

III. | Scientific Facts That Make This Breakthrough Irreversible

Chapter Introduction by Dr. Niedzwiecki

Cancer is one of the most challenging projects for a scientist – it has been marked by many decades of unfulfilled hopes and dead end ideas. However, the cancer research based on the new concept by Dr. Rath has been one of the most rewarding projects in my scientific life.

Before joining Dr. Rath, I worked on unravelling many biological aspects that make our body so unique. Among them I studied how the nuclear ‘software’ of the cell is built, how cells multiply and what happens when they become old. I was fortunate to research many of these aspects in famous research institutions in the US and Canada, and cooperated with two Nobel Laureates.

However, my most remarkable scientific journey began when I met Dr. Rath and we started working together more than two decades ago. It was clear to me from the beginning that he had a special way of looking at the same things everyone did, but seeing what no one could see.

His ideas were challenging but at the same time simple in explaining complex processes.



Together with Dr. Rath during the ‘early days’ of our research in 1991

In 1999 when we started our own research Institute and Dr. Rath invited me to direct it, I asked some of my former colleagues to join us. Thanks to the first pioneers of our cancer research, Dr. Shrirang Netke and later, Dr. Waheed Roomi, we could advance research in this area very fast. Already in 2001 we knew that the direction outlined in Dr. Rath’s concept was right. Our first challenge was to identify the most effective group of natural substances in curbing the invasion of cancer cells in the body.



Until today we have published more than 60 publications on this topic, participated in and given presentations at many scientific conferences in the US and other countries, written book chapters and cooperated with other scientific groups on cancer and other projects.

We are proud that many students who participated in the research projects at our laboratories could see for themselves the powerful effects of micronutrients in various aspects of cancer. Many of these young people continue their studies at medical schools, including the Medical Schools of Yale and other acclaimed universities. They form a new generation of doctors who will take an unbiased look at science-based natural approaches in helping their patients.

As a research team, we are propelled by great ideas and a desire to make the results of our work benefit all humanity.

What You Will Learn in This Chapter

In this chapter, we will share with you many more exciting facts about the breathtaking possibility to finally achieve victory over cancer. We will learn that:

- Besides the mechanism of cancer cell invasion, there are other key cellular processes that determine the course of the cancer disease;
- In addition to vitamin C and lysine, there are certain other important micronutrients that are able to block these disease mechanisms naturally;
- All these micronutrients work together in synergy, i.e., as a team, thereby mutually increasing their effectiveness in controlling cancer.

Most importantly, on the following pages we will take you through the huge amount of scientific proof about the possibility to control cancer naturally.

Knowledge of these facts opens the door to a world without cancer for future generations.



The Science of Cancer Made Easy

This chapter is about science – the science of disease and the science of life. You may say: I am not a scientist, why bother reading this chapter and making efforts to understand its contents.

We have to tell you that this understanding by you, your family – even your children – and millions of people is a precondition for the control of cancer.

This understanding of the basis for the natural control of cancer is important for every person in order to make informed decisions about their own health. This is critical not only in case you are affected by this disease – but also if you want to prevent it in the first place.

Moreover, this new understanding will protect you from falling prey to the economic interests that thrive on the continuation of the cancer epidemic as a global market for their patented chemotherapy drugs.

It was clear to us already two decades ago that the discovery we shared with you in the previous chapter, if confirmed, would mean victory over the cancer epidemic – and thereby a significant advance for all of mankind.

On the following pages, we will now share with you a few examples of the comprehensive rigorous scientific testing conducted at our research institute over the past decade.

With each of the experiments described here, you will find a reference to the original scientific publication with additional online links at the end of this chapter.

Three Steps of Scientific Confirmation



1 The cellular level: The basic level of scientific proof is the cell. Here the different biological actions of micronutrients can be studied in great detail.



2 Living organisms: Once the basic mechanisms of micronutrient action have been identified, they need to be confirmed in a living organism. This is necessary in order to:

- Document their efficacy in a complex living system, resembling the situation in people;
- Confirm the safety of these micronutrients.



3 Patients: The ultimate proof of the efficacy of micronutrients comes from their use by patients suffering from cancer. In this context two aspects are important:

- Can micronutrients stop tumour growth and cancer spread?
- Can micronutrients reverse already existing tumours?

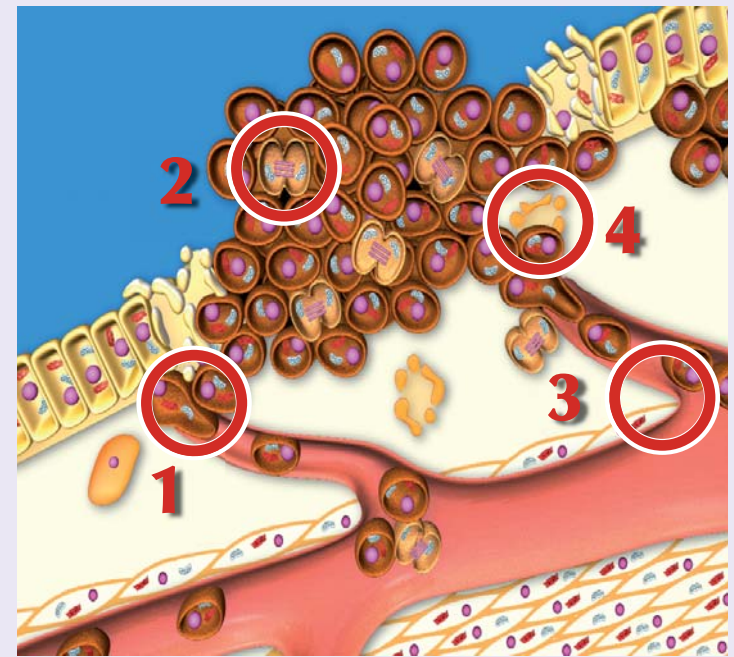
Key Mechanisms of Cancer Disease

Cancer cells use various mechanisms to grow, spread and ultimately overpower the body:

1. **Cancer cell invasion and metastasis.** The most critical mechanism is the ability of cancer cells to digest the connective tissue surrounding them and thereby pave the way for invasive growth and metastasis to other organs.
2. **Cancer cell multiplication and tumour growth.** A characteristic feature of cancer cells is a change in the biological 'software' in the cell core (nucleus) that renders them immortal. This explains why cancer cells multiply indefinitely – thereby gradually increasing tumour size and ultimately overwhelming the body.
3. **Formation of new blood vessels that feed the tumour (Angiogenesis).** If the tumour surpasses a certain size, normally 1/20 of an inch, the tumour cells can no longer be nourished from within. Therefore, growing tumours induce the formation of new blood vessels that supply oxygen and nutrients for further growth. This formation of new blood vessels is called 'angiogenesis'. The blocking of angiogenesis has become an important target of international anti-cancer research.
4. **Inducing the natural death of cancer cells (Apoptosis).** We already know cancer cells never die. The immortality of cancer cells is due to a genetic 'switch' in the cell core. Correcting this abnormality and reversing this 'switch' induces natural cell death. This is a precondition for stopping the continuous multiplication of cancer cells and ultimately leading to the shrinkage and disappearance of tumours.

Effectively blocking even one of these mechanisms can be sufficient to control cancer.

Key Cellular Targets for the Effective Control of Cancer



1. Cancer cell invasion and metastasis
2. Cancer cell multiplication / tumour growth
3. Growth of new tumour blood vessels (Angiogenesis)
4. Triggering death of cancer cells (Apoptosis)

Key Micronutrients for the Natural Control of Cancer

In the previous chapter we already learned about the key role of vitamin C and lysine in blocking the spread of cancer cells.

Our research over the past decade has shown that other specific micronutrients can enhance the effectiveness of these two natural compounds in controlling cancer.

This 'team' of micronutrients can be subdivided according to specific mechanisms of cancer control. For example:

- Support of connective tissue production and maintaining its integrity and stability: vitamin C, lysine, proline, copper, manganese.
- Inhibitors of connective tissue digestion: lysine, proline, vitamin C, N-acetyl-cysteine (NAC), green tea, selenium.
- Inhibitors of new blood vessel formation (Angiogenesis): green tea, NAC.
- Inducers of cancer cell death (Apoptosis): vitamin C, green tea, NAC, selenium, arginine, proline.

Micronutrient 'Team' Tested in Cancer

Vitamins

- Vitamin C

Amino Acids

- L-Lysine
- L-Proline
- L-Arginine
- N-Acetyl L-Cysteine (NAC)

Polyphenols

- Green Tea Extracts (EGCG)
- Quercetin*

Minerals

- Selenium
- Copper
- Manganese

* Quercetin is proven to be an essential part of nutrient synergy. It has therefore been included in all our current experiments.

Increased Biological Effectiveness by a 'Team Effort' of Micronutrients (Nutrient Synergy)

Over the past decades, anti-cancer research has been conducted involving individual micronutrients (e.g., vitamin C, which was applied in high doses), in approaches referred to as so-called 'megadoses'.

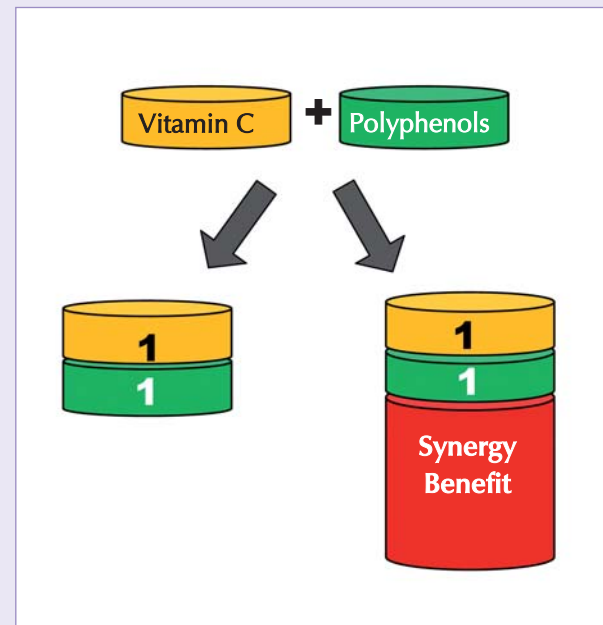
Our research over more than a decade has created a modern understanding about how to maximise the biological effectiveness of micronutrients.

The key principle is '**Synergy**'. This principle is so important that we have to highlight some of its characteristics:

1. Synergy is a principle of life. Many biological components work together within cells to achieve a desired biological result.
2. Synergy means that the effectiveness of this group of biological components working together is greater than the sum of its individual parts.
3. Applied to the anti-cancer properties of micronutrients, this 'Synergy' principle means that high amounts of an individual vitamin are less effective than the combination of moderate amounts of selected micronutrients.

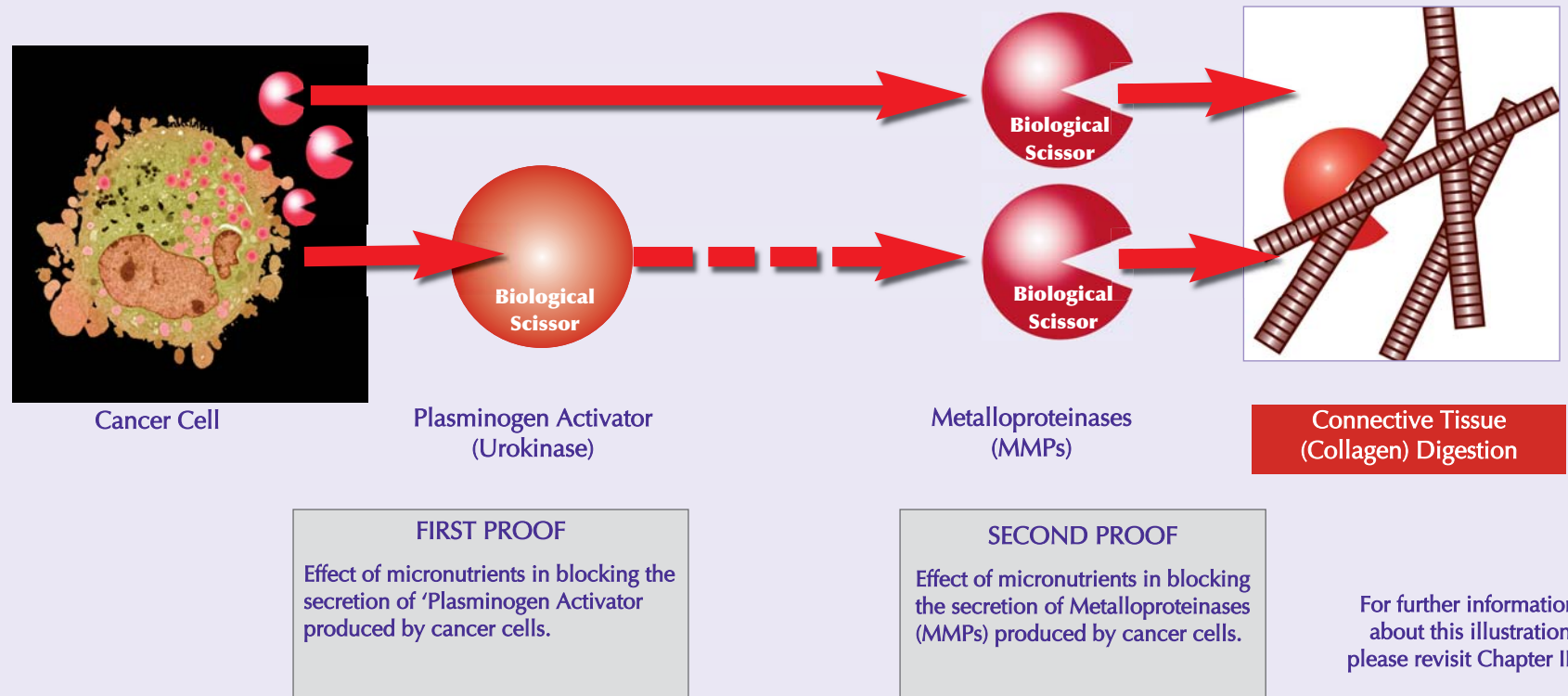
This principle is illustrated on the facing page and we will revisit it throughout this chapter.

The Principle of Synergy



Synergy is more than
the sum of its individual components.

How We Proved that Micronutrient Synergy Prevents Destruction of Connective Tissue – A Necessary Step to Halt the Spread of Cancer



We already know that the aggressiveness (malignancy) of any type of cancer depends on the amount of 'biological scissors' produced by this type of cancer.

Thus, any successful approach to block cancer has to aim at inhibiting the excessive, uncontrolled production of these collagen-digesting enzymes (see Chapter II).

We tested the effect of micronutrient synergy on the two most important types of enzymes used by cancer cells. Our goal was to prove that micronutrient synergy can inhibit both of them.

The first key enzyme is called 'Urokinase Plasminogen Activator (uPA)', the second is the group of 'Metalloproteinases' (MMP2 and MMP9). The following pages show the results.

Scientific Proof: **Blocking the Secretion of Plasminogen Activator (Urokinase) Produced by Human Cancer Cells**

In this experiment, we tested whether our micronutrient team is able to inhibit the secretion of the 'biological scissor' enzyme Urokinase, produced by human prostate cancer cells.

For this purpose, six test sets containing equal numbers of prostate cancer cells were used. The first set did not contain additional micronutrients and served as the control. The other five sets of cells were placed (incubated) with increasing amounts of micronutrients.

The next day we measured the amounts of Urokinase collagen-digesting enzymes that were secreted by each set of cells exposed to different levels of micronutrients.

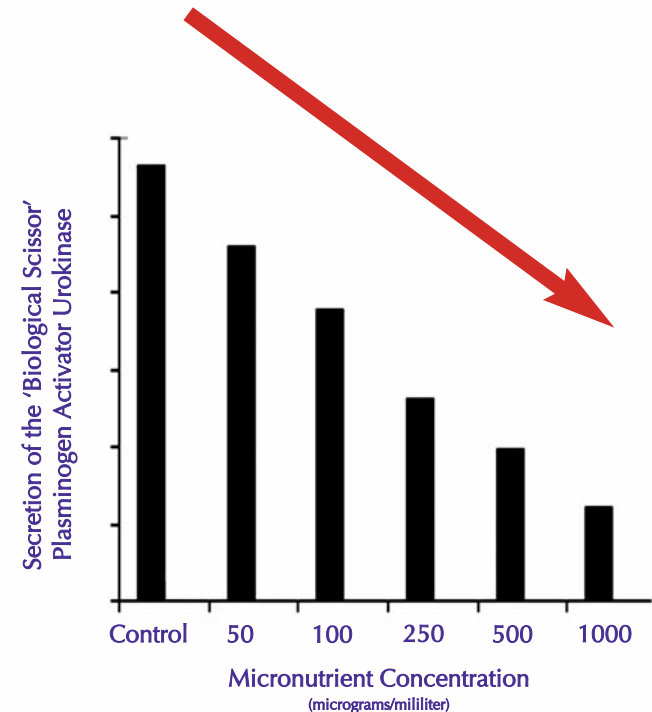
We found that the higher the concentration of micronutrients, the lower the production of the 'biological scissor' Urokinase by prostate cancer cells.

In the meantime we could confirm this effect of micronutrients in many other types of human cancer.

This means that – by inhibiting the secretion of Urokinase – micronutrients are able to reduce the ability of many types of cancer cells to grow, spread and metastasise to other organs.

Other scientists have confirmed these research results in the meantime. They demonstrated that cancer metastasis can be inhibited in mice lacking the enzyme urokinase, thereby underscoring the significance of this enzyme in cancer.

Micronutrients Inhibit the Secretion of 'Biological Scissors' by Cancer Cells



The higher the micronutrient concentration, the less cancer cell enzymes can digest the surrounding collagen.

Read the complete study results online at
<http://www.drrathresearch.org/pub/voc/121>

Scientific Proof: Blocking the Secretion of Collagen Digesting Enzymes (MMPs) Produced by Human Cancer Cells

As we already know, the second key group of collagen digesting enzymes produced by cancer cells is called matrix metalloproteinases (MMPs) – two of them, MMP-2 and MMP-9, are most critical in cancer.

We wanted to prove that the defined team of micronutrients is also able to inhibit the production and secretion of the ‘biological scissors’ MMP-2 and MMP-9 by cancer cells.

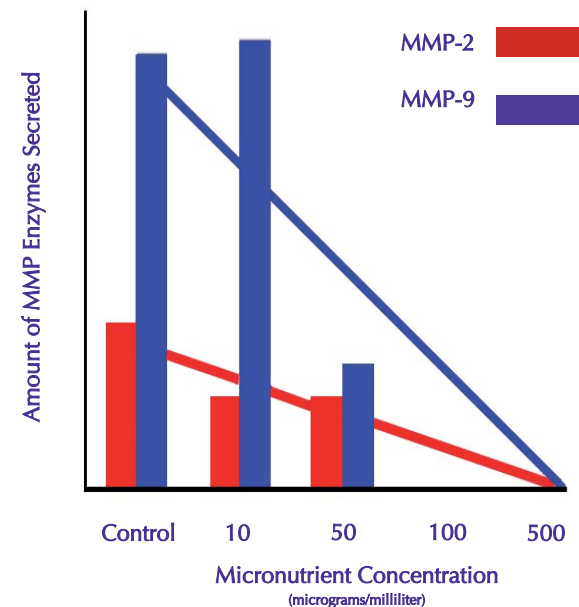
For this purpose, five test sets containing equal numbers of cells were used, this time from human bladder cancer. The first set did not contain additional micronutrients and served as the control. The other four sets of cells were placed (incubated) in the presence of increasing amounts of micronutrients.

On the following day, we measured the amounts of MMP-2 and MMP-9 enzymes that were secreted by each set of cells, which had been exposed to different levels of micronutrients. The results are shown on the facing page.

As in the previous experiment with Urokinase, we found that micronutrients can also inhibit the secretion of MMP ‘scissor’ enzymes. It is important to note that in this case, micronutrients in moderate and higher concentrations were able to completely stop the secretion of both MMP enzymes by these cancer cells.

In the meantime we could confirm this effect of micronutrients in more than 40 types of human cancer.

Micronutrients Inhibit the Secretion of ‘Biological Scissors’ (MMPs) by Human Cancer Cells



The higher the micronutrient concentration, the less cancer cell enzymes can destroy the surrounding collagen.

Read the complete study results online at

- <http://www.drrathresearch.org/pub/voc/123>
- <http://www.drrathresearch.org/pub/voc/124>

Testing the Ability of Micronutrients to Inhibit the Invasion of Cancer Cells

The next question was whether the micronutrient team would not only block these 'scissor' enzymes but actually prevent the cancer cells from cutting through the connective tissue to invade other organs.

To study this decisive question without ambiguity, we set up a testing system that mimics the situation in the human body with respect to its components (shown on the facing page):

- The test vials were filled with a liquid solution mimicking human body fluid.
- The top and bottom portion of the vial were separated by a membrane of connective tissue called Matrigel.
- The top portions of the vials contained equal numbers of human cancer cells.

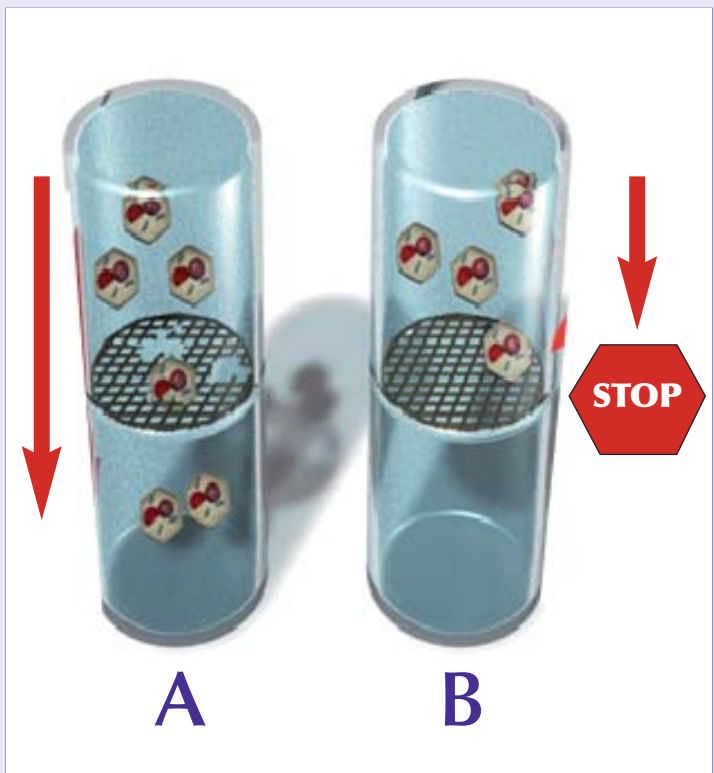
The only difference between vial **A** and vial **B** was the presence of micronutrients, which were added only to vial **B**.

From earlier experiments, we knew that the cancer cells are easily able to cut through the separating connective tissue membrane and can be found – and counted – on the other side of the membrane. Generally, the more aggressive the cancer type is, the more cancer cells are found on the other side of the membrane.

In an extensive series of experiments, we could show that the team of micronutrients was able to block all tested types of cancer from breaking through the connective tissue.

The following pages will show some of these research results in more detail.

Testing the Invasion of Cancer Cells



Micronutrients prevent cancer cells from migrating through connective tissue.

Scientific Proof: Micronutrients Inhibit the Invasion of Human Cancer Cells

Fibrosarcoma is a frequent form of cancer of the connective tissue. This cancer develops when the software of human fibroblast cells is modified to become carcinogenic.

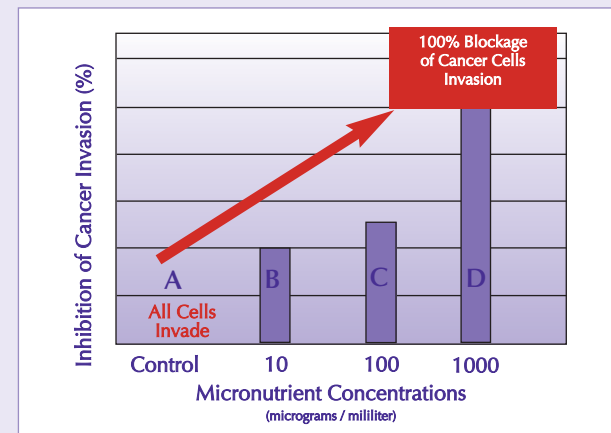
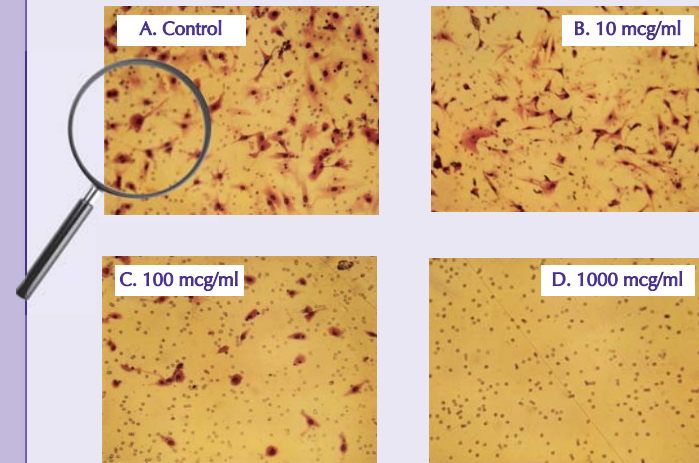
We tested the inhibitory effect of micronutrients on the invasion of these fibrosarcoma cells in the test system described on the previous pages. The four images in the upper half of the facing page show microscopic pictures of fibrosarcoma cells (dark brown structures) that had cut through the connective tissue membrane.

- Picture A, designated 'Control', was taken in the absence of the micronutrients. Most of fibrosarcoma cells had cut their way through the membrane.
- The pictures designated B, C and D from the same test system show decreasing numbers of migrating cancer cells when exposed to increasing amounts of micronutrients.

You can clearly see that at the highest concentration of micronutrients (picture D), no cancer cells were detected because they were blocked in their attempt to break through the connective tissue. The small dark spots in the pictures are not cells, but membrane background.

The lower portion of the page shows the quantitative results of these experiments: The higher the columns, the greater the effect of micronutrients in inhibiting the invasion by cancer cells. At the highest concentration of micronutrients, no cancer cells could cut through the connective tissue any more (column D).

Micronutrients Inhibit the Invasion of Connective Tissue Cancer (Fibrosarcoma)



Micronutrients are inhibitors of cancer cell invasion.

Read the complete study results online at
<http://www.drrathresearch.org/pub/voc/127>

Scientific Proof: Micronutrients Inhibit the Invasion of Breast Cancer Cells

We were particularly interested to study the effectiveness of micronutrients in controlling the most frequent forms of cancer.

The most frequent form of malignancies in women is breast cancer. These cancers are categorised in two main groups. Since the invasive potential of one type of breast cancer is dependent on the hormone estrogen, these cells are categorised as 'estrogen dependent'. The second type of breast cancer grows independently of this hormone and is called 'estrogen independent'.

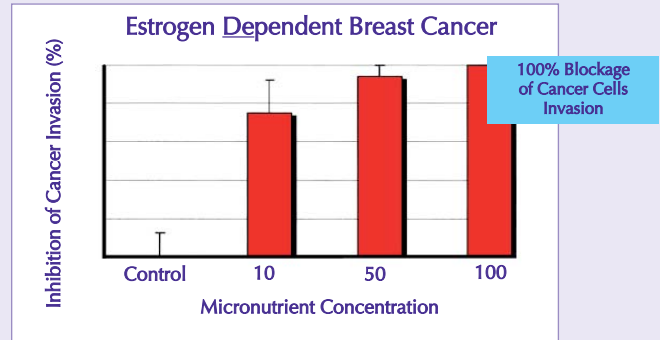
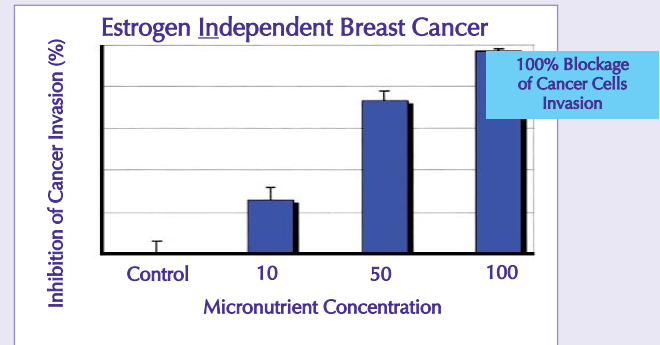
We studied whether our team of micronutrients is able to halt the invasiveness of both types of human breast cancer cells. To answer this question, we used the same experimental setting as described on the previous pages.

With breast cancer, we could also observe that the invasive potential of this type of cancer decreases with increasing amounts of micronutrients. At the highest concentration of micronutrients, no breast cancer cells were able to cross the connective tissue barrier anymore.

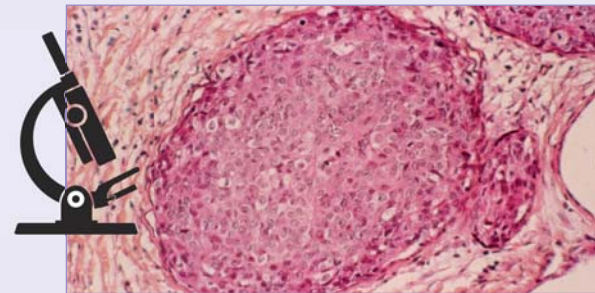
The same encouraging results were obtained for both 'estrogen dependent' and 'estrogen independent' types of breast cancer, as shown in the two graphs on the facing page.

The microscopic picture at the bottom of this page shows a specific type of breast cancer, called Adenocarcinoma, which derives from the glandular cells that line the milk ducts in the breast. This is one of the most frequent forms of malignancy in women.

Micronutrients Inhibit the Invasion of Breast Cancer Cells



Read the complete study results online at
<http://www.drrathresearch.org/pub/voc/129>



Microscopy Picture of Human Breast Cancer (Adenocarcinoma)

Scientific Proof: Micronutrients Inhibit the Invasion of Prostate Cancer Cells

One of the most frequent forms of cancer in men is prostate cancer. Similar to breast cancer in women, prostate cancer, too, can be hormone dependent. In this case its growth can be regulated by male hormones called androgens, which include testosterone.

We studied whether our team of micronutrients is able to halt the invasiveness of both types of human prostate cancer cells. As in the previous experiments, we used the experimental design described before to answer this question.

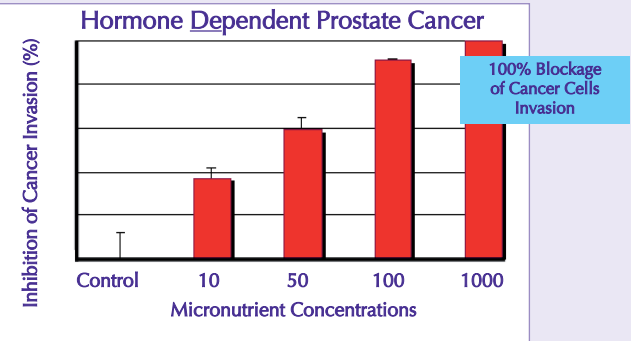
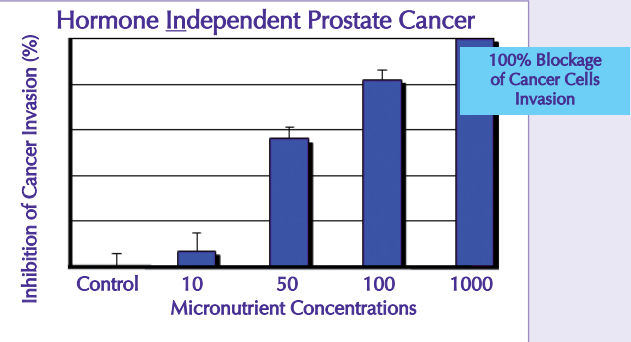
Similar to fibrosarcoma and breast cancer, we observed that the invasion of prostate cancer cells decreases with increasing amounts of micronutrients. Again, at the highest concentration of micronutrients, no prostate cancer cells were able to cross the connective tissue barrier any more.

The same encouraging results were obtained for both hormone dependent and independent types of prostate cancer. The graphs on the facing page summarise these results.

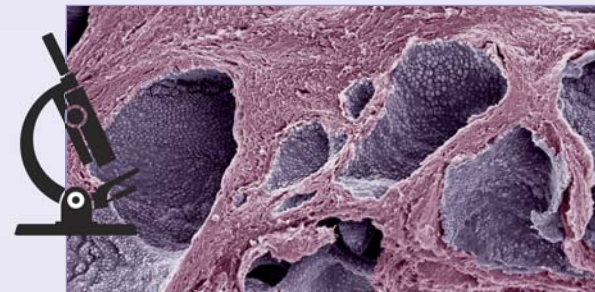
The microscopic picture at the bottom of this page shows an adenocarcinoma of the human prostate. We already know that this form of cancer derives from glandular cells that produce hormones.

This highly magnified picture is taken with a Scanning Electron Microscope (SEM) and shows the ducts of the prostate completely covered with carcinoma cells (blue/grey structures).

Micronutrients Inhibit the Invasion of Prostate Cancer Cells



Read the complete study results online at
<http://www.drrathresearch.org/pub/voc/131>



Microscopy Picture of a Human Prostate Cancer (Adenocarcinoma)

Micronutrients Inhibit the Invasion of More Than 40 Human Types of Cancer

When you read through the previous pages, you may have felt like we did as researchers when we conducted these experiments: Can the solution to the cancer epidemic be so simple and universal? To answer this question we studied the effectiveness of the micronutrient team on the invasion of **all available human cancer types**.

Altogether, we tested the effect of micronutrient synergy on more than 40 different types of human cancer. Among the cancer cell types tested are some of the most frequent forms of cancer that affect the lives of millions of people, including cancer of the lung, colon, pancreas, brain, blood, skin, ovaries, and many others (see facing page).

While studying this large number of human cancer types we established that micronutrient synergy was able to completely block the invasiveness of all human cancer cell lines tested. The only difference was the amount of micronutrients needed to achieve this goal.

Some chemotherapy proponents may argue that the solution to cancer cannot be that simple. But it can – and we know why: All cancer cells use the same mechanism to invade the surrounding tissue and metastasise. Since micronutrients are capable of blocking this universal cellular mechanism, they can inhibit the invasion of any type of cancer cells irrespective of their origin.

Of course, this does not mean that cancers at any stage can be halted by micronutrients. This is particularly true for patients with advanced stages of cancer, as well as in cases where the immune system – and thereby the body's capability to fight cancer – had been destroyed by chemotherapy.

Blocking Cancer Invasion Naturally – Examples of Human Cancer Types

Complete Block at Low Nutrient Concentration

- Breast Cancer
- Hodgkin's Lymphoma

Complete Block at Moderate Nutrient Concentration

- Lung Cancer
- Colon Cancer
- Cervical Cancer
- Skin Cancer (Melanoma)
- Bone Cancer (Osteosarcoma)
- Testicular Cancer
- Blood Cancer (Non-Hodgkin's Lymphoma)
- Pancreatic Cancer

Complete Block at High Nutrient Concentration

- Liver Cancer
- Bladder Cancer
- Kidney Cancer
- Ovarian Cancer
- Prostate Cancer
- Brain Cancer (Glioblastoma)
- Blood Cancer (Leukemia, PML)

Micronutrients are capable of inhibiting the invasiveness of **all** types of cancer cells we tested.

Read the complete studies results online at
<http://www.drrathresearch.org/pub/voc/133>

Scientific Proof: Micronutrients Inhibit Cancer Metastasis in Living Organisms (I)

After confirming the benefits of micronutrients in blocking the invasion of cancer cells in a laboratory setting (*in vitro*), we wanted to establish the scientific proof also at the next level – in a living organism (*in vivo*).

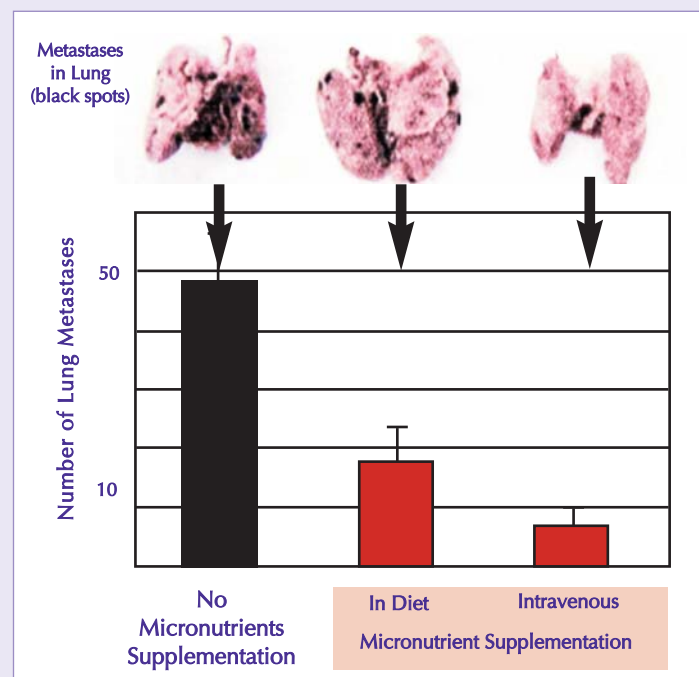
After careful evaluation and approval by an animal care committee, we conducted these important experiments in mice. These experiments were justified considering the fact that more than 4 million people will continue to die from cancer each year – if no cure is found.

In order to spare animal life, we immediately addressed the most challenging question in cancer, which is the prevention of metastasis. After all, 9 out of 10 patients die of metastasising cancer, not of a tumour confined to one organ.

We tested the ability of micronutrients to inhibit the metastasis of cancers in the following way: A group of mice was injected with an equal number of skin cancer (melanoma) cells. Thereafter, the mice were divided into three groups: a) a control group without micronutrient supplementation, b) a group receiving micronutrient supplements in the diet and c) a group receiving micronutrients directly into the blood stream (intravenously).

When the lungs were later analysed for the numbers of metastases, we found that micronutrient supplementation in the diet reduced the number of metastases in the lungs by more than 60%. In the group that had received the micronutrients directly into the blood, the results were even better: The metastases were reduced by more than 80% compared to the control group without micronutrient supplementation.

Micronutrients Inhibit Metastasis of Melanoma Cells to the Lung



Read the complete studies results online at
<http://www.dmrathresearch.org/pub/voc/135>

Micronutrients can reduce cancer metastasis *in vivo*.

When Animal Experiments Are Justified

Our position on this important topic is clear. Life in general needs to be protected and animal experiments have to be avoided whenever possible. They should be considered only in those cases when the results of these experiments directly affect human life and if there are no alternatives available. In the case of cancer, where millions of lives each year are at stake, we are convinced that the experiments documented here will help greatly reduce human suffering and death.

Scientific Proof: Micronutrients Inhibit Cancer Metastasis in Living Organisms (II)

In the previous experiments we showed that micronutrient supplementation can prevent cancer cells – injected directly into the bloodstream – from metastasising into the lungs.

This was an important step; however, it does not exactly reflect the development of the cancer disease in people. Normally, a cancer starts with a 'primary tumour' in one organ. From there, the cancer cells metastasise to other organs in the patient's body. **Thus, it is important to know whether micronutrients can reduce the spread of cancer from the primary organ to another organ.**

To establish this important fact, we injected melanoma cells directly into the spleen of mice. Then one group of animals was placed on a normal diet, without additional micronutrients (control). The other group received daily supplementation of micronutrients in their diet. Subsequently, the organs were analysed for the growth of the primary tumour in the spleen (picture A) and the presence of metastases in the liver, a primary organ of metastasis for melanoma cancer (picture B).

Our findings in these studies were as equally significant as the results from the previous experiments. **We established that animals which received micronutrient supplementation had significantly less growth of the primary tumour. The metastases from the primary organ (spleen) to the liver were reduced almost by half.**

Additional studies will establish whether increased amounts of micronutrients in the diet can further reduce or even completely block metastasis to secondary organs.

Micronutrients Inhibit Cancer Metastasis from Organ to Organ

A Primary Tumour in Spleen



No added micronutrients

The tumour (black areas) has massively enlarged the entire organ.



With added micronutrients

The tumour is significantly reduced. No organ enlargement.

B Metastases in the Liver



No added micronutrients

The enlarged liver contains numerous metastases (black areas).



With added micronutrients

The number of metastases in the liver is greatly reduced. No organ enlargement.

**Micronutrients can reduce cancer metastasis
from one organ to another.**

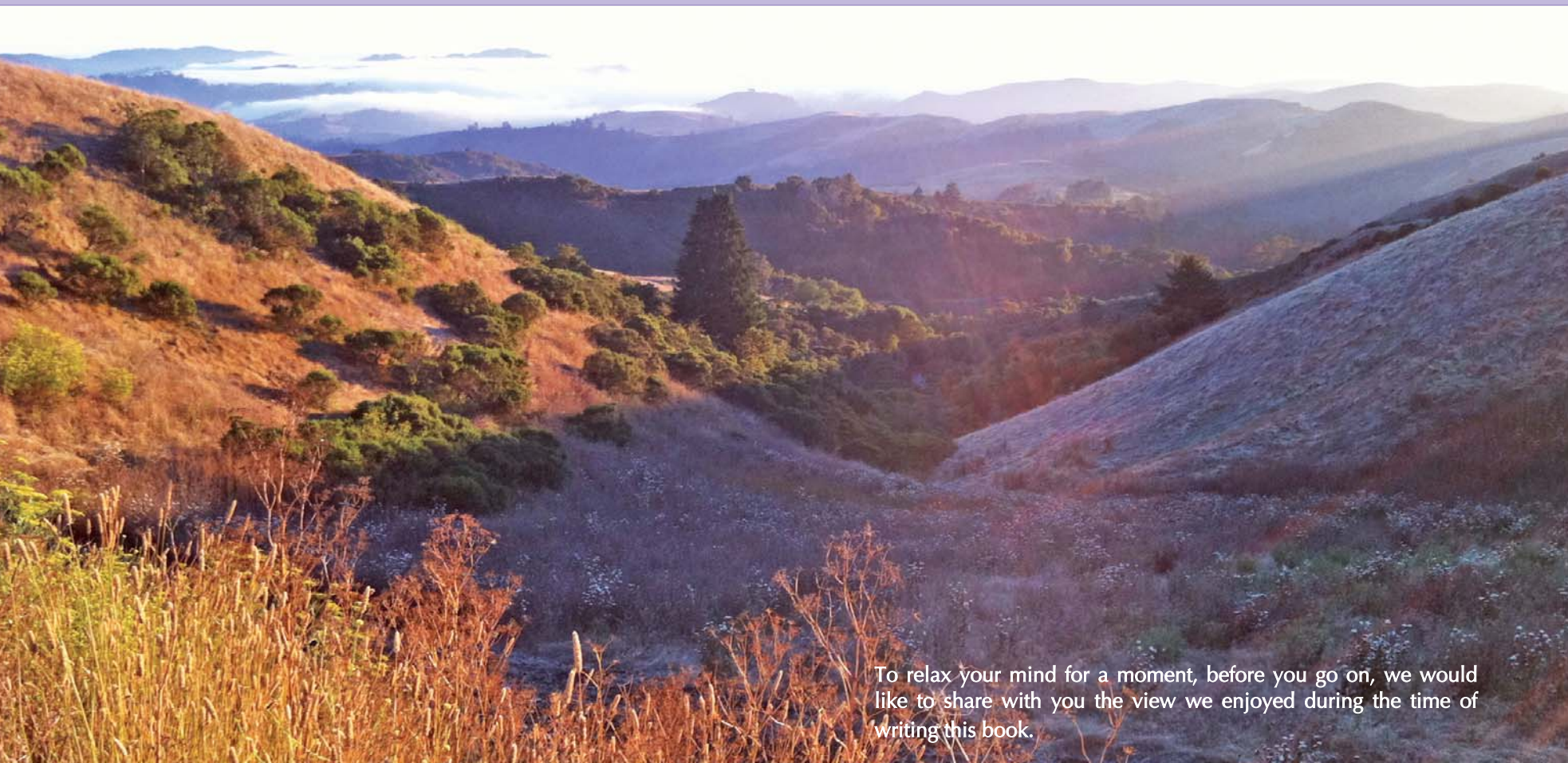
Read the complete studies results online at
<http://www.dmrathresearch.org/pub/voc/137>

As the authors of this book we undertook great efforts to present this complex but life-saving medical and scientific knowledge in a way that can be understood by everyone.

From the response of our readers we know that we accomplished that to a large degree.

We are, of course, also aware of the effort you and every new reader of this book have to undertake to work through this exciting, but new, information.

Great that you made it to this point! Now it's time for a little break.



To relax your mind for a moment, before you go on, we would like to share with you the view we enjoyed during the time of writing this book.

Micronutrients in Blocking Tumour Growth

Up to now we presented the results of our research in connection with invasion and metastasis, the most important mechanisms of cancer disease.

In the course of our decade-long research we, of course, also wanted to know whether micronutrients are able to affect – or even block – other important mechanisms of cancer development. Thus, another important mechanism we looked at was tumour growth, i.e., the uncontrolled multiplication of cells making up a tumour.

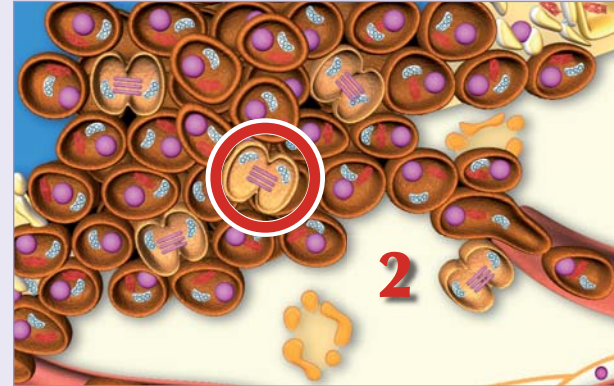
Growth of normal cells is strictly regulated. Some cells in our body grow and reproduce frequently, i.e., blood cells (erythrocytes, leukocytes), the cells lining our intestines and skin cells. Most cells multiply less frequently and a few cell types reproduce rarely, like bone cells or nerve cells.

In contrast, cancer cells have lost the ability to regulate their own growth and they constantly multiply. Moreover, by definition, cancer cells have become immortal and never die. Both mechanisms together have deleterious consequences for the organ where cancer develops. Sooner or later the tumour is taking over major parts or the entire organ.

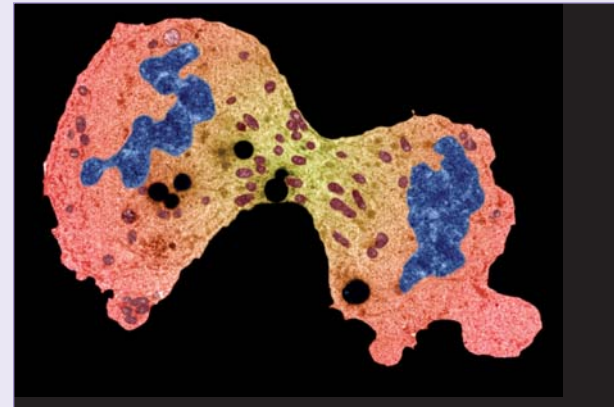
The microscopic picture at the bottom of the facing page shows a dividing cancer cell from an aggressive bone cancer (Ewing Sarcoma). The two cell cores (nuclei), shown here as blue structures, have already completely separated. The remaining cell bodies will follow soon.

Cancer Cells Constantly Divide to Form a Tumour

Picture of multiplying tumour cell (schematic)



Dividing Bone Cancer Cell (Ewing Sarcoma)
– Electron Microscopy Picture –



Scientific Proof: Micronutrients Block Tumour Growth

To test the effect of micronutrients on the multiplication of tumour cells, we set up the following experiment:

We injected equal numbers of bone cancer cells (osteosarcoma) into two groups of mice. One group did not receive any dietary micronutrient supplementation after the cancer cells were applied, the other group did receive a micronutrient supplemented diet.

As documented on the facing page, the results were amazing. **Picture A** shows a huge tumour that had developed in an animal that did not receive micronutrient supplementation. In contrast, **picture B** shows a tumour from an animal receiving high amounts of micronutrients in the diet. The difference is clearly visible.

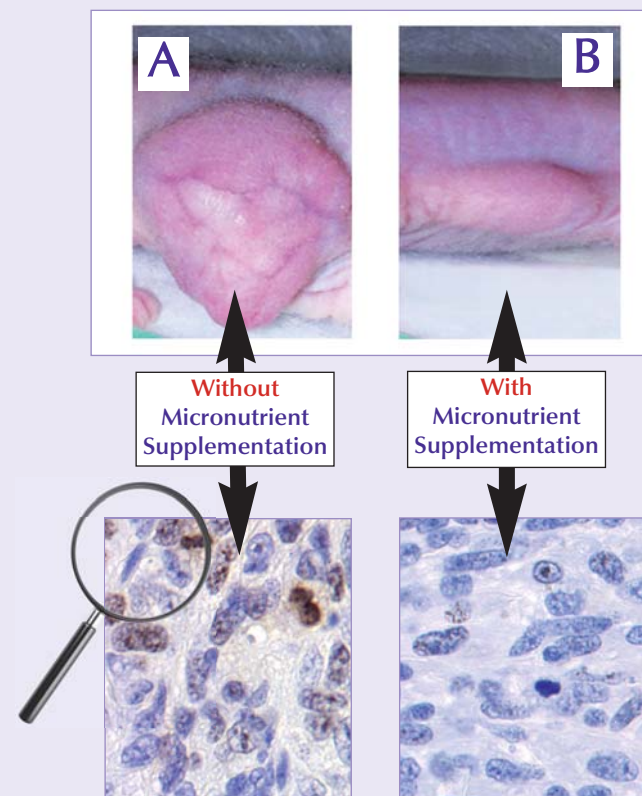
These results were confirmed when the tumours were analysed under the microscope. The bottom part of the facing page shows tissue cross sections of the tumours under high magnification. The individual tumour cells in both pictures are visible. However, the picture on the left side – without micronutrient supplementation – shows many more dividing cells (brown colour) than the picture on the right side – with micronutrient supplementation.

The growth of all types of human tumours investigated by us could be inhibited by micronutrients to a varying degree:

Breast Cancer	78%	Osteosarcoma	53%
Pancreatic Cancer	64%	Prostate Cancer	47%
Colon Cancer	63%	Lung Cancer	44%
Fibrosarcoma	59%	Synovial Cancer	44%
Melanoma	57%	Liver Cancer	36%

Micronutrients Block Tumour Growth

Bone Cancer (Osteosarcoma) Growing in Mice



Microscopy pictures of the tumours from A and B. The brown colour indicates cancer cells that are multiplying at this moment. Note the high number of cancer cell divisions in A – without dietary micronutrients.

Micronutrients are able to inhibit the multiplication of cancer cells.

Read the complete studies results online at <http://www.drrathresearch.org/pub/voc/143>

Micronutrients and the Formation of New Blood Vessels in Tumours (Angiogenesis)

Another key mechanism of cancer development is the formation of new blood vessels that feed the tumour. Every tumour needs a continuous supply of nutrients in order to grow and expand. Tumours as small as 1 mm (1/25th of an inch) in size cannot grow without generating new blood vessels to provide their own blood supply.

To induce the formation of these new blood vessels, called angiogenesis, cancer cells produce various signal molecules that are being sent out to the nearby blood vessels in order for these vessels or capillaries to sprout. Under the effect of these signal molecules the endothelial cells, i.e., the cells that form the lining of blood vessels, separate from the 'mother vessel' and migrate towards the tumour. The pictures on the adjacent page illustrate this important process.

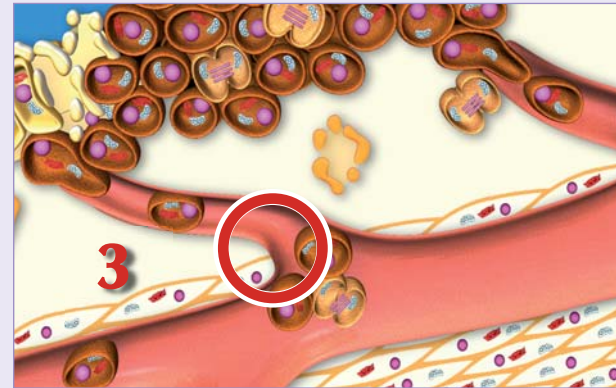
On the upper picture, the new blood vessel that has formed from the original one – and is now supplying blood to the tumour – is circled. In the bottom picture a microscopic image is shown that illustrates the formation of a whole branching system of blood vessels reaching deep inside a tumour (black area). The unique form of these structures, which resemble the roots of plants, is clearly visible.

The growth of new blood vessels through a tissue requires the restructuring of this entire area. Any restructuring in the human body, in turn, requires the breaking down of collagen and other connective tissue molecules with the help of collagen-digesting enzymes.

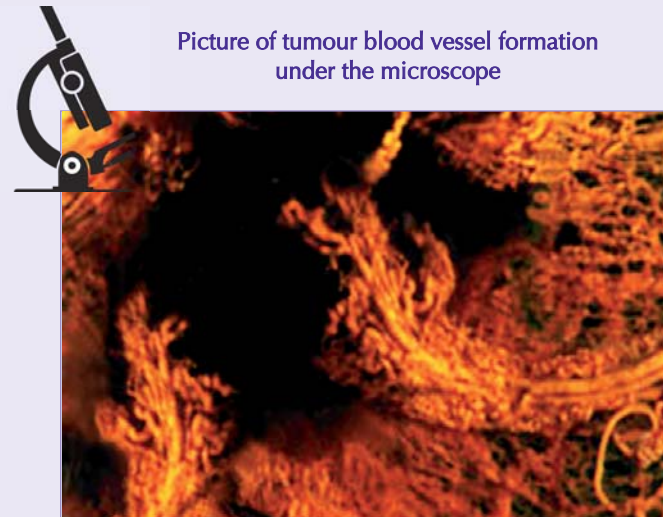
Based on a detailed understanding of these mechanisms, we were confident that micronutrients would also be able to block angiogenesis, as another key mechanism of cancer.

Formation of New Blood Vessels That Feed the Tumour

Picture of tumour blood vessel formation (schematic)



Picture of tumour blood vessel formation under the microscope



Scientific Proof: **Micronutrients Inhibit the Formation of New Blood Vessels in Tumours**

To test the effectiveness of micronutrients in inhibiting the formation of new blood vessels during cancer growth, we used the same experimental model as described in the previous 4 pages.

As mentioned before, the two groups of animals received equal numbers of bone cancer (osteosarcoma) cells. From the previous experiment we already know that animals receiving micronutrient supplementation had significantly smaller tumours.

In this set of experiments we were particularly interested in whether the micronutrient supplementation would also be able to decrease the formation of new tumour blood vessels. By looking at the tumour from the outside (facing page A) the network of blood vessels can be clearly seen in the tumour formed in mice deprived of micronutrient supplementation.

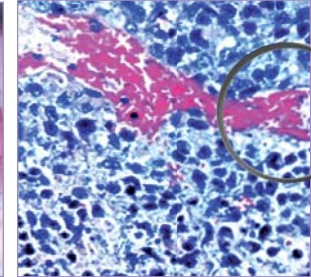
The microscopic pictures (to the right of the facing page) confirmed this observation. The cross-section view of the tumours of animals not receiving micronutrient supplementation show that the tumour had developed a large number of new blood vessels (red structures).

In contrast, the microscopic cross-section of the tumours of animals that received high amounts of micronutrients in the diet showed little or no formation of new blood vessels.

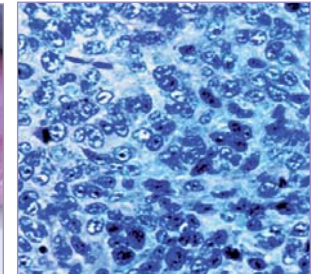
Moreover, we also determined an important reason why micronutrients had this dramatic effect: Many signal factors produced by tumour cells to stimulate blood vessel growth were significantly decreased in animals receiving a micronutrient supplemented diet. These factors include the vascular endothelial growth factor (VEGF) and others.

Scientific Proof: **Micronutrients Inhibit Angiogenesis**

No
Micronutrients
in Diet



With
Micronutrients
in Diet



Micronutrients help to decrease tumour growth also by inhibiting the formation of new blood vessels that feed tumours.

Read the complete studies results online at
<http://www.drrathresearch.org/pub/voc/147>

Scientific Proof: Micronutrients Inhibit Angiogenesis in a Human Model

Considering the fact that the inhibition of angiogenesis is a central mechanism for controlling cancer, many drug companies are currently spending hundreds of millions of dollars to find new, synthetic inhibitors of angiogenesis which they can then patent and market as anti-cancer drugs. The global market of angiogenesis inhibitors is estimated to reach tens of billions of dollars.

Considering that fact, our research results based on micronutrients – which are after all natural substances – are of utmost significance for millions of patients and for the health care systems worldwide. In light of this fact, we undertook a further step to verify the role of micronutrients in controlling this important therapeutic mechanism.

We chose a system that would eliminate all potential variables when studying the effects of micronutrients on the formation of blood vessels. We used blood vessel lining cells (endothelial cells) derived from human umbilical cords.

These cells were cultured and exposed to increasing amounts of micronutrients.

As shown in the pictures on the facing page, the endothelial cells without micronutrients produced a dense network of capillary 'pipes' (Picture A) which are seen as dark lines.

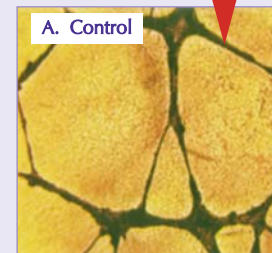
With increasing amounts of micronutrients, the human endothelial cells produced less of these capillary structures (B to D). At the highest micronutrient concentration (D), the formation of capillaries was completely blocked.

This study is irrefutable scientific proof that micronutrients are powerful anti-angiogenic agents that can be immediately applied to help control cancer.

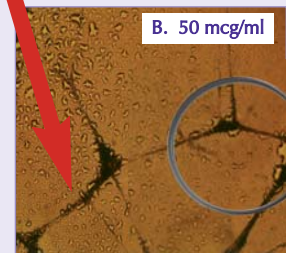
Micronutrients Inhibit the Formation of Blood Vessels by Human Endothelial Cells



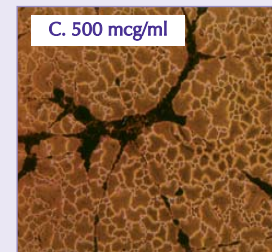
This is a model of a small blood vessel (capillary). Its formation can be studied in a model using human cells. The dark tubes below correspond to such capillaries.



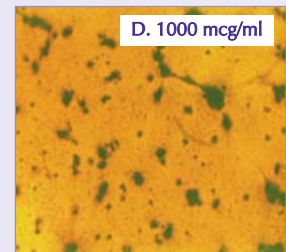
A. Control



B. 50 mcg/ml



C. 500 mcg/ml



D. 1000 mcg/ml

The pictures B to D show human blood vessel lining cells (endothelial cells) exposed to increasing amounts of micronutrients. At the highest micronutrient concentration (D) no blood vessel structures are formed.

Micronutrients can inhibit the formation of capillary blood vessel structures by human endothelial cells, a relevant mechanism for inhibiting tumour growth.

Read the complete studies results online at
<http://www.drrathresearch.org/pub/voc/149>

Micronutrients and the Induction of Natural Death of Cancer Cells (Apoptosis)

A hallmark of every cancer is immortality, which means its ability to live forever. This malfunction of a normal cell cycle originates from an error in the software program, the DNA, in the core (nucleus) of cancer cells.

To turn this 'biological switch' back and cause the natural death of cancer cells is a pre-condition to reverse and eliminate cancers. This mechanism that causes the natural suicide of cancer cells is called 'apoptosis' and is defined as the natural death of cells. It derives from the Greek word for 'dropping off', e.g., like falling leaves.

As opposed to apoptosis the premature – unnatural – death of cells and living tissue is called 'necrosis', deriving from the Greek word 'making dead', i.e., killing. It is caused by injury from factors outside the cell or tissue such as highly toxic chemotherapy agents, high-energy radiation and other harmful agents.

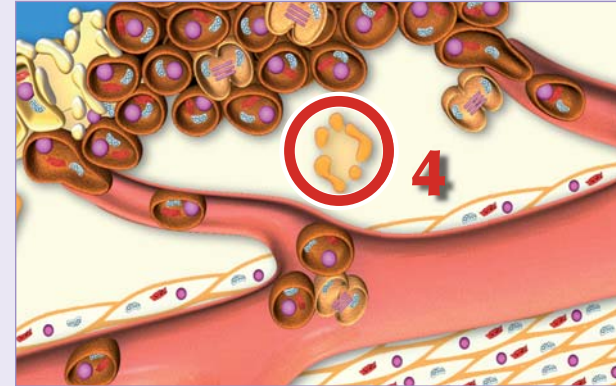
In the human body each day, between 50 and 70 billion normal cells die through apoptosis. Cancer cells are the exception.

We tested whether micronutrients can induce this natural death in cancer cells and thereby reverse their immortality. We studied this process in great detail, identifying genetic and cellular mechanisms involved. The bottom of the facing page shows a cancer cell that is undergoing natural death from apoptosis. Characteristic are the rough surface ('buds') which contain fragments of the cell breakdown.

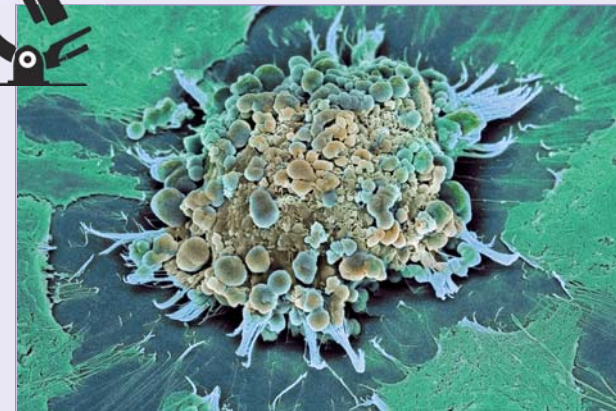
On the following pages we show examples of our research with micronutrients inducing apoptosis in cancer.

Natural Death of Cancer Cells

Schematic picture of cancer cells that had turned mortal again and had subsequently died



Cancer cell committing 'suicide' by apoptosis (microscopic picture)



Scientific Proof: Micronutrients Can Induce the Natural Death of Cancer Cells

An important step in studying the process of apoptosis of cancer cells is to visualise the cellular steps involved for evaluation under the microscope.

Towards this end, certain markers within the cell or the cell core (nucleus) were defined that allowed us to distinguish those cells undergoing apoptosis from other living cells.

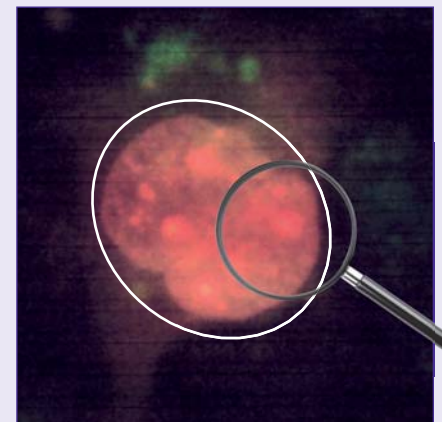
The facing page shows a single melanoma cancer cell undergoing apoptosis, a process that was induced by exposing these melanoma cells to micronutrients. Details of this experiment are described on the following pages.

In the facing picture, the cell nucleus is outlined by a white circle. The red colour inside this circle marks the active process of core breakdown. The darker reddish spots within this red area (under magnifying glass) represent DNA and related core components packed in small, dense bundles.

Apoptosis starts with the activation of special enzymes – inside the cell – which cause gradual disintegration of all cellular components, including the nucleus.

At a later stage, the cell develops buds on the surface (see previous page). Finally, the cell shrinks and becomes fragmented into small units that are then disposed of by white blood cells (phagocytes), which specialise in biological ‘waste removal’.

Micronutrients Can Induce Apoptosis of a Melanoma Cancer Cell



Skin cancer cell (melanoma) in the process of committing suicide (apoptosis).

Micronutrients can induce cellular processes that lead to the natural death of cancer cells.

Read the complete studies results online at
<http://www.drrathresearch.org/pub/voc/153>

Scientific Proof: The Effectiveness of Micronutrients in Inducing Apoptosis

On this page we document the results of the investigation of whether micronutrients are able to reverse already existing tumours or make them completely disappear.

This is an important question in light of the fact that conventional medicine has been largely unable to accomplish this goal. Chemotherapy, by intoxicating cells, may lead to an intermediate remission of cancers, generally followed by its re-occurrence due to the fact that chemotherapy drugs not only attack cancer cells but also all healthy cells, including the cells of the immune system required to fight cancer.

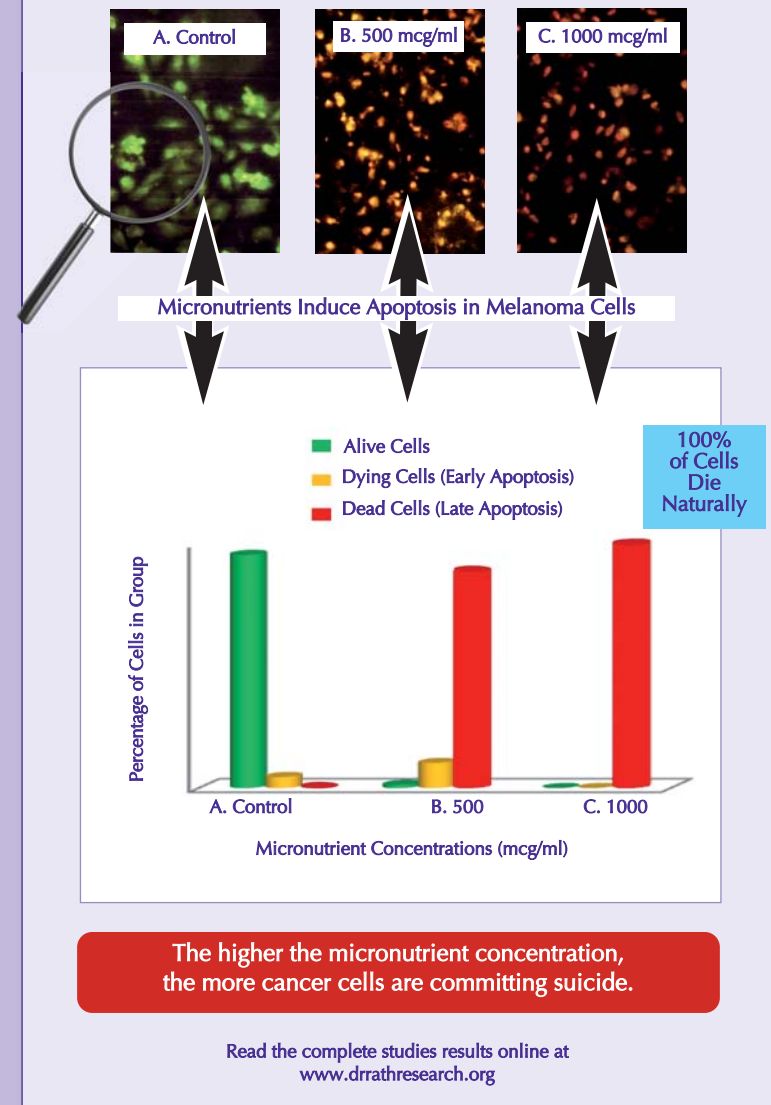
In this series of experiments, we exposed skin cancer (melanoma) cells to increasing concentrations of micronutrients.

As markers of these cells we used the same system described on the previous pages: green represents cells that are alive, yellow identifies cells at the stage of early apoptosis (beginning cancer cell suicide) and red means late apoptosis, when the cancer cells are essentially dead.

We evaluated the cancer cells exposed to the different concentrations of micronutrients under the microscope (upper half of the facing page) and quantified the percentages of respective cell colours (bottom half of the page).

The results show that the higher the concentration of micronutrients, the more cancer cells undergo natural death. At the highest concentration (group C), all cancer cells were found in an advanced stage of apoptosis – i.e., they were dying. **Thus, micronutrients are a safe way to not only halt the further development of cancer but also to reverse already existing tumours.**

Micronutrients Trigger Natural Death of Human Melanoma Cells



Victory Over Lung Cancer

My name is Werner Pilniok.

In September 1999, during a routine x-ray exam, I was diagnosed with a rapidly growing lung tumour. According to the doctor, a pulmonologist, the size of this lung tumour was 1.5 x 1cm [0.6 x 0.4 inches]. I had to undergo a series of additional tests after which the doctors recommended surgery and the removal of the entire section of the lung where the tumour had been located.

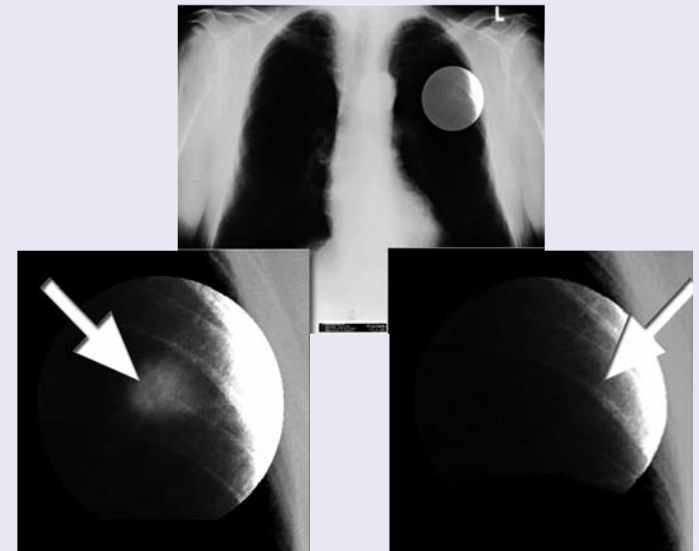
Because I was also suffering from heart disease any operation would have been a great risk for me, so I started to look for alternatives. I read about research conducted by Dr. Rath, who was studying the role of micronutrients in fighting cancer naturally.

I decided to cancel the scheduled surgery and give micronutrients a chance. From October 1999 onwards I was supplementing my diet with high amounts of micronutrients. On April 3, 2000, a control CT-Test was undertaken. The result: the tumour that had been diagnosed half a year earlier was gone – the doctor could not believe it! He told me to wait until another X-ray machine became available because he apparently thought that this X-ray machine was broken. The repeated control scan showed the same result: no more tumour.

This was more than a decade ago. In 2011 I celebrated my 80th birthday in good health. Thanks to the micronutrients I take, I hope to live many more years.

Werner Pilniok

Meet Werner Pilniok



A-1: September 1999, CT scan of Mr. Pilniok's lungs show the presence of a tumour in the highlighted area.

A-2: Magnification of the highlighted area of picture A-1.

B: April 2000, control CT scan of Mr. Pilniok's lungs. This picture shows the same area as in A-2. The tumour can no longer be detected.

The fact that no tumour could be detected anymore means that it had disappeared by natural means – without surgery, radiation or chemotherapy.

Have you realised ...

that by working through this book chapter you have entered the world of modern medicine and health? This new world of health is characterised by 'knowledge for all' – and by taking responsibility for your own health.

Before you take on the next pages of this book, we invite you to take a glimpse at our Research Institute in California where everyone is committed to make 'health for all' a reality.



Dr. Rath
Research
Institute

View of One
of Our
Laboratories



Dr. Niedzwiecki,
Directing Research
at Our Institute
For Over a Decade

Dr. Waheed Roomi,
Head of Our
Cancer Research,
Evaluating a Cancer
Experiment



Key Researchers
Discussing Scientific
Projects at a
Laboratory Bench



Increased Effectiveness by a 'Team Effort' of Micronutrients (Nutrient Synergy)

Some of our readers, including health professionals, may be surprised about the comprehensive benefits of micronutrients in blocking cancer and even reversing important cellular mechanisms that have gone awry.

The scientific reason behind these amazing results is straightforward: we mimicked nature! By not relying on individual micronutrients but taking advantage of the positive and mutually reinforcing interaction of individual micronutrients, we were able to unleash the full potential of Nature in activating the self-healing ability of the body.

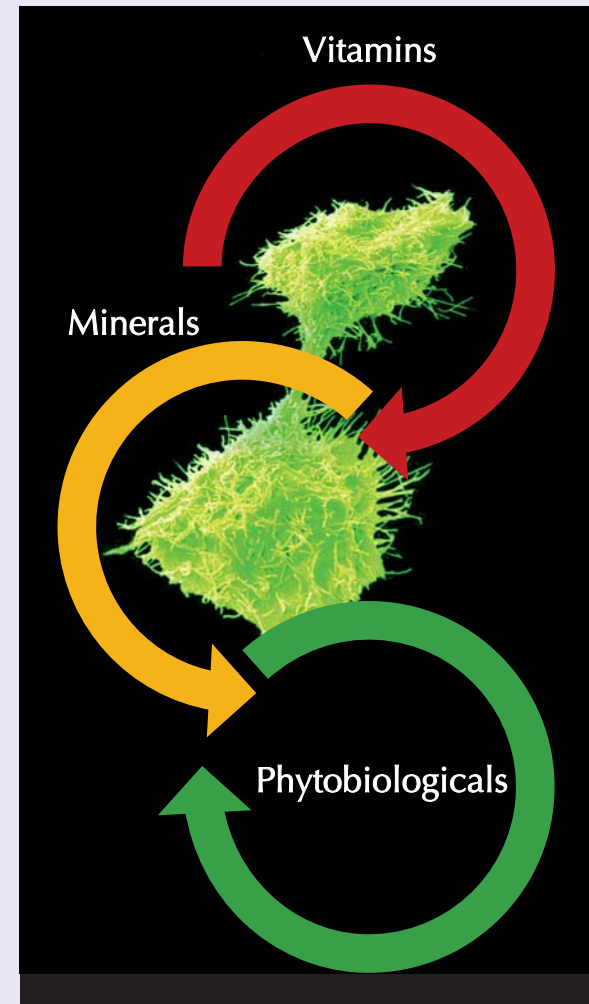
Over past decades, many researchers have looked at the possibility to control cancer with micronutrients. Unfortunately, most of them used individual vitamins and other natural compounds trying to accomplish this goal. One of the reasons for this narrow approach was the regulatory climate.

Regulatory agencies around the world were prohibiting the registration of combinations of micronutrients for preventive and therapeutic purposes. This was the result of false conclusions.

The regulatory bodies were simply imposing the experiences from pharmaceutical drug interactions to biological substances. Obviously, the serious and often deadly interactions of pharmaceutical drugs are a major health concern. Not so, of course, for biological substances that work together in billions of biochemical interactions in our body every second.

At our Research Institute we have pioneered the new direction of micronutrient synergy. On the next pages we will document the superiority of micronutrient synergy compared to individual components.

Micronutrient Synergy – the Basis of Modern Health Care



Scientific Proof: Nutrient Synergy Has Advantages over Individual Micronutrients in Inhibiting the Invasive Potential of Cancer

To study the advantage of a combination of micronutrients and individual natural compounds in the fight against cancer, we decided on the following set of scientific experiments:

Human cancer cells from connective tissue producing cells (fibrosarcoma) were exposed to two different environments:

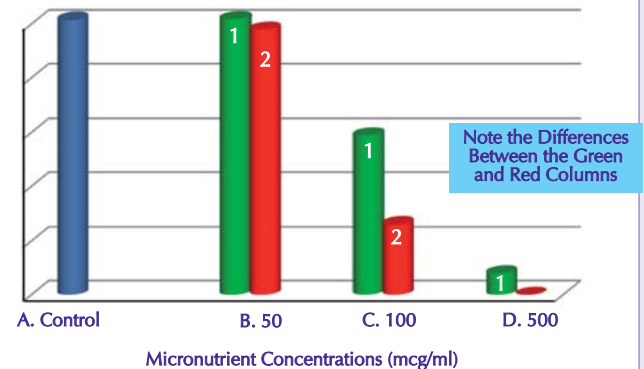
1. Cell culture solution supplemented with Green Tea Extracts (GTE), rich in bio-active compounds called polyphenols. This compound is represented in the adjacent graphs in green colour.
2. Cell culture solution supplemented with the same GTE solution as in 1) but – in addition – a composition of micronutrients containing certain vitamins, minerals and amino acids. For details of this composition we refer you to the pages on nutrient synergy (NS) at the beginning of this chapter. On the facing page it is represented in red colour.

The results of these experiments showed that increasing amounts of green tea extract as well as the nutrient combination were able to gradually inhibit the production of collagen-digesting enzymes by cancer cells. It is noteworthy, however, that the green tea extract – when combined with other micronutrients – was much more effective in inhibiting the invasive potential of cancer cells than if used alone.

These results were not limited to fibrosarcoma cells. We documented the same advantage of nutrients in human liver cancer cells, brain cancer cells (Glioblastoma) and other cancer types.

Advantage of Nutrient Synergy in Inhibiting the Invasive Potential of Cancer Cells (Fibrosarcoma)

Inhibitory Effect of Green Tea Extract Alone and in Combination with Other Micronutrients on the Secretion of Collagen-Digesting Enzymes (MMP-9) by Human Cancer Cells



Tested Compositions:

1. Green Tea Extract (GTE)

2. Nutrient Synergy (NS)

1. Green Tea Extract (GTE)
rich in polyphenols

2. Nutrient Synergy (NS)
Composition:

- Amino Acids
- Minerals
- Vitamins
- Green Tea Extract

* for details see beginning of this chapter

A synergy of micronutrients, mimicking the situation in biological systems, is more effective in inhibiting cancer than individual components alone.

Read the complete studies results online at
<http://www.drrathresearch.org/pub/voc/163>

Scientific Proof: Nutrient Synergy Has Advantages Over Individual Micronutrients in Inhibiting Breast Cancer Growth

After we had confirmed the increased effectiveness of micronutrient synergy over individual micronutrients using cancer cells, we wanted to answer the important question of whether this finding also applies to a living system.

Our assumption was that this should be the case – after all, the biochemical functions of the body are not dependent on one single micronutrient alone, but rather than on the availability and ‘orchestrated’ interaction of many micronutrients.

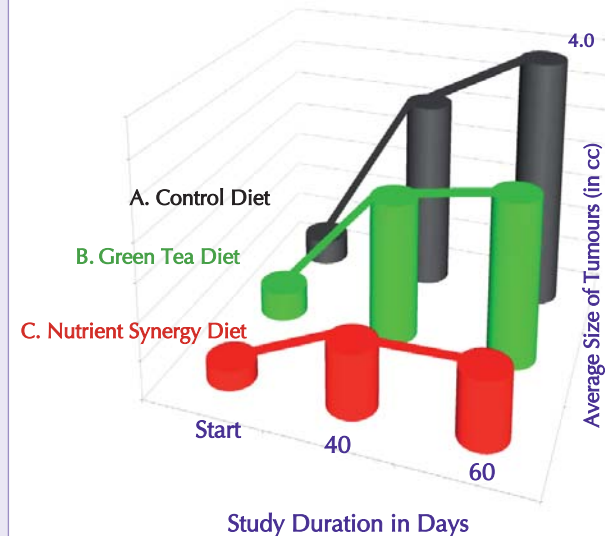
We designed a study where we induced breast cancer in three groups of animals (in this case rats) and allowed the tumours to develop for a period of 18 weeks. With this study design, we wanted to mimic the situation in patients in whom cancer had already developed.

Before receiving any micronutrient supplementation, the sizes of the tumours in the three groups were measured. The results are represented as ‘Start’ on the graph of the facing page. While Group **A** continued without micronutrient supplementation and served as a control, the diet of group **B** was supplemented with green tea extract and the diet of group **C** with green tea extract plus additional micronutrients (nutrient synergy, see previous page).

The results of this *in vivo* study are shown on the facing page. Dietary supplementation was shown to dramatically reduce the size of the breast tumours. It was noteworthy, however, that animals receiving the micronutrient synergy diet had the greatest benefit: between 40 and 60 days of the study duration, the tumour growth was essentially brought to a complete standstill.

Nutrient Synergy is More Effective Than Green Tea Alone in Inhibiting Growth of Breast Tumours

Inhibitory Effect of Green Tea Extract Alone and in Combination with Other Micronutrients on the Growth of Breast Tumours *in vivo*



In living conditions too, the synergy of micronutrients is more effective in inhibiting tumour growth than individual micronutrient components alone.

Read the complete studies results online at
www.drathresearch.org

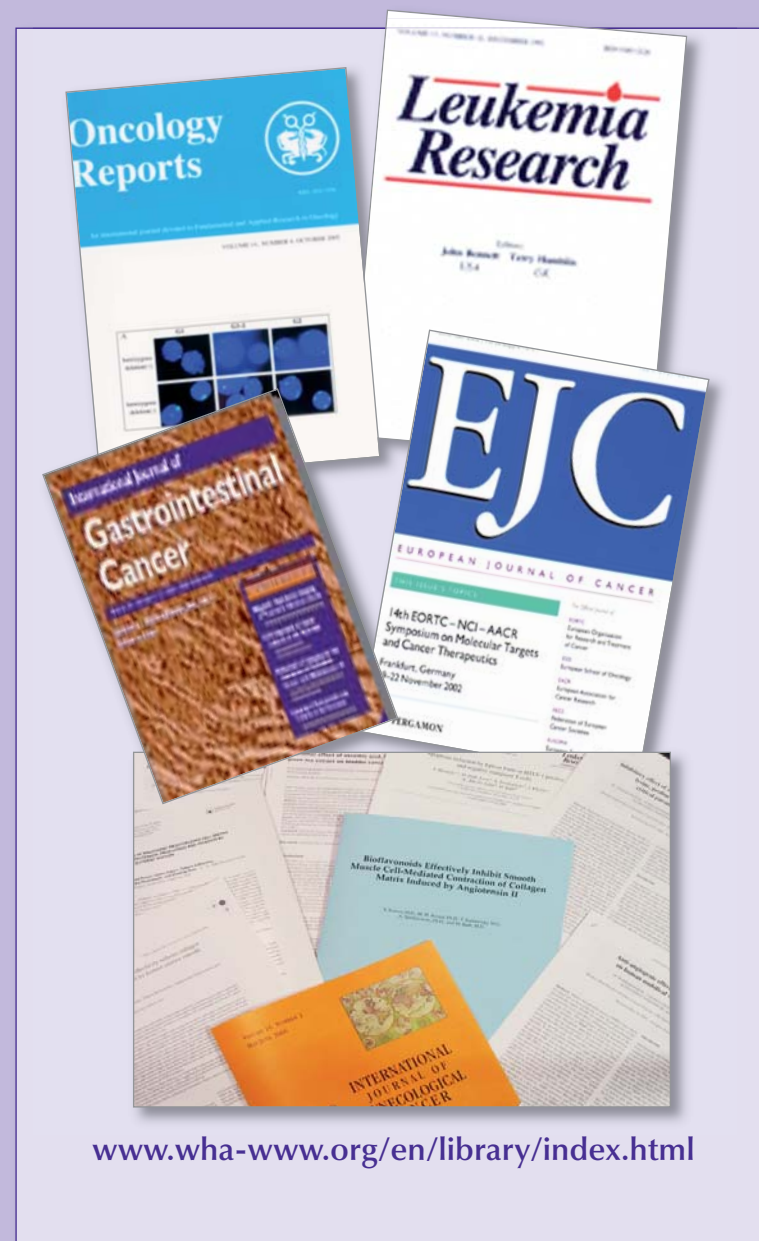
Research You Can Trust!

When you hear media reports about 'breakthroughs' in the fight against cancer, be careful. Pharmaceutical companies are experts in creating media hype to increase the sales of their patented drugs and boost share value of their business.

Our research institute is independent from the influence of the pharmaceutical investment business and from any other private financial interests. For more than a decade now, our research has been exclusively financed by people whom we have helped with the results of our scientific research and the health knowledge we shared.

Moreover, our Research Institute and the entire group of Dr. Rath companies are 100% owned by non-profit foundations. Thus, there is no profit motive involved in our presenting you with this information. The only interest we represent is your health. What a better way to earn your trust.

Over the years, our Institute has become one of the world's leading research institutions in natural health. The research results have been published in leading scientific journals and presented at international scientific conferences. All results are also presented on our Institute's website:



www.wha-www.org/en/library/index.html

What is Your Summary of This Chapter

When writing this chapter, we had important goals in mind about the changes this information would make in the understanding of cancer by our readers. On this page you can check whether these goals were accomplished.

Do you know now that:	Yes	No
All types of cancer use the same mechanism to spread through the body?	<input type="checkbox"/>	<input type="checkbox"/>
Micronutrients can control all key mechanisms of cancer?	<input type="checkbox"/>	<input type="checkbox"/>
Micronutrients working in teams (synergy) are more effective than acting alone?	<input type="checkbox"/>	<input type="checkbox"/>
Micronutrients represent an option to fight cancer effectively and safely, without side effects?	<input type="checkbox"/>	<input type="checkbox"/>
Micronutrients work through regulation of cell function – as opposed to chemotherapy that works by intoxication of cells?	<input type="checkbox"/>	<input type="checkbox"/>
Based on this modern understanding of cancer origin and control, this disease can become largely unknown in our generation?	<input type="checkbox"/>	<input type="checkbox"/>

Compelling Perspectives for Global Health Care

From the scientific evidence provided in this chapter there are immediate consequences for patients, health professionals and political decision makers, in fact, for every reader.

With the following postulates we would like to inspire a public discussion – which is long overdue – that will lead to victory over cancer.

1. With the scientific basis for the natural control of cancer presented in this book, victory over cancer is dependent on one factor only: How fast will this information spread worldwide?
2. The implementation of the knowledge presented in this book will help to eliminate cancer as yet another disease that has been haunting mankind in epidemic proportions.
3. The economic savings from using this book as the basis for new public health strategies will save billions in health care costs and reduce the fateful dependency of patients and politicians alike from the strangulating grip of the multi-billion dollar pharmaceutical investment business thriving on the cancer epidemic.

Do you realise ...

that by reading this book, you are obtaining information that is currently not being taught at medical schools anywhere in the world?

On the facing page you see just three of the world's leading medical institutions: Harvard Medical School, Sloan Kettering Center, and Stanford University.

To this day, generations of future doctors are being trained there without the basic understanding that the aggressiveness of cancer disease derives from the abuse of natural mechanisms in the body – such as ovulation and leukocyte migration – by cancer cells.

Generations of future doctors at medical schools around the world don't learn that this abuse of normal cellular mechanisms is the reason why cancer can so easily escape the body's defences – and why cancer is such an aggressive disease.

With the publication of this book, this life-saving information is made available to health professionals. More importantly, the straightforwardness of the message of this book will allow millions of people without any specific training in medicine to understand that the victory over cancer is now in their hands.

Imagine!



Harvard
Medical School,
Cambridge, MA

Sloan Kettering Center,
New York



Stanford University
Palo Alto

