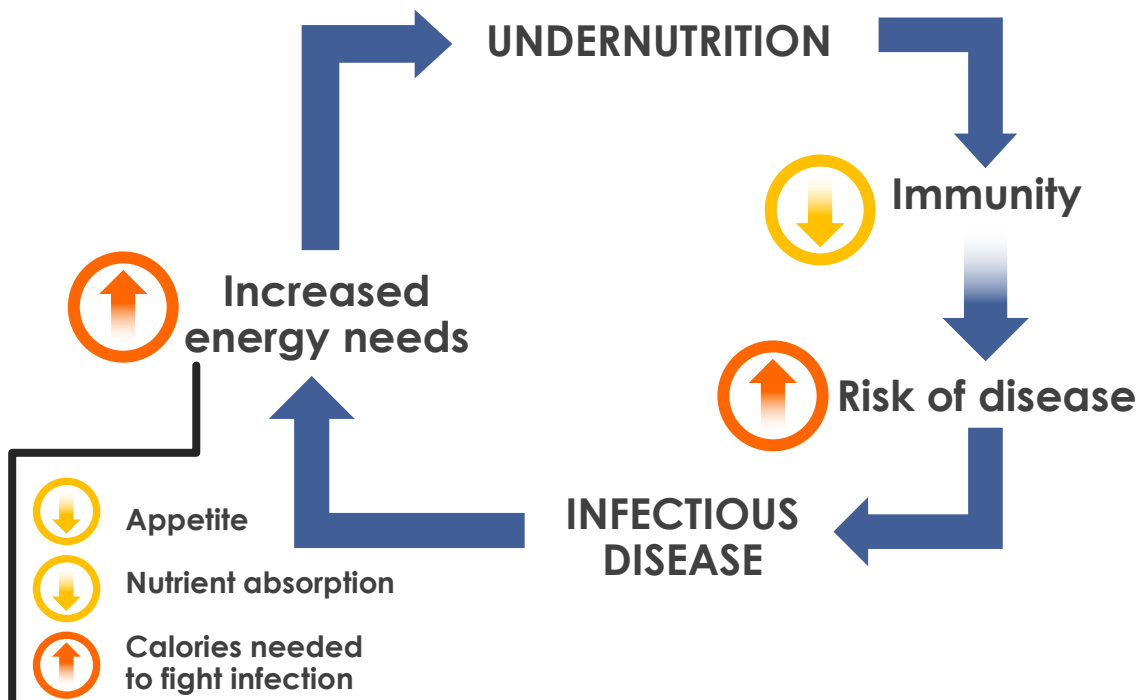
Flu viruses look different, but they use the same basic mechanisms to multiply inside cells and spread in the body, as illustrated in this graph.

The differences in surface proteins used to infect and break up the host cells determine their infectivity in humans and other species (birds, and other animals) and their health impact in affected organisms.

Because influenza viruses have the capacity to mutate, or undergo changes in their surface proteins, they may change into forms of the virus that are able to infect more easily and pose increased danger to humans.

NUTRITION AND IMMUNITY ARE INTERRELATED

Nutrition is critical for healthy function of the immune system. Malnutrition and micronutrient deficiencies have been the major contributing factor to compromised immunity.



Immune supporting nutrients

PROTEINS

- Dietary Fatty acids
- Probiotics

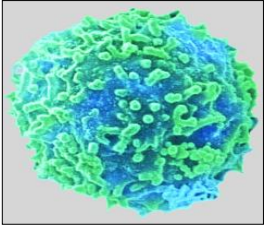
MICRONUTRIENTS

- Vitamin A, C, D, E, B6, Folic acid
- Iron (organic)
- Zinc
- Selenium
- Copper

PLANT COMPONENTS AND OTHER NATURAL COMPOUNDS

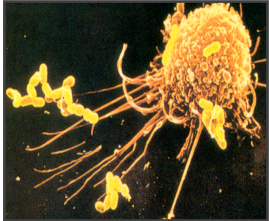
- Quercetin
- Lysine
- EGCG and others

IMMUNE SYSTEM FIGHTERS – THE WHITE BLOOD CELLS



Leukocytes

Cells of the immune system have different appearances and distinct functions in our body. All types of white blood cells (leucocytes), together with the immune system's organs, respond in a coordinated way to every type of infection.



**Monocytes
Macrophages**

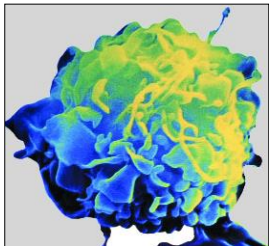
White blood cells are formed in the bone marrow and reach peripheral tissues through the blood and lymph. The production of all immune cells utilizes specific vitamins, minerals and other nutrients.



T cells

**B cells - antibody
production**

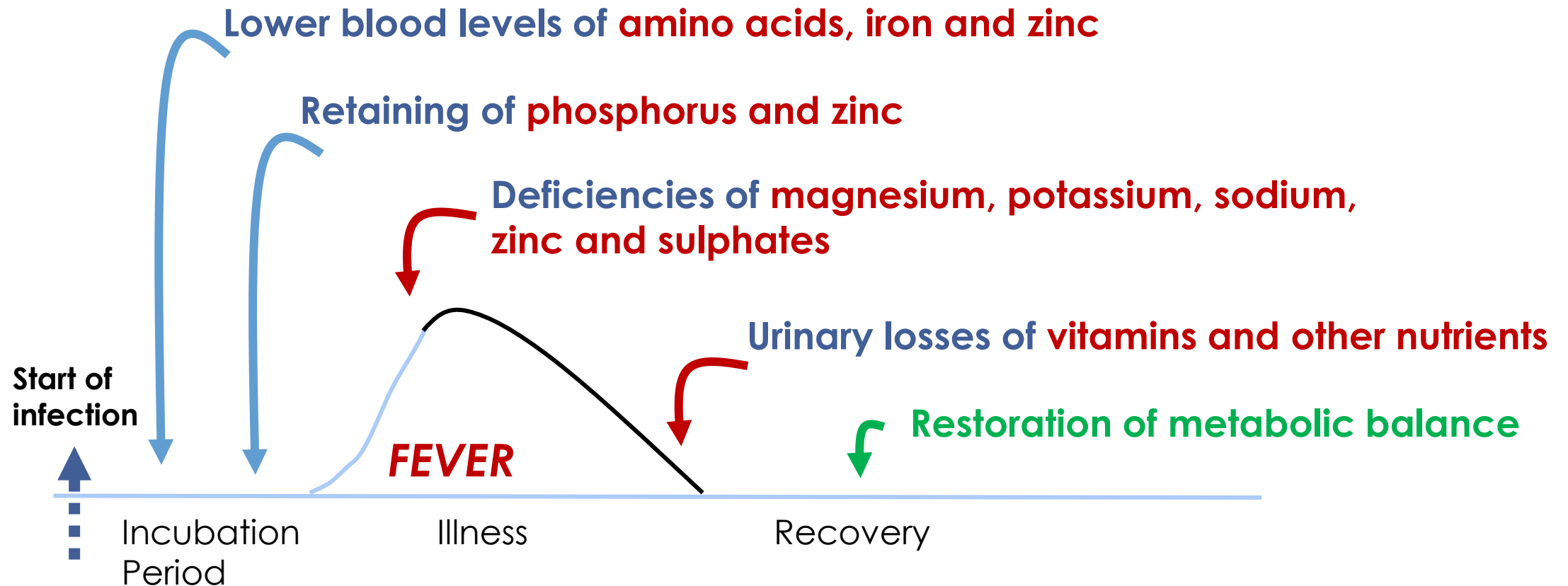
The first line of defense against pathogens comes from types of white blood cells known as monocytes and macrophages, which engulf and destroy foreign invaders.



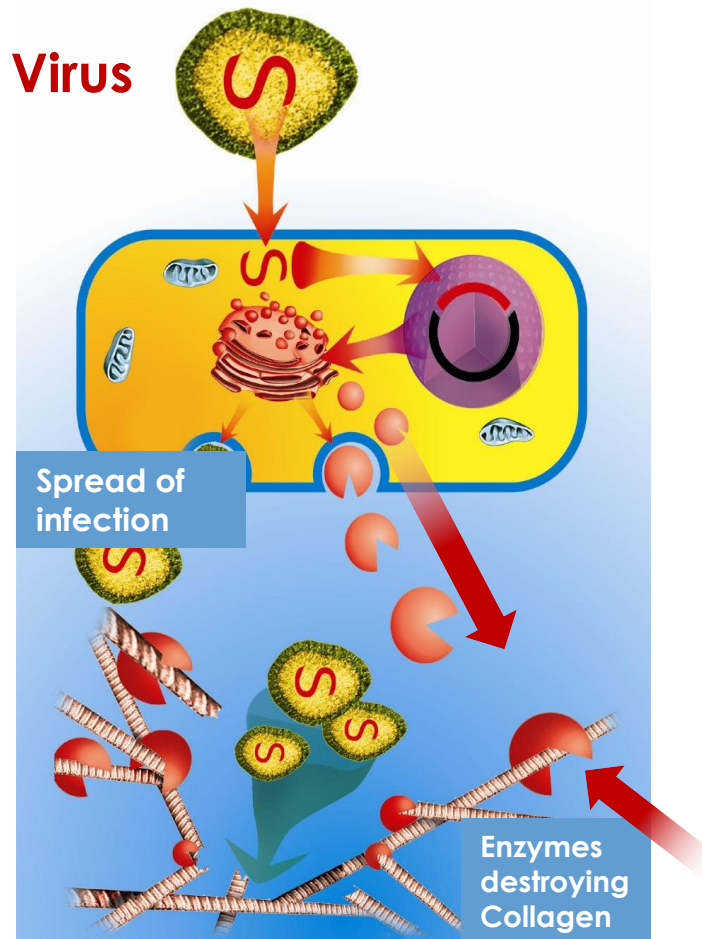
**Spleen and
thymus
function**

Longer lasting and involving immunologic 'memory' is the response mounted by other types of white blood cells known as 'T cells' (which are matured in the thymus gland) and 'B cells' (which produce antibodies).

DEMANDS FOR MICRONUTRIENTS CHANGE AT DIFFERENT STAGES OF INFECTIONS



MICRONUTRIENTS CAN SIMULTANEOUSLY AFFECT MANY STAGES OF VIRUS INFECTION



The advantage of micronutrients over a single chemical drug is that they can affect multiple stages of infection at the same time. As such they can:

- **Kill pathogens** or stop their multiplication (vitamin C, N-acetylcysteine, other nutrients)
- **Limit spread** of infectious agents by strengthening the integrity of connective tissue (lysine, vitamin C, and EGCG inhibit enzymes digesting collagen and increase collagen production)
- **Prevent** the formation of and eliminate pathogens in their 'hiding' places such as biofilm (vitamin C, various nutrients)
- **Systemic effect** by improving efficacy of the immune system (zinc, selenium, vitamins A, C, D and others)

Micronutrients are essential in fighting infections at all their stages

DR RATH RESEARCH: NATURAL BASED APPROACHES AGAINST THE THREAT OF INFECTIONS

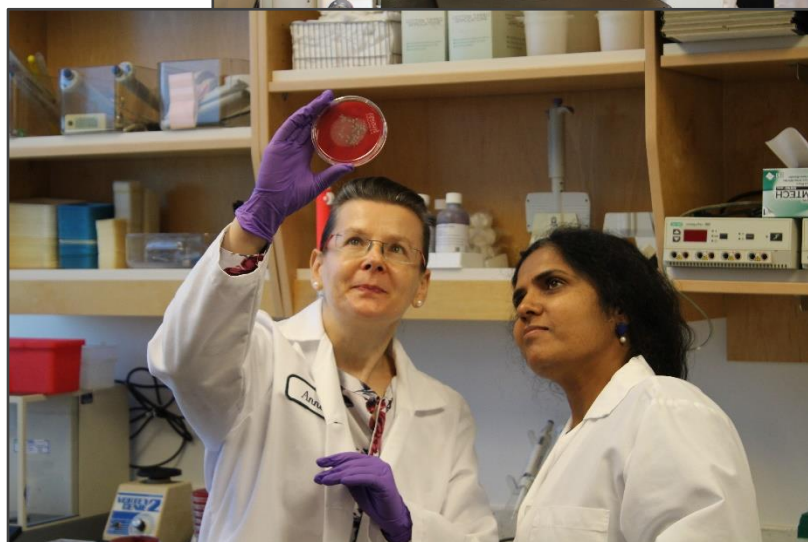
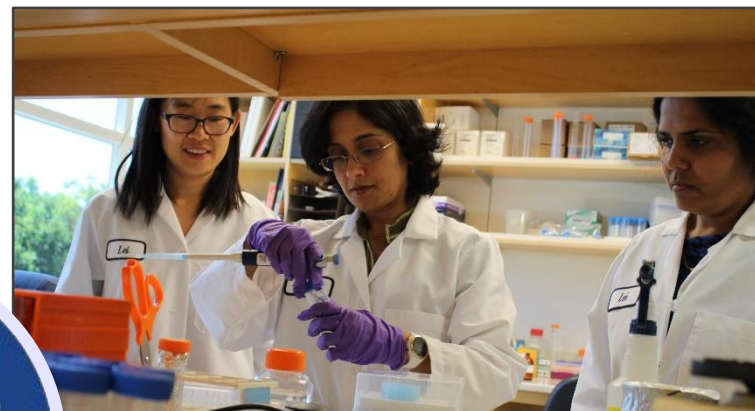


Dr. Rath himself and the findings of the Dr. Rath Research Institute led by Dr. Niedzwiecki have been the source of innovative scientific results that have been helpful in controlling earlier viral epidemics such as human influenza and bird flu.

Among other findings, our research documents how specific micronutrient combinations are instrumental in controlling the life cycle of a virus and its spread in the body, as well as in enhancing the efficacy of our immune system in fighting viral infections.

On the following pages you can learn how viruses affect the body and look at a few examples from our research documenting how specific micronutrients are effective in controlling key mechanisms involved in different types of viral infection.

OUR RESEARCHERS AT WORK



MICRONUTRIENTS AGAINST HUMAN FLU VIRUS

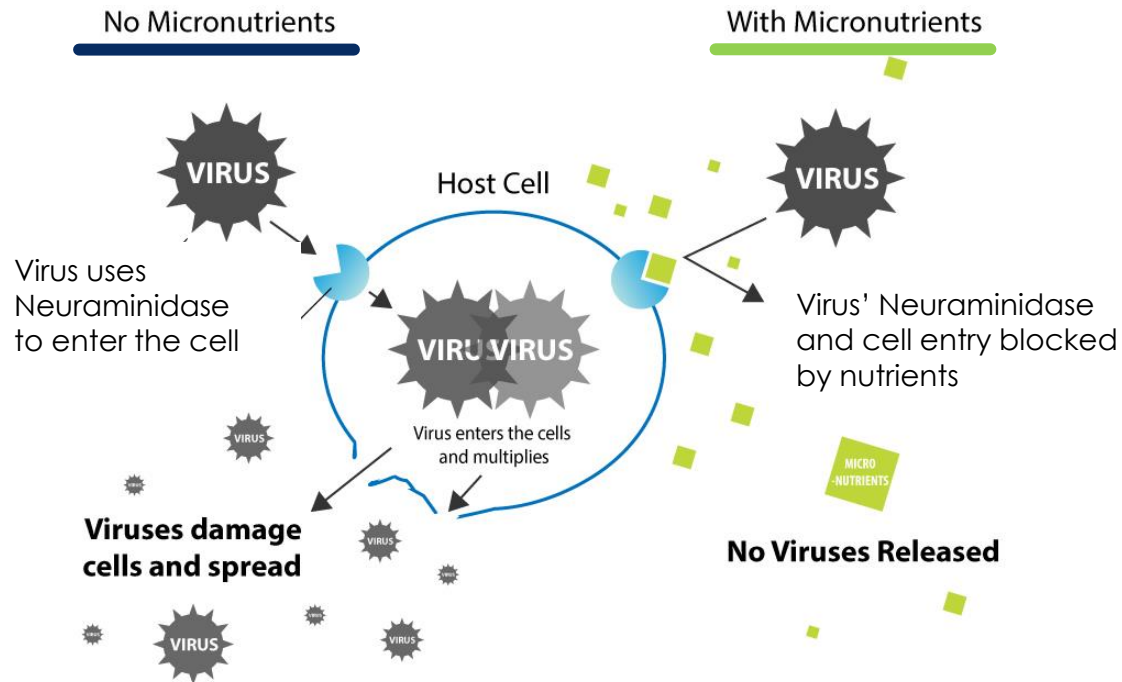


Human influenza virus type H1N1 is the most common cause of human flu in its different outbreaks. This virus is actually a combination of viruses from pigs, birds and humans.

The numbers in the name of a virus identify different types of viruses, based on their surface proteins: hemagglutinin (H type 1) and neuraminidase (N type 1).

Since there are no effective treatment for flu infections, we tested the effects of micronutrients on various mechanisms involved in the infectivity and spread of this virus. Some of the results are presented below.

HOW MICRONUTRIENTS CAN BLOCK VIRAL INFECTION AND ITS SPREAD: WHAT WE EXPECTED



Human flu viruses (H1N1) use the enzyme Neuraminidase located on their surface to infect cells, and then release multiple copies from the host cells in order to spread.

In our study we tested whether micronutrients can decrease the activity of this enzyme in human cells and, in addition, inhibit its production.

If micronutrients can prevent the activity of Neuraminidase, they can effectively inhibit the virus' ability to infect and harm the cells.

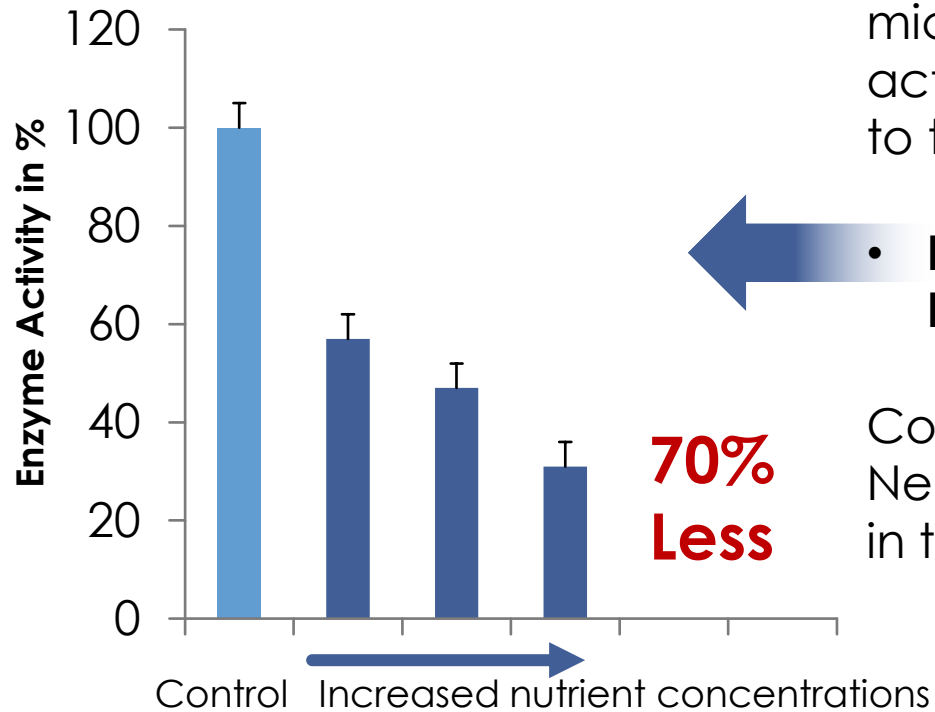
The results of our research confirm this effect!



MICRONUTRIENTS SUPPRESS THE KEY MECHANISM INVOLVED IN INFECTIVITY OF HUMAN FLU VIRUS (H1N1)



Decreased Neuraminidase activity

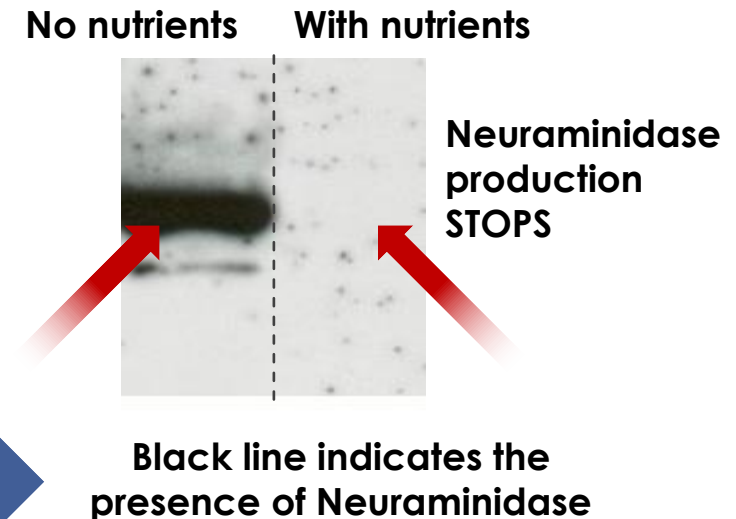


Our study results document that micronutrients can affect the activity of Neuraminidase linked to the infectivity of the virus

- **Decreased activity of Neuraminidase by about 70%**

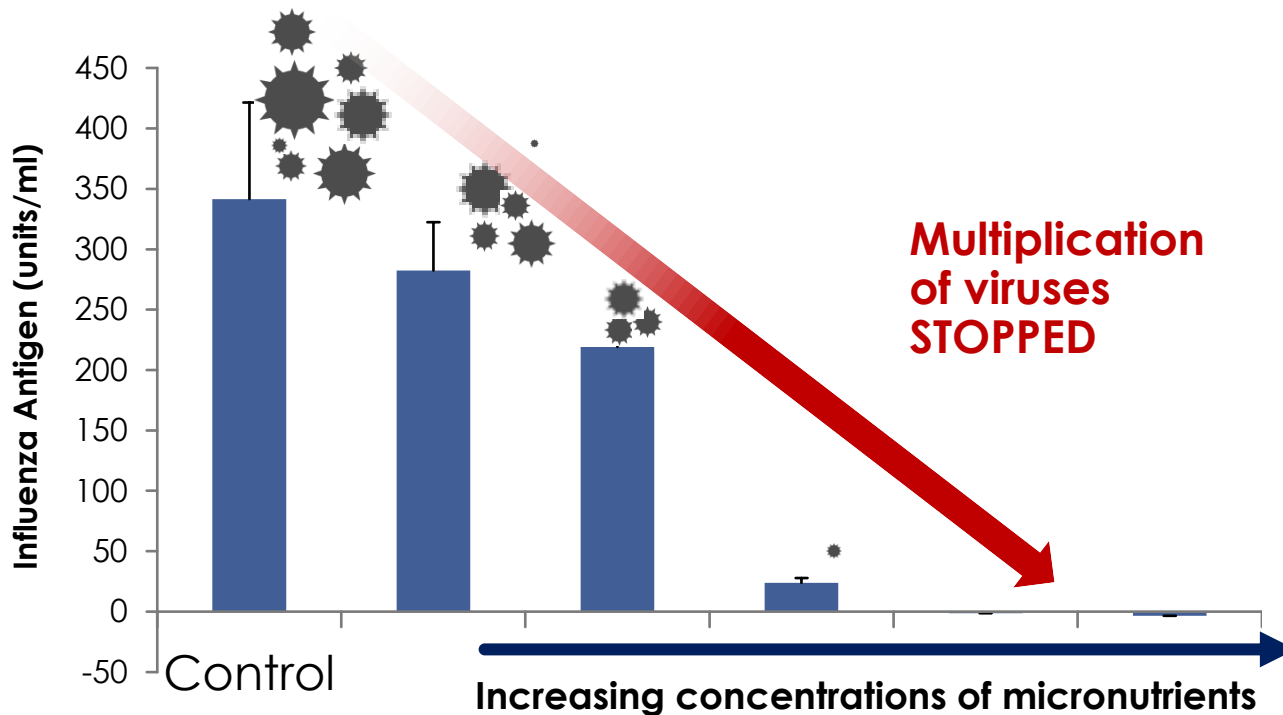
Complete inhibition of Neuraminidase production in the cells.

Inhibit Neuraminidase production



Without Neuraminidase the flu viruses (H1N1) are not able to infect cells

MICRONUTRIENTS INHIBIT MULTIPLICATION OF FLU VIRUSES IN INFECTED CELLS



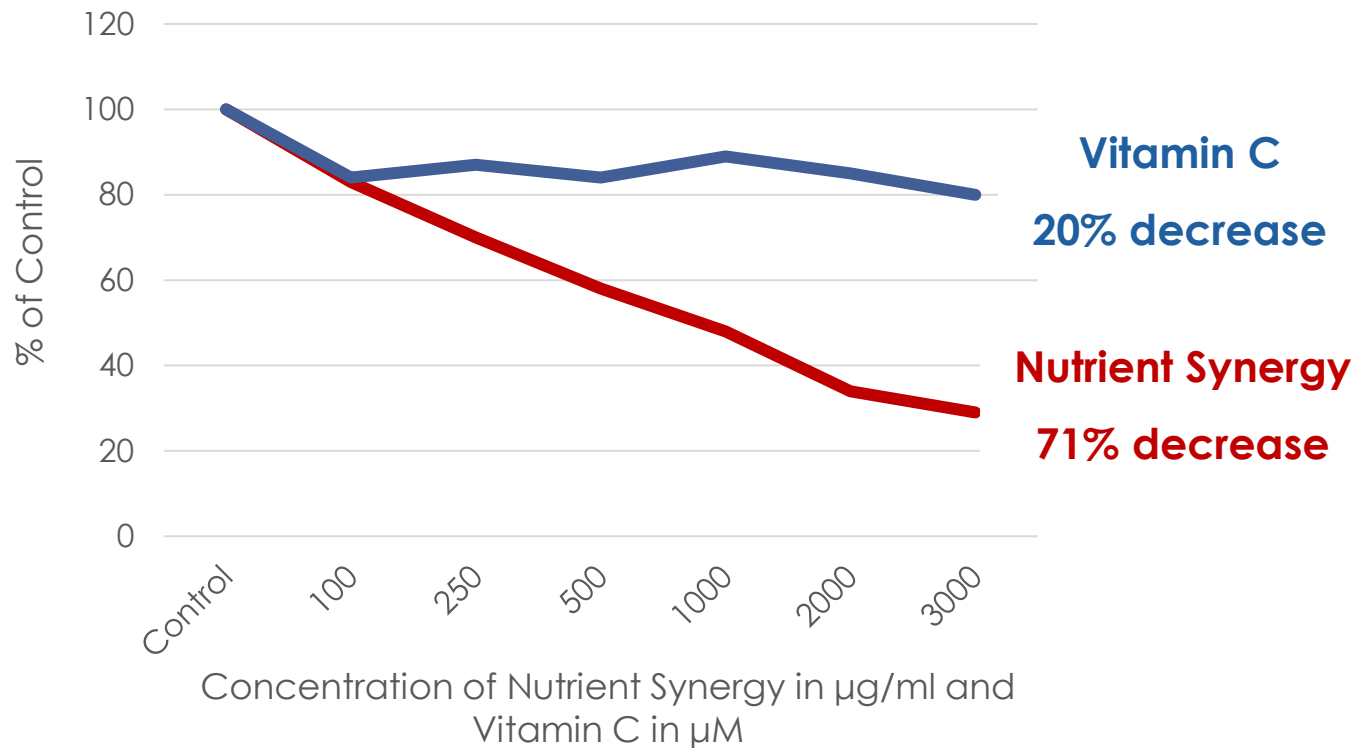
Our study showed that a specific micronutrient mixture can inhibit the multiplication of the human flu virus (H1N1) in infected cells.

The results on this graph show that a specific micronutrient combination can stop the multiplication of viruses in the cells.

Exposed to higher micronutrient concentration – these viruses can't multiply at all!

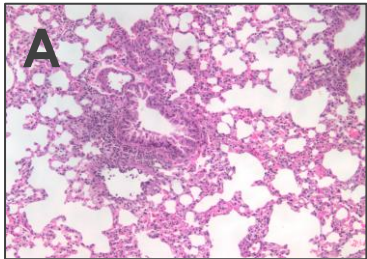
Micronutrients can stop viral multiplication in infected cells

NUTRIENT SYNERGY MORE EFFECTIVE IN SUPPRESSING INFECTIVITY OF HUMAN FLU VIRUS

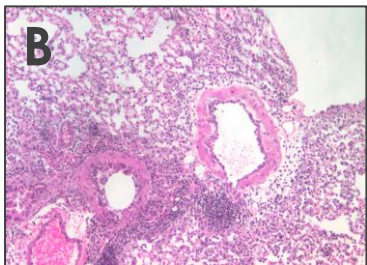


Our study documents that a synergistic combination of vitamin C with other micronutrients is more effective than vitamin C used alone in decreasing the multiplication of human flu viruses.

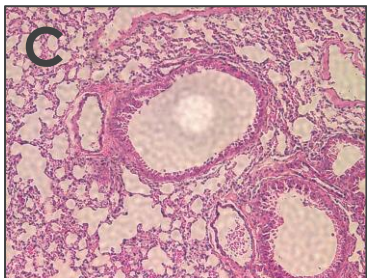
DIETARY INTAKE OF VITAMIN C PROTECTS THE LUNGS AGAINST DAMAGE CAUSED BY HUMAN INFLUENZA VIRUS (H1N1)



A Infection under vitamin C deficiency: Bronchiole Destruction



B Infection under vitamin C supplementation: Lung tissue protected



C Healthy, not infected lung, from wild-type mouse

This study results confirm a critical role of vitamin C in protecting lung tissue against damage by human flu virus, which mostly affects our respiratory tract.

The study was conducted using a special strain of mice, which, like humans, are unable to produce vitamin C internally. Mice on vitamin C deficient and supplemented diets were infected with human flu virus (H1N1), after which their lung tissue was evaluated.

- A.** The results show that mice kept on a diet without vitamin C and infected with human flu virus experienced significant destruction of their lungs
- B.** Mice infected with the same dose of flu viruses but receiving vitamin C in their diets had their lung structure protected. Their lung structure resembled the healthy lungs in vitamin C producing mice that were not exposed to this flu virus (compare to **C**).

Vitamin C is critical in protecting lung tissue against destruction by virus

MICRONUTRIENTS AGAINST BIRD FLU VIRUS (H5N1)

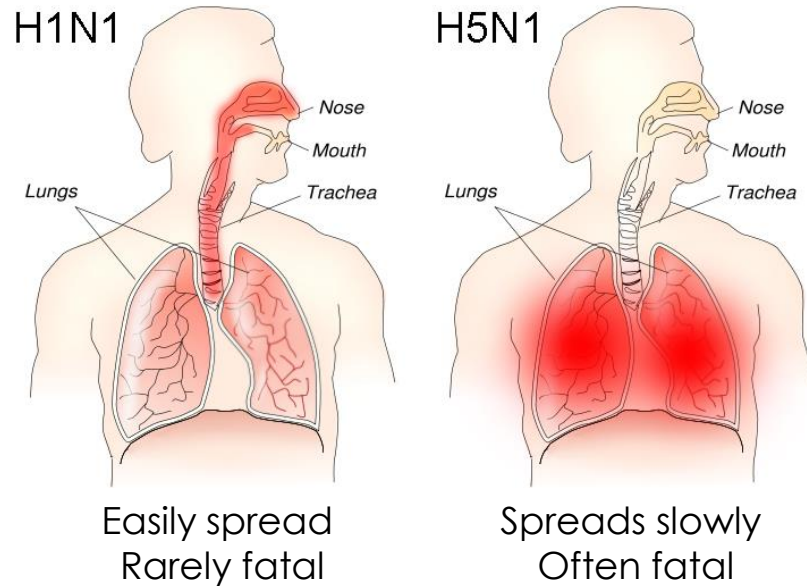


Bird flu is an infection in birds caused by influenza virus.

The H5N1 viruses are taking a huge toll on the poultry industry, which directly or indirectly impacts both economic and social well-being in many countries.

In the past, and now today, they also pose a threat to humans.

BIRD FLU VIRUS (H5N1) RESPONSIBLE FOR EARLIER HUMAN EPIDEMICS



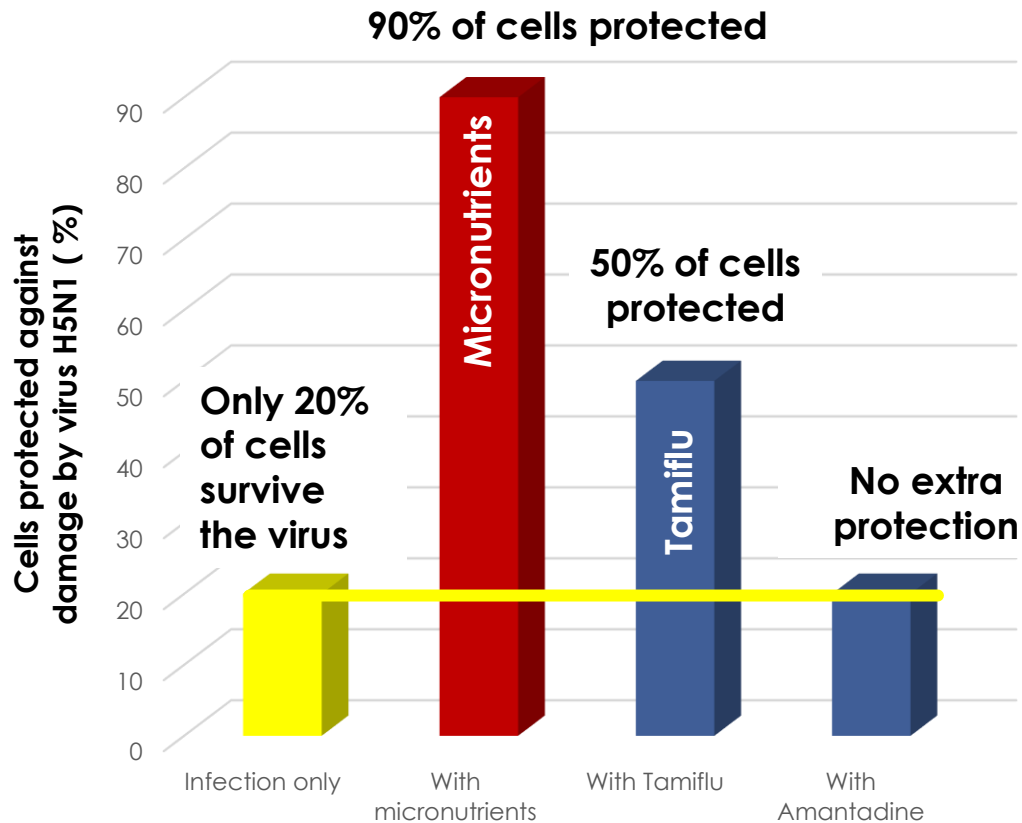
The infections by bird flu virus H5N1 in humans can cause a severe illness requiring hospitalization. This includes the developing of a severe form of pneumonia that can lead to multiorgan failure. While up to 50% of humans who contract bird flu may die from the infection, the actual numbers vary widely with the strain of virus and the underlying health and age of the patients.

In most cases the symptoms vary and range from 'typical' flu to eye infections and pneumonia.

The World Health Organization (WHO) recommends the antiviral drug oseltamivir (Tamiflu) and others for the treatment and prevention of bird flu, along with supportive care.

Unfortunately, despite their role in viral infections being unquestionable, the official recommendations exclude the intake of micronutrients.

MICRONUTRIENTS MORE EFFECTIVE THAN ANTI-VIRAL DRUGS IN PROTECTING HUMAN CELLS AGAINST BIRD FLU VIRUS (H5N1)



We compared the efficacy of micronutrients and anti-viral drugs (Tamiflu and Amantadine) in protecting cells against damage by bird flu virus (H5N1). The cells were infected with the virus and 2 hours later were treated with micronutrients and two anti-viral drugs. The surviving cells were counted after 3 days of virus infection.

Our study showed that in already infected cells:

- **Micronutrient synergy protects about 90% of cells** against damage and death
- Only 50% of cells survived infection in the presence of Tamiflu
- The antiviral drug Amantadine did not protect cells from the virus, and the survival of cells was the same as without any treatment at all (only 20% of infected cells survived)

EXPANDING EFFICACY OF MICRONUTRIENTS IN NATURAL CONTROL OF OTHER VIRAL INFECTIONS

- Although avian influenza type H9N2 is a disease affecting birds globally, its human transmission has been known since 1998 and it was most recently reported in 2019.
- Since viruses use common cellular mechanisms to spread, we expanded our evaluation of micronutrient effects in controlling H9N2 viral infections, which have a great economic toll on the poultry industry. This information is important as H9N2 transmission to humans is potentially dangerous.
- The results from our *in vitro* and *in vivo* studies confirm the anti-viral efficacy of micronutrient synergy in decreasing infectivity of the H9N2 virus and demonstrate significant protection of the lungs and intestines, organs attacked by the virus.
- In addition, these micronutrients were effective in reducing the pathologic effects of secondary bacteria infection with *E.coli* in birds that were already infected with a flu virus. Micronutrients helped in decreasing tissue damage, diarrhea, inflammation, and other pathologies caused by concomitant viral and bacterial infections.

MICRONUTRIENTS PROTECT VARIOUS ORGANS FROM INFECTION BY BIRD FLU VIRUS

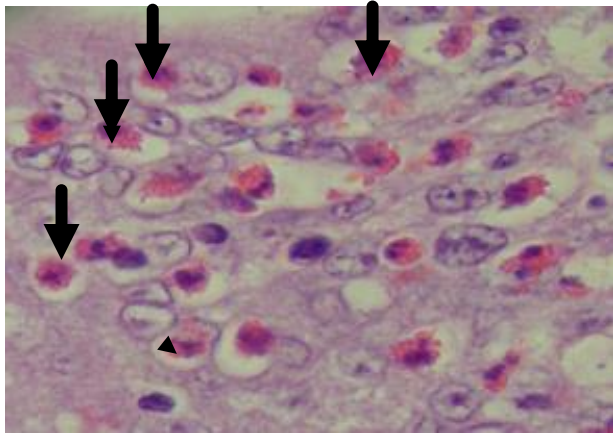
Organs affected by H9N2 virus	Percent of Birds with Infection-related lesions	
	No nutrients	With nutrients
Trachea	47%	0%
Intestines	23%	0%

The study conducted in birds (chicken) challenged with H9N2 virus showed that micronutrient intake in infected birds caused a significant reduction in various pathological effects, such as the absence of rales and lesions in the trachea and intestines, compared to the birds fed control diets.

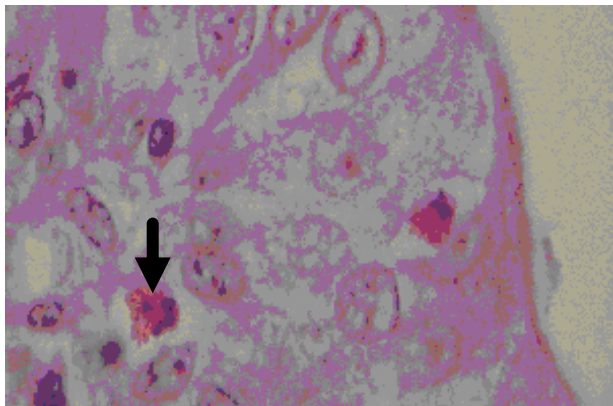
These health benefits were associated with a significant reduction in viral infectivity.

Nutrient Synergy protected the birds against flu virus!

NUTRIENTS SUPPORT THE IMMUNE SYSTEM IN ELIMINATING BIRD FLU VIRUSES IN A TISSUE



Without micro-nutrients



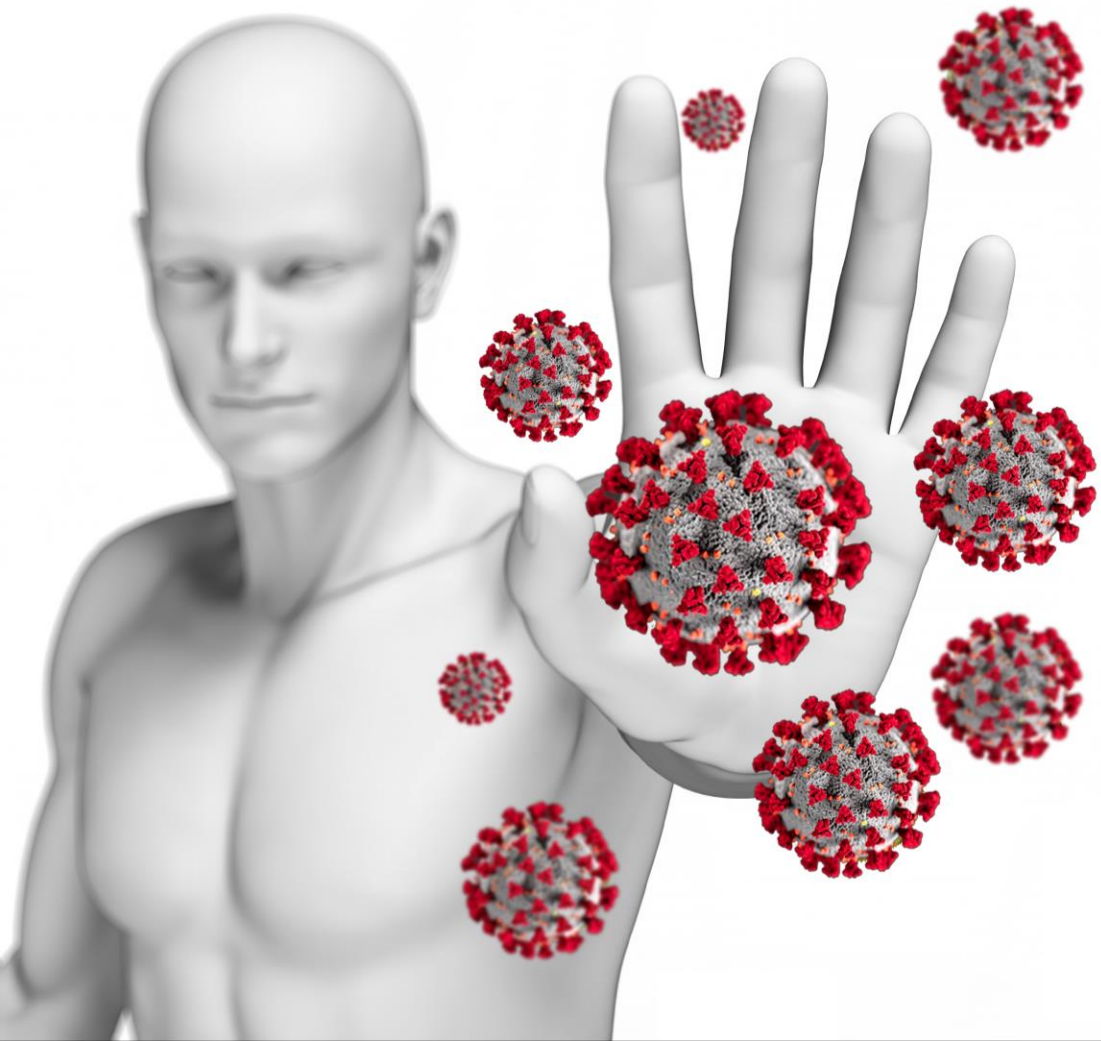
With micro-nutrients

Another study conducted in birds (chicken) challenged with H9N2 virus further confirmed the health benefits of a dietary intake of synergistic micronutrients in infected birds. Animals receiving micronutrients had air passages in their trachea cleared of mucus, higher engulfing of virus particles by white blood cells (phagocytosis), and enzymatic destruction of the virus.

In addition, both infected and uninfected birds receiving micronutrients had much better weight gain compared to animals fed a control diet.

Fewer red spots indicate that the white blood cells are more effective in eliminating viruses in tissues

YOUR HEALTH IS IN YOUR HANDS



Science clearly confirms multiple health benefits from vitamin C, the amino acid lysine, green tea and other micronutrients, especially combined in synergy, in the natural control of various aspects of viral infections.

Take advantage of this knowledge!