

Dr. Rath's Cellular Medicine Research

How micronutrients work in controlling HIV/AIDS and viral diseases



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Scope of HIV/AIDS

Number affected:

42 million people worldwide

29.4 million people in Sub-Saharan Africa

2.3 million Africans died of AIDS in 2002



Outline of Topics:

- Basic functions of the cells of the immune system
- Causes of Immune Deficiency Syndrome
- How HIV propagates in the cells
- The Cellular Medicine approach explores common mechanisms in the spread of cancer and infectious diseases
- How nutrients help AIDS patients: Clinical proof
- Learning about the mechanisms of HIV infection by studying similar viruses
- Conventional AIDS treatments

The Cells of the Immune System

HIV/AIDS destroys the person's immune system. It is important to learn how this system functions in the body.

The immune system is built of various types of white blood cells, which have different functions in the body's defense.

- Neutrophils: Form the first line of defense against aggression.
- Monocytes: Develop into macrophages, which are involved in all types of immune response.
- Lymphocytes: Recognize and eliminate virus-infected cells or cancer cells. Lymphocytes comprise about 40% of all white blood cells.

T-Cells of the Immune system

T-lymphocytes are produced in the bone marrow and mature in the thymus. They are divided into three groups:

- T-4 cells, also called CD4 or helper T-cells: Help other cells destroy infective organisms.
- T-cells, also called CD8 cells or suppressor T-cells: Suppress the activity of other lymphocytes to prevent destruction of normal tissues.
- Cytotoxic T-lymphocytes (CTLs), also called killer T-cells: Recognize and destroy abnormal or infected cells.

Causes of Immune Deficiency Symptoms:

1. Viral Infection

- HIV targets primarily immune system cells, in particular a subset of T-cells called CD4 cells.
- HIV binds to the CD4 cell surface and enters the cell.
- In the cell, HIV either multiplies immediately or remains in a dormant state (latency).
- Replication of the virus destroys cells, and the body attempts to produce new lymphocytes in order to replace the destroyed ones.
- Eventually, HIV attacks and kills so many CD4 cells that the immune system is unable to replace them and deficiency symptoms develop.

Causes of Immune Deficiency Symptoms:

2. Malnutrition

There is a debate whether all AIDS cases are caused by HIV infection, particularly in developing countries.

- It is a well-known fact that immune deficiency symptoms develop as a result of malnutrition and a chronic deficiency of specific nutrients essential for immune system function.
- The immune-compromised person becomes increasingly vulnerable to bacterial, viral, and/or fungal (opportunistic) infections, as well as to certain cancers, now attributed exclusively to HIV infection.

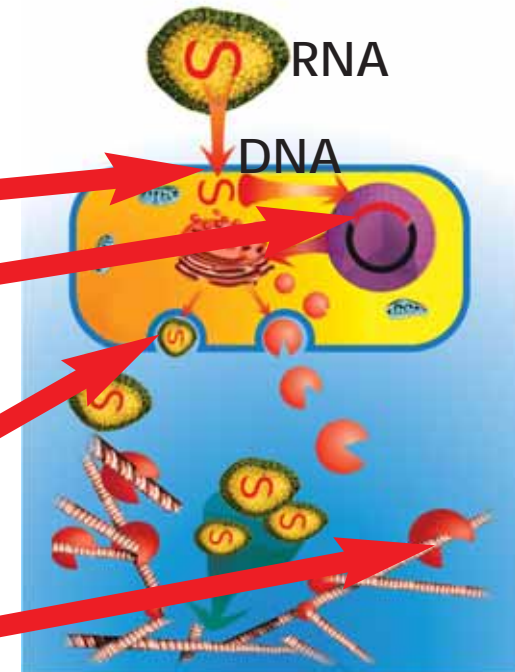
How HIV Attacks Cells

Disease initiation:

- Virus attaches to and enters the cell.
- The Reverse Transcriptase (RT) enzyme converts the RNA of the virus to the DNA of the virus.
- Incorporation of the virus's DNA into the host cell's DNA.

Disease propagation:

- Multiplication of the virus in the host cells.
- Mass production of collagen-digesting enzymes and destruction of connective tissue are essential for virus spread in the body.



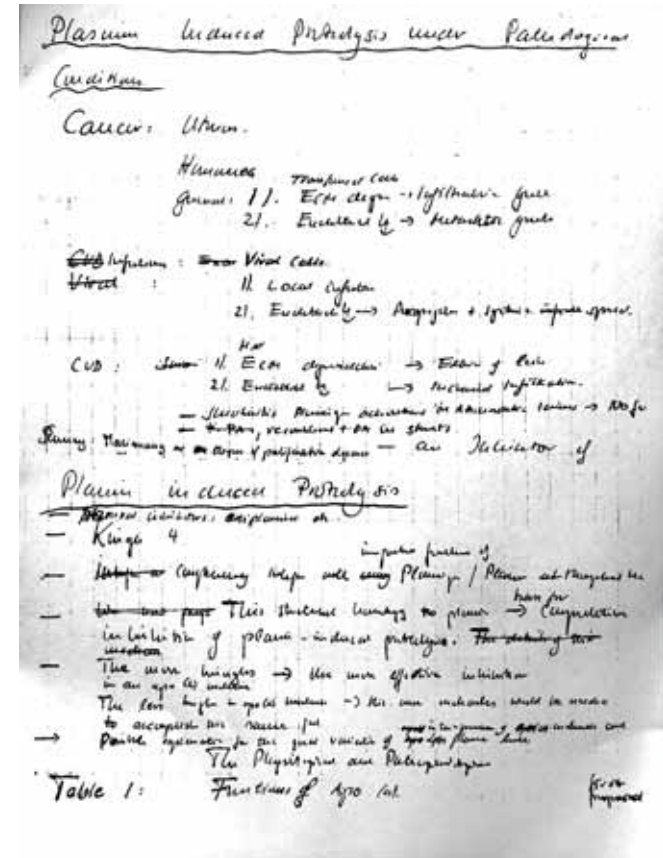
Necessity of Natural Therapies in AIDS

- Micronutrient deficiency is common in all stages of the disease.
- Antioxidant imbalance can activate HIV in a latent state.
- Nutrients are essential for boosting optimum immune system function.
- Nutrients are essential for controlling various stages of viral replication.

Scientific Basis of the Cellular Medicine Approach to HIV/AIDS

In 1992, Dr. Rath published that because cancer and viral diseases (infections) use the same mechanisms to spread in the body, that is, the degradation of collagen, the natural inhibition of these mechanisms by lysine and vitamin C can be applied for the effective control of these devastating diseases.

Manuscript page of Dr. Rath's scientific publication on plasmin-induced proteolysis and its implications for cancer and other diseases. (J. Orthomol. Med., 1992)



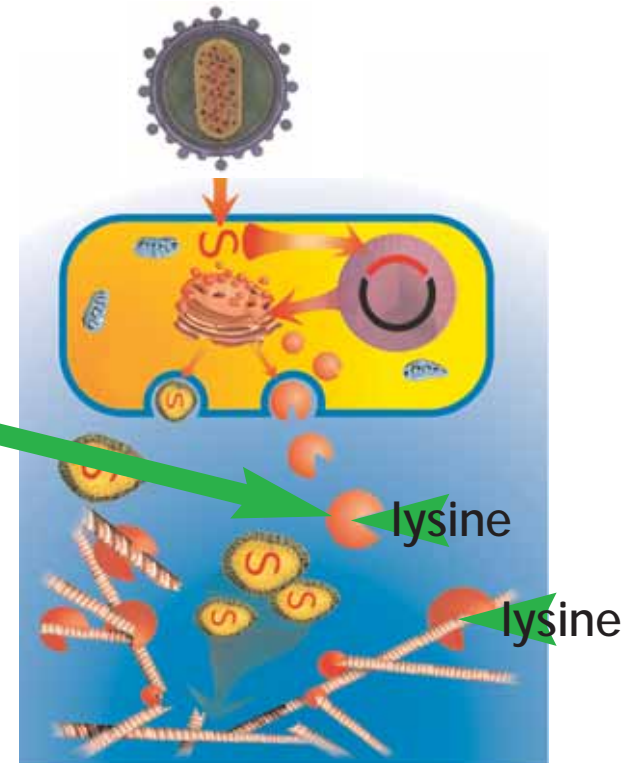
How Nutrients Can Control Virus Infection:

1. Preventing Virus Spread

1. Essential nutrients specifically inhibit the enzymatic destruction of collagen and other components of the connective tissue, halting viral spread.

Lysine and other nutrients are natural inhibitors of collagen-digesting enzymes and, thereby, prevent the destruction of connective tissue.

Lysine only comes from the diet!

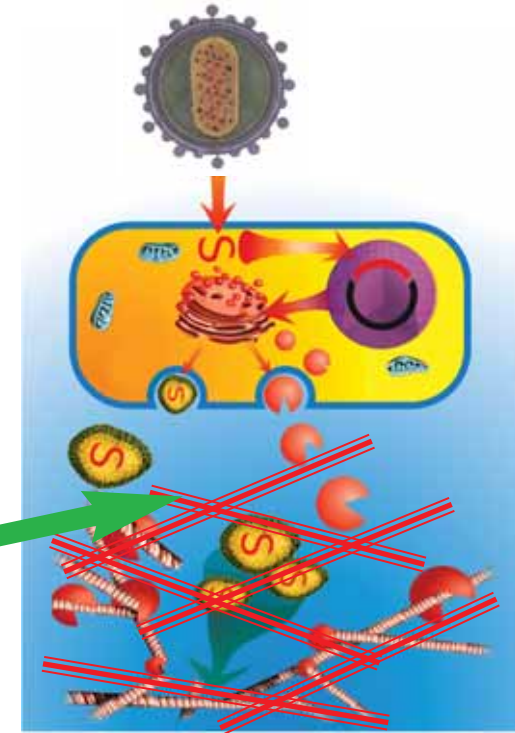


How Nutrients Can Control Virus Infection:

2. Strengthening the Connective Tissue

2. Nutrients essential for the production and optimum structure of connective tissue (i.e. vitamin C, lysine, proline) help increase connective tissue integrity, thereby halting the spread of viruses.

Vitamin C, lysine, and other nutrients are essential for building strong collagen structure. These nutrients are not produced in the body; they only come from the diet.

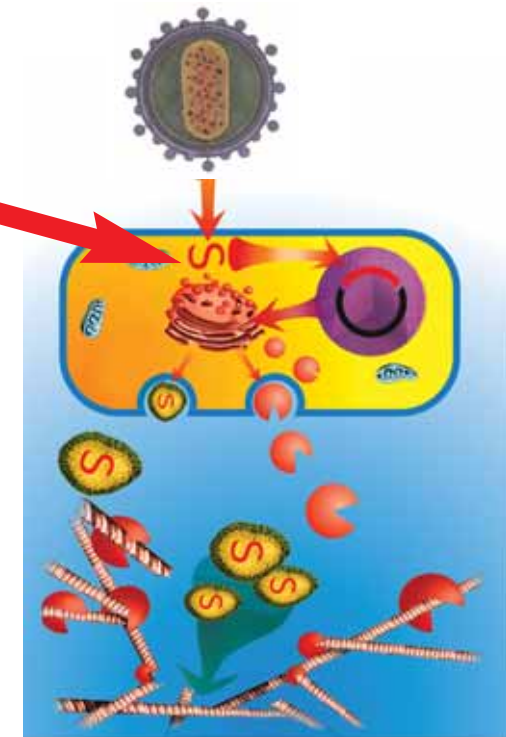


How Nutrients Can Control Virus Infection:

3. Inhibiting Replication of Viruses

3. Specific nutrients (i.e. vitamin C, N-acetyl cysteine) can prevent viral multiplication (inhibit RT activity) and infection of new cells.

HIV binds to the surface of and enters primarily immune system cells (CD4 cells). In the cell, HIV either reproduces immediately or remains in a resting state. In order to incorporate in the intracellular DNA and start its own multiplication, HIV has to be converted from its infective RNA form into DNA by using the enzyme Reverse Transcriptase (RT).



RT activity, as well as the production of viral proteins, can be inhibited by vitamin C, N-acetyl cysteine, glutathione and antioxidants.

How Nutrients Can Control Virus Infection:

4. Improving Immunity

4. Micronutrient support (i.e. vitamin C, selenium, zinc) enhances immune system function and its ability to destroy infected cells.

White blood cells are the body's police cells to destroy viral and bacterial invaders. About 40% of all white blood cells are lymphocytes.

The body needs specific micronutrients to support optimal production of all white blood cells in the bone marrow.



Cellular Medicine Research

Research conducted at the Dr. Rath Research Institute in California has been based on Dr. Rath's concept of the natural enhancement of connective tissue stability, which is essential in cancer and infectious diseases.

Our research in cancer, including blood cancers induced by the HTLV-1 virus (a retrovirus similar to HIV), has shown that a specific synergistically acting nutrient combination can stop the invasion of cancer cells in the connective tissue by inhibiting the activity of enzymes that destroy it (matrix metalloproteinases (MMPs)). This nutrient synergy was also effective inducing natural cancer cell death (apoptosis) and other mechanisms critical in cancer.

These results have been published in numerous peer-reviewed publications and presented at medical and scientific conferences in the USA and many countries in Europe.

The Basis of the Micronutrient Synergy Program in HIV/AIDS Patients: A Clinical Pilot Project

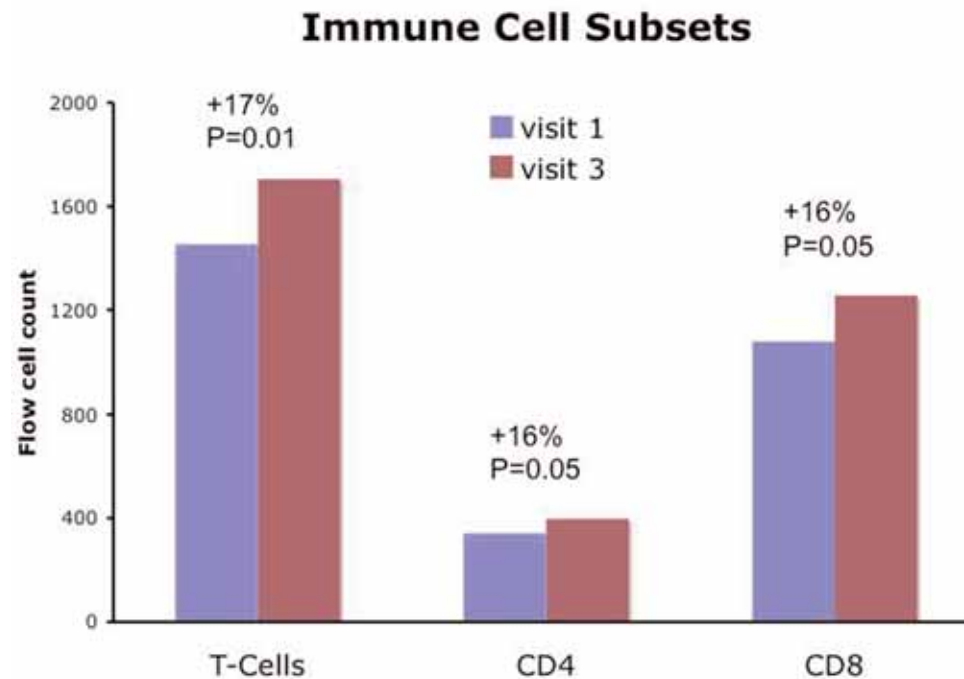
- We have developed a scientifically proven (in vitro and in vivo) specific nutrient synergy program effective in stopping the spread of cancer cells in the tissues.
- There are similar cellular mechanisms involved in the spread of HIV and cancer, such as the destruction of connective tissue.
- This nutrient synergy program can be applied to the natural control of AIDS.
- In addition to their anti-viral actions, these micronutrients enhance immune system function.

Vitamins in Reversing the Course of AIDS

Outline of the Pilot Vitamin Program:

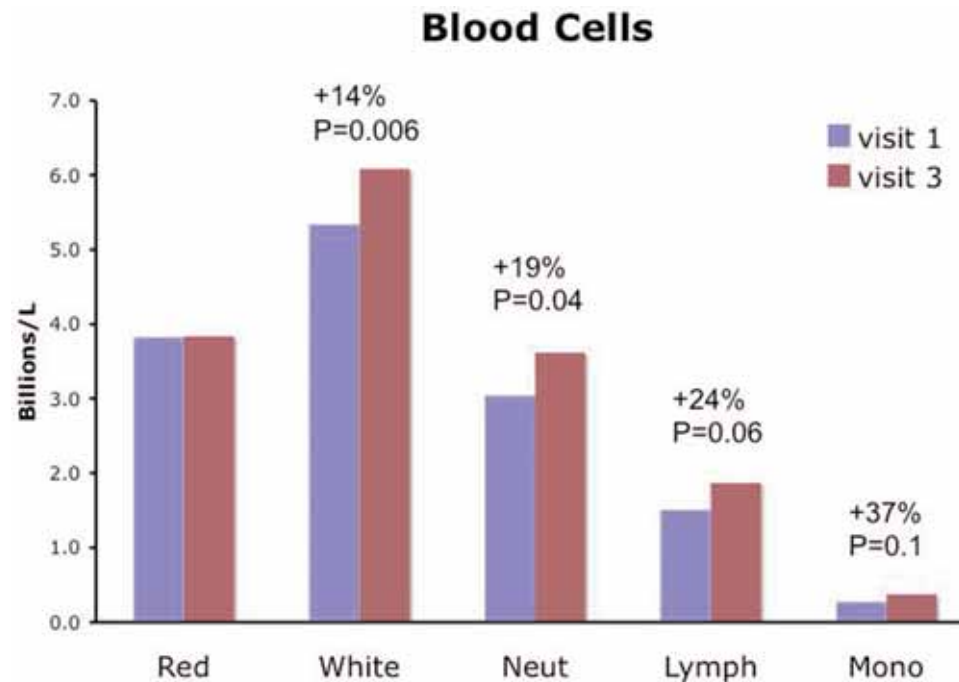
- 18 patients, ages 18-53
- Diagnosed with different stages of HIV/AIDS
- No previous or concurrent use of anti-retroviral therapies (ARVs)
- No lifestyle changes
- Health evaluations after four and eight weeks following the multivitamin-micronutrient program
- Micronutrient program containing vitamins/minerals/trace elements/amino acids/bioflavonoids/other minerals

Clinical Effects of Nutrients in HIV/AIDS Patients: Increase in T-Cell Levels



Statistically significant increase in total number of T-cells and their subsets (CD4 and CD8), indicating improvement of the immune system affected by the virus.

Clinical Effects of Nutrients in HIV/AIDS Patients: Improved White Blood Cell Count



Statistically significant increase in total number of various types of white blood cells essential for effective immune defense.

Healing of Skin Ulcer in AIDS Patient

At the start of
vitamin program

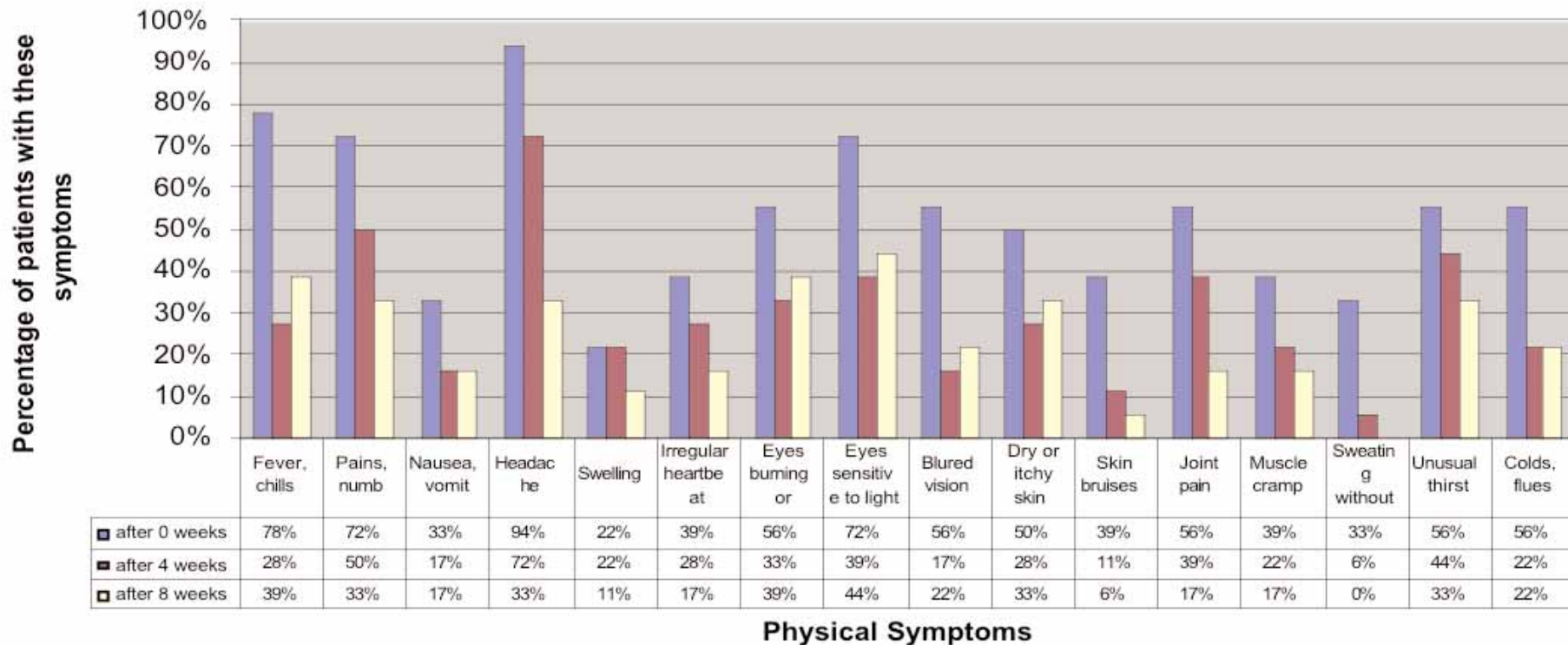


After four weeks on
vitamin program



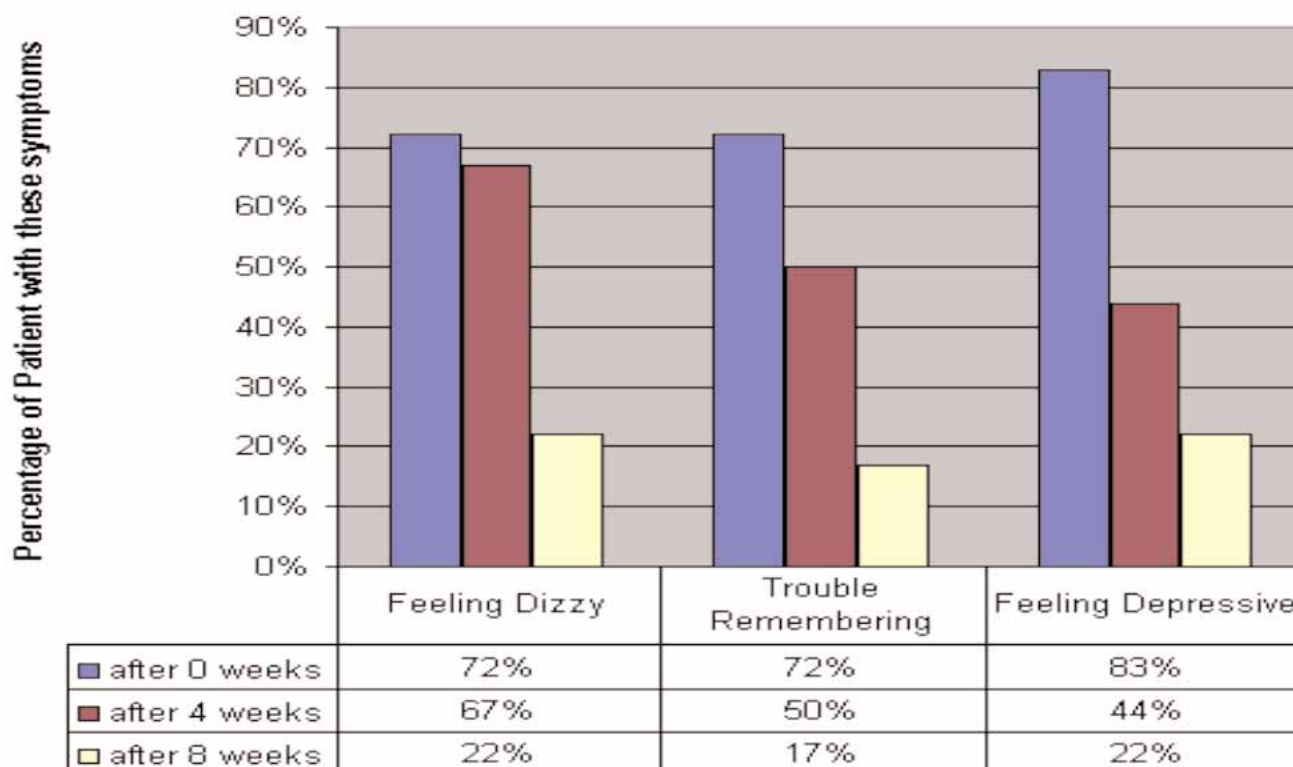
Clinical Effects of Nutrients in HIV/AIDS Patients: Improved Physical Symptoms

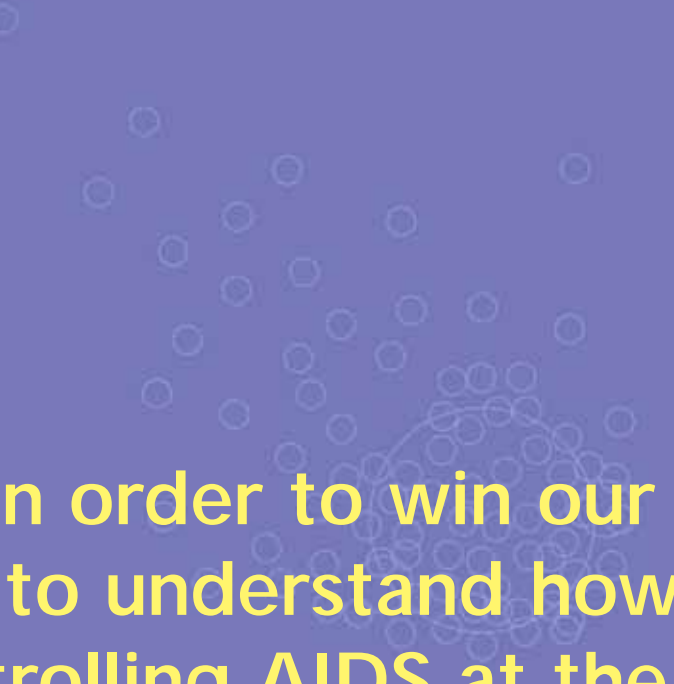
Symptoms Progress



Clinical Effects of Nutrients in HIV/AIDS Patients: Improved Mental Health

Changes in Mental Symptoms





**In order to win our health,
we need to understand how nutrients work
in controlling AIDS at the cellular level
and how to explain their mechanisms of action.**

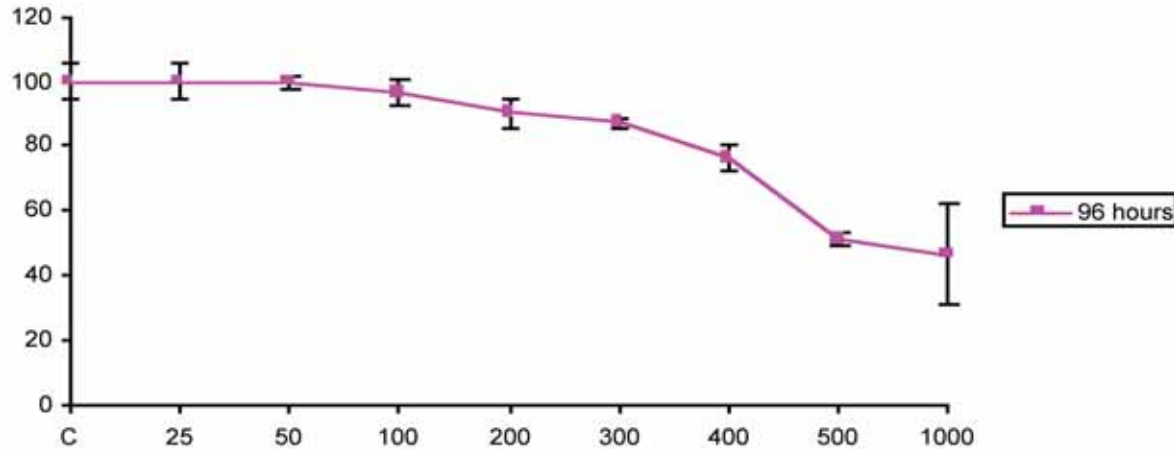
We Can Learn About the Cellular Effects of Micronutrients on HIV by Studying Similar Viruses

Adult Type Leukemia is a retroviral type leukemia caused by the HTLV-1 virus, an RNA virus similar to HIV. Both types of viruses are reproduced in the white blood cells through similar mechanisms.

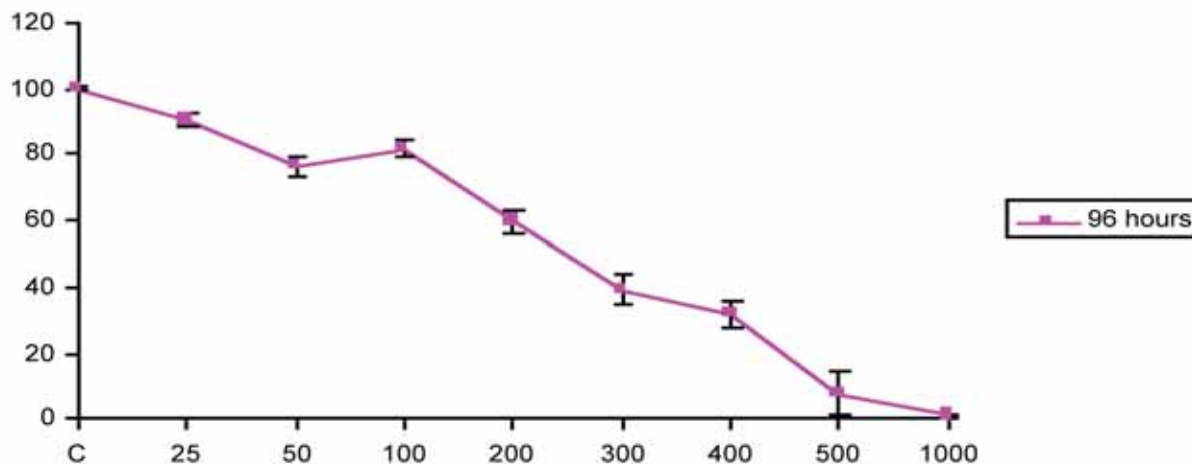
We used HTLV-1 derived leukemia as a model to study the effects of nutrient synergy on controlling HIV/AIDS.

We studied HTLV-1 containing the CD4 T-lymphocyte cell lines HUT-102 and C91PL.

Nutrient Synergy Inhibits Growth of Virus-Infected Cells Without Toxic Effects on the Cells



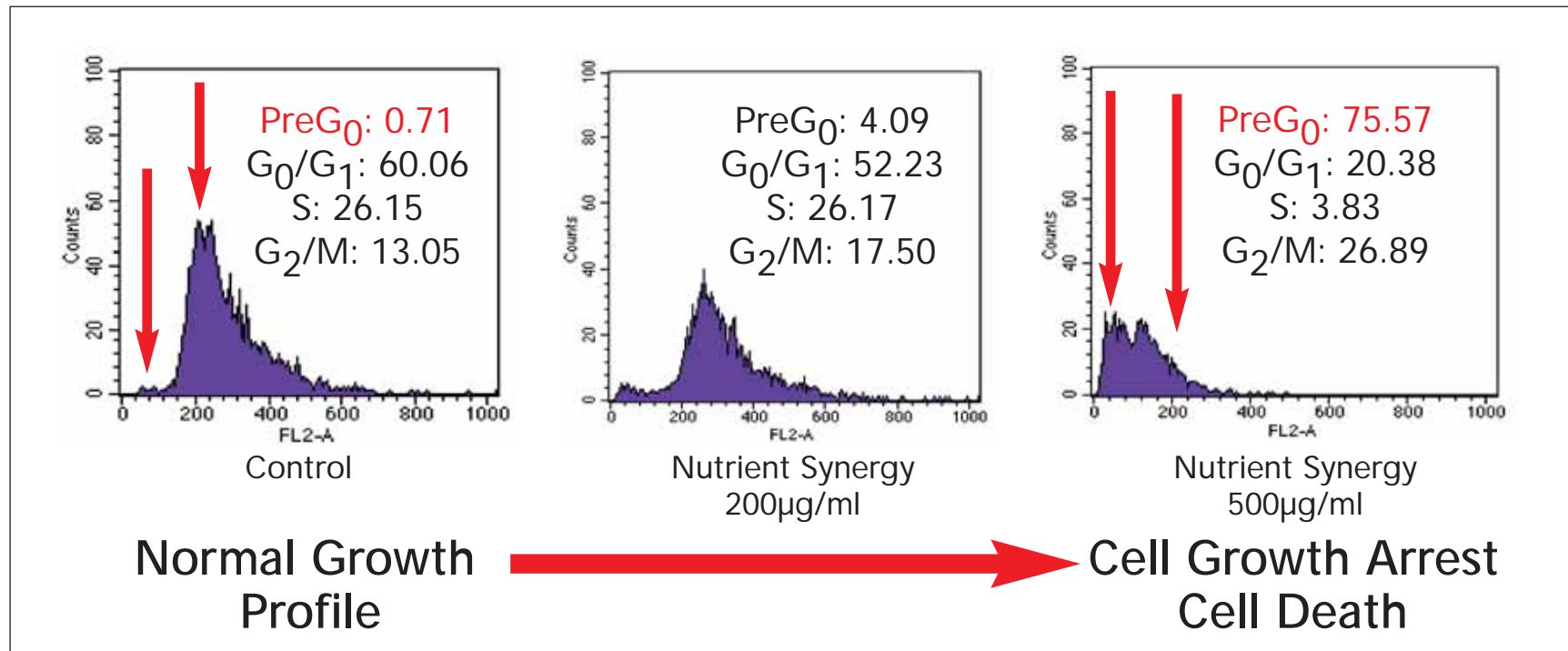
A high concentration of the nutrient mixture does not have a toxic effect on the cells, even after 96 hours of exposure.



However, this nutrient mixture effectively stops the growth of virus-infected cells (after 96 hours of exposure), so the disease can be controlled.

Cell line HUT-102 as an example

Nutrient Synergy Arrests Growth of Cells Infected With the Virus and Promotes Death in These Cells

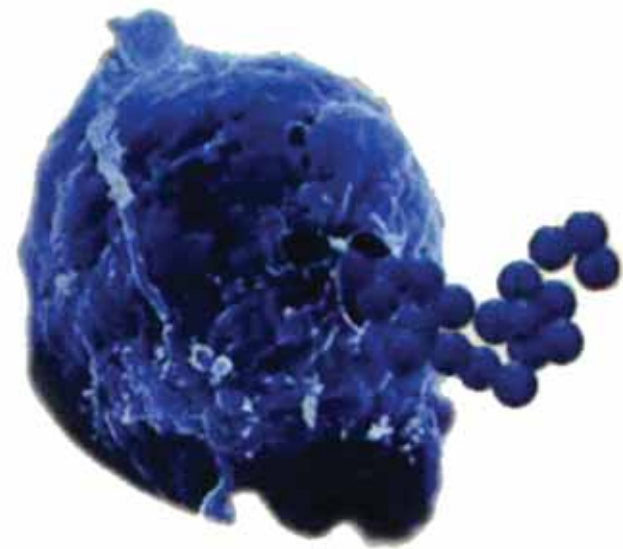


These results confirm that the nutrient combination can arrest the growth of viral leukemia cells (increasing the number of cells in preG₀ phase) and cause their death by internal cellular programming (apoptosis).

This is an example of a flow cytometry assay of HUT-102 leukemia cells, a test that allows a group of cells to be separated according to their growth cycle.

Evidence That Nutrients Can Trigger Cell Death Naturally (by Apoptosis)

All normal cells die either by exposure to toxins or through their normal life-death cycle. In cancer cells, this function is defective, which makes them immortal. This natural cell death (apoptosis) is controlled by a genetic program. Therefore, making abnormal cells, such as virus-infected or cancer cells, commit suicide (apoptosis) requires changes at the genetic level. These changes can be triggered by nutrient synergy.



Production of Key Proteins Regulating Cell Cycle and Critical in Inducing Natural Cell Death (Apoptosis)

- **Bcl-2:** Increases in this protein cause the immortality of cells and their transformation into a malignancy.
- **Bax:** A pro-apoptotic protein, it causes the release of cytochrome C from mitochondria.

Bax and Bcl-2 are antagonists and in normal cells, they are in balance.

- **P53:** The “guardian” of the genome. It eliminates cells with damaged DNA, thereby preventing their transformation into a malignancy.
- **P21:** A Cyclin-dependent kinase inhibitor that causes cell cycle arrest (phase G1).

Genetic Changes Promoting Apoptosis

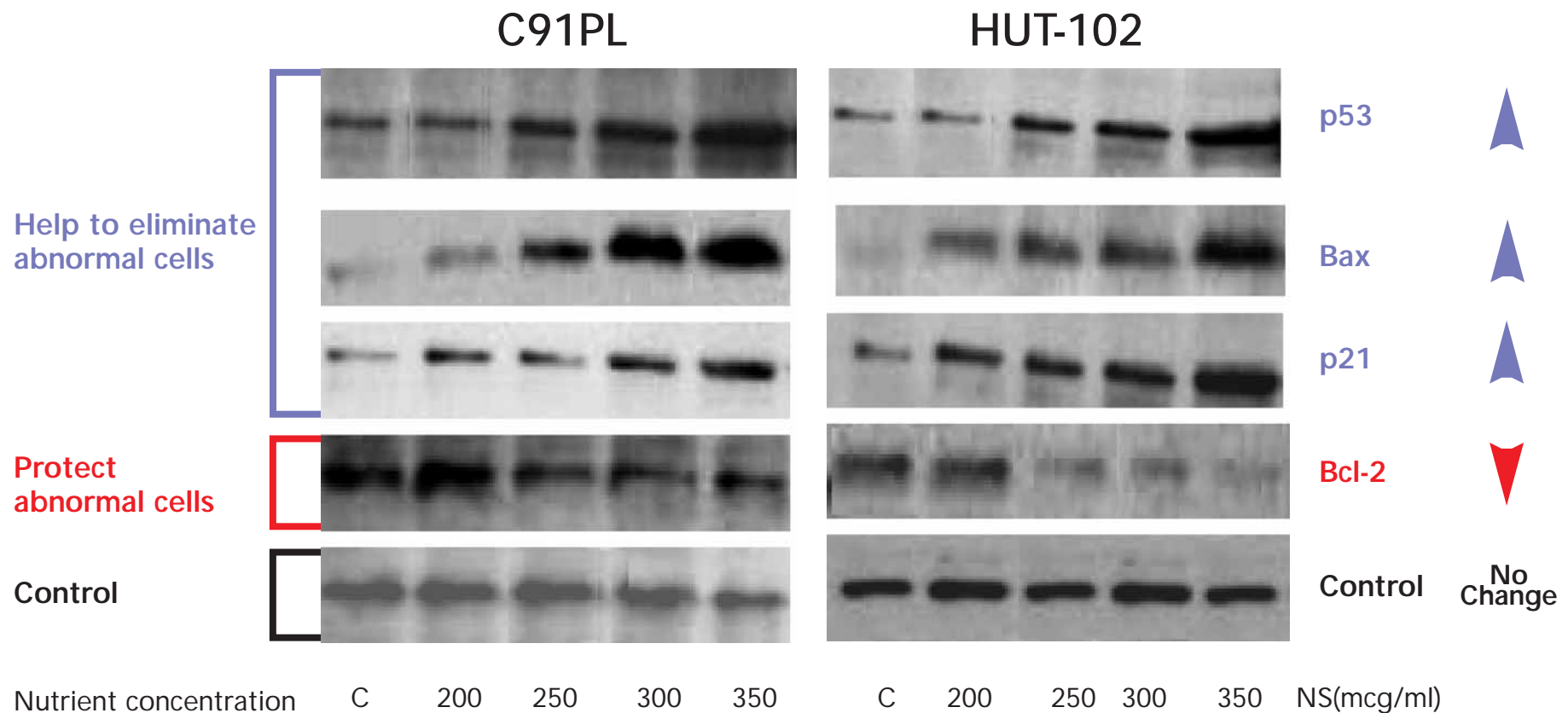
Anti-Cancer = Expected Increase

- Bax (kills cancer cells)
- P53 (eliminates cells with damaged genome)
- P21 (stops cell division)

Cancer-Promoting = Expected Decrease

- Bcl-2 (protects abnormal cells)

In Virus-Infected Leukemia Cells, Nutrients Trigger Genetic Changes Toward Apoptosis, Thereby Killing Abnormal Cells



Western blot apoptosis and cell death by ELISA confirmed in all cell lines.

Conclusions:

Nutrient synergy induced cell death in all tested T-cell lines infected with the HTLV-1 virus by increasing the levels of p53, p21, and Bax proteins and decreasing the level of Bcl-2 protein expression in a dose-dependent manner.

Nutrients can kill virus-infected cells naturally!

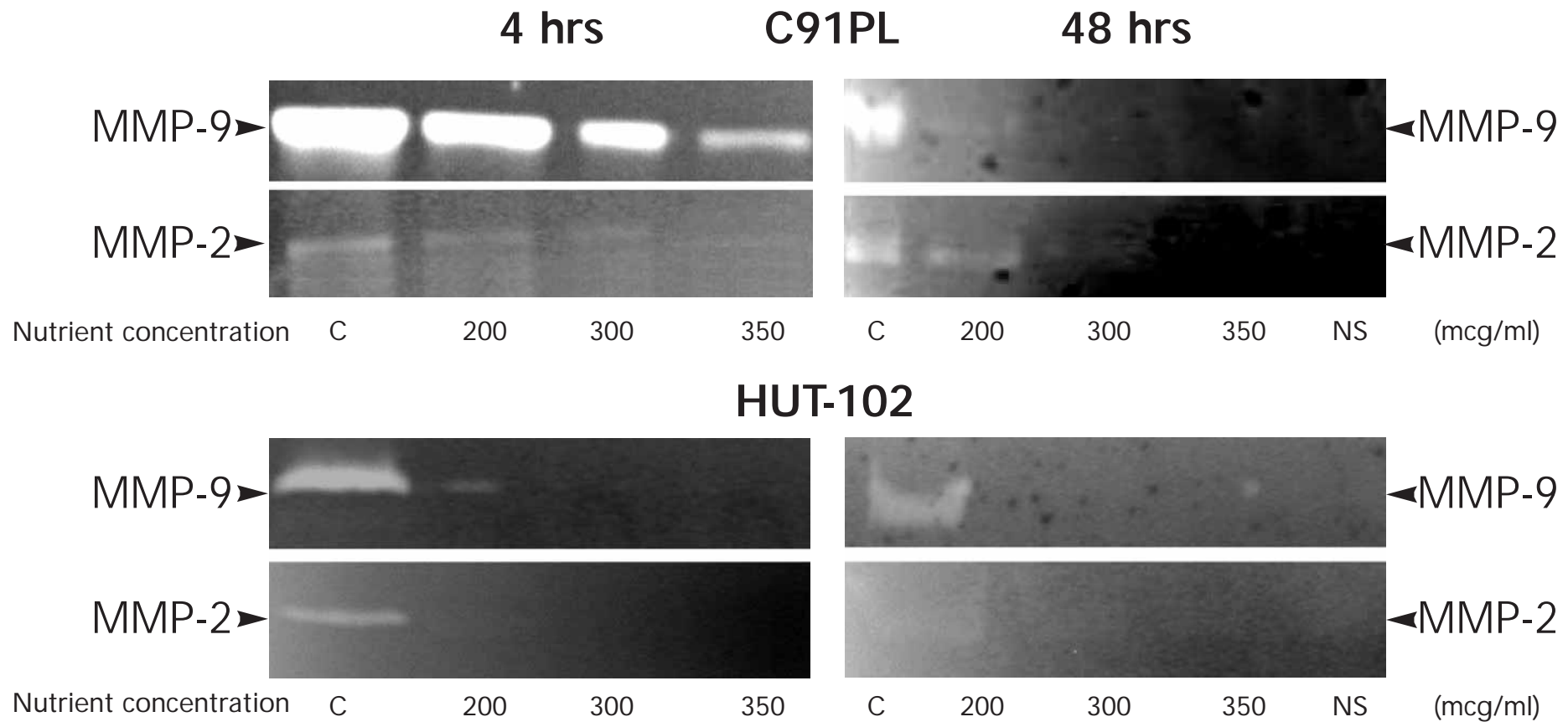
Nutrients Are Essential in Stopping the Degradation of Connective Tissue Triggered by Viral Infection

Viruses spread in the body by degrading collagen and other connective tissue components. This means that if connective tissue stability is preserved, viruses cannot spread freely.

Decreasing the activity of connective tissue-degrading enzymes (MMPs) is important for halting the spread of viruses in the tissues.

The key enzymes secreted by virus-infected cells (MMP-2 and MMP-9) can be measured and visualized by white bands. In the presence of increasing nutrient concentrations, the secretion of these enzymes is stopped, halting the spread of viruses.

Nutrients Inhibit the Secretion of MMPs in Virus-Infected Cells

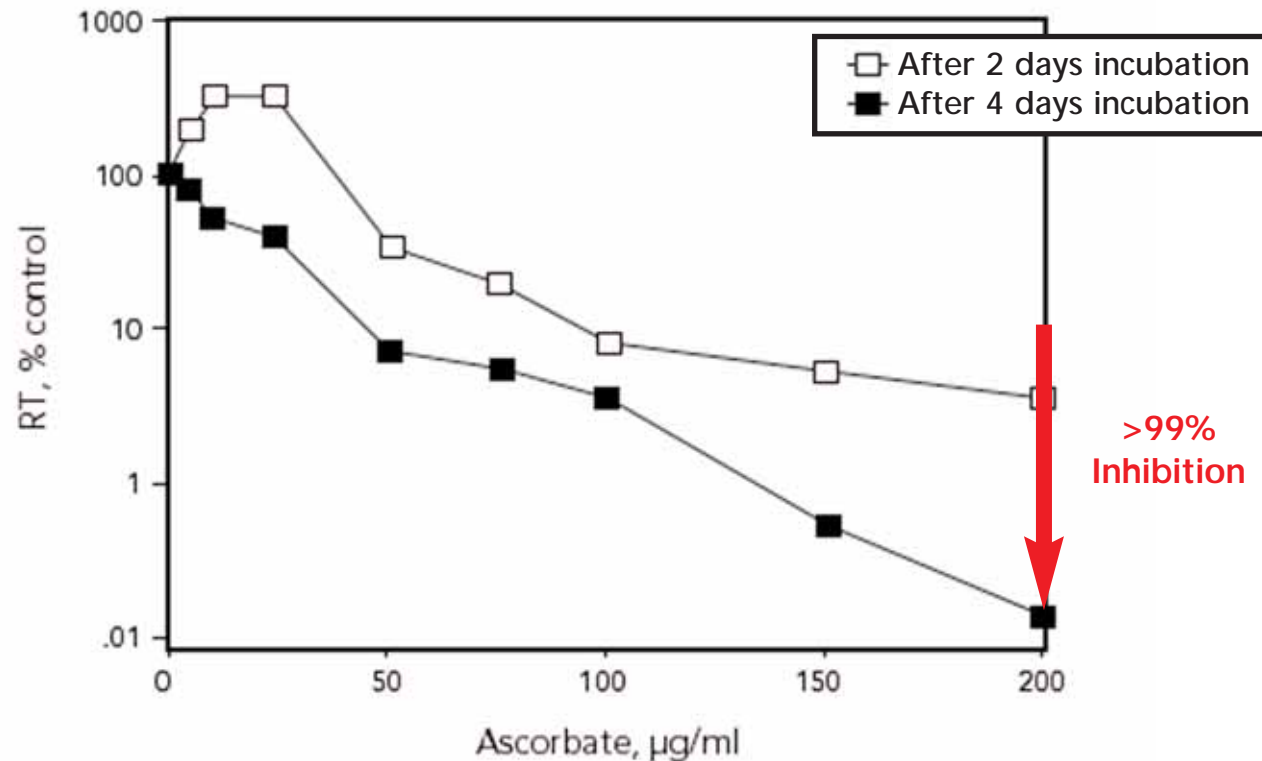


Individual Nutrients in HIV Infection



**Vitamin C (Ascorbic Acid)
Inhibits HIV Replication**

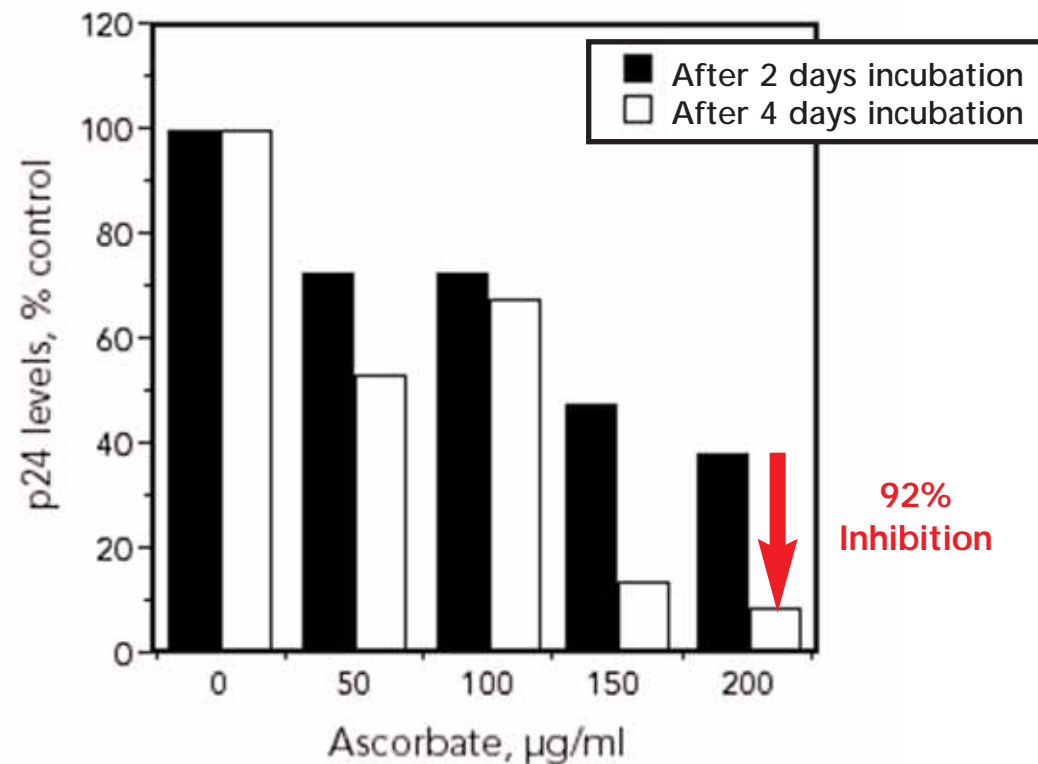
Vitamin C Inhibits (RT Activity) in Chronically Infected Cells, Stopping HIV Multiplication



Reverse Transcriptase (RT) is a key enzyme in the infectivity of HIV. In HIV chronically infected cells, which continuously produce virus, vitamin C reduces RT levels by more than 99%, stopping production of the virus.

Harakeh et. al., PNAS (1991) 87:7245-7249

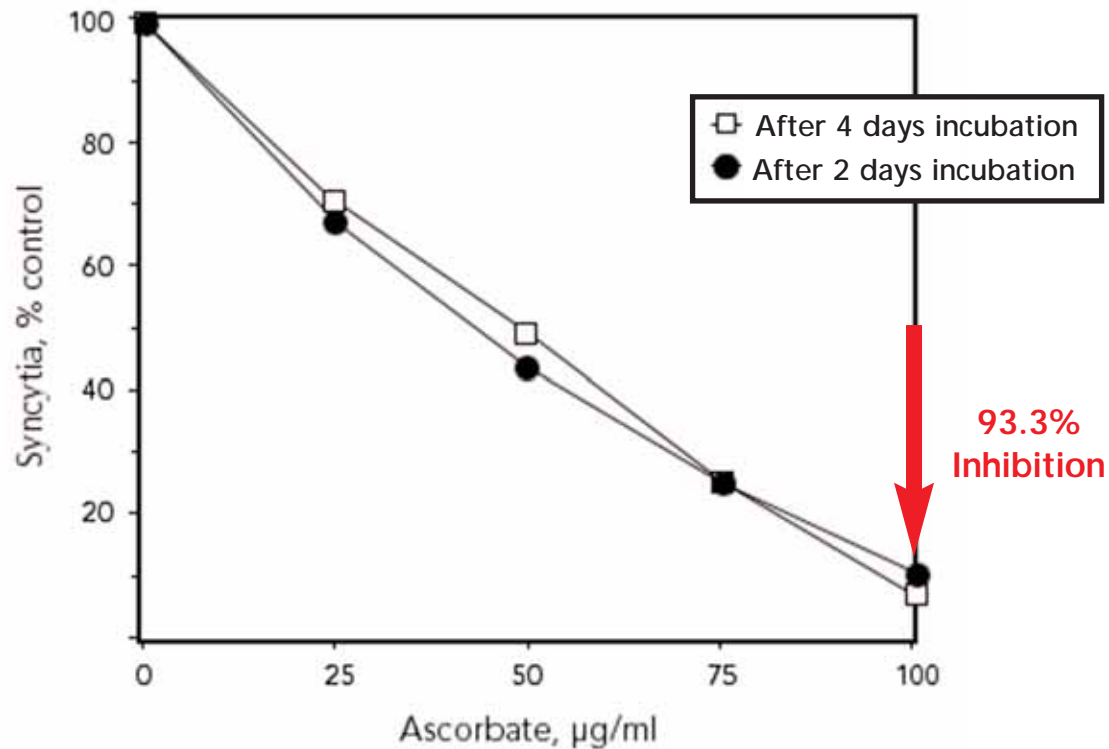
Vitamin C Inhibits P24 Levels in Chronically Infected Cells



P24 is a major core protein of the human immunodeficiency virus. Vitamin C inhibits its production, thereby inhibiting the virus's ability to grow.

Harakeh et. al., PNAS (1991) 87:7245-7249

Vitamin C Inhibits HIV Replication in Acutely Infected Cells



Vitamin C is effective preventing new HIV infections.

Harakeh et. al., PNAS (1991) 87:7245-7249

Vitamin C Inhibits RT Activity in T-Cells Containing Integrated Virus

		Relative RT activity in activated cells (ACH-2)
Ascorbate	200 mcg/ml	2-4 fold decrease
Ascorbate	300 mcg/ml	5-10 fold decrease
AZT	2.5 mcg/ml	No effect

Conclusions: Vitamin C was more effective than AZT in decreasing virus multiplication in latently infected T-cells activated with TNF α to produce the virus.

Harakeh et. al., Nutrition (1995) 5 Suppl. 684-687

Further Evidence of the Benefits of Nutrients in AIDS

- Clinical improvements in AIDS patients (Cathcard, 1985).
- Ascorbate and thiol-containing nutrients decrease RT activity (Am J Clin Nutr, 1991).
- Multivitamins can reduce fetal death and improve the immune status of HIV-positive mothers (Lancet, 1998).
- WHO study in 481 HIV-infected men and women living in Thailand documents significant health improvements after 48 weeks of using multiple vitamin doses (AIDS, 2003).
- Vitamin A supplementation in 28 children born to HIV-infected women in Durban, SA showed decreased morbidity due to diarrhea (Am J Publ Health, 1995).

Nutrients in AIDS

- Double-blind placebo-controlled study over 6 years in 1078 pregnant women in Tanzania evaluated the effects of multivitamins and vitamin A on HIV disease progression and survival. The results showed that taking vitamins cut disease progression by 50% and reduced risk of death by 27%. Multivitamin intake significantly increased CD4 and CD8 counts and lowered viral loads (N Engl J Med, 2004).
- Vitamin A supplementation in 75 children with AIDS in Cape Town, SA showed an increase in CD4 count, indicating improved immunity (1996).
- A comprehensive study of the effects of micronutrients in AIDS reviewed by Tufts University researchers (AIDS, 2005).

Conventional AIDS Treatments

- AIDS treatment is considered by many as bad as the disease itself.
- Anti-AIDS drugs are very toxic to the body and have many debilitating side effects.
- Huge numbers of medications have to be taken on regular schedule.
- Frequently missed doses diminish drug effectiveness and increase the likelihood of the virus developing resistance.
- Requires drastic changes in lifestyle.
- No cure is achieved.

Conventional Treatments: No Cure

The main focus of HIV research is stopping virus replication in the body with the assumption that then the immune system will rebuild itself.

The fact is that although anti-HIV therapies can temporarily weaken the virus's ability to replicate, they are not a cure since these drugs cannot totally eradicate the virus from the body or permanently suppress its replication. Also, these drugs are not able to restore immune system function, but, rather, impair it by damaging healthy cells.

Over time, the virus mutates or changes itself enough so that it is no longer affected by these drugs. This process is called viral resistance and is likely to happen with almost all anti-HIV drugs.

Conventional Treatments: Side Effects

1. Fat maldistribution or changes in body composition, commonly called lipodystrophy syndrome(s).

This includes sunken cheeks in the face; loss of fat in the arms and legs; loss of shape in the buttocks; breast enlargement; formation of fatty pad in the back, or buffalo hump; and increase in fat around the gut, or central obesity.


2. Nucleoside analog drugs are toxic to the mitochondria, which has different clinical manifestations.

Symptoms can include myopathy (muscle cell destruction and weakness), peripheral neuropathy (numbness and tingling in fingers and toes), pancreatitis (inflammation of the pancreas) and lactic acidosis (abnormally high levels of lactate). In early stages, people experience shortness of breath, nausea, vomiting and pain in the gut. Hepatic steatosis, or "fatty liver," can develop.

Conventional Treatments: Side Effects

3. Vascular necrosis and bone necrosis (osteonecrosis).

These result from a lack of blood supply in the bone that leads to the deterioration and death of bone tissue. One of the consequences of this condition is the fracture or even collapsing of the bone.

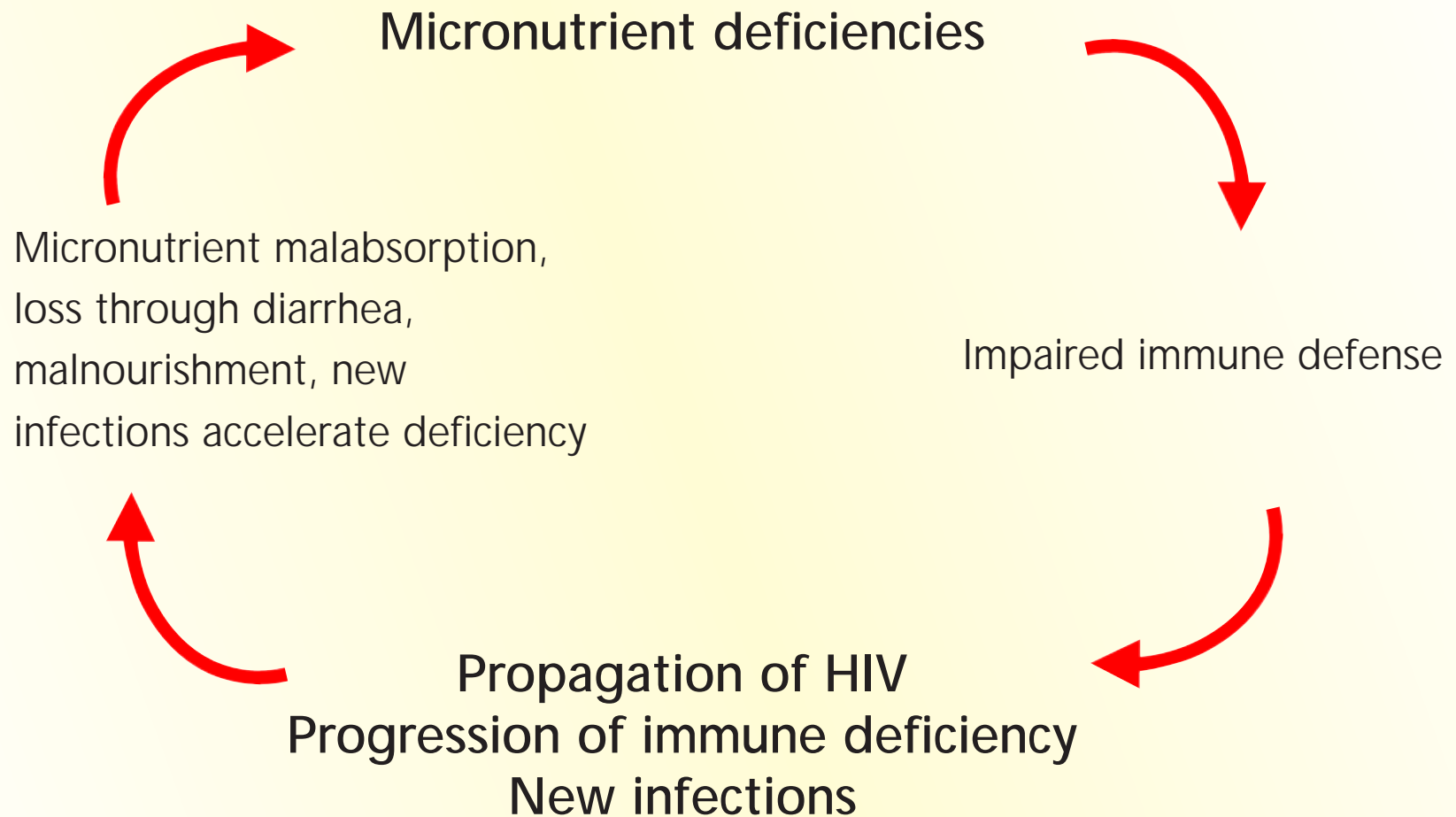


We already know from various scientific studies the benefits of nutrient supplementation in HIV/AIDS. The results of these studies have not been applied in clinical practice despite the safety record of vitamins and other nutrients and their affordability (non-patentable).

WHY?

**Who Has Interests in Suppressing
This Knowledge?**

This Vicious Cycle Can Be Stopped!





www.drrathresearch.org