

Incurable HIV or Aids virus is destroyed by humic extracts, epidemic now has over 33 million people infected

According to the Joint United Nations Program on HIV/AIDS, the epidemic currently infects over 33.4 million people worldwide. An estimated 14 million people have died since the epidemic began.

An extensive number of studies show that Humic extracts, specifically Fulvic acids, effectively and safely kill the HIV/Aids virus. In fact, one pharmaceutical company has patented a humic based drug that purifies blood for transfusions, killing the HIV virus without damaging blood cells.

Humic extracts are the most effective natural treatment against viruses of all kinds. Comprehensive studies show that humic extracts are effective against common cold and flu viruses, including respiratory tract viruses, retroviruses, influenza viruses, herpes simplex viruses, just to name a few.

Medicinal value of the Humic extract known as Fulvic acid is astounding and very well-documented

Many reports on the beneficial use of humic substances, especially fulvic acid, for human health and medicine have been published. These include reports documented in the Chinese Materia Medica pharmacological compendium, dating back to the 15th century Ming Dynasty. During that period, a very famous medical doctor, Li Shi Zhen, used "Wujinsan", meaning "golden medicine", containing humic and fulvic acids as the active ingredient in the treatment of infectious ulcerous growth and female hemorrhage diseases. These studies showed humic and fulvic acids to be efficient anti-inflammatory and blood coagulating agents.

Hospital eye clinic patients with ulcerous cornea infection had 94.2% success rate when treated with fulvic acid eye drops and injections.

Yuan, Shenyuan; Fulvic Acid, 4 1988; in *Application of Fulvic acid and its derivatives in the fields of agriculture and medicine*; First Edition: June 1993

In China, prior to 1978, humic and fulvic acids had been used in hospitals and among the general population for the treating of a wide range of diseases with success. Up to that point there was very little research conducted on the pharmacology of its therapeutic mechanism. Because of lack of clinical data, doubt and misconceptions remained as to therapeutic use.

Hospital patients treated for chronic ulcerous colon infections had 92.6% success rate when treated with fulvic acid enema.

Yuan, Shenyuan; Fulvic Acid, 4 1988; in *Application of Fulvic acid and its derivatives in the fields of agriculture and medicine*; First Edition: June 1993

Since that time, many medical schools and hospitals in China have engaged in extensive studies on the toxicology and pathological aspects of humic and fulvic acids and their clinical applications. Hundreds of research papers have now been published nationally in China, and some have appeared in international journals and have been presented at various meetings outside of China.

Hospital patients with acute upper gastroenterological bleeding had 95.6% success rate when treated with fulvic acid oral medicine and injections.

Yuan, Shenyuan; Fulvic Acid, 4 1988; in *Application of Fulvic acid and its derivatives in the fields of agriculture and medicine*; First Edition: June 1993

Pharmaceutical companies in Da Tong, Shanxi, in Gongxian, Henan and in Kunming, Yunnan are manufacturing humic acid medicines which are approved by the Chinese Drug Administration. Because of their non-toxicity, the humic extract fulvic acid is approved for internal as well as external use.

Clinical medical studies using humic and fulvic acids were performed on thousands of hemorrhoid patients, which were so successful that the Chinese government had a special pharmaceutical preparation developed for treatment of this condition.

Yuan, Shenyuan; Fulvic Acid, 4 1988; in *Application of Fulvic acid and its derivatives in the fields of agriculture and medicine*; First Edition: June 1993

Chinese doctors now use fulvic related medicines to reduce inflammation, increase circulation and control bleeding, to regulate the immune system and hormone systems, to heal digestive tract disorders, and as an anti-cancer and anti-tumor therapy.

German companies have a number of humic and fulvic based products. These include the following healing bath additives: Moorbad Saar N, Humopin N, Leukona Sulfomoor-Bad N, Salhumin Rheuma-Bad, Salhumin Sitbad N, Salhumin Teilbad N, Contrheuma-Bad L, mostly for the relief of rheumatism and arthritis. Huminit is used internally for the treatment of stomach hyperacidity and other gastric disturbances, gastric ulcers and gastroenteritis in humans. Veterinary medicines include, Kalumin, Sulumin, Salhumin and Kalumat for the therapy and prevention of diarrhea and enteritis.

Studies of patients with gastric and duodenal ulcers showed that 91.1% had condition improve when treated with fulvic acid. Treatment showed no side effects, substantially diminished pain, with few relapses, with 61.1% of patients being completely cured.

Xinsheng Zhu, Fulvic Acid, 9 (1991)

Studies show that humic, and especially fulvic acids do occur naturally in the human diet. Waters from streams and rivers running through forested land contain dissolved humic and fulvic acids. Humic and fulvic acids occur in living plants grown in organic humus containing soils, and humic and fulvic acids have been isolated from live plants. Humic and fulvic acids have been found in the gastrointestinal tract of humans and animals and are absorbed. They circulate with the blood and are metabolized in the liver.

In 1988, Dr. S. A. Visser reviewed the medicinal value of humic substances in an article entitled: "Effects of humic substances on higher animals and man; the possible use of humic compounds in medical treatments", which was presented at the International Humic Substance Society meeting in Sevilla, Spain. His findings showed that the medicinal applications of humic and fulvic acids can be external as well as internal.

Hospital studies in China show that elderly patients, ages 60-90, when treated with fulvic acid, regained appetite, slept better, and became more energetic. Other hospital studies

coming from India show that fulvic acids are considered to be a powerful anti-aging therapy that also able to help with symptoms of dementia.

Erchuan Wang et al, Humic acid, 3 (1991)

Dr. Visser stated that external applications of humic and fulvic acids are based on their use as antiphlogistic (antiinflammatory), analgesic (pain relieving), hyperemic (blood flow increasing), anti-rheumatic, anti-microbial, anti-fungal, antiviral and anti-cancer agents. Humic and fulvic acids have also been used externally in the treatment of hematoma (localized accumulation of blood), phlebitis (inflammation of veins), desmorrhexis (rupture of a ligament), and myogelosis (hardening of a muscle), as well as for the treatment of patients with contusions, distortions, cervical (neck) complaints, lumbago (pain in the lower back), ischias (pelvic pain in the hip joint), arthrosis (non-inflammatory arthritis), polyarthritits (arthritis of multiple joints), osteoarthritis (arthrosis deformans), and with osteochondrosis (ossification of cartilage).

With respect to internal use, humic and fulvic acids have been shown to be particularly useful in the prophylaxis (prevention), therapy and metaphylaxis (after-care) of a variety of stomach and intestinal troubles such as, hyper-acidity, diarrhea, gastric ulcers, dysentery, gastroenteritis and colitis. They can also act as a detoxifying agent, and have been used against bacterial and viral infections. They have been found to be useful in the treatment of anemia (deficiency of red blood cells, hemoglobin or total blood volume) and as a stimulator of the body's immune system and of detoxifying liver functions. By counteracting certain kinds of cancerous growth, humic acids may also have a potential as an anti-carcinogen.

Many of these effects can be attributed to the activity of humic and fulvic acids by themselves, and are the result of their surface activity, chelating properties, power of absorption, their polyacidic nature, their polyphenolic structure, their interaction with other organic molecules including polysaccharides, proteins, enzymes and lipids, as well as of their redox properties and free radical content. No unfavorable side effects have so far been noticed with the administration of humic or fulvic acids.

Dr. G. Davies summarized the effects of humic acids in the Nucleus, Feb. 1996, in a monograph titled "Properties and functions of humic acids." He stated that oral doses of humic acids reduce heavy metal absorption in animals and also decrease pesticide toxicity. Humic acids can be administered preventatively and therapeutically in animals, including pregnant animals, without apparent risk. Some humic acids control uterine cancer in rats and humic acids markedly reduce the mutagenic effect of benzopyrene, 3-aminoanthracene, 2-nitrofluorene and 1-nitropyrene. The anti-mutagenic effect depends upon the adsorption of these dangerous chemicals onto the humic acid surface. Since fulvic acid is humic acid, the bioactive component, all data applies to fulvic acid as well.

Recent research articles by Dr. Senesi and Dr. Miano clearly link humic and fulvic acid properties with human health.

Hospital patients with rheumatoid arthritis had 92% success rate when treated with humic extract baths.

Yuan, Shenyuan; Fulvic Acid, 4 1988; in *Application of Fulvic acid and its derivatives in the fields of agriculture and medicine*; First Edition: June 1993

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BIO-FULVIC ACID (BFA)

Introduction

Organic matter in the soil exists in 3 different forms or states: 1) Living plant and animal matter 2) Dead plant and animal matter 3) Decomposed plant and animal matter or humus. Humus can be further defined as: Humic - the portion of humus which is soluble and is called Humic Acids and Non Humic - the portion of humus which is insoluble and is called Humin.

The soluble Humic Acids have 3 major fractions:

- Humic Acid - (singular) is a long chain molecule which is high in molecular weight, dark brown and is soluble in an alkaline solution and insoluble in water, acids, ethanol and acetone.
- Ulmic Acid - Also called humatomelanin Acid which is brown and soluble in alkaline, ethanol and acetone
- Fulvic Acid - is a short chain molecule which has a low molecular weight, yellow in color and soluble in both acid, alkali and water.

Bio-Fulvic Acid (BFA) is made by fermentation from crop stalks and other organic by-products. BFA is a type of short-chain-molecule low-molecular-weight weak organic acid which is composed of fulvic acid, amino acids, ribonucleic acid, vitamin B, vitamin C, inositol, protein, trace elements, sugars and other active ingredients. In comparison with mineral fulvic acid, BFA has following characteristics:

- Better solubility in water
- More powerful chelating ability
- Lower molecular weight (400-800)
- More significant growth promotion to plants and animals
- Stronger hard water resistance, no flocculation occurs in 1.2° hard water within 24h

BFA specifications:

BFA technical grade is in two types powder form:

Index	Spec	
Appearance	Dark brown powder	
Assay	55.0% min.	50.0% min.
RNA	15.0% min.	13.0% min.
Amino acids	8.5% min.	8.0% min.
pH	5.5-8.5	5.5-8.5
Insoluble substances in water	7.0% max.	8.0% max.
Water	15.0% max.	18.0% max.

BFA technical grade is in liquid form:

Index	Spec	
Appearance	Brown suspension liquid	
Assay	3.0% min.	2.0% min.
RNA	0.7% min.	0.5% min.
Amino acids	0.4% min.	0.3% min.
pH	5.0-6.0	5.0-6.0
Ash	0.6% max.	0.8% max.

For referenece: MFA-Mineral Fulvic Acid

Index	Spec
Fulvic acid	8.0% min.
P2O5	2.0% min.
Insoluble matters in water	2.0% max.
pH	2.0 min.

Applications in Agriculture

BFA contains many active blocks like carboxy, hydroxy, quinonyl which are good chelating agents and are also involved in redox and metabolism process of plants. The benefits of BFA are:

- Reduce expansion ratio of plants; reduce evaporation on the leaves; stimulate root growth. It's an excellent anti-drought agent.
- Increase enzyme activity and chlorophyll; accelerate metabolism and photosynthesis; strengthen plants' irreversibility; increase output and quality. It's a new plant hormone and regulating agent.
- Modify soil in physical and chemical way; increase soil's ability to retain water and nutrients; It's a good soil modifier especially for low-yield, acid and alkali fields.
- Chelate with trace elements, increase efficacy of NPK and other farm chemicals. It's an ideal, safe and slow-release synergist.

BFA can be applied in following ways:

- Seed soaking: Concentration at 60-80 times, time varies with seeds and temperature
- Seed dressing: Concentration at 20-40 times, make seeds dressed evenly
- Root soaking: Concentration at 60-100 times for a few hours
- Foliar spraying: Concentration at 200-600 times for 3-5 times in florescence

BFA formulations:

- Cotton-Max: mainly used to prevent blight and wilt of cotton
- Rice-Plus: mainly used for rice in yield increase and disease control
- Wheat-Plus: mainly used for wheat in disease control and growth promotion
- Vege-Plus: mainly used for vegetables in yield increase and growth promotion

Applications in Animal Husbandry

Due to its biological activity, BFA has been clinically proved to stimulate immunology of animals, increase utilization of feedstuff and control infectious disease. The benefits of BFA for livestocks:

- Promote growth and increase utilization of feed

By adding 0.01-0.03% BFA into feed, BFA can promote growth of livestocks, increase weight daily and laying rate. The mechanism of BFA is assumed 1) RNA, amino acids, vitamins, inositol and

polysaccharides are nutrients and involved in metabolism of animals 2) Chemical composition of BFA makes macro-molecule nutrients decompose into micro-molecule nutrients which is easily absorbed by animals 3) The quinonyl in BFA is involved in redox process of animals and make metabolism vigorous 4) BFA has effect on nervous system which slows heart beat and activates movement of stomach thus increase utilization of feed.

- Control and treat viral infectious disease

Research is under way about the mechanism in this regard.

- Act as feed additive to increase quality of livestock

BFA formulations:

Feed-Plus: mainly used in feed and treatment of livestock diseases

Welcome to the world's leading Fulvic acid and Humic substance medical research center

Since 1996, Fulvica BioScience has continually searched the world over for valid human clinical medical studies relating to Humic substances, particularly Fulvic acid. We feel it is our most urgent responsibility to inform the public and the medical community alike about the important discoveries that we have unearthed that pertain to world health.

We have discovered that Humic and Fulvic acids are the missing link in the human food chain, the lack of which is having deadly consequences. World health now hangs in the fragile balance.

Medical and agricultural research continues to conclusively point to one fact: Fulvic acid holds the keys to prevention, healing, and elimination of the world's diseases.

- Fulvic acid is nature's perfect medicine. It is by far the world's most complex and diverse substance. Fulvic acid is actually a whole universe within a single molecule. A good analogy would be to compare the medical implications and complexities of Fulvic acid to all the sands of the seashore, where all of the world's man-made pharmaceutical drugs combined would not even rate as one single grain of sand.
- The DNA of every living or extinct species of organism on Earth, whether plant, animal, or microorganism, has eventually become a highly refined component of fulvic acid.
- The original life giving, protective, and healing components from plants (phytochemicals) do not disintegrate during nature's fulvic acid production process (humification), but become highly concentrated as components of fulvic acid. In a sense you might say these substances are somewhat immortal, they are recycled, reused, and impart vitality and even a certain amount of immortality to subsequent generations of living things.
- Fulvic acid exhibits remarkably similar beneficial characteristics to the bioactive substances it originated from, yet the biological effect on other organisms is often significantly magnified and enhanced beyond that of the source material.
- Many species of plants, particularly microscopic plants, are involved in the fulvic acid production process, known as humification.

- Fulvic acid production is, in essence, nature's perfect recycling process, where the end product, fulvic acid, provides a steady and compounding increase in health to subsequent generations of living organisms.
- Modern waste disposal and agricultural practices have completely destroyed nature's fulvic acid production and recycling process, resulting in progressively deteriorating health of crops, animals, and humans.
- In a more perfect world, fulvic acid can reverse the steady cycle of health deterioration, and start a new cycle of progressive health improvement.

Fulvic acid is a Humic substance or extract. Fulvic acid is the end product of nature's Humification process, which is involved in the ultimate breakdown and recycling of all once-living matter, especially plants.

Fulvic acid contains ALL of the phytochemical protective substances, amino acid peptides, nucleic acids, etc., from the original plant matter, highly concentrated, refined, transformed, and enhanced by the actions of innumerable microscopic plants, such as fungi. The Humification processes prevents the original phytochemical protective components from completely breaking down and turning back into basic mineral elements. Even small strands of RNA, DNA, and plant photosynthetic materials still remain intact. Many of the original components become complex enzymes, which have seemingly miraculous function.

Because fulvic acid is so highly refined, it consists of extremely complex but small molecules, easily penetrating cells. For this reason it is highly reactive and bioactive, and is the most rare and valuable of all humic substances. Because of Fulvic acid's very small size (low molecular weight), it readily penetrates human tissues and cells, and interacts on the cellular level providing innumerable functions. The results are simply phenomenal.

Nature meant for small amounts of fulvic acid to participate at every level and link along the food chain. It contains latent solar energy, remnants of plant photosynthesis. Fulvic acid even bridges the gap between inert minerals and living matter, and it participates in the spark of life.

Fulvic acid is simply nature's most important form of protection and defense for plants, animals, and man. It is tied very closely with immune system functions and has powerful antioxidant qualities. Because fulvic acid is so small and complex, it has been entirely misunderstood and overlooked by most of medicine and science.

For a good preliminary understanding of the many important health related implications, we highly recommend that you read our online [Health ALERT](#). Prior to our taking the journal online in January 2001, we published and distributed over 20,000 hard copy issues of *Health ALERT 2000*.

We have spent many thousands of dollars on acquisition and translation of valuable Fulvic acid and Humic substance related medical documents. We appreciate your help in spreading the word to others, and also welcome contributions of related and worthwhile clinical studies.

Thank you for visiting our site. We hope that your visit will be informative and enjoyable.

Docks Mineral Rocks™

Important Plant Source Liquid Trace Minerals with Fulvic Acid!

Our organic plant source liquid minerals are often called "the ninth wonder of the world"! ***Doc's Mineral Rocks™*** is a highly concentrated, plant derived liquid mineral solution that contains more than 70 important liquid minerals, plus, because of the importance of ***Fulvic Acid***, Higher Ideals adds it to our ***Docs Mineral Rocks™***, which makes our product even more valuable to your health than any other liquid trace mineral product on the market today. ***Fulvic Acid is as important to our bodies as oxygen and water!*** As Valuable as it is, you will not find it in sufficient amounts from any other mineral supplement .. period! It is known that ***Fulvic Acid*** is readily admitted into living cells.

This may be in part, to its low molecular weight, its electrical potential, its bio-transporting ability, and other factors just waiting to be discovered and understood. Scientists do know, however, that **once inside the living cell, fulvic acid aids in the selective trading or supply of minerals and other nutrient factors inside the cell.** Can you begin to see why this is so important - ***first it gets into the cells, and second, once in them, it may be the very catalyst that makes sure the cells get precisely the amount of minerals and other nutrients they need.***

This is only the beginning, however, of the marvelous story of ***fulvic acid***. In addition to supplying these essential nutrients to the cell, **it has been shown that *fulvic acid* can actually chelate toxins and reduce them to a harmless state!** ***Fulvic acid*** is effective at **neutralizing a wide range of toxic materials - everything from heavy metals and radioactive waste to petrochemicals.** In fact, it has been shown to be so effective that tests are soon to be conducted on a new system designed to compost land fill refuse using fulvic acid and humic acids to safely render all toxins harmless! Yes ***fulvic acid*** is a "high energy" substance that enters into all life processes within plants and animals and wears many hats. When necessary; it acts as a "free radical" scavenger, supplies vital electrolytes, enhances and transports nutrients, relieves oxygen deficiency, catalyzes enzyme reactions, increases assimilation, stimulates metabolism, chelates and humanizes essential major and trace minerals, empowers all cellular life and demonstrates amazing capacity for electrochemical balance.

Minerals are perhaps the most important supplement we take because they literally are the catalysts that help vitamins and enzymes carry out their necessary functions. *Doc's Mineral Rocks™* have a natural negative charge which provides a 98% absorption rate!

Without a doubt, *Doc's Mineral Rocks™* certainly is a valuable source of all the key trace minerals and nutrients necessary for your health and as essential as they are, they do not supply enough of the major minerals your body needs, therefore, we have developed our *Complete PM™ Minerals* to ensure your Complete source for major minerals!

Suggested Usage:

As a nutritional supplement take one capful with a glass of your favorite fruit or vegetable juice, or with pure distilled water in the evening - preferably on an empty stomach.

Doc's Mineral Rocks™ 4oz. highly concentrated

From The Westwood Enterprises' Brochure: "The Wonderful World of Fulvic"

[*Robby Noel "talk radio" Interview
with Developers of Immunité*](#)

Though virtually unknown to the layman, there is perhaps no substance more vital to life, (with the possible exception of oxygen and water) than the biologically derived compounds known as Humic and Fulvic acids. Fulvic acids enter into all life processes within plants and animals and wear many hats. When necessary; they act as free-radical scavengers, supply vital electrolytes, enhance and transport nutrients, make water wetter, catalyze enzyme reactions, increase assimilation, stimulate metabolism, chelate essential major and trace elements making them organic, and demonstrate amazing capacity for electrochemical balance. Fulvic acids are involved in indispensable biochemical reactions which influence all biological life-forms, both plant and animal.

THE FULVIC STORY

With regard to currently marketed liquid mineral products the bottom line is not how much mineral they contain, but how much Fulvic acid they contain.

Regardless of product cost, even the strongest of the so-called colloidal minerals have, at most, a few cents worth of minerals per quart. If their mineral content is truly colloidal it is of no value to plants or animals since they cannot use minerals in this form. Fulvic acid is the biological substance that changes inorganic colloidal minerals into organically complexed, soluble minerals which can be used by plants and animals. Fulvic acid is an "organic" acid produced by soil microorganisms in trace amounts in healthy soils. It is vital to all life forms and without it there would be no you. In aqueous solutions it is the most powerful natural electrolyte known. It is also the most powerful natural chelating substance known which makes it an extremely effective anti-oxidant.

SCIENTIFIC DOCUMENTATION

A casual glance at the thousands of current scientific references on Fulvic acids will reveal the vital nature of this unique substance. All food, directly or indirectly, originates in the soil. What is taken up by plants also ends up in man's food chain. That which beneficially affects healthy plants will also beneficially affect humans. Fulvic acid is responsible for carrying these organically complexed minerals into the plant, where the Fulvic remains and becomes a vital link in our food chain.

NEW GENERATION DISEASES

It is evident that the pandemic deficiency diseases now occurring in America are the direct result of intensified chemical farming which destroys indigenous soil microorganisms vital to the production of Fulvic acid. Without healthy microorganisms, we have no Fulvic acid. With organically rich, Fulvic enhanced soils, we can have as much as 1,000 times more of vital trace elements and other bio-nutrients in our foods than is found in foods grown in chemically sterile soils. It is physically impossible to eat enough of these commercially grown, nutritionally-hollow fruits and vegetables to overcome the deficiencies currently being manifested in America. It is not enough to emphasize eating adequate amounts of fruits and vegetables. Fulvic acid is the vital and indispensable link in the chain of vibrant health and longevity.

VITAMINS, MINERALS AND ENZYME

The world at large now recognizes the essential nature of vitamins and enzymes. Less understood is that vitamins and enzymes cannot be properly formed without specific, organically-complexed minerals. For instance, zinc is absolutely necessary in the formation of over 200 different enzymes. Calcium is essential in over 500 different enzymes. The billions of cells in our bodies are all capable of producing their own specific enzymes. The metabolic and biochemical systems of the body are all enzyme driven. We have tens of thousands of functional enzyme systems within the healthy human body. Whenever any of these enzyme systems are stressed or malfunction to any degree, degenerative diseases begin

to occur. We cannot have vitamins and enzymes without biologically complexed minerals without Fulvic acid.

SUMMARY

As an electrolyte, Fulvic Acid is unsurpassed. It carries all the natural components necessary for balance, cellular integrity and electrical potential. When combined with other supplements, it potentizes and adds positive benefit far beyond its role as an essential electrolyte. As a natural antibiotic, it is a wide spectrum antimicrobial, antiviral and antifungal agent and enhances the effects of colloidal silver, topical silver gels and aloe skin preparations of all kinds. There is no finer treatment for burns, cuts, abrasions and skin disorders than Fulvic acid. As an antioxidant, acting alone or in conjunction with other proven ingredients, it is unrivaled in its ability as a "free-radical" scavenger. Acting at times as an acceptor, and at other times as a donor (depending upon need), Fulvic acid helps to create balance. As a complexing agent, Fulvic acid helps to create balance. As a complexing agent, Fulvic acid can chelate, detoxify and restructure otherwise toxic substances into non-toxic, useful substances for the body. It can reduce mineral compounds from a higher oxidative, unavailable state to a lower oxidative, available ferrous oxide to eliminate iron deficiencies. There is no other known biological substance that can beneficially modify so many essential biochemical, electrochemical and metabolic processes as can Fulvic acid. It is frequently referred to as "Fantastic Fulvic" and, as the late Dr. Clyde Sandgrin used to express it: "If I had to choose between that liquid mineral and electricity, electricity would have to go."

Fulvic Enhanced TM Westwood Enterprises.

Toll Free: 1-866-291-4400 Hours: 9am - 5pm Mountain Time Zone

Fulvic Acid Report

Fulvic Acid: The Miracle Molecule

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Introduction

Fulvic acid (not to be confused with folic acid) is rapidly being recognized as one of the key elements in many outstanding health and scientific breakthroughs of the 21st century. Scientists and doctors throughout the world are beginning to discover fulvic acid and are starting to recognize its extraordinary potential. At Vital-Earth Minerals, we have no doubt that this interest will increase dramatically as ongoing findings are released to the world, and as word-of-mouth spreads the amazing news about this phenomenal element.

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Fulvic acid has always occurred naturally in organic plants and soils, yet its recent discovery and tremendous value is now just beginning to be recognized. It can balance and energize cell life and biological properties it comes into contact with.¹ If the individual cell is restored to its normal chemical balance and electrical potential, we have given cells life where death and disintegration would normally occur.²

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Doctors have known for years that everyone needs at least 90 nutrients to maintain optimum health. These nutrients include a minimum of 59 minerals, 16 vitamins, 12 amino acids and 3 essential fatty acids. But eating good tasting food and swallowing a lot of vitamin pills does not guarantee absorption or utilization of these vital nutrients. When the body does not absorb nutrients the door is open for disease.

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Scientists have found that fulvic acid is the element that makes nutrients absorbable, which gives it the ability to make a dramatic impact on all kinds of diseases and health problems that afflict us today. They call it the elixir of life and theorize that without it, nothing would live.

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Fulvic Acid – The Miracle Molecule

“If I had to chose between the liquid mineral and electricity, electricity would have to go.”

Dr. Clyde Sandgrin

Fulvic acid is being called Nature’s Miracle Molecule, because it does so many things ... it wears so many hats. Reported claims of benefits are a little short of astonishing. For internal use they are:

- Increased energy
- It’s a ferocious antioxidant and free radical scavenger
- Chelates heavy metals and body toxins, removing them from the system
- Transports nutrients into the cells
- Extends the time nutrients remain active – potentiates the availability of essential nutrients

- Increases metabolism of proteins, contributing to DNA and RNA synthesis
- It's a powerful natural electrolyte
- Restores electrochemical balance
- Increases activity of a host of enzyme systems
- Helps rebuild the immune system
- Increases bioavailability of nutrients and minerals

Reported beneficial claims for external use:

- Treating open wounds, cuts and abrasions
- Healing burns with minimum pain or scarring
- Eliminating discoloration due to skin bruises
- Killing pathogens responsible for athlete's foot
- Acting as a wide spectrum anti-microbial and fungicide
- Treating rashes, skin irritations, insect and spider bites
- Neutralizing poison ivy and poison oak

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The agricultural benefits of fulvic acid have enormous potential to heal soils of the world and to neutralize radioactive and toxic wastes.

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Fulvic Acid, Origin and Overview

In the Beginning

In the beginning the earth was blessed with optimum organic growing conditions. The soil had a wealth of minerals, trace elements and rich humus soil teeming with microbes. The earth's minerals had not been depleted from over-farming, therefore the soil was exceptionally

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The vegetation was very lush and abundant, as is evidenced by ancient remains that geologists call humic deposits. These deposits are quite rare and can be found in various areas of the world. Even more rare are deposits of humic substance that are exceedingly rich in a little known substance called fulvic acid.

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Fulvic Acid – Supercharged Electrolyte

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Fulvic Acid has been called one of the most important natural miracles related to life itself. It is an acid³ created in extremely small amounts by millions of beneficial microbes working on decaying plant matter.⁴

Because of fulvic acid's low molecular weight⁵ (small molecules) it has the ability to readily dissolve and bond minerals and nutritional elements into its molecular structure. Nutrients that have been chelated by fulvic acid are in an ideal natural form to interact with and be absorbed by living cells.⁶ Fulvic Acid is so powerful that one single fulvic acid molecule is capable of carrying 60 or more minerals and trace elements into the cells.

Fulvic Acid is Lacking in Food Crops

It is a well known and publicized fact that our soils are sick from poor agricultural practices. The sterile soil conditions brought on by the overuse of pesticides, chemical fertilizers and erosion prohibit microbial activity and the formation of fulvic acid.

Fulvic acid that is essential for maximum human health has been missing from our diets for generations.

Re-mineralization of our bodies without the fulvic acid (that should be in the plants we eat), has little benefit. People are sick with degenerative and deficiency related diseases now more than ever. Fulvic acid supplementation is a good start toward reversing this situation.

Supercharged Electrolyte, Antioxidant, and Free Radical Scavenger

Cellular electrical energy could be called the life force of the body. When electrical energy is reduced in cells, they disintegrate and die. It is believed that electrical and chemical balances within the cell can be created and controlled by electrolytes ... the body's mini battery chargers.

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Scientists tell us fulvic acid is one of the most powerful natural electrolytes known to man. These supercharged molecules balance cellular life ... restoring the electrical potential that was once normal to the cell by charging, regenerating, regulating and delivering their living energies to the living cells.

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Fulvic acid maintains the ideal environment⁷ for dissolved mineral complexes, elements, and cells to bio-react electrically with one another causing electron transfer, catalytic reactions, and transmutations into new

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It helps with human enzyme production, hormone structures, and is necessary for the utilization of vitamins. It has been found to be essential to living cells in carrying on metabolic processes.

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It is also one of the most powerful natural antioxidants and free radical scavengers known. It has the unique ability to react with both negatively and positively charged unpaired electrons and render free radicals harmless. It can either alter them into new useable compounds or eliminate them as waste.

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Fulvic acid can similarly scavenge heavy metals and detoxify pollutants.

Fulvic Acid Mineral Complexes are Better than True Colloidal Minerals

You may have heard all the excitement about colloidal minerals. But true colloidal minerals by themselves are not readily useable by cells. It is the fulvic acid *in conjunction* with minerals that makes them effective. Many colloidal minerals on the market contain a small amount of fulvic acid, which is responsible for any results they may produce. Vital-Earth's **Fulvic Mineral Complex** contains a whopping 42% fulvic acid.

Fulvic Acids Further Defined

Individual cells when properly nourished, are capable of producing many of their own amino acids, enzymes, and other factors necessary for all metabolic processes. Each cell, in addition to other processes, burns its own energy, maintains itself, manufactures its own enzymes, creates its own proteins, and duplicates itself.⁹ It is essential to understand that the total metabolism of the body is the sum of the metabolic operations carried on in each individual cell.

Growth & Maintenance Nutrients

Scientists have identified at least 90 growth and maintenance nutrients which must be continuously supplied to the body to sustain healthful life. These nutrients include amino acids, major and trace minerals, vitamins and other nutritional factors.¹⁰ When these factors are supplied to our cells, the cells then create the building blocks of our life process. The building blocks present in the metabolic machinery are, in the great majority of cases, the same in other organisms of extremely different types.¹¹

Humans can produce all but eight amino acids within their cells. The very

complex process of all metabolic functions are carried on within the cell. If we fail to supply the cell with essential growth and maintenance nutrients we will experience a breakdown of these functions. When the breakdown is substantial we have the onset of disease or the manifestation of some related defect.

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Sick Soils, Sick Plants, Sick People

In the beginning, our naturally fertile soils contained adequate amounts of humic and fulvic acids produced by resident microbes within the soil. They delivered nutrients and minerals to the plants.

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Largely our modern agriculture aims at one goal ... an abundance of saleable products. Food quality is sacrificed for food quantity. Since the farmer is paid by the bushel, yield is more important than nutritional content. To control disease and force yield, excessive amounts of nitrate fertilizers are applied to the soil. Such practices stun and destroy the indigenous microbial life within the soil, which destroys vital humic and fulvic acids.

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Gone Are The Minerals

When microbes are depleted from the soils, they are no longer present to convert inorganic minerals into organic minerals needed by plants. Excessive use of nitrate fertilizers inhibits the formation of normal plant proteins and stimulates an over-abundance of unused amino acids that attracts insects.¹² Since pests were created to eat diseased plants this introduces the ideal environment for increased infestation because of increased insect food supply. The farmers reaction is to apply more pesticides and fungicides to save his infested crop. This in turn inhibits or destroys even more vital microorganisms that are essential in converting minerals to plant nutrients.

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Unsafe Foods

These deficient, pesticide laden products are turned into “cash”, which the farmer thinks is the bottom line. Lacking in organic trace elements and other nutritional factors, but long on chemical residues from pesticides, insecticides and herbicides, these nutritionally hollow product end up on the table of America. Without taste, and deficient in organic minerals and nutrients, we peel, boil and overcook what remains and then ask “why am I sick”.

The Vitamin Connection

New breakthroughs are just beginning to emerge in the use of increased dosages of vitamins and minerals for treatment of some ailments. However, it is crucial to remember that vitamins cannot complete their function in the cell's metabolism without the presence of the appropriate and specific mineral co-factor and fulvic acid.

Cell Wall Permeability and Absorption

One of the strongest advantages of fulvic acid minerals is that absorption greatly exceeds traditional tablet supplements. As with any nutrient or supplement, the only way your body can benefit, is if it is absorbed. Fulvic acid enhances this process.

Fulvic acid makes elemental minerals and vitamins more absorbable by complexing them (refines, purifies, combines and re-refines) into organic, ionic forms that are easily transported into and through membranes and cell walls. Once the nutrients meld into the fulvic acid complex, they become bioactive and bioavailable.

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Humic and fulvic acids have a fascinating effect on living organisms. Fulvic acid chelates and binds scores of minerals into a bio-available form used by cells. These trace minerals serve as catalysts to vitamins within the cell.¹³ Additionally, fulvic acid is one of the most efficient transporters of vitamins into the cell.

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An enzyme is a catalyst that does not enter into a reaction but speeds up or causes a reaction to take place. Enzymes are complex proteins. Enzymes are the life force behind vitamins and minerals. Without enzyme activation in the stomach, food would simply rot, elimination would not take place, thought would cease and we would die.

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At the cellular level, the burning of glucose in cells for instance, requires

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the action of several enzymes, each working on the substrate of the previous reaction. Each cell of the body, when properly nourished, is capable of producing the enzymes needed for complete metabolism.¹⁴ Research has shown that fulvic acid improves enzymatic reactions in cells and produces maximum stimulation of enzyme development.¹⁵

Free Radicals & Antioxidants

If a healthy body is your goal, then you must take action to protect yourself against free-radical attacks.

Dramatic increases of free radicals in our air, food and water in recent years have put a tremendous strain on the body's natural defense mechanisms. Our first line of defense against free radicals is a generous supply of free radical scavengers, called antioxidants.

Free radicals are highly reactive molecules or fragments of molecules that contain one or more unpaired electrons.¹⁶ They circulate through the body causing great mischief in bonding to and injuring tissues. In addition to destroying tissue, they magnify the probability that injured cells will become susceptible to a great many infections and diseases, or mutate and cause cancer.

According to Sesesi, Y. Chen and M. Schmitzer, fulvic acid has the ability to dramatically reduce the oxidative effects of free-radicals. This means fulvic acid could potentially help your body ward-off disorders such as cancer, premature aging, wrinkling of the skin and arthritis ... all of which are thought to be hastened by oxidation.

Antioxidants

In recent years frantic efforts have been made to locate and isolate compounds with an extraordinary affinity for free radicals. Entire industries have evolved around such efforts, with nearly every vendor of health food products offering possible solutions. There are three identified categories of free radicals, and numerous identified free-radical scavengers, Vitamin A, C, E, Gamma-Linoleic Acid, L-Cysteine, L-Glutathione, Selenium, and CoQ10 are the best known. Each one of the free-radical scavengers eradicate a different category of free-radicals. Its very complicated to get the right form of nutrients, in the correct amounts, along with all the co-factors needed to make them work.

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For an antioxidant to bind a free radical, the antioxidant molecule must have unpaired electrons of equal and opposite charge to that of the unpaired electrons of the free radical.

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Fulvic Acid, the Super Antioxidant

We have found that fulvic acid is a powerful, natural electrolyte that can eradicate any form of free-radical. It can act as an acceptor or as a donor in the creation of electrochemical balance. If it encounters free radicals with unpaired positive electrons, it supplies an equal and opposite negative charge to neutralize the bad effects of the free radicals. Likewise, if the free radicals carry a negative charge, the fulvic acid molecule can supply positive unpaired electrons to nullify that charge. Fulvic acid plays the role as a bi-directional super antioxidant.

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In Summary

Fulvic acid is a bio-available chelated molecule that can also chelate. As a refiner and transporter of organic minerals and other cell nutrients, it has the ability to turn bad guys into good guys by chelating and humanizing free radicals. Depending upon the chemical makeup of the free radical, they can be incorporated into and become a part of life sustaining bio-available nutrients. In the event that the chemical makeup of the free radical is of no particular benefit, it is chelated, mobilized and carried out of the body as a waste product

Many of the substances that make up humic matter have yet to be discovered and catalogued among the know and documented organic chemicals. We are beginning to realize that what we know about Fulvic Acid is just the tip of the iceberg.

Information Concerning Possible Toxic Minerals

"Poisons in small doses are the best medicines; and the best medicine in too large doses are poisonous."

A famous quote by Wm. Withering

Consumption of plant derived mineral fulvic complexes by humans for many years has shown that they will not build up in the body tissues as do

metallic minerals. The following observations and theories describe the reasons why:

Cells have the ability to accept or reject minerals, including *aluminum*, *lead*, *arsenic*, *mercury*, etc., at their discretion when presented as organic fulvic acid complexes. It should be considered that these minerals may not necessarily be present to “nourish” cells, but are needed to act as “electrodes” in the fulvic electrolyte solution. In that capacity they are probably most essential for bio-reactions, electron transfer, catalytic reactions and transmutations.

Fulvic acid carries complexed minerals in “trace” amounts only, and should not be confused with metallic minerals. Fulvic acid has the ability to complex and remove toxic metals and other minerals from the system. Fulvic acid mineral solutions have been ingested by people for many years, yet have never been shown to cause toxic mineral build-up in humans.

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It is obvious that when metals, minerals and trace elements become complexed into fulvic acid, they take on an entirely new property of availability, unlike their original form.

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It is when fulvic acid is not present that one should seriously worry about toxic buildup from any source. This could account for the health problems that are causing concern today in our “fulvic starved” society.

Aluminum makes up 12% of the Earth’s crust, and is the most abundant metallic element. Aluminum is found in biological quantities in most plants grown in soil. Most of our food crops contain 20 – 200 ppm or more of aluminum. In crops today this concentration would normally be in the absence of fulvic acid.

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Known biological function of Aluminum is to activate the enzymes succinic dehydrogenase. It increases survival rate of newborn infants, and according to professor Gerhard Schrauzer, head of the department of chemistry at UCSD, is an essential mineral for human nutrition.

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In a study that appeared November 5, 1992 in the science journal, NATURE, Frank Watt, et al (University of Oxford) used a highly accurate laboratory technique to quantify the levels of aluminum in the brains of Alzheimer’s patients. To their great surprise, they found the same levels of aluminum in the brains of the non-Alzheimer’s control as they did in their Alzheimer’s patients. Watts believes that aluminum contaminated stains gave faulty results in the early studies that highlighted aluminum as a health risk.

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Science is just learning about other supposedly toxic minerals

Arsenic

It is now generally accepted that arsenic in trace levels, is an essential element for optimal health and longevity. The levels of arsenic that most people ingest in food or water are not usually considered to be of health concern.

Despite all the adverse health effects associated with arsenic exposure, there is some evidence that low levels of exposure may be beneficial to good health. Test animals maintained on a diet deficient in arsenic did not gain weight normally, and they became pregnant less frequently than the control animals maintained on a diet containing a more normal (but low concentration) of arsenic.

Arsenic has been found to be essential for survivability of newborn babies and also neonatal growth. Arsenic has been shown to promote the growth rate in animals and prevent carpal tunnel syndrome in humans

Smokers and cadmium

Like most plants, tobacco contains trace amounts of cadmium and lead. It is interesting to note that people that smoke tobacco have about twice as much cadmium in their bodies as do nonsmokers. Higher levels of lead are also found in smokers. It would stand to reason that burning converts the natural organic plant forms to a metallic or toxic form causing buildup in the body. This also could be direct evidence proving the safety of natural organic plant forms of these metals.

Mercury and Selenium

The metabolic antagonism between mercury and selenium results in the protection from selenium poisoning by mercury, and the protection against mercury poisoning by selenium.

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Taking too little zinc is at least as important a health problem as taking in too much zinc. Without enough zinc in the diet, people can experience loss of appetite, decreased sense of taste and smell, slow wound healing, and skin lesions. In severe cases in children, too little zinc can cause poorly developed sex organs and dwarfism.

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Agency for Toxic Substances and Disease Registry, Public Health Statements: Arsenic, Aluminum, Mercury, Zinc, Selenium, Cadmium, Lead.

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Kehoe, R.A., et al.: Manganese, Lead, Tin, Aluminum, Copper and Silver in Normal Biological Material. J. Nutr. July 1940. Pages 85 – 98.

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Human Experiments With Fulvic

The Healing & Regenerative Influences of Low Molecular Weight Humic Substances (Fulvic Acid) On Human Tissues and Cells

Tests¹⁷ were conducted by Dr. W. Schlickewei¹⁸ and five associates¹⁹ at the University Hospital in Freiburg, Germany, on human patients requiring transplantation or replacement of bone during surgery. The transplantation of bone tissue is required in about 15% of all cases of replacement surgery of the locomotor apparatus, and it is generally applied to reconstitute and repair actual defects in bone.

Human donor tissues have become scarce due to special legal requirements and necessary additional testing because such tissues have a high danger of transmitting the HIV virus and hepatitis. There are also obvious disadvantages to using bone grafts from other areas of the same patient's body because they require a second operation and prolong the length of time in surgery. The only other known substitute source available in large enough quantities for clinical use, was animal bone in the form of inorganic calcium compounds (bovine calcium hydroxyapatite), and although these were well tolerated by the body, they showed no signs of being resorbed.

Remarkable bone regeneration and resorption characteristics were identified when the animal bone implants were impregnated with a low molecular weight humic substance

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(fulvic acid) prior to transplant into patients. The bone implant then became highly osteoconductive, and served the host tissue as a “guide-line” for the deposition of newly developing bone tissue. The same transplant procedure without the fulvic acid showed no signs of regeneration during the course of the experiment.

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While on the lookout for a new group of active agents with the ability to promote wound healing, the doctors came across the humic substances. The doctors said that the bone resorption is most easily explained by the known ability of humate to induce the activation of leucocytes. They said that previous experiments had established that the humic substances are able to bind to calcium-containing compounds, stimulate granulocytes, and block the infectivity of the HIV virus.

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Summary: In this clinical test and previous experiments, fulvic acid has been shown to activate and stimulate white blood cells, promote healing, turn inorganic calcium into an organic bio-active cellular regenerative medium conducive to new bone growth, stimulate cellular growth and regenerate, and inhibit the HIV virus.

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Animal Experiments with Fulvic

Early studies with livestock animals were conducted by Dr. Charles S. Hansen, D.V.M. in the state of California from the early 1960's through 1967 on an experimental basis. Dr. Hansen's test included a blend of fulvic and humic acid used as a feed additive. He also used fulvic acid alone as a treatment for specific ailments in livestock. The results of supplement feeding and treatment included:

Dairy Cows

- After 2 months of supplement no bacterial or viral infections
- Herd of over 300, after 3 months on supplement increased butterfat production of 15%
- Herd on supplement cut back on high protein rations with no decrease in production
- All cows on supplement experienced more complete digestion
- Cows with bacterial infection (mastitis) treated with 1 pint fulvic

acid solution recovered to full production in 12 to 24 hours

- When using antibiotics to treat mastitis the recovery was only 50% - 70% after 2 to 3 weeks.

Hogs

- Animals on the supplement experienced better and more complete digestion
- The free choice supplement in 36 hrs acted as an excellent vermifuge (de-worming agent)
- The supplement completely eliminated Necro, a bloody diarrhea in hogs

Mink

- Animals on the supplement experienced more complete digestion
- When on the supplement were less vicious, more docile
- Supplemented animals ceased fur chewing
- Successfully eliminated most diseases common to mink herds

Poultry

- Supplementing to feed acted as a vermifuge
- Pullets given supplement were free of most diseases
- Pullets on supplement experienced more complete digestion of other feeds in diet
- Pullets on supplement produced eggs of superior shell hardness and quality

The results of these early tests support the known benefits which fulvic acid provides to all living systems, plant or animal. They indicate that fulvic acid may very possibly become the most important factor in health management in the future.

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¹⁸ W. Schlickewei, Dept. of Surgery (Traumatology), University Hospital, Freiburg, Germany

¹⁹ U.N. Riede, Dept. of Pathology, University Hospital, Freiburg, Germany, J. Yu, Dept of Pathology, University Hospital, Freiburg, Germany. W. Ziechmann, Ground Chemistry Research Group, University of Gorrinfen, Germany. E.H. Kuner, Dept. of Surgery (Traumatology), University Hospital Freiburg, Germany. B. Seubert, Weyl Chemicals, Mannheim, Germany.

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The Colloidal Myth

Definition of Colloidal

A colloid is: "A state of matter in which the matter is dispersed in or distributed throughout some medium called the dispersion medium. The matter thus dispersed is called the disperse phase of the colloid system. The particles of the disperse phase are larger than the ordinary crystalloid molecule, but not large enough to settle out under the influence of gravity."¹

Colloids as defined in physical chemistry are: A. A colloidal system, one in which a finely divided solid is suspended in a liquid: such colloids range from solutions to gels. B. A colloidal suspension. C. A substance that when suspended in a liquid will not diffuse easily through vegetable or animal membrane.²

According to Remington's *Pharmaceutical Sciences*: "colloidal mineral particles each consist of many aggregates, and each aggregate contains many molecules." Thus it stands to reason that colloidal minerals exist in particle sizes many time larger than some other mineral forms.

Because of their size, true colloidal minerals are not absorbed by the body.³

Remember ... fulvic acid is the key to outstanding health benefits ... not colloidal minerals.

¹ definition of a colloid – Dorland's Illustrated Dictionary, 24th Edition

² definition of colloids – Random House Dictionary of the English Language

³ colloids and their size – Max Motyka, M.S.. Albion Laboratories

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More On Fulvic Acid Mineral Water

- [Just how important](#) is the role of fulvic acid in humans?
- [What is the difference](#) between Fulvic Acid Mineral Water and other mineral drinks?
- [Just how important](#) is the role of fulvic acid in humans?
- [If fulvic acid is so important](#), why haven't I heard of it before?
- [Why is the carbon content](#) in Fulvic Acid Mineral Water so high?
- [Aluminum has been linked to Alzheimer's](#) Disease. Is the aluminum in Fulvic Acid Mineral Water harmful?

Ingredients:

Natural electrolytes and dissolved mineral complexes from an ancient deposit of natural organic plant material

Contains no sugar, artificial flavor or color.

Suggested use:

Two to four tablespoons in the morning as a digestive aid. May be mixed with orange, grapefruit, or cranberry juice to reduce the stringent mineral taste. Take supplemental fiber and minerals at different times because fiber decreases the body's absorption of minerals.

Package size:

- **32 fluid ounces**
- **2 Tablespoons/Day = 32 Servings**
- **4 Tablespoons/Day = 16 Servings**

Minerals are required by every organ, gland, and muscle in the body to function properly. Over 900 common medical problems are directly linked to mineral deficiencies.

The 74 different minerals in Fulvic Acid Mineral Water are 100% bioavailable because they are chelated.

The mineral content of fruits and vegetables depends on the soil they are grown in. Erosion and modern farming methods have seriously depleted the minerals available from plant food sources making supplementation a necessity for good health.

Organically grown foods must have a humic soil base composed of degraded organic compounds and soil. Farmers who grow crops with chemical fertilizers and pesticides destroy the humus beds and microorganisms of the soil. A century ago, our farm lands boasted a foot of humic soil whereas today it is less than four inches. The amount of organically viable land fertile enough to produce nutritious and healthy foods diminishes each year as does the health of those eating the nutritionally deficient plants.

It has been known since 1936 that vitamins control the body's appropriation of minerals, but lacking minerals, vitamins are useless. There are two groups of minerals - macro and trace. Macro minerals which are needed in larger amounts include calcium, magnesium, sodium, potassium and phosphorus. Trace minerals such as zinc, boron, iron, chromium, selenium and iodine are needed in minute amounts but are essential to good health. For instance, boron is needed for calcium uptake; iodine helps to metabolize excess fat and is needed for a healthy thyroid gland; and chromium is involved in the metabolism of glucose.

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Minerals need to be chelated, bound to a protein molecule, to be bioavailable. (Mineral assimilation without chelation is only about 10%.) Fulvic acid, a by-product of plant photosynthesis, is the strongest chelating agent known. Fulvic acids enter into all life processes within plants and animals. They act as free radical scavengers, supply vital electrolytes, enhance and transport nutrients, catalyze enzyme reactions, increase assimilation, chelate macro and trace minerals, and enhance electrochemical balance. Fulvic acid is what makes the trace minerals in Fulvic Acid Mineral Water 100% bioavailable.

In light of the fact that our food supply is nutritionally deficient, supplementation has become a necessity rather than a luxury if we want to maintain good health.

Fulvic Acid Mineral Water Questions & Answers

What is the source of Springboard's Fulvic Acid Mineral Water?

Fulvic Acid Mineral Water is extracted from an ancient organic humus bed that was living

plant matter containing all of the major and trace elements when these deposits were stored.

What is the difference between Fulvic Acid Mineral Water and other mineral drinks?

The fulvic acid content and the extraction method. Photosynthesis produces mucopolysaccharides or sugars which are exuded at the root level. Microorganisms ingest the polysaccharides and produce humic and fulvic acids. Humic acid dissolves minerals in the soil then the fulvic acid supplies the minerals to the plant via the root system. The minerals are then 100% bioavailable because they have been naturally chelated by the fulvic acid. Mineral complexes from rock, clay, salt beds or lakes are inorganic because they have never been assimilated by a plant and reduced to an ionic form. (The body can only assimilate about 10% of an inorganic mineral complex.)

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The minerals in Fulvic Acid Mineral Water are extracted with purified cold water. This method does not destroy the fulvic acid. Many other mineral preparations are extracted using sulfuric acid, a method which produces a high sulphur, high solid (mostly sulphur), low carbon, and low fulvic acid end product. Low carbon and low fulvic acid levels are the prime indicators that a mineral product is inferior.

Just how important is the role of fulvic acid in humans?

Fulvic acid assists every stage of cellular metabolism and is the most powerful, natural electrolyte known. It restores electrical balance to damaged cells, neutralizes toxins and can eliminate food poisoning within minutes. When it encounters free radicals with unpaired positive or negative electrons, it supplies an equal and opposite charge to neutralize the free radical. Fulvic acid acts as a refiner and transporter of organic materials and cell nutrients.

If fulvic acid is so important, why haven't I heard of it before?

Outside of technical circles, fulvic acid is virtually unknown. In plants, fulvic acid stimulates metabolism, provides respiration, increases metabolism of proteins and activity of multiple enzymes, enhances the permeability of cell membranes, cell division and elongation, aids chlorophyll synthesis, drought tolerance, crop yields, buffers soil pH, assists denitrification by microbes, contributes to electrochemical balance as a donor or an acceptor, decomposes silica to release essential mineral nutrients, detoxifies pollutants such as pesticides and herbicides.

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Why is the carbon content in Fulvic Acid Mineral Water so high?

Carbon is the main ingredient in the formation of fulvic acid. The higher the level of carbon, the higher the content of fulvic acid. A product with low levels of carbon does not have very much fulvic acid and consequently will not work well. Sweeteners mask carbon content.

Aluminum has been linked to Alzheimer's Disease. Is the aluminum in Fulvic Acid Mineral Water harmful?

A refined mineral or metal produced by man should not be confused with a naturally chelated ionic form of aluminum, arsenic, lead, or any trace element derived from plant life. Aluminum is the second most prevalent element on earth and organic aluminum is in every food we eat. Combined with fulvic acid, organic aluminum forms aluminum silicate which is harmless to the body. (One gram of beans contain 200 mg. of aluminum silicate. If it were harmful, people who eat beans as a staple would all have Alzheimer's disease.) All minerals found in plants are bound to an organic compound composed of amino acids, proteins or acids. Plant form minerals are ionic rather than metallic elements.

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This product is not intended to diagnose, treat, cure or prevent any disease or disorder. The statements contained herein have not been evaluated by the Food and Drug Administration.

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WHAT IS FULVIC ACID?

As originated in nature, or through very high quality processing and refining, fulvic acids are biologically active, low molecular weight (i.e., small molecules) derived from humates or fulvates. Organic fulvic acids are created by micro-organisms in the soil, for the purpose of transporting minerals and nutrients from the soil into the plant. From there, complex photosynthesis reactions produce the components of all the various parts of the plant. Muco-polysacharrides (complex carbohydrate sugars) flow throughout the plant for nourishment. Some are returned to the roots. There,

the micro-organisms are nourished and produce fulvic acid to complex with minerals and nutrients to restart the cycle again.

LIFE-GIVING NUTRIENTS IN, TOXINS OUT

It is known that fulvic acid is readily admitted into living cells. This may be in part due to its low molecular weight, its electrical potential, its bio-transporting ability, and other factors just waiting to be discovered and understood. Scientists do know, however, that once inside the living cell, fulvic acid aids in the selective trading or supply of minerals and other nutrient factors inside the cell. Can you begin to see why this is so important - first, it gets into the cells, and second, once in them, it may be the very catalyst that makes sure the cells get precisely the amount of minerals and other nutrients they need.

In addition to carrying essential nutrients to the cell, it has been shown that fulvic acid can actually chelate toxins and reduce them to a harmless state. Fulvic acid is effective at neutralizing a wide range of toxic materials - everything from heavy metals and radioactive waste to petro-chemicals. In fact, it has been shown to be so effective that tests are soon to be conducted on a new system designed to compost land fill refuse using fulvic and humic acids to safely render all toxins harmless.

THE SCIENCE AND CHEMISTRY OF FULVIC ACID

Fulvic acid is involved in complex biochemical reactions in living plants and animals, which directly influence the very metabolic processes at the cellular level. To the science of living cells, fulvic acids are vital in bringing substantial amounts of nutrients and minerals into water solution and delivering their living energies to the living cells.

In terms of benefits to all living organisms, organic fulvic acids:

- Greatly enhance the bioavailability of important trace minerals.
- Regenerate and prolong the residence time of essential nutrients in the cells.
- Modify the damage of toxic compounds such as heavy metals and free radicals.
- Enhance the permeability of digestive, circulatory and cell membranes.
- Increase the metabolism of proteins contributing to RNA and DNA synthesis.
- Increase the activity of a multitude of enzymes.

THE ELECTRIC POTENTIAL OF A CELL IS ITS "LIFE FORCE"

Electrical stimulation in most cells is the equivalent of biological activity. The cells disintegrate when their electrical potential is reduced to zero. When the electrical potential is reduced, progressive weakness and illness may occur. A person's electrical potential may be lowered by loss of blood or fluids, excessive emotional stress, accidents, lack of sleep, lingering infections, and an unbalanced diet.

Scientists theorize that electrical and chemical balances at the cellular level can be created and controlled by electrolytes. Perhaps the most effective known electrolyte found in nature is the powerful fulvic acid organic electrolyte that restores, regenerates, regulates and balances cellular life. When the cell is restored to its normal chemical balance, and thereby achieves its bio-electrical potential, life flourishes where sickness, weakness, disintegration and death would have resulted. This is the fulvic acid phenomenon.

SUPERCHARGE & EXTEND LIFE OF CELLS

Organic fulvic acid electrolytes contain and transport essential nutrients, essential and trace minerals in a highly charged bio-available form and serve as an outside electrical force. They charge, recharge and restore the potential that is or once was normal to the cell, and in doing so, balances and supercharges cellular life. The fulvic acid electrolytes act as a miniature battery charger, providing a small but constant charge of nutritional and mineral energy replacement. They create a natural balance for many life processes and help each cell perform at its maximum potential. Toxins and heavy metals are taken up by the fulvic acid electrolytes, to be carried away from the cell and discharged from the body.

YOU ARE WHAT YOU ASSIMILATE

As a transporter of energy-rich and bio-electrically charged nutrients and minerals, the fulvic acid electrolytes greatly increase the percentage rate of absorption through the digestive system of minerals, nutrients, vitamins, and herbs into the circulatory system. From there, they carry life force energetic compounds to and easily through the cell membrane, across the cytoplasm and directly to the nucleus of the cell.

At this point the Fulvic Acid electrolytes discharge electrical energy and their nutrient and mineral components. It is literally recharging and replacing exhausted or diminished components within the nucleus of the cell. The minerals and nutrient wastes are complexed and taken from the nucleus, then transported back across the cell for removal. Fulvic acid electrolytes act as a donor, and at other times as a receptor based on a cell's requirement for balance. They also absorb both positive and negative electrical charges from free radicals in a process of neutralization.

PESTICIDES AND HERBICIDES HAVE DEPLETED NUTRIENTS

This natural balance for many biological processes includes active participation in oxidation-reduction, electron transfer and catalytic reactions. Many people are aware our soils are depleted of minerals and nutrients. They were eaten in the food grown many years ago. Precious little remains in most soils. However, only a few

scientists are aware that the fulvic acid is also seriously depleted. Because of the pesticides and herbicides, most of the microbial life in the soil is gone. What is left is depleted and weak. As a result, less fulvic acid is produced. Less fulvic acid means less minerals and nutrients will be taken up by the plants.

SUPPLEMENT WITH MAXIMUM LIQUID MINERALS

Since we are what we eat, our bodies receive less minerals and nutrients. Now it's becoming alarmingly apparent: the deficiency of fulvic acid may be the most critical factor missing in our dietary deficiencies. Only in a few places on earth are there abundant deposits of organic fulvic acids. They occur in humic shale deposits and are interspersed with colloidal minerals. Unfortunately, much of the available Fulvic Acid in humic shale is highly complexed with toxins and heavy metals. The concentration of fulvic acid is usually quite low. Fulvic acid is so water soluble it was leached from the humic shale by water from rain and other sources millions of years ago. There are large deposits of organic fulvic acid that were leached from humic shale and flowed out into areas in which they accumulated and concentrated in southern Utah. Now those deposits are being mined and the richness of the organic fulvic acid complexes are being refined and purified.

USAGE

Take 1/2 oz once or twice daily on an empty stomach. *Raspberry Flavored tastes great, or order the non-flavored to mix with juice.* We recommend mixing 1 oz of juice with 1/2 oz *Maximum Minerals*. Shake well before use. Refrigerate after opening to maintain shelf life.

Take on an empty stomach before any other supplements. Compatible with any other supplements. We suggest our [Cascading Antioxidant Formula](#) with your Maximum Liquid Minerals for the perfect two supplements to start your day!

480 ml / 16 oz. #1830 Classic- unflavored \$24.70

480 ml / 16 oz. #1840 Raspberry - flavored \$24.70

The dermatological efficiency of humic acids is noteworthy. Salts of humic acid formed with ammonia and alkali metals significantly shortened the time of wound healing.²³

Possibility of applying humic acids in medicine (wound healing and cancer therapy)

Jurcsik, I. Lab Agrochem. Plant Physiology, Pecs, Hung.

Abstract:

Previous expts. proved that humic acids (HA, esp. humatolanic acid, HY) generate active oxygen of the presence of oxygen, water and radiation. Based on these expts., it was thought that this process accelerates wound healing and inhibits multiplication of malignant tumor cells. Hy can help meet the increased demand for oxygen during wound healing by producing active oxygen. Multiplication of tumor cells is restricted by the intercalation of HY mols. with DNA strands, causing hydrogen abstraction from DNA deoxyriboses (5). In addn., HY increases the respiration rate. As HA have a self-regulation mechanism for the amt. of active oxygen produced, lipid-peroxidn. was detected. Clin. tests (in the case of wound healing) and in-vitro expts. (carcinostatic lab tests) provided results that proved the above theory. In wound healing expts., 0.01%Hy shortened the healing time. HY (0.012%) reduced the reprodn. of tumor cells by 70% (HEp-2) while multiplication of HEF remains const. DNA synthesis practically stops above a concentration of 0.004%HY. At the same time, HY had a restricting effect only above 0.2g/100ml concentration on group of cells. [TOP](#)

Oxihumic acids and its use in the treatment of various conditions.

Patent #	Kind Date	Date	Application
WO 2000016786	A2	20000330	WO
1999-IB1569	19990922		
WO 2000016786	A3	20000608	

Abstract:

A pharmaceutical compound comprising an oxihumic acid salt, ester or derivatives thereof as an active ingredient is disclosed. The compound. is preferably administered orally for stimulating lymphocytes in a human, animal or bird. It may be used in treating viral and bacterial infections, HIV infections, opportunistic diseases, inflammation, pain and fever, cancer growth and diseases associated with viral infection and a depressed immune system. A number of pharmacological examples were given including interleukin 10 production by oxihumate treated lymphocytes, increased antibody production against Newcastle disease in chickens treated with oxihumate, TNF production by oxihumate treated lymphocytes, and antiviral activity of oxihumate against HSV-1 and coxsackie virus type 1 in vitro.

Fulvic Acid Minerals Information

Fulvic acid and Humic extract topical use and bath therapies show amazing clinical results

Fulvic acid and humic extract water solutions can safely be applied as skin treatments. Directly applied or as bath therapies, fulvic and humic extracts are safe in amounts as high as 10 percent weight-by-volume. Medical doctors have found that extended saturation of the skin by direct application, or use as a bath therapy can be highly successful in treating many external and internal conditions. Clinical studies show that ulcerous skin problems and various skin diseases can be eliminated. Studies by a U.S. doctor have shown that fulvic acid or humic extract bath

treatments can cure the common cold or flu in just one or two session, stopping them dead in their tracks.

Hospital patients with skin ulcers had 92.2% success rate when treated with fulvic acid and humic extract baths.

Yuan, Shenyan; Fulvic Acid, 4 1988; in *Application of Fulvic acid and its derivatives in the fields of agriculture and medicine*; First Edition: June 1993

Medical doctors in Europe, China, and even the United States, have discovered that clinical bath treatments using specially prepared humic and fulvic extracts have unparalleled healing power with many serious diseases. Patients with severe rheumatoid arthritis and other bone, joint, tendon, and muscle autoimmune disorders, exhibit healing effects that are unrivaled. Often after a few weeks of daily bath sessions, patients are significantly relieved of pain and inflammation, and are restored to health.

Medical test results indicate that humic extracts enhance the human immune system, which results in the cure of viral diseases.

Jingrong Chen et al, jiangxi humic acid, 2 (1984)

Literally hundreds of well documented clinical studies exist from hospitals, medical schools, and doctors from around the world. Internal use of fulvic acid also works well for many of these same conditions including the various rheumatoid and autoimmune disorders.

Bath treatments, or lengthy periods of moist localized saturation, are extremely potent therapies for many conditions. Such treatments are remarkable effective. Extensive clinical studies support the exceptional safety of both topical and bath therapies.

Fulvic Acid Minerals Information

Humic substances are nature's most powerful antiviral

New studies continue to show virus - cancer connection

The relationship of viruses to cancer is not too surprising, considering the mounting evidence that shows that there is a missing link in our food chain that is allowing viruses to run rampant in their attack on humans, animals, and even our food crops. What may surprise you most is that drug companies have sponsored extensive secret studies for the purpose of profiting from this dire situation, when in fact inexpensive and effective natural solutions exist. This entire website documents the relationships.

Of immense interest is the fact that medical hospital studies show that difficult viral respiratory illnesses common in children are readily resolved with fulvic acid dietary supplementation. Fulvic acid is a humic extract common to rich organic humus soil and also certain ancient plant deposits. Many medical studies show that humic substances, especially fulvic acids, have the power to protect against cancer AND the related cancer causing viruses. Studies often show reversal of

deadly cancers and tumors using special humic substance therapies. Many studies and extensive references exist, a few of which are referenced below.

Search keywords: respiratory, tumor, virus, cancer

Also see the following articles for more information:

[Common Virus Shows Link To Brain Cancer In Children](#)

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Fulvic Acid Minerals Information

Medicinal value of the Humic extract known as Fulvic acid is astounding and very well-documented

Many reports on the beneficial use of humic substances, especially fulvic acid, for human health and medicine have been published. These include reports documented in the Chinese *Materia Medica* pharmacological compendium, dating back to the 15th century Ming Dynasty. During that period, a very famous medical doctor, Li Shi Zhen, used "Wujinsan", meaning "golden medicine", containing humic and fulvic acids as the active ingredient in the treatment of infectious ulcerous growth and female hemorrhage diseases. These studies showed humic and fulvic acids to be efficient anti-inflammatory and blood coagulating agents.

Hospital eye clinic patients with ulcerous cornea infection had 94.2% success rate when treated with fulvic acid eye drops and injections.

Yuan, Shenyuan; *Fulvic Acid*, 4 1988; in *Application of Fulvic acid and its derivatives in the fields of agriculture and medicine*; First Edition: June 1993

In China, prior to 1978, humic and fulvic acids had been used in hospitals and among the general population for the treating of a wide range of diseases with success. Up to that point there was very little research conducted on the pharmacology of its therapeutic mechanism. Because of lack of clinical data, doubt and misconceptions remained as to therapeutic use.

Hospital patients treated for chronic ulcerous colon infections had 92.6% success rate when treated with fulvic acid enema.

Yuan, Shenyuan; *Fulvic Acid*, 4 1988; in *Application of Fulvic acid and its derivatives in the fields of agriculture and medicine*; First Edition: June 1993

Since that time, many medical schools and hospitals in China have engaged in extensive studies on the toxicology and pathological aspects of humic and fulvic acids and their clinical applications. Hundreds of research papers have now been published nationally in China, and some have appeared in international journals and have been presented at various meetings outside of China.

Hospital patients with acute upper gastroenterological bleeding had 95.6% success rate when treated with fulvic acid oral medicine and injections.

Yuan, Shenyuan; *Fulvic Acid*, 4 1988; in *Application of Fulvic acid and its derivatives in the fields of agriculture and medicine*; First Edition: June 1993

Pharmaceutical companies in Da Tong, Shanxi, in Gongxian, Henan and in Kunming, Yunnan are manufacturing humic acid medicines which are approved by the Chinese Drug Administration. Because of their non-toxicity, the humic extract fulvic acid is approved for internal as well as external use.

Clinical medical studies using humic and fulvic acids were performed on thousands of hemorrhoid patients, which were so successful that the Chinese government had a special pharmaceutical preparation developed for treatment of this condition.

Yuan, Shenyuan; *Fulvic Acid*, 4 1988; in *Application of Fulvic acid and its derivatives in the fields of agriculture and medicine*; First Edition: June 1993

Chinese doctors now use fulvic related medicines to reduce inflammation, increase circulation and control bleeding, to regulate the immune system and hormone systems, to heal digestive tract disorders, and as an anti-cancer and anti-tumor therapy.

German companies have a number of humic and fulvic based products. These include the following healing bath additives: Moorbad Saar N, Humopin N, Leukona Sulfomoor-Bad N, Salhumin Rheuma-Bad, Salhumin Sitbad N, Salhmin Teilbad N, Contrheuma-Bad L, mostly for the relief of rheumatism and arthritis. Huminit is used internally for the treatment of stomach hyperacidity and other gastric disturbances, gastric ulcers and gastroenteritis in humans. Veterinary medicines include, Kalumin, Sulumin, Salhumin and Kalumat for the therapy and prevention of diarrhea and enteritis.

Studies of patients with gastric and duodenal ulcers showed that 91.1% had condition improve when treated with fulvic acid. Treatment showed no side effects, substantially diminished pain, with few relapses, with 61.1% of patients being completely cured.

Xinsheng Zhu, Fulvic Acid, 9 (1991)

Studies show that humic, and especially fulvic acids do occur naturally in the human diet. Waters from streams and rivers running through forested land contain dissolved humic and fulvic acids. Humic and fulvic acids occur in living plants grown in organic humus containing soils, and humic and fulvic acids have been isolated from live plants. Humic and fulvic acids have been found in the gastrointestinal tract of humans and animals and are absorbed. They circulate with the blood and are metabolized in the liver.

In 1988, Dr. S. A. Visser reviewed the medicinal value of humic substances in an article entitled: "Effects of humic substances on higher animals and man; the possible use of humic compounds in medical treatments", which was presented at the International Humic Substance Society meeting in Sevilla, Spain. His findings showed that the medicinal applications of humic and fulvic acids can be external as well as internal.

Hospital studies in China show that elderly patients, ages 60-90, when treated with fulvic acid, regained appetite, slept better, and became more energetic. Other hospital studies coming from India show that fulvic acids are considered to be a powerful anti-aging therapy that also able to help with symptoms of dementia.

Erchuan Wang et al, Humic acid, 3 (1991)

Dr. Visser stated that external applications of humic and fulvic acids are based on their use as antiphlogistic (antiinflammatory), analgesic (pain relieving), hyperemic (blood flow increasing), anti-rheumatic, anti-microbial, anti-fungal, antiviral and anti-cancer agents. Humic and fulvic acids have also been used externally in the treatment of hematoma (localized accumulation of blood), phlebitis (inflammation of veins), desmorrhaxis (rupture of a ligament), and myogelosis (hardening of a muscle), as well as for the treatment of patients with contusions, distortions, cervical (neck) complaints, lumbago (pain in the lower back), ischias (pelvic pain in the hip joint), arthrosis (non-inflammatory arthritis), polyarthritits (arthritis of multiple joints), osteoarthritis (arthrosis deformans), and with osteochondrosis (ossification of cartilage).

With respect to internal use, humic and fulvic acids have been shown to be particularly useful in the prophylaxis (prevention), therapy and metaphylaxis (after-care) of a variety of stomach and intestinal troubles such as, hyper-acidity, diarrhea, gastric ulcers, dysentery, gastroenteritis and colitis. They can also act as a detoxifying agent, and have been used against bacterial and viral infections. They have been found to be useful in the treatment of anemia (deficiency of red blood cells, hemoglobin or total blood volume) and as a stimulator of the body's immune system and of detoxifying liver functions. By counteracting certain kinds of cancerous growth, humic acids may also have a potential as an anti-carcinogen.

Many of these effects can be attributed to the activity of humic and fulvic acids by themselves, and are the result of their surface activity, chelating properties, power of absorption, their polyacidic nature, their polyphenolic structure, their interaction with other organic molecules including polysaccharides, proteins, enzymes and lipids, as well as of their redox properties and free radical content. No unfavorable side effects have so far been noticed with the administration of humic or fulvic acids.

Dr. G. Davies summarized the effects of humic acids in the Nucleus, Feb. 1996, in a monograph titled "Properties and functions of humic acids." He stated that oral doses of humic acids reduce heavy metal absorption in animals and also decrease pesticide toxicity. Humic acids can be administered preventatively and therapeutically in animals, including pregnant animals, without apparent risk. Some humic acids control uterine cancer in rats and humic acids markedly reduce the mutagenic effect of benzopyrene, 3-aminoanthracene, 2-nitrofluorene and 1-nitropyrene. The anti-mutagenic effect depends upon the adsorption of these dangerous chemicals onto the humic acid surface. Since fulvic acid is humic acid, the bioactive component, all data applies to fulvic acid as well.

Recent research articles by Dr. Senesi and Dr. Miano clearly link humic and fulvic acid properties with human health.

Hospital patients with rheumatoid arthritis had 92% success rate when treated with humic extract baths.

Yuan, Shenyuan; Fulvic Acid, 4 1988; in *Application of Fulvic acid and its derivatives in the fields of agriculture and medicine*; First Edition: June 1993

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Fulvic Acid Minerals Information

Renowned longevity and health of isolated Himalayan cultures is linked to fulvic acid extracted from fossil-like humic substances

For centuries traditional medical doctors in remote areas of the Himalayas have claimed that "shilajit", a rare humic substance high in fulvic acid, can "arrest the aging process" and "induce revitalization". Historical documents testify to the amazing longevity and health of these people who often live well beyond 100 years of age. Now the physiological functions behind these claims are being

substantiated by leading medical hospitals and pharmacologists around the world.

Fulvic acid extracts from the rare humic substances found on the high mountain slopes of the Himalayas, have been used for centuries by the isolated inhabitants of that region as a "rejuvenator, a class of drugs reputed to arrest the aging process and to induce revitalization", according to quotes from leading pharmacologists studying them. The traditional medical claims of "rehabilitation of muscles, bones and nerves", treatment of "geriatric complaints including arthritis, diabetes and allergic manifestations," dementia, etc., are now being proven, along with their mode of action, by pharmacologists and many other medical doctors and scientists.

The various pharmacological studies reveal that the fulvic acids exhibit results "sufficiently impressive", and "more effective" than several currently available immune system regulators. The fulvic acids "produced significant effects", as an anti-stress agent, in relieving stomach ulcers, preventing allergic reactions, and in activating the immune system against tumor cells. "The results support the use" of fulvic acids "as an adjuvant [assisting in the prevention, amelioration, or cure] in the therapy of diabetes", to quote leading pharmacologists.

In recent years, leading scientists, doctors, and pharmacologists from major hospitals and universities in India, Russia, and China have become more conscious of the purported anti-aging and health claims associated with the rare fulvic acids, and have been looking deeper into the assertions coming from traditional health practitioners of the region. The inhabitants and areas of the Himalayan belt that are mentioned in the many and growing number of scientific and medical studies documenting this research include: The Tibetans of the Tibet region of China, the Georgian Russians living in the Caucasus Mountains of Russia, the Hunzas of Pakistan and Afghanistan (Hindu Kush and Karakoram Mountains), the Sherpas in Nepal, the people of the Kashmir region, and the Indians living in the Kumaon, Himalayas, Vindhya and Aravalli Mountains of India.

It is a well-known fact that a large number of individuals in the Himalayan belt live to well over 100 years of age, and often are reported to live to 120-140 years or more, maintaining excellent health throughout their entire lives. People of the region that use fulvic acid preparations made from the rare humic substance not only report significant health benefits for themselves, but for their animals as well, and most people lack the degenerative diseases common to other cultures today.

Scientists researching these matters determined that the prized shilajit health preparation esteemed for centuries throughout the region was indeed organic humic matter of ancient plant origin, and they spent time tracking down and checking the authenticity of the very best supplies. Rather than simply studying the people and their livestock, which had already shown significant health benefits historically, the scientists undertook extensive clinical, medical, pharmacological, and laboratory studies to identify the active constituents and analyze their physiological functions.

In a scientific world that as a whole still knows very little about humic substances, these researchers went far beyond. They accurately identified and quantified the water soluble fulvic acid fractions. This in itself is an amazing feat considering that fulvic acids, for the most part, are virtually unknown to medical science and undetectable through standard testing procedures. These scientists proved that the water soluble fulvic fraction was the primary active constituent. They even recognized that the fulvic, along with its associated organic metal ions, was made up of numerous other and even more obscure active constituents. They identified and isolated extremely valuable functional groups within the fulvic acid spectrum that were also shown responsible for the protective, regenerative, and healing responses of cells. They did this for the most part independent from the rest of the scientific world.

What the researchers discovered is fascinating. From one clinical study to the next, scientists were able to prove not only that many of the medicinal remedies and health benefits are completely justified by scientific fact and medical results, but they also identified mechanisms responsible. Their studies opened up an entirely new picture into the amazing functions and values of fulvic acids in relation to man and medicine.

After years of scientific research, other pharmacologists determined that not all fulvic acids are the same, and that they vary in quality from one source to the other. These pharmacologists came up with methods for determining and quantifying the medicinal value. They perfected their extraction processes. The pharmacologists performed extensive chemical analysis, metal ion analysis, microbiological analysis, pathogen analysis, and mycotoxin analysis. They went to great lengths to identify the presence of any harmful substances, which were proven absent at any toxic level. The pharmacologists used extremely advanced pharmaceutical techniques to standardize the natural extract, to the quality of the finest pharmaceutical preparations in the world today, while retaining all of the natural organic principles in an unadulterated "herbal" form.

The pharmacologists recognized that although the rare humic substance was rock-like and seemed inert or fossilized, it had all of the organic characteristics of the natural botanicals they had been working with for years. In other words, although it was ancient and looked like dead rock, it was in actuality a natural organic herbal substance, and they used extreme care in preserving the fulvic extracts so that they would retain their organic form.

Traditional medicine throughout the Himalayan belt lists the indigenous humic substance and resultant fulvic acids as a "rasayana" or rejuvenator, a class of drugs reputed to arrest the aging process and induce revitalization of attenuated physiological functions. The special endurance attributed to the Sherpas, including their ability to survive extremely cold conditions and high altitudes has also been linked to these substances during the medical studies.

Clinical studies in pharmacology have shown significant value in treatment of diabetes mellitus (attenuates the development and progression), stomach ulcers (anti-ulcerogenic and anti-stress activity), allergies and anti-allergic action (mast cell protection), hormonal control and regulation of immunity (immunomodulatory

functions), and tumor and cell growth factors relating to activated white blood cells and immune system (splenocytes and peritoneal macrophages).

Traditional medicine of the region prescribes the local rare fulvic acid extract in genito-urinary diseases, diabetes, jaundice, gallstones, enlarged spleen, digestive disorders, epilepsy, nervous diseases, elephantiasis, chronic bronchitis, dementia, arthritis, and anemia. The humic extract has been shown to accelerate the process of rehabilitation of muscles, bones and nerves, and is used to treat many geriatric complaints including memory loss, and is believed to increase cerebral functions. It has also proven useful as an aphrodisiac, rejuvenator, alternative tonic, stimulant, internal antiseptic, diuretic, lithontriptic, and is used for treatment of respiratory problems, worms, piles, adiposity, renal and bladder stones, nervous diseases, amenorrhoea, dysmenorrhoea, menorrhagia, eczema, anorexia, and fracture of bones.

Historically, fulvic acids from the Himalayan region have been shown effective for treatment of cold stress, diabetes, tumors, skin diseases, rheumatic pain, kidney stones, heart ailments, leprosy, and many other ailments. Fulvic acids are also a panacea of oriental medicine, where they continue to be used extensively.

These discoveries are most significant, considering the fact that the various cultures of these remote Himalayan regions have used organic farming practices for centuries, which promote soil and crops already rich in natural humic/fulvic substances. Yet these people still find that additional fulvic acid supplementation and medication proves highly beneficial to their health, and alleviates disease problems when they arise. This shows that the ancient vegetation, which was the source for the rare fulvic acids, has exceptional properties that may even surpass those of vegetation found anywhere on Earth today.

The rare humic deposits of the region were exposed at the time of uplift of the Himalayas, and are normally found from about 5,000-15,000 feet of elevation. These humic deposits are exposed by landslides, excavation or road-cutting. It is important to note that similar high quality humic substances found in various other regions of the Earth show similar results. However, the fulvic acids from the shilajit humic have some most unusual characteristics.

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From notes by: D.B.A. Narayana, Ph.D., manager of research and development for Dabur Research foundation, and also member and past president of the Indian Pharmaceutical Association, and also is a member of the Research Advisory Council of CSIR.

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Fulvic Acid Minerals Information

Research on the development of the medicinal applications of Fulvic acid in China

In the 15th century during the Ming Dynasty, Li Shi Zhen, in the *Materia Medica* pharmacological compendium, recorded incidents of the use of "Wujinsan" (golden medicine) containing fulvic acid as the active ingredient in the treatment of infectious ulcerous growth and female hemorrhage diseases, implying fulvic acid to be an efficient anti-inflammatory and blood coagulating agent.

Prior to 1978, fulvic acid had been used in hospitals and among the general population for the treating of a wide range of diseases with success; however, there was very little research conducted on its therapeutic mechanism. Because of lack of clinical data, doubts and misconceptions remained regarding the therapeutic usage of fulvic acid.

Since then, a score of medical schools and hospitals in China have begun to engage in extensive studies on the toxicology and pathology of fulvic acid and its clinical applications. Over a hundred research papers have been published nationally in China and some appeared in international journals, in addition to some reports presented at various meetings outside of China. Pharmaceutical companies in Da Tong, Shanxi, in Gongxian, Henan and in Kunming, Yunnan manufactured fulvic acid which was then approved by the Chinese Drug Administration, because of its non-toxicity, for oral as well as external usages. The pharmaceutical usage of fulvic acid has been approved by the provincial drug administration to be used clinically for its effectiveness and safety, both internally and externally.

Pharmacological studies:

- 1. As an anti-inflammatory agent:** The effectiveness of fulvic acid relative to hydrogenated cortisone varies with the location of its source and the method of extraction. (i) Fulvic acid inhibits an enzyme secreted from the infected area and (ii) Fulvic acid regulates the level of the trace elements Zinc and Copper and thus activates the super-oxide dismutase which is a Zinc and Copper containing enzyme. Free radicals generated in the infected region are dismutated, utilized, and eliminated by this agent. Applications have also been established in the area of veterinary medicine.
- 2. Stimulates blood circulation and enhances blood coagulation:** Many diseases are caused by malfunction of the circulation in the capillary blood system. The therapeutic effect of fulvic acid is a result of its ability to restore and improve blood circulation in the capillary system. Fulvic acid, on the other hand, serves as well as a blood coagulant when there is bleeding or blood seeping from the vascular bed.
- 3. Digestive tract ulcers:** The healing effects of various fulvic acids are a result of their ability to stimulate blood circulation in the stomach wall and its ability to inhibit the secretion of acid from the stomach wall. It stimulates as well the secretion of those glands in the stomach which have the ability to protect the stomach inner wall, preventing and healing stomach ulcers.
- 4. Immunology:** There are indications that with injection of fulvic acid into the abdominal region, the size of thymus in experimental animals increases, together with indications of macrophage activation. A dosage of 5 mg/kg of fulvic acid when injected into the abdominal cavity is beneficial. However, larger dosages of 50 mg/kg showed adversary effect, i.e., the weight of the thymus reduced. Researchers became interested in carrying out research to investigate how fulvic acid regulates the immune system.
- 5. Endocrinology:** Fulvic acid regulates abnormal thyroid hormone secretion as a result of its being able to regulate cyclic nucleotides at the cellular level.

6. **Anti-cancer:** In general, fulvic acid does not kill cancer cells. It serves as a regulating agent in the immune system and can be used in conjunction with other anti-cancer medicines.

Clinical Applications of Fulvic Acid:

1. **Anti-inflammatory and blood coagulant:** In many clinical cases infections were accompanied by blood seeping into the area, or bleeding caused ulcers. Fulvic acid moderates ulcerous conditions on the basis of its anti-inflammatory nature, its coagulating nature, and general healing ability.

2. **Ulcerous cornea infection:** 53 cases studied, treated with fulvic acid eye drops and intramuscular injections. Success rate 94.2%. Study performed at an eye clinic in a hospital in Shaoxin, Zhejiang Province, China.

3. **Blood shot eye:** 47 cases studied, treated with fulvic acid eye drop and intramuscular injection. Success rate 93.6%. Study performed at an eye clinic in a hospital in Shaoxin, Zhejiang Province, China.

4. **Colon infection, including chronic ulcerous colon infection:** 95 cases studied, treated with 30 dosages of fulvic acid enema. Success rate 92.6%. Studies performed at Haidian Hospital in Beijing, China.

5. **Acute upper gastroenterological bleeding:** 160 cases studied, treated with oral fulvic acid and injection. Success rate 95.6%. Studies performed at Internal Medicine, Tongren Hospital, Beijing, China.

6. **Skin ulcers:** 51 cases studied, treated with fulvic acid bath. Success rate 92.2%. Studies performed at Internal Medicine, Tongren Hospital, Beijing, China.

7. **Rheumatoid arthritis:** Large number of cases studied, treated with fulvic acid bath. Success rate 92%. Studies performed at Haidian Hospital in Beijing, China.

8. **Hemorrhoids:** Several thousand cases studied, treated with fulvic acid preparation. Success rate was so good that Chinese medical authorities developed an over-the-counter medicine for national distribution. Studies performed at Erlonglu Hospital in Beijing, China, and Kunming in Yunnan, China.

9. **Cancer of the esophagus, disease incubation period:** 27 cases studied, treated using fulvic acid water solution for two years. 100% successful in preventing tumor progression into the cancerous state. Studies performed by Hongji Xie, et al.

10. **Malnutrition in women:** 1800 cases studied, treated with fulvic acid. Success rate 96.0%. Studies performed by Professor Deqing Yao at Tongren Hospital in Beijing, China.

11. **Over-active thyroid:** 33 cases studied, treated for 6 months of fulvic acid treatment. Success rate 90.9%. Studies performed at Tongren Hospital in Beijing, China.

12. **Congenital regional neurological disease (deaf and dumb, mental retarded and seizure patients):** Three groups studied, with one year of fulvic acid treatment. Success rate 30.3%. Studies performed at Tongren Hospital in Beijing, China, and Epidemic Prevention Station in Changping, China.

In summary, as a result of the joint efforts contributed by both the basic science researchers and clinicians, the fulvic acid component derived from humic acid has proven to be an effective and a safe remedy for a wide range of diseases. This accomplishment has raised the curiosity and interests of scientists from abroad. As evidenced by "*The Recent Progress in Chinese Medicine*" published in Singapore and "*Fulvic Acid*" published in Germany.

Future research and development directions are:

1. Continuous collaboration among researchers in chemistry, pharmacology and medicine is needed to warrant provision of high quality and authentic products. This is a mandate for making the treatment effective and safe.
2. Expand the existing clinical application to benefit more patients.
3. Select meaningful areas and develop in-depth research methodologies.
4. Acquire advanced information from researchers abroad in order to gain a broader view and understanding of the fulvic acid applications in medicine.

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3. Medicinally Useful Properties of Humic Acids

- Mucous membrane covering and astringent efficacy

The macro colloidal structure of humic acids provides a good film-like covering on the surfaces of the gastrointestinal mucous membrane, peripheral capillaries and damaged mucosa cells. As a result of this process, the resorption of toxic metabolites is, for example, reduced or totally suppressed (e.g., after infection, with toxic residues in feed or when changing feed). There is an additional positive result that is expressed in a calming of peripheral nerve endings due to the colloidal protective function of humic acids. That way an accelerated recovery of physiological intestinal tonus is made possible.

- Anti-bacterial and virucidal efficacy

Humic acids especially have the ability to influence the protein and carbohydrate metabolism of microbes by catalytical means. This has a direct harmful effect on bacterial cell or viral particles. Obviously the diffusion of humic acids into the interior of the cell needs a transmitter. Research has shown that in different test systems a significant and sometimes highly active inhibition of bacterial (*E. coli*, *Salm. Typh.*, *Salm. Cholerae* quis, *Staph. Aureus* SG 511 etc.) and viral (*Herpes Simplex virus* type 1, *Adenovirus* 2, *ECHO virus*, *Rota virus*) test species was to be observed (among others: Schneider, 1992).

A second mechanism is based on the interionic binding of high molecular protein fractions (toxins) of infecting microbes. Their

toxic effect on physiological processes in mucous cells can therefore be bly reduced or even inhibited.

- Anti-phlogistic efficacy

The basis for the anti-inflammatory property in all probability lies in the flavonoid structure contained in the basic structure af humic acids.

Antiphlogistic effects have been shown in oedema tests on rat paws. The result was a time-dependent delay of oedema growth or an accelerated regression in oedematous anomalies.

Figure 4: Time-Dependent Oedema Growth and Depression (Simultaneous active agent application)

Figure 4 shows that, when humic acid content in a preparation is increased as compared to the control group (with DMSO as depressor), the most effective oedema depression is achieved in terms of both time and efficacy. (see V2)

- Anti-resorptive and adsorptive efficacy

Since high-molecular humic acids remain almost completely in the gastrointestinal tract after enteral application (no self-resorption) the anti-resorptive and adsorptive effects become especially clear in the digestive tract at the point of action. Cationoid noxae especially (protein toxins, toxic residues) are bound. Their resorption is bly reduced or completely inhibited and their elimination through the

faeces enhanced.

The toxic-depressive effects of humic acids relative to a number of noxae as well as in cases of acute and subchronic intoxications are also due to its good adsorption properties. The adsorption effect has been demonstrated on, among others, heavy metals, nitrate/nitrite, fluorides, organic phosphates (e.g., parathionmethyl), chlor-organic insecticides, carbaryl and warfarin. Since the adsorption by humic acids involves not only physical but also chemical reactions (e.g., complex formation and ion exchange), it is more intensive and dynamic (chemisorption) compared to purely physical adsorbents (e.g. Carbo med.).

- Paramunologic efficacy

Caused by the inducer-effect of the phenolic components of humic acids, it forms the basis for therapeutic success against so-called multifactorial diseases in rearing young stock.

- Ergotropic efficacy

Below research is for those physicians who rightfully want to examine a product prior to prescribing it to their patients.

Please note that this research mentions Humet-Syrup, the Integrated Medicine Practice only sells the capsules because these do not contain sugars, otherwise its formulation is exactly the same as the syrup.

1. INTRODUCTION

1.1. BACKGROUND

HUMET®-R syrup is an orange-flavoured colloidal solution of humic acids and ten organic minerals: Iron, Magnesium, Zinc, Copper, Cobalt, Manganese, Selenium, Vanadium, Molybdenum and Potassium. This colloidal solution forms an optimal carrying agent with the humic acids providing variable function groups, which contain the trace elements and minerals in chelated biochemical structures similar to the human body's own transport-proteins. These are thus more easily absorbed and have high bioavailability. HUMET®-R is formulated to carry the international Recommended Daily Allowances (RDA) of the ten organic minerals.

Once the organic minerals are released into the body, the freed humic acids naturally bond to any heavy metal molecules (cadmium, mercury, lead, etc) and these are removed in the waste.

Humet-R has been developed after many years of study into the inter-relationship of the trace element content of cultivated fields, the trace element content of farm animals maintained in those fields, and the area spread of disease due to trace element deficiency. In spite of the fact that both soil and its vegetation contain lavish quantities of the elements needed, animals developed deficiency symptoms.

It is known from the literature that the humic acids contained in peat assist in efficiently delivering the required trace elements into the animal organism. This is impossible for inorganic compounds in the form of the simple metal salts.

The eminent veterinarian Dr. Elek Csucska carried out the majority of the veterinary observations mentioned above as well as the early experiments with a peat-based product. Basic experiments were followed by research work for several years. An extraction method was developed to separate humic acid from calcium huminate. By adding the proper metal ions to the humic acid, the product was found to improve the clinical state of mineral-deficient patients.

1.2. DATA FROM THE LITERATURE

The results of recent research works clearly demonstrate that animals are unable to utilise metal ions when they are introduced in the form of inorganic compounds. References reinforce that the efficiency of inorganic metal salts is very low in the replacement of trace elements demanded by the body.¹

Similarly, literature references demonstrate that peat and peat soil possess the capacity to bind metal ions.² It was shown that the humic acid component of peat was responsible for the chelate binding of trace elements.³ It became evident that the administration of peat and peat extracts might improve the introduction of the vital metal ions.

Additionally, it was observed that animal feed enriched with humic acid could be curative not only in deficiency diseases but the feed also improved the reproductive function of several domestic animals and their resistance against infectious diseases. Furthermore, humic acid-enriched animal feed could exponentially increase the utilisation of nutrients and, consequently, body weight gain increased.⁴ Obviously, that which proved to be helpful in the animal organism may possess therapeutic value in humans, too. Many well-documented trace element deficiency diseases are known in medical practice and the research of the medico-biological role of trace elements is continuing.

1.3. DEVELOPMENT OF A PARAMEDICINAL PRODUCT

Research workers of HUMET Limited (formerly HORIZON-MULTIPLAN Ltd.), and the laboratories working with the company, have investigated HUMET®-R since 1992. The final composition was determined during this period. The efficiency of Humet®-R was proved in controlled expertly based experiments, its further therapeutic indications were revealed, and its safety tested in toxicity studies.

Based on this data, the National Institute of Pharmacy (OGYI) of Hungary approved the product of the HUMET Ltd. in 1993 and the production started in 1994.

2. COMPOSITION OF THE PRODUCT AND THE ROLE OF ITS COMPONENTS

In HUMET®-R the vehicle is a humic acid preparation of homogenous origin, extracted from geologically young (about 3,000-7,000 years old) peat. This vehicle is completed with several micro- and macro-elements. This

paramedicinal product is a complex trace element preparation and its humic acid vehicle is a biologically compatible chelate-former, which assures the good absorption and bioavailability of the metal ions included. Each of its constituents possesses an individual physiological action and effect, but the general roboration (or tonic) effect results from their synergistic, joint action and interaction.

2.1. STRUCTURE AND CHEMICAL PROPERTIES OF HUMIC ACIDS

During the last 50 years, several research works and theoretical studies have focused on the chemical structure of humins. Their common source is lignin, which constitutes the slowly degradable compact skeleton of plants. Lignin undergoes a slow microbiological transformation, caused primarily by bacteria and fungi, and chemical changes in the soil. The joint effect of these changes leads to the enrichment with humic acids of various soils (primary peat and brown coal). The two most important therapeutic groups of humins are humic acids and fulvic acids, which are determined based on their acid/base solubility.

According to present knowledge, humic acids are chemically multi-substituted polyaromatic heterocyclic macromolecules, which incorporate cyclic structures joined by aliphatic carbon chains. This primary structure can fix other organic components, such as carbohydrates, proteins, and lipids, in physical and chemical bonds.⁵

Related to oxidised state, the aromatic and chinoidal structures of the chemical entity contain the oxo-, hydroxyl-, carboxyl-, amine, - and substituted amine groups which can bind several bivalent metal ions in chelate bonds. This chelate-bonding ability of humic acids has been used for many years for the clearance of toxic heavy metals from waste water and superficial water running downhill from mining areas.⁶

2.2. BIOLOGICAL ROLE OF HUMIC ACIDS

Humic acids are difficult to characterise by physical or chemical methods. Their place of origin, age and geological past may be more characteristic than actual chemical and physical analysis. Their biological effects may be very different.

There is a humin preparation derived from the peat (Tolpa Torf preparation, TTP) which exerts immuno-modulator effect.⁷ TTP preparation increases the production of tumour necrosis factor (TNF) in human leukocytes and stimulates the synthesis of interferon.⁸ In mice, it can recover the immune responses which have been suppressed by zinc phosphamide.⁹ TTP preparation given prophylactically significantly decreases the damage of the gastric mucosa and duodenal ulcer¹⁰ and its regenerative effect was also demonstrated in the liver.¹¹ Humic acids have been noted to influence the function of the endocrine system. The effect on the thyroid function was studied in mice and this demonstrated that humic acids antagonise the action of thyroxin; this effect is mediated by blocking the activity of the Na⁺/K⁺-ATP-ase.¹² The antibacterial effects of humic acids antagonise the mutant strain of streptococci-producing glucane which is responsible for the development of caries.¹³ Anti-viral effectiveness of humic acids is also known.

The sodium salt of humic acids, when given together with cadmium (a toxic heavy metal) in experiments in chickens, showed a marked decrease in the absorption of the heavy metal and prevented its incorporation into the liver.¹⁴ At the same time according to our experiments with humans, HUMET®-R decreases the blood level of the toxic heavy metals, such as lead and cadmium, in exposed workers.¹⁵

It was found that, after surgery, humic acid treatment successfully prevented adhesion in rats.¹⁶

In other experiments, human endothelial cells were incubated with humic acids and an increase in the tissue factor (TF) expression was found. In conjunction with this, increasing intracellular Ca²⁺ was measured, even in the presence of Verapamil (a strong Ca²⁺ channel blocker), which led to the conclusion that the influx was independent of the specific Ca²⁺ channels.¹⁷

Desmutagenic activity was observed *in vitro* on CHO cells using four different humic acid preparations against two known mutagens, mitomycin-C and maleic acid hydrazide.¹⁸

Of possibly outstanding importance, in cell culture, synthetic humin analogues block the human immuno-deficiency virus (HIV)¹⁹, the paralysis²⁰, and herpes virus.²¹

The anti-allergic effect (e.g.: in "hay fever") of salts, formed by humic acids with alkali metals, has been positive.²²

The dermatological efficiency of humic acids is noteworthy. Salts of humic acid formed with ammonia and alkali metals significantly shortened the time of wound healing.²³

Humic acids have been shown to inhibit the reproduction of malignant tumour cells. Thus, they can be useful in anti-cancer therapy.²⁴

Humic acids, as a natural absorbent of the ultraviolet light, may protect the human skin.²⁵

The protective effect of humic acid against radiation was demonstrated in rats using its sodium salt. The lethal effect of gamma radiant ^{60}Co was prevented by 50 percent in animal experiments.²⁶ The increasing use of humic acids in the antiphlogistic treatment and particularly in arthritis yields new important therapeutic indications.²⁷

It has been reported several times that humic acids possess toxic heavy metal binding capacity.²⁸ The therapeutic applications and the potential curative indications outlined above justify further basic research activity.

2.3. THE HUMIC ACID METAL CHELATE

For therapeutic application, the most interesting medico-biological effects are due to the metal binding capacity of humic acids. The metal binding capacity of humic acids is based, in part, on chelate forming. Development of chelate bonding masks the charge of the metal ion. The chelated metal loses its hydrate cover and receives the hydrophilic/hydrophobic characteristics of the chelate-forming compound. Thus, in principle, the chelate could easily pass the hydrophobic cell membrane.

The metal-humin interactions are selective. Namely, humic acids binding the toxic heavy metals (lead, cadmium, and mercury), mobilise and eliminate them from the organism, but some vital macro- and microelements are transported by humic acids into the body to specific enzymes. Humic acids can affect several biological processes by hitherto unknown mechanisms.

Recently, it became evident that **selenite** is essential to the function of antioxidant enzymes (e.g.: glutathion-peroxidase), which are responsible for the elimination of free radicals. This mechanism is important where increased formation of free radicals is present (radiation effect, tumour, increased degradation of lipid and protein, long-lasting starvation, etc.). In the body, the lack of selenite causes muscular tissue deficiency and the tumourigenic effect of cadmium and lead possibly increases in humans, and certainly in animals, respectively. Sufficient selenine supply can prevent cardiomyopathy and muscular dystrophy.

The **molibdate** content of the diet assures the co-factor of xanthin oxydase, aldehyde oxydase, and sulphite oxydase.²⁹

The **vanadate** component inhibits the phosphatases, which control the intracellular signal transduction and, thereby, can prolong the duration of hormonal action. In diabetes, the gene expression of certain enzymes changes.³⁰ K^+ found in the preparation is the most important intracellular kation, which has central role in stimulus conduction, and in the maintenance of basic life processes. K^+ deficiency may occur following drug treatment (e.g. diuretics) or due to some diseases. Besides these metal ions, HUMET® -R contains a further six bivalent metal ions which are chelated with the humic acids.

2.4. METAL IONS AND THEIR PHYSIOLOGICAL ROLE

Several monographs widely discuss the biological role of the bivalent metal ions and these may be summarised as follows.

- Iron (**Fe**) is the basic component of the functional group of haemoglobin and myoglobin, transporting oxygen and electron-transporting cytochromes. There are clinical symptoms in iron deficiency (fatigue, headache, stomatitis, gingivitis, loss of appetite, etc.) In chronic deficient state, hypochrome anaemia with microcytemia and bone marrow hyperplasia develop. The presence or absence of the other microelements influences the administration of iron to the organism. At the same time, iron intake potentiates the elimination of the toxic lead.
- Magnesium (**Mg**) is a natural calcium antagonist and thus influences the metabolism of calcium, phosphorus, and sodium. Magnesium is the activator of the glycolysis and plays a significant role in protein metabolism. It modifies the muscular function, participates in the maintenance of circulatory homeostasis, and decreases blood pressure (relaxation of the vascular smooth muscle). Magnesium has a role in energy metabolism and in the reproductive function. Magnesium deficiency is manifested in spastic responses.
- Zinc (**Zn**) is the component of several enzymes. It has a central role in the formation of the steric structure of insulin and in the synthesis of DNA and RNA. The presence of Zinc is especially important in lead and cadmium exposition: its administration decreases the toxicity of these metals. Zinc deficiency causes typical symptoms (dermal changes, alopecia, disturbance in testicular development, sexual retardation, hepato- and splenomegaly, growth disturbances, delayed wound healing, and decreased immunological

- defensive function.) Levels of Zinc may decrease following the adverse effect of corticosteroid or diuretic therapy, in sickle cell anaemia, lung tumours or myocardial infarction and, in consequence, of anticoncipient use.
- Copper (**Cu**) has a significant role on the haemopoiesis, celloxidation, energy metabolism, and in cerebral catecholamine metabolism. It influences the iron and zinc balances and the reproductive functions. Its lack may be one of the causes of infertility and the increase in cadmium toxicity. Consistent Copper deficiency evokes anaemia, bone marrow alterations, growth retardation, cerebral dysfunction, and myocardial destruction. Patients with Wilson disease a.k.a. pseudosclerosis of Westphal-Strümpell - a trias of basal ganglia dgeneration, liver cirrhosis and corneal Keyser-Fleischer ring - which is quite rare should not use Humet-R.
 - Manganese (**Mn**) is an essential mineral requirement for the formation of bone, cartilage and ligaments. It plays an essential role in the formation of Superoxide dismutase, the cellular antioxidant enzyme responsible for the removal of Superoxide radicals. It stabilises blood sugar levels, and is essential for reproduction, red blood cell synthesis, production of insulin as well as maintaining healthy DNA & RNA.
 - Molybdenum (**Mb**) assists the body's antioxidant function, removes protein breakdown products like urea, hydrocarbon based free radicals and sulphites.
 - Potassium (**K**) is vital in the maintenance of the body's hydrostatic balance, assists with insulin secretion and overall energy balance, maintains heart function, stimulates gut movement and encourages elimination. Promotes healthy nerves and muscle condition, key component in the potassium:sodium ratio for maintenance of blood pressure.
 - Selenium (**Se**) is known as the anti-cancer mineral is a principal antioxidant vital in the removal of free radicals and is a component of the antioxidant enzyme Glutathione peroxidase. Essential for male reproduction, immune system stimulation and cardiac function.
 - Vanadium (**Va**) is considered an essential trace mineral. Its primary role is associated with regeneration of red blood cells, imbalance in iron metabolism, maintenance of blood sugar levels via the insulin –mimic effect of vanadyl ions, reduces blood fat and cholesterol levels and prevents dental caries.
 - Cobalt (**Co**) influences iron metabolism. It increases the haemoglobin concentration in red blood cells. Cobalt is the metal component of the prosthetic group of vitamin B₁₂. It is one of the components of beta-lysine-isomerase, glycerin dehydrogenase, and methionin aminopeptidase.³¹

3. PRECLINICAL INVESTIGATION

3.1. TOXICOLOGICAL INVESTIGATIONS

3.1.1. ACUTE TOXICITY STUDIES IN RATS (WITH 14-DAY POST-TREATMENT OBSERVATION PERIOD)

Acute toxicity studies were performed in the form of "limit tests" in two species (mouse and rat), in compliance with the GLP regulations, for the determination of the acute oral LD₅₀ values.³²

These studies were carried out in male and female Wistar rats and in CFLP mice. At the beginning of the studies, the animals were 5-6 weeks old. The animals were treated with the endowed humic acid which is the active ingredient of the Humet®-R, (supplemented humic acid - SHA) in total amount of 40 ml/kg. Related to the standard humic acid preparation containing 15 mg/ml, this 'total amount' corresponds to 600 mg effective dose of humic acid.

The animals were fasted for 18 hours, the active part of Humet®-R (SHA) was given (p.o.) via gavage in a volume of 10 ml/kg, twice per 24 hours (10 males and 10 females in every group). Control groups (10 for each gender) were given the same volume in physiological saline. Animals were maintained for further 14-day (post-treatment observation period).

The lethality per group and the body weight of the animals during the post-treatment period were studied. The necropsy did not reveal any pathological changes in several organs.

The single-dose administration of SHA did not cause altered behavioural effects or any other pathological changes.

Acute oral LD₅₀ value of this trace element preparation could not be properly determined in Wistar rats and CFLP mice. There was no lethality after the doses applied. LD₅₀(male) > 600 mg/kg; LD₅₀(female): > 600 mg/kg in both species.²⁷

3.1.2. SUBACUTE (4-WEEK) DIETARY TREATMENT OF RATS WITH Humet®-R

In the course of a four-week treatment, the effects of Humet®-R on the haematological parameters and the body weight gain were studied.

At the end of the observation period, the mass of several organs (lung, liver, spleen, and kidney) was registered and the possible macroscopic changes were studied.

Treatment was carried out in five groups (n = 10), the animals were given 5, 15, 50, 150, 500 mg/kg/day doses in the different groups. The amount of the Humet®-R preparation was related to the dried content mixed with the trace element deficient food. Control group was supplied with normal food.

In this rat study, the animals were fed continuously with food containing Humet®-R for four weeks. The results may be summarised as follows.

It was demonstrated that the humic acid-containing preparation Humet®-R did not affect the animals' general physical state (motility, food intake), the weight of the whole body or that of different organs or the haematological and blood chemistry parameters during the four week diet treatment.

For the animals fed with 150 and 500 mg/kg/day doses of Humet®-R, loss of appetite and consequent weight loss developed three weeks after starting the treatment but the haematological and blood chemistry parameters remained unchanged. Humet®-R did not influence the survival of the animals in either dose group; lethality did not occur. There was no significant difference between the control and Humet®-R treated any dose group of animals in the value of haematological or blood chemistry parameters.³³

3.1.3. CUMULATIVE TOXICITY EVALUATION IN RATS

The aim of the study was to determine the cumulative toxicity of Humet®-R.

Study was performed in control and treated Wistar rats (n = 10). The results of the previous studies declared the product non-toxic. The LD₅₀-value was arbitrarily declared 150 mg/kg. The rats were orally treated with 9, 13.5, 20, 30, 45 and 68% of this LD₅₀ value (13.5, 20.3, 30.0, 45.0, 67.5, 101.3 mg/kg/day). Each was given sequentially for four days in a total 24 day interval with daily volume of 5 ml/kg.

Following treatment, the total body weight and the relative organ weight (thymus, lung, heart, liver, spleen, kidney, and adrenals) were determined. Each of these organs was histologically processed. The haematological parameters were determined and differential blood count was taken. Serum iron value and level of the thyroid hormones (T3 - T4) were also measured.

According to the results of this study, Humet®-R did not evoke any changes due to cumulative toxicity. The decrease of the leukocyte count, the haematocrit, the MCV and serum iron was not a toxic effect. Other biologically detectable changes were not observed.³⁴

3.1.4. MUTAGENICITY STUDIES

In the **Ames test**, the lyophilised Humet®-R preparation was investigated. The study was carried out in several strains of Salmonella typhimurium (TA 98, TA 100, TA 1537, TA 1538) both in the presence and absence of the liver microsomal fraction, activated with Arochlor 1254, using positive and negative control groups.

(Concentrations studied of Humet®-R were: 469, 938, 1875, 3750, 7500 microgram per plate.)³⁵

Results of the study showed that Humet®-R did not possess any mutagenic activity after the administration of the above concentrations, in this test.

3.2. PHARMACOLOGICAL INVESTIGATIONS

In the course of the animal experiments, primarily the biological effects of Supplemented Humic Acid (SHA), which is the active principle of Humet®-R syrup, were studied in well-controlled animal experiments.

3.2.1. STUDY OF THE IMMUNOLOGICAL EFFECTS

To date, Humet®-R was studied in non-controlled clinical studies involving volunteers, most of whom suffered with a tumour disease. In these cases, the treatment resulted, in part, in the cessation of growth of the tumour, or its healing. It should be stressed, however, that in these studies the administration of Humet®-R syrup was made in the form of adjuvant therapy.

As is known, tumours are cellular agglomerates with abnormal reproduction capacity occurring in several tissues. They have the ability, by deceiving the immune system of the body, to proliferate abundantly and finally destroy it. In this study the purpose was to determine how the growth and proliferation of the tumour cells can be inhibited by the administration of Humet®-R (supplemented humic acid, SHA).

In this study, C57BL (black) 6 male mice were used, their mean age was 3 months, and mean body weight was 20 g. SHA was mixed into the drinking water in a concentration of 1.5 ml/L.

For studying the effect on the immune system, several cell sets were given subcutaneously into the trunk area above the hip. The growth rate of the tumours, injected subcutaneously, and its possible inhibition by the SHA, were studied.

The experimental results showed that tumours could grow *only* in untreated animals inoculated with the least amount of tumour cell (103 cell/animal). Such difference was not seen after inoculation with hundred fold higher concentrations of the inoculation (105 cell/animal) but the growth of tumours was slower in the treated than in the control animals. Among the groups of animals inoculated with one million tumour cells, half of the treated animals were living 2.5 months after beginning the study. However, after only 7 weeks after inoculation, the control animals had to be over-anaesthetised to spare them from suffering due to their enormous tumours.

Subcutaneous tumours developed also in the treated animals but the animals gnawed their tumours causing great wounds. The majority of gnawed wounds cleanly healed without infection, and the remaining part of the tumour did not grow in most cases.

Such responses of animals are usual in the development of inflammatory processes. The study convincingly demonstrated the positive effect of this preparation (SHA) upon the immune system and this can explain the tumour-inhibitory effect, too.³⁶

3.2.2. EFFECT ON THE IRON METABOLISM

The objective of these studies was to obtain information about the veterinarian therapeutic usefulness of Humet®-R and an iron-chelate preparation in sows and piglets and further experimental evidence about the effect upon the iron-deficient anaemia of rats treated with SHA and several granulates of solid physical state (this latter investigation was carried out in GLP-conform study).

3.2.2.1. Study of the effect on the iron intake in piglets and sows

In conventional animal husbandry, the iron-deficiency anaemia regularly develops in piglets. The following factors are involved:

the very low iron level in the body of the new-born piglet which is the lowest in comparison with the other mammals;

increasing iron-deficiency due to the rapid growth;

the low iron level of the milk of the sows which is the only food for the suckling-pigs.

The pigs, born with body weight of 1.2-1.5 kg and 30-50 mg iron reserve, are provided with a total of 30 mg iron, during the first 5 weeks of life. At the same time, 120-150 mg daily iron intake would normally be needed for the synthesis of haemoglobin, and enzymes containing myoglobin or iron (cytochrome, cytochrome-oxydase, catalase, peroxidase, etc.).

For the prevention of iron-deficiency anaemia in pigs, parenteral iron treatment has become widely used which causes a sudden increase in the iron content of the blood and the saturation of transferrin by nearly 100%. However, the negative actor of parenteral iron therapy is the inability of the gut to absorb iron. The natural way for the prevention of iron deficiency is for the oral administration of the iron.

100 ml of Humet®-R syrup was applied on 30g perlite and this provided 140 mg iron intake for a litter consisting of 10 piglets. Among suitable experimental conditions and nutrition, the following conclusion may be drawn:

The highest total body iron content of new born piglets was found in the offspring of sows supplied with Humet®-R; the second was the group supplied with iron-chelate. The lowest iron level was stored in the animals of the untreated control group.

The blood haemoglobin content of piglets fed with Humet®-R was significantly higher than that of either control group or iron-chelate consuming group.³⁷

3.2.2.2. Study of the effect of trace element humic acid preparation (SHA) in iron-deficiency rat model

Pregnant Sprague-Dawley rats were fed with normal, (control) and iron-deficient (Fe<10 ppm) rodent food during the entire gestation and lactation period. After weaning, the following groups were formed:

control group: feeding with normal food,

iron-deficiency group: feeding with iron-deficient food
group fed with SHA: feeding with iron-deficient food
Reference substance was Aktiferrin syrup.

Doses: SHA 0.66 ml/kg (i.e.: 3.7 mg Fe²⁺ /kg)
Aktiferrin 0.54 ml/kg (i.e.: 3.7 mg Fe²⁺ /kg)

Following weaning, the haematological parameters of control and iron-deficient (anaemic) offspring were determined before starting the 21 day treatment with either SHA or reference substance (Aktiferrin). Offspring exposed to iron-deficiency pre- and postnatally had body weight 60% less than that of the control group. Red blood cell (RBC) count, mean volume of erythrocytes (MCV), haemoglobin (Hb) haematocrit (Htc), serum iron concentration (Fe), and transferrin saturation (Sat) were significantly lower, ratio of zinc-protoporphyrine/hem (ZP) and total iron binding capacity (TIBC) were significantly higher. Both in the offspring of Aktiferrin- and SHA treated animals, the value of Hb, Htc, MCV overtook the value of RBC, ZP, Fe and TIBC approximated the values of the offspring of the control group. There was no significant difference between the effects of Aktiferrin and SHA. Conclusively, according to the animal experiments, SHA (Humet®-R) is outstandingly suitable for the therapy of the iron-deficiency anaemia and it is equally effective with Aktiferrin for iron content.³⁸

3.2.3. INVESTIGATION OF THE CARDIOPROTECTIVE EFFECT

Heart failure and several types of arrhythmia due to ischemic heart disease play a central role in the mortality rate of cardiovascular diseases. The aim of the study was to demonstrate the antifibrillatory effect of the endowed humic acid (SHA) during reperfusion period following 25 minute coronary occlusion in isolated rat cardiac preparation. It was possible to obtain experimental data about the cardio-protective action of Humet®-R syrup given in repeated-dose long-term administration.

SHA was administered in an oral dose of 10 mg/kg for two weeks. At the end of the treatment, the heart was exteriorised, a canule was inserted into the aorta, and perfusion was carried out for 10 minutes maintaining constant perfusion pressure, according to Langendorff. During this period, a canule was introduced into the right atria using Neele's method. The value of 'pre-load' and 'after-load' was kept constant during the entire period of the experiments.

In these experiments, the coronary blood flow, the aortic blood flow, the heart rate, and the left ventricular end diastolic pressure (LVEDP) were measured. The ratio of onset of the ventricular fibrillation (VF) and the first derivative of the upstroke phase of the left ventricular pressure (i.e.: contractility: dp/dt_{max}) were calculated.

The results of the experiments are shown in the Table 1.

Treatment	CBF ml/min	AF ml/min	HR min⁻¹	VF %	+dp/dt_{max} kPa/s	LVEDP kPa
before ischaemia (n=8)	22.9 ± 0.9	43.4 ± 1.5	265 ± 6.0	0	1026 ± 45	0.51 ± 0.04
after ischaemia	20.4 ± 0.9	13.3 ± 2.5	260 ± 3.9	87.5	609 ± 53	1.53 ± 0.09
SHA treatment 10mg/kg p.o. for 2 weeks (n=8)	24.5* ± 0.8	24.5* ± 2.8	263 ± 3.0	12.5*	788* ± 36	1.09* ± 0.08

p < 0.05 X ± S.E.M. (after ischaemia or SHA)

Two weeks oral administration of 10 mg/kg SHA could improve all parameters, which became pathologic after ischemia. Although the dose-dependent character of the response remains to be studied, the cardio-protective effect of SHA seemed to be proven.³⁹

3.2.4. EFFECT OF HUMET®-R ON THE MOBILISATION OF TOXIC HEAVY METAL IN PIGS

Experiments were performed in pigs (body weight range was 16.2-18.2 kg at the beginning of the study). Humet®-R syrup was given in three different doses 2.5; 7.5; 20 ml/day/pig (i.e.: 1.1, 3.3, 8.8 mg/kg/day humic acid).

The aim of the study was to investigate the effect of the preparation on the elimination of ²⁰³Hg isotope from the organism and vital organs.

The treatment with Humet®-R syrup started 5 days before the administration of the Hg-isotope and lasted 11 days after the administration of the isotope. The changes of the elimination from the total body and the fate of radioactivity of faeces, urine, and several organs were measured.

The results of the study are summarised in the Table 2:

Dose mg/lg/day	Faeces	Urine	Faeces/Urine	Total
Control (n=4)	52.8 ± 2.3	12.1 ± 4.4	4.36	64.9 ± 2.8
1.1 (n=4)	53.8 ± 4.0	13.0 ± 4.4	4.14	66.9 ± 0.9
3.3 (n=3)	60.2 ± 6.1	15.4 ± 7.9	3.91	75.6 ± 1.9
8.8 (n=4)	67.9 ± 9.5	18.1 ± 10.1	3.71	86.6 ± 3.5

mean \pm S.E.M

From the above results, one can observe that Humet®-R syrup increases the amount of ^{203}Hg in the faeces, the urine and, total value, in tendency. Apart from the lowest dose (1.1 mg/kg/day), the same trend was observed in the other organs, as well. However, numerical value was not given due to the great standard deviation and the low case number. The effect proved to be dose-dependent. Namely, increasing the doses, the biological effect increases. In spite of the non-significant data, it seems evident that one can obtain positive results by performing the experiment with suitable animal numbers.⁴⁰

3.2.5. EFFECT OF THE HUMIC ACID ON THE REGENERATION OF THE HAEMO-POETIC SYSTEM

According to the results of our preliminary experiments, there is a possibility to develop a therapeutic preparation for the prevention or regeneration of the damage of the haemopoetic system by using the humic acid and endowed humic acid.

It is known that humic acids are hetero-polycondensates containing highly variable components. They are allomelanins, which can be found in soils, coals, and peats that develop during the slow decomposition of plant residues by means of their chemical and biological transformation.

They contain polymerised phenolic macromolecules, their composition highly depends on the place and time of their origin.

Their chelate forming with metal ions, and especially their iron-binding activity, is well known. Their practical application has been discussed since the Fifties in the literature.

The humic acid preparation, which is the basic material of Humet®-R, can advantageously affect the regeneration of the haemopoetic system damaged by ^{60}Co -gamma irradiation.

We could not find any literature data or reference about such biological effectiveness of the humic acid. Detailed examination was performed in animal experiments using several doses of whole-body gamma irradiation to develop a treatment procedure, which could be applied in the human therapy as well. The biological effectiveness of the humic acid preparation produced was demonstrated in the following experimental arrangement:

I. Experimental animals

At the beginning of these experiments, the animals were randomised according to body weight. They were male animals (b.w. 190-220 g) of Wistar strain (HUMAN Vaccine and Pharmaceuticals, Co., Ltd., Gödöllő, Hungary). The animals were kept in rooms with controlled temperature ($23 \pm 3^\circ\text{C}$), relative humidity of $60 \pm 10\%$, and alternative lighting (light / dark cycle by 12 hours) and in type II plastic cages (5 animals / cage). Drinking water and normal and humic acid enriched foods were provided *ad libitum*.

Rats were adapted to the experimental conditions for two weeks. During the experiments, the general clinical state of the animals were controlled daily.

II. Active substance applied

The preparation, which contained 5-15% humic acid, was given by gavage in several doses to the experimental animals.

III. Whole-body irradiation

Whole body irradiation of the rats was carried out in a special plastic restraint cage (40 animals/cage). This dose of irradiation was 7.0 Gray (Gy) (dose intensity: 0.82 Gy/min). The $\text{LD}_{50/30}$ value: 7.5 Gy, which was characteristic for this rat strain.

IV. Haematological examinations

On the day 0, 7, 14, 21, and 28 of the experiment, the abdominal aorta was prepared for blood sampling in ether anaesthesia. Haematological parameters determined were leukocytes (WBC), red blood cells (RBC), haemoglobin (Hgb), haematocrit (Htc), platelet (TRO), reticulocyte (RET). Determination was made with types PHA-1 and PHA-2 automatic device (made by MEDICOR, Hungary). The measurement error of the system was 1-3%.

V. Experimental groups

In these experiments, treatment with several doses of humic acid preparation was performed in groups of 30 animals. On the figures, the mean value characteristics to the Wistar strain were always demonstrated.

Group 1: Whole body irradiation with 7 Gy ^{60}Co gamma radiation (standard food + drinking water)

Group 2: 7-day pre-treatment with humic acid (240 mg/animal/day active ingredient), then whole-body irradiation with 7 Gy and further four-week treatment with 240 mg/animal/day dose of humic acid

Group 3: Whole-body irradiation with 7 Gy then, single-dose administration of 240 mg/animal/day dose of humic acid

Group 4: Seven-day pre-treatment with humic acid (90 mg/animal/day) then, whole-body irradiation with 7 Gy and further four week treatment with 90 mg/animal/day dose of humic acid

Group 5: Whole-body irradiation with 7 Gy then single-dose treatment with 90 mg/animal/day dose of humic acid
Statistical analysis of the test was used for the evaluation of the experimental data.

VI. Results

Evaluation of the haematological and chemical parameters demonstrated that, independently of the treatments applied, each value was in the proximity of the reference value corresponding with the regeneration of the haemopoetic system, at the end of the experiment (28 day).

Haematological parameters of the rats, treated in the different ways, the changes of leukocytes (WBC) and thrombocytes of the 240 mg/animal/day treated group *and* those of the 90 mg/animal/day treated group were demonstrated on the Fig 1, Fig 2 *and* on the Fig 3, Fig 4, respectively.

The results obtained after treatment with 240 mg/animal/day dose:

It was stated that count of leukocytes and thrombocytes significantly decreased one week after whole body irradiation (Group 1, i.e. control group) and in animals which were treated with humic acid by single administration (Group 3). In case of the single-dose administered humic acid, only the thrombocyte count showed moderate increase of regeneration during the third week.

In the animals of the control group (Group 1), the regeneration counts of both leukocytes and thrombocytes appeared only on the third week after irradiation.

In the animals which were pre-treated and following the 7 Gy whole-body irradiation further treated with 240 mg/animal/day dose of humic acid (Group 2), there was no damage of the haemopoetic system. Thus, the count of leukocytes and thrombocytes remained in the proximity of the reference values which were characteristic to the Wistar strain.

Our experimental results demonstrated that humic acid / humin preparation given in adequate dose (240 mg/animal/day) and using the appropriate treating arrangement (pre-treatment at first, then maintenance treatment after irradiation), could prevent the damage of the haemopoetic system due to high-dose irradiation with ionisation irradiation (Fig 1 and Fig 2).

1= Group 1 without treatment (control group)
2= Group 2 continuous HS treatment
3= Group3 one HS treatment
Wistar average

1= Group 1 without treatment (control group)
2= Group 2 continuous HS treatment
3= Group3 one HS treatment
Wistar average

Results obtained after the treatment with 90 mg/animal/day/dose:

One week after whole-body irradiation, both in single-dose and continuously treated animals, the leukocyte count and the thrombocyte count significantly ($p < 0.05$) decreased.

Low cell count was measured also on the second week after irradiation in the irradiation control (Group 1) and single-dose treated (Group 5) animals.

In the animals of the control group which were only irradiated (Group 1) the regeneration of both leukocyte and thrombocyte counts started only after the third week.

In the animals given 90 mg/animal/day humic acid treatment, if humic acid pre-treatment was used (Group 4), the regeneration of both cell types started intensively already after the first week. Until the end of the second week, the values were similar to those of the control animals (Fig 3 and 4).

1= Group 1 without treatment (control group)
2= Group 2 continuous HS treatment
3= Group3 one HS treatment
Wistar average

1= Group 1 without treatment (control group)
2= Group 2 continuous HS treatment
3= Group3 one HS treatment
Wistar average

Conclusively, one can state that, after a whole-body irradiation with high-dose ^{60}Co gamma radiation, the normalisation of radiation-caused haemopoetic changes was evoked by several therapeutic doses of humic acid preparation.

The most advantageous effect was obtained in the animals, which were also pre-treated (before irradiation) with the preparation of the patent.

The results of these experiments showed that the humic acid/humin preparation might be properly applied for the prevention of the damage of the haemopoetic system, and for the efficient facilitation of the regeneration of the haemopoetic functions already damaged.

Biological efficacy of the humic acid/humin preparation provided the possible successful application of this therapeutic material in human therapy in-patients who were exposed therapeutically or accidentally to ionisation radiation (reactor accident or accidental ionisation of patients or staff). Further experiments show that above preparation is suitable for the acceleration of the regeneration of the haemopoetic damage due to chemotherapeutic treatment.⁴¹

4. CLINICAL OBSERVATIONS

4.1. STUDY OF THE EFFECTS ON THE SERUM IRON LEVEL

The study was performed in an open clinical trial (Dept. of Paediatrics, Erzsébet Hospital, Hódmezővásárhely, Dr. P. Szűts, Dr. P. Koszó) in anaemic children (age 1-18 years). Anaemia was diagnosed by complete blood count analysis from a blood sample taken before oral administration of Humet®-R syrup. In the case of a small child, 2x1 ml (for age 1-2 years), 2x2.5 - 5.0 ml (for age 2-3 years old) of Humet®-R were given maximum for 3 weeks. Therapeutic efficacy was demonstrated by checking the total body count on the weeks 2 and 4 after treatment. Twenty-two persons were involved in this study.

Results are demonstrated in the following figures 5, 6:

According to the results of the study, three weeks oral treatment with adequate doses of Humet®-R caused significant increase of the serum iron level which was a marked effect on the week 4, too (i.e.: one week after cessation of treatment).⁴²

4.2. EFFECT OF HUMET-R SYRUP IN VOLUNTEERS WORKING IN CADMIUM EXPOSITION

The aim of the study was to investigate the influence of the regular intake of Humet®-R syrup, (which contains ten essential elements bound to the mixture of the humic acids and is distributed as a therapeutic product) on the biological parameters (blood and urine cadmium concentration) of subjects working in cadmium exposure conditions; and on their clinical laboratory parameters (haemopoiesis, liver and kidney function) characteristic to their health status.

The workers involved in the study were involved partly in battery production, and partly in over-plating some component with cadmium; the performance of these technical processes needed very simple activity. The persons studied were exposed to cadmium in the workplace and their blood cadmium level (90 nmol/L) or the urine level (10 nmol/mmol creatinine) remained within the determined biological limit values.

The patients were examined three times: record of the basic state (examination No 1) which was followed by a six-week voluntarily intake of Humet®-R syrup in daily dose of 10 ml (examination No 2), and on the week 14 after cessation of the treatment (examination No 3).

All patients were free of symptoms and complaints and remained capable of work during the entire period of investigation. There was no intermittent disease or illness.

In the course of the study, for characterising the degree of exposure, the biological exposure parameters of cadmium were measured, as follows: level of cadmium concentration in the blood and urine samples (value of quantitative urine determination was corrected to be the creatinine concentration), the effect on the hæmopoiesis (total quantitative blood count, serum iron concentration, iron-binding capacity and saturation), the value of the liver function (serum bilirubin concentration, the activity of aspartate amino-transferase (GOT), alanine aminotransferase (GPT), gamma-glutamyl transferase (GGT), and the values of the kidney function (study of general state, and sediment, quantitative protein concentration of urine, N-acetyl-betaD-glucosaminidase NAG) activity, the concentration of serum creatinine, carbamide and uric acid (urate). From the results of the study, the three examinations (basic state, after six-week treatment with HUMET-R, and on the week 14 after the treatment) of 16 male patients regarding the cadmium concentration of the blood and urine and the results of the other laboratory parameters are demonstrated in the Tables 3 & 4.

Table 3:
Changes of the blood and urine cadmium content in volunteers

Measurement (n=16 males)	Blood Cd (nmol/L)	Urine Cd (nmol/mmol creatinine)
Basic state	8.5 ± 5.7 (2.3-23.3)	1.0 ± 0.6 (0.3-2.6)
6 weeks after HUMET-R treatment 10mL/day	7.2 ± 4.8* (2.5-18.4)	1.3 ± 0.78* (0.4-2.8)
on the week 14 after treatment	6.3 ± 4.6* (1.1-17.3)	2.0 ± 1.1* (0.5-5.0)

X ± S.D. * p<0.05

Table 4:
Effect of Humet®-R treatment on haematological and urine parameters
in cadmium exposition.

Parameter	examination No1	examination No2	examination No3	Significant difference p<	Significant difference p<
tested	mean ± S.D.	mean ± S.D.	mean ± S.D.	1. vs 2.	2. vs 3.
Red Blood Cell count (T/1)	5.17 0.17	5.06 0.20	5.01 0.28	0.05	NS
Haemoglobin (g/L)	152.8 4.8	149.1 6.3	153.4 6.2	0.01	0.05
Haematocrit (%)	46.1 1.6	44.7 2.3	44.8 1.9	0.01	NS
MCV (fl)	88.8 3.1	87.9 3.4	89.3 3.7	0.01	0.001
Leucocyte count (g/L)	6.6 1.3	6.7 1.8	7.4 1.8	NS	0.01
GPT (U/L)	47.1 36.0	38.6 26.7	41.9 25.1	0.05	NS
Urate (micromol/L)	432.7 110.0	334.6 116.7	340.0 76.6	0.001	NS
Urine protein (mg/mmolcr.)	9.6 17.4	5.9 12.5	6.2 6.8	0.05	NS

Decrease of the blood cadmium concentration (15 and 13%) and the increase of the urine cadmium concentration (25 and 56%) were significant both in response to the six-week Humet®-R treatment and at the end of the treatment-free period (week 14). It was noteworthy that at the end of the six--week Humet®-R treatment the serum GPT activity (from 47.1 to 38.6 U/L), the urate concentration (from 432.7 to 334.6 micromol), the total protein concentration of the urine (from 9.6 to 5.9 mg/mmol creatinine) significantly decreased. Conclusively it can be stated that the regular daily intake of Humet®-R syrup decreased the absorption of the cadmium and increased its urinary elimination. In respect to the outstandingly cumulative potency of cadmium in the human organism, this clinical finding has extraordinary importance from the point of view of prevention.

4.3. STUDY ON THE EFFECT OF HUMET®-R ON THE LEAD LEVEL OF URINE AND BLOOD IN HEALTHY ADULT POPULATION

The aim of the experiment was to study the effectiveness of Humet®-R on reducing the lead level of urine and blood in a city-dwelling volunteer population. 51 persons were included in the experiment (25 men and 26 women), aged between 18-60 years.

The laboratory samples of blood and urine were obtained before the administration of Humet®-R syrup and after a 14-day treatment, using the recommended daily dosage.

From the 51 person volunteers for the study, 11 proved to have moderate lead exposure thus this sub-group was evaluated separately. The results are shown below:

**Blood (n=51) and Urine (n=46) Lead Levels upon HUMET-R Administration
Healthy Adult Population**

**Blood (n=11) and Urine (n=7) Lead Levels upon HUMET-R Administration
in Lead Exposed Workers**

From these results it can be safely concluded that, for the exposed volunteers (determined as lead level above 1.0 mol/L blood), the lead content of the blood dropped significantly after 2 weeks of treatment. However, the expected elevation of lead level in urine was not significant.

The same tendencies were observed in the non-exposed group, but for them the changes were insignificant.

4.4. STUDY ON THE EFFECT OF HUMET®-R TREATMENT ON LEAD POISONED PATIENTS.⁴³

9 patients were treated at the Department of Internal Medicine of Szent György Hospital between August and October 1994 with lead poisoning due to paprika tainted with minimum (Pb_3O_4).

Of the 9 patients 3 required Ca-Na-EDTA acute treatment which eliminated the symptoms of lead poisoning quickly (after the third day of treatment).

The purpose of the study was to evaluate the efficiency of the HUMET®-R treatment (20 ml/day for three weeks) on the remaining 6 patients with less severe poisoning and compare it to a reference compound (Byanodine).

The results clearly revealed that the HUMET®-R preparation would normalize the blood lead level with the same efficiency as the reference compound.

4.5. EFFECT ON THE PHYSICAL PERFORMANCE OF FIRST-CLASS SPORTSMEN

According to several years' experience, the physical performance of sportsmen, following extreme load, can be characterised by the parameters as follows:

the blood lactate concentration related to the resting haematocrit value,
the maximal heart rate,
the maximal O_2 uptake related to body weight kg,
and the correlation connection between them.

The effect of three week continuous daily intake of HUMET-R preparation (20 ml/day) was studied in complaint free first-class sportsmen separated into groups according to changes related to the resting value of the haematocrit. The blood lactate concentration (LA), the maximal heart rate (HR), the maximal O_2 -uptake related to the kg body weight (RVO_2) and their correlation connection were studied.

The Htc and Hb values, related to the initial values, depending on the high or low level of the latter, decreased or increased and the mean values remained in proximity with the mean value of the physiological range. LA, HR and RVO_2 , level of the sportsmen, grouped according to the low (<0.43) and high (>0.47) Htc values, were compared. Examining all sportsmen, there was positive correlation between Htc and RVO_2 , LA and RVO_2 (both Htc and lactate are proportional with the aerobic performance) in low Htc group (value < 0.43), the same correlation was negative in the high Htc group (value > 0.47).

Based on this three week HUMET-R treatment, one can state that the result of the treatment is the optimisation of the value of Htc and Hb and approximation of the physiological reference values.⁴⁴

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Some more science

A review of the potential uses of Humet®-R and a summary of various studies

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1.INTRODUCTION

1.1. Background

HUMET®-R syrup is an orange-flavoured colloidal solution of humic acids and ten **organic** minerals: Iron, Magnesium, Zinc, Copper, Cobalt, Manganese, Selenium, Vanadium, Molybdenum and Potassium. This colloidal solution forms an optimal carrying agent with the humic acids providing variable function groups, which contain the trace elements and minerals in chelated biochemical structures similar to the human body's own transport-proteins. These are thus more easily absorbed and have high bioavailability. HUMET®-R is formulated to carry the international Recommended Daily Allowances (RDA) of the ten organic minerals.

Once the organic minerals are released into the body, the freed humic acids naturally bond to any heavy metal molecules (cadmium, mercury, lead, etc.) and these are removed in the waste.

HUMET®-R has been developed after many years of study into the inter-relationship of the trace element content of cultivated fields, the trace element content of farm animals maintained in those fields, and the area spread of disease due to trace element deficiency. In spite of the fact that both soil and its vegetation contain lavish quantities of the elements needed, animals developed deficiency symptoms.

It is known from the literature that the humic acids contained in peat assist in efficiently delivering the required trace elements into the animal organism. This is impossible for inorganic compounds in the form of the simple metal salts.

The eminent veterinarian Dr. Elek Csucska carried out the majority of the veterinary observations mentioned above as well as the early experiments with a peat-based product. Basic experiments were followed by research work for several years. An extraction method was developed to separate humic acid from calcium huminate. By adding the proper metal ions to the humic acid, the product was found to improve the clinical state of mineral-deficient patients. ([Top](#)) ([Bottom](#))

1.2. Data from the literature

The results of recent research works clearly demonstrate that animals are unable to utilise metal ions when they are introduced in the form of inorganic compounds. References reinforce that the efficiency of inorganic metal salts is very low in the replacement of trace elements demanded by the body. (1)

Similarly, literature references demonstrate that peat and peat soil possess the capacity to bind metal ions.(2) It was shown that the humic acid component of peat was responsible for the chelate binding of trace elements.(3) It became evident that the administration of peat and peat extracts might improve the introduction of the vital metal ions.

Additionally, it was observed that animal feed enriched with humic acid could be curative not only in deficiency diseases but the feed also improved the reproductive function of several domestic animals and their resistance against infectious diseases. Furthermore, humic acid-enriched animal feed could exponentially increase the utilisation of nutrients and, consequently, body weight gain increased.(4) Obviously, that which proved to be helpful in the animal organism may possess therapeutic value in humans, too.

Many well-documented trace element deficiency diseases are known in medical practice and the research of the medico-biological role of trace elements is continuing. ([Top](#)) ([Bottom](#))

1.3. Development of a paramedicinal product

Research workers of HUMET Limited (formerly HORIZON-MULTIPLAN Ltd.), and the laboratories working with the company, have investigated HUMET®-R since 1992. The final composition was determined during this period. The efficiency of HUMET® was proved in controlled expertly based experiments, its further therapeutic indications were revealed, and its safety tested in toxicity studies.

Based on this data, the National Institute of Pharmacy (OGYI) of Hungary approved the product of the HUMET Ltd. in 1993 and the production started in 1994. ([Top](#)) ([Bottom](#))

2. COMPOSITION OF THE PRODUCT AND THE ROLE OF ITS COMPONENTS

In the HUMET®-R syrup, the vehicle is a humic acid preparation of homogenous origin, extracted from geologically young (about 3,000-7,000 years old) lowland moorland. This vehicle is completed with several micro- and macro-elements. This paramedicinal product is a complex trace element preparation and its humic acid vehicle is a biologically compatible chelate-former, which assures the good absorption and bioavailability of the metal ions included. Each of its constituents

possesses an individual physiological action and effect, but the general roboration (or tonic) effect results from their synergistic, joint action and interaction.

2.1. Structure and chemical properties of humic acids

During the last 50 years, several research works and theoretical studies have focused on the chemical structure of humins. Their common source is lignin, which constitutes the slowly degradable compact skeleton of plants. Lignin undergoes a slow microbiological transformation, caused primarily by bacteria and fungi, and chemical changes in the soil. The joint effect of these changes leads to the enrichment with humic acids of various soils (primary peat and brown coal). The two most important therapeutic groups of humins are humic acids and fulvic acids, which are determined based on their acid/base solubility.

According to present knowledge, humic acids are chemically multi-substituted polyaromatic heterocyclic macromolecules, which incorporate cyclic structures joined by aliphatic carbon chains. This primary structure can fix other organic components, such as carbohydrates, proteins, and lipids, in physical and chemical bonds.(5)

Related to oxidised state, the aromatic and chinoidal structures of the chemical entity contain the oxo-, hydroxyl-, carboxyl-, amine, - and substituted amine groups which can bind several bivalent metal ions in chelate bonds. This chelate-bonding ability of humic acids has been used for many years for the clearance of toxic heavy metals from waste water and superficial water running downhill from mining areas.(6) ([Top](#)) ([Bottom](#))

2.2. Biological role of humic acids

Humic acids are difficult to characterise by physical or chemical methods. Their place of origin, age and geological past may be more characteristic than actual chemical and physical analysis. Their biological effects may be very different.

There is a humin preparation derived from the peat (Tolpa Torf preparation, TTP) which exerts immuno-modulator effect.(7) TTP preparation increases the production of tumour necrosis factor (TNF) in human leukocytes and stimulates the synthesis of interferon.(8)

In mice, it can recover the immune responses which have been suppressed by zinc phosphamide.(9) TTP preparation given prophylactically significantly decreases the damage of the gastric mucosa and duodenal ulcer (10) and its regenerative effect was also demonstrated in the liver.(11) Humic acids have been noted to influence the function of the endocrine system. The effect on the thyroid function was studied in mice and this demonstrated that humic acids antagonise the action of thyroxin; this effect is mediated by blocking the activity of the Na^+ / K^+ -ATP-ase.(12) The antibacterial effects of humic acids antagonise the mutant strain of streptococci-producing glucane which is responsible for the development of caries.(13) Anti-viral effectiveness of humic acids is also known.

The sodium salt of humic acids, when given together with cadmium (a toxic heavy metal) in experiments in chickens, showed a marked decrease in the absorption of the heavy metal and prevented its incorporation into the liver.(14) At the same time

according to our experiments with humans, HUMET®-R decreases the blood level of the toxic heavy metals, such as lead and cadmium, in exposed workers.(15)

It was found that, after surgery, humic acid treatment successfully prevented adhesion in rats.(16)

In other experiments, human endothelial cells were incubated with humic acids and an increase in the tissue factor (TF) expression was found. In conjunction with this, increasing intracellular Ca²⁺ was measured, even in the presence of Verapamil (a strong Ca²⁺ channel blocker), which led to the conclusion that the influx was independent of the specific Ca²⁺ channels.(17)

Desmutagenic activity was observed *in vitro* on CHO cells using four different humic acid preparations against two known mutagens, mitomycin-C and maleic acid hydrazide.(18)

Of possibly outstanding importance, in cell culture, synthetic humin analogues block the human immuno-deficiency virus (HIV),(19) the paralysis,(20) and herpes virus.(21)

The anti-allergic effect (e.g.: in "hay fever") of salts, formed by humic acids with alkali metals, has been positive.(22)

The dermatological efficiency of humic acids is noteworthy. Salts of humic acid formed with ammonia and alkali metals significantly shortened the time of wound healing.(23)

Humic acids have been shown to inhibit the reproduction of malignant tumour cells. Thus, they can be useful in anti-cancer therapy.(24)

Humic acids, as a natural absorbent of the ultraviolet light, may protect the human skin.(25)

The protective effect of humic acid against radiation was demonstrated in rats using its sodium salt. The lethal effect of gamma radiant ⁶⁰Co was prevented by 50 percent in animal experiments.(26)

The increasing use of humic acids in the antiphlogistic treatment and particularly in arthritis yields new important therapeutic indications.(27)

It has been reported several times that humic acids possess toxic heavy metal binding capacity.(28)

The therapeutic applications and the potential curative indications outlined above justify further basic research activity. ([Top](#)) ([Bottom](#))

2.3. The humic acid metal chelate

For therapeutic application, the most interesting medico-biological effects are due to the metal binding capacity of humic acids. The metal binding capacity of humic acids is based, in part, on chelate forming. Development of chelate bonding masks the

charge of the metal ion. The chelated metal loses its hydrate cover and receives the hydrophilic/hydrophobic characteristics of the chelate-forming compound. Thus, in principle, the chelate could easily pass the hydrophobic cell membrane.

The metal-humin interactions are selective. Namely, humic acids binding the toxic heavy metals (lead, cadmium, and mercury), mobilise and eliminate them from the organism, but some vital macro- and microelements are transported by humic acids into the body to specific enzymes. Humic acids can affect several biological processes by hitherto unknown mechanisms.

Recently, it became evident that **selenite** is essential to the function of antioxidant enzymes (e.g.: glutathion-peroxidase), which are responsible for the elimination of free radicals. This mechanism is important where increased formation of free radicals is present (radiation effect, tumour, increased degradation of lipid and protein, long-lasting starvation, etc.). In the body, the lack of selenite causes muscular tissue deficiency and the tumourigenic effect of cadmium and lead possibly increases in humans, and certainly in animals, respectively. Sufficient selenine supply can prevent cardiomyopathy and muscular dystrophy.

The **molibdate** content of the diet assures the co-factor of xanthin oxydase, aldehyde oxydase, and sulphite oxydase.(29)

The **vanadate** component inhibits the phosphatases, which control the intracellular signal transduction and, thereby, can prolong the duration of hormonal action. In diabetes, the gene expression of certain enzymes changes.(30) K^+ found in the preparation is the most important intracellular cation, which has central role in stimulus conduction, and in the maintenance of basic life processes. K^+ deficiency may occur following drug treatment (e.g. diuretics) or due to some diseases.

Besides these metal ions, HUMET® -R contains a further six bivalent metal ions which are chelated with the humic acids. [\(Top\)](#) [\(Bottom\)](#)

2.4. Bivalent metal ions and their physiological role

Several monographs widely discuss the biological role of the bivalent metal ions and these may be summarised as follows.

Iron (**Fe**) is the basic component of the functional group of haemoglobin and myoglobin, transporting oxygen and electron-transporting cytochromes. There are clinical symptoms in iron deficiency (fatigue, headache, stomatitis, gingivitis, loss of appetite, etc.) In chronic deficient state, hypochrome anaemia with microcytemia and bone marrow hyperplasia develop. The presence or absence of the other microelements influences the administration of iron to the organism. At the same time, iron intake potentiates the elimination of the toxic lead.

Magnesium (**Mg**) is a natural calcium antagonist and thus influences the metabolism of calcium, phosphorus, and sodium. Magnesium is the activator of the glycolysis and plays a significant role in protein metabolism. It modifies the muscular function, participates in the maintenance of circulatory homeostasis, and decreases blood pressure (relaxation of the vascular smooth muscle). Magnesium has a role in energy

metabolism and in the reproductive function. Magnesium deficiency is manifested in spastic responses.

Zinc (**Zn**) is the component of several enzymes. It has a central role in the formation of the steric structure of insulin and in the synthesis of DNA and RNA. The presence of Zinc is especially important in lead and cadmium exposition: its administration decreases the toxicity of these metals. Zinc deficiency causes typical symptoms (dermal changes, alopecia, disturbance in testicular development, sexual retardation, hepato- and splenomegaly, growth disturbances, delayed wound healing, and decreased immunological defensive function.) Levels of Zinc may decrease following the adverse effect of corticosteroid or diuretic therapy, in sickle cell anaemia, lung tumours or myocardial infarction and, in consequence, of anticonceptive use.

Copper (**Cu**) has a significant role on the haemopoiesis, celloxidation, energy metabolism, and in cerebral catecholamine metabolism. It influences the iron and zinc balances and the reproductive functions. Its lack may be one of the causes of infertility and the increase in cadmium toxicity. Consistent Copper deficiency evokes anaemia, bone marrow alterations, growth retardation, cerebral dysfunction, and myocardial destruction.

Cobalt (**Co**) influences iron metabolism. It increases the haemoglobin concentration in red blood cells. Cobalt is the metal component of the prosthetic group of vitamin B₁₂. It is one of the components of b -lysine-isomerase, glycerin dehydrogenase, and methionin aminopeptidase.(31) ([Top](#)) ([Bottom](#))

3. PRECLINICAL INVESTIGATION

3.1. Toxicological investigations

3.1.1. Acute toxicity studies in rats (with 14-day post-treatment observation period)

Acute toxicity studies were performed in the form of "limit tests" in two species (mouse and rat), in compliance with the GLP regulations, for the determination of the acute oral LD50 values.(32)

These studies were carried out in male and female Wistar rats and in CFLP mice. At the beginning of the studies, the animals were 5-6 weeks old.

The animals were treated with the endowed humic acid which is the active ingredient of the HUMET® -R, (supplemented humic acid - SHA) in total amount of 40 ml/kg. Related to the standard humic acid preparation containing 15 mg/ml, this 'total amount' corresponds to 600 mg effective dose of humic acid.

The animals were fasted for 18 hours, the active part of HUMET® -R (SHA) was given (p.o.) via gavage in a volume of 10 ml/kg, twice per 24 hours (10 males and 10 females in every group). Control groups (10 for each gender) were given the

same volume in physiological saline. Animals were maintained for further 14-day (post-treatment observation period).

The lethality per group and the body weight of the animals during the post-treatment period were studied. The necropsy did not reveal any pathological changes in several organs.

The single-dose administration of SHA did not cause altered behavioural effects or any other pathological changes.

Acute oral LD50 value of this trace element preparation could not be properly determined in Wistar rats and CFLP mice. There was no lethality after the doses applied. LD50(male) > 600 mg/kg; LD50(female): > 600 mg/kg in both species.²⁷ [\(Top\)](#) [\(Bottom\)](#)

3.1.2. Subacute (4-week) dietary treatment of rats with HUMET® -R

In the course of a four-week treatment, the effects of HUMET® -R on the haematological parameters and the body weight gain were studied.

At the end of the observation period, the mass of several organs (lung, liver, spleen, and kidney) was registered and the possible macroscopic changes were studied.

Treatment was carried out in five groups (n = 10), the animals were given 5, 15, 50, 150, 500 mg/kg/day doses in the different groups. The amount of the HUMET® -R preparation was related to the dried content mixed with the trace element deficient food. Control group was supplied with normal food.

In this rat study, the animals were fed continuously with food containing HUMET® -R for four weeks. The results may be summarised as follows.

It was demonstrated that the humic acid-containing preparation HUMET® -R did not affect the animals' general physical state (motility, food intake), the weight of the whole body or that of different organs or the haematological and blood chemistry parameters during the four week diet treatment.

For the animals fed with 150 and 500 mg/kg/day doses of HUMET® -R, loss of appetite and consequent weight loss developed three weeks after starting the treatment but the haematological and blood chemistry parameters remained unchanged.

HUMET® -R did not influence the survival of the animals in either dose group; lethality did not occur. There was no significant difference between the control and HUMET® -R treated any dose group of animals in the value of haematological or blood chemistry parameters.⁽³³⁾ [\(Top\)](#) [\(Bottom\)](#)

3.1.3. Cumulative toxicity evaluation in rats

The aim of the study was to determine the cumulative toxicity of HUMET® -R.

Study was performed in control and treated Wistar rats (n = 10).

The results of the previous studies declared the product non-toxic. The LD50-value was arbitrarily declared 150 mg/kg. The rats were orally treated with 9, 13.5, 20, 30, 45 and 68% of this LD50 value (13.5, 20.3, 30.0, 45.0, 67.5, 101.3 mg/kg/day). Each was given sequentially for four days in a total 24 day interval with daily volume of 5 ml/kg.

Following treatment, the total body weight and the relative organ weight (thymus, lung, heart, liver, spleen, kidney, and adrenals) were determined. Each of these organs was histologically processed. The haematological parameters were determined and differential blood count was taken. Serum iron value and level of the thyroid hormones (T3 - T4) were also measured.

According to the results of this study, HUMET® -R did not evoke any changes due to cumulative toxicity. The decrease of the leukocyte count, the haematocrit, the MCV and serum iron was not a toxic effect.

Other biologically detectable changes were not observed.(34) ([Top](#)) ([Bottom](#))

3.1.4. Mutagenicity studies

In the **Ames test**, the lyophilised HUMET® -R preparation was investigated. The study was carried out in several strains of Salmonella typhimurium (TA 98, TA 100, TA 1537, TA 1538) both in the presence and absence of the liver microsomal fraction, activated with Arochlor 1254, using positive and negative control groups. (Concentrations studied of HUMET® -R were: 469, 938, 1875, 3750, 7500 microgram per plate.) (35)

Results of the study showed that HUMET® -R did not possess any mutagenic activity after the administration of the above concentrations, in this test. ([Top](#)) ([Bottom](#))

3.2. Pharmacological investigations

In the course of the animal experiments, primarily the biological effects of Supplemented Humic Acid (SHA), which is the active principle of HUMET® -R syrup, were studied in well-controlled animal experiments.

3.2.1. Study of the immunological effects

To date, HUMET® -R was studied in non-controlled clinical studies involving volunteers, most of whom suffered with a tumour disease. In these cases, the treatment resulted, in part, in the cessation of growth of the tumour, or its healing. It should be stressed, however, that in these studies the administration of HUMET® -R syrup was made in the form of adjuvant therapy.

As is known, tumours are cellular agglomerates with abnormal reproduction capacity occurring in several tissues. They have the ability, by deceiving the immune system of the body, to proliferate abundantly and finally destroy it. In this study the purpose was to determine how the growth and proliferation of the tumour cells can be inhibited by the administration of HUMET® -R (supplemented humic acid, SHA).

In this study, C57BL (black) 6 male mice were used, their mean age was 3 months, and mean body weight was 20 g.

SHA was mixed into the drinking water in a concentration of 1.5 ml/L.

For studying the effect on the immune system, several cell sets were given subcutaneously into the trunk area above the hip. The growth rate of the tumours, injected subcutaneously, and its possible inhibition by the SHA, were studied.

The experimental results showed that tumours could grow *only* in untreated animals inoculated with the least amount of tumour cell (10^3 cell/animal). Such difference was not seen after inoculation with hundred fold higher concentrations of the inoculation (10^5 cell/animal) but the growth of tumours was slower in the treated than in the control animals. Among the groups of animals inoculated with one million tumour cells, half of the treated animals were living 2.5 months after beginning the study. However, after only 7 weeks after inoculation, the control animals had to be over-anaesthetised to spare them from suffering due to their enormous tumours.

Subcutaneous tumours developed also in the treated animals but the animals gnawed their tumours causing great wounds. The majority of gnawed wounds cleanly healed without infection, and the remaining part of the tumour did not grow in most cases.

Such responses of animals are usual in the development of inflammatory processes. The study convincingly demonstrated the positive effect of this preparation (SHA) upon the immune system and this can explain the tumour-inhibitory effect, too. (36) [\(Top\)](#) [\(Bottom\)](#)

3.2.2. Effect on the iron metabolism

The objective of these studies was to obtain

Information about the veterinarian therapeutic usefulness of HUMET® -R and an iron-chelate preparation in sows and piglets and

Further experimental evidence about the effect upon the iron-deficient anaemia of rats treated with SHA and several granulates of solid physical state (this latter investigation was carried out in GLP-conform study).

3.2.2.1. Study of the effect on the iron intake in piglets and sows

In conventional animal husbandry, the iron-deficiency anaemia regularly develops in piglets. The following factors are involved:

the very low iron level in the body of the new-born piglet which is the lowest in comparison with the other mammals;

increasing iron-deficiency due to the rapid growth;

the low iron level of the milk of the sows which is the only food for the suckling-pigs.

The pigs, born with body weight of 1.2-1.5 kg and 30-50 mg iron reserve, are provided with a total of 30 mg iron, during the first 5 weeks of life. At the same time, 120-150 mg daily iron intake would normally be needed for the synthesis of haemoglobin, and enzymes containing myoglobin or iron (cytochrome, cytochrome-oxidase, catalase, peroxidase, etc.).

For the prevention of iron-deficiency anaemia in pigs, parenteral iron treatment has become widely used which causes a sudden increase in the iron content of the blood and the saturation of transferrin by nearly 100%. However, the negative actor of parenteral iron therapy is the inability of the gut to absorb iron. The natural way for the prevention of iron deficiency is for the *oral administration of the iron*.

100 ml of HUMET® -R syrup was applied on 30g perlite and this provided 140 mg iron intake for a litter consisting of 10 piglets. Among suitable experimental conditions and nutrition, the following conclusion may be drawn:

The highest total body iron content of new-born piglets was found in the offspring of sows supplied with HUMET® -R; the second was the group supplied with iron-chelate. The lowest iron level was stored in the animals of the untreated control group.

The blood haemoglobin content of piglets fed with HUMET® was significantly higher than that of either control group or iron-chelate consuming group. (37) ([Top](#)) ([Bottom](#))

3.2.2.2. Study of the effect of trace element humic acid preparation (SHA) in iron-deficiency rat model

Pregnant Sprague-Dawley rats were fed with normal, (control) and iron-deficient (Fe<10 ppm) rodent food during the entire gestation *and* lactation period. After weaning, the following groups were formed:

control group: feeding with normal food,

iron-deficiency group: feeding with iron-deficient food

group fed with SHA: feeding with iron-deficient food

Reference substance was Aktiferrin syrup.

Doses: SHA 0.66 ml/kg (i.e.: 3.7 mg Fe⁺⁺ /kg)

Aktiferrin 0.54 ml/kg (i.e.: 3.7 mg Fe⁺⁺ /kg)

Following weaning, the haematological parameters of control and iron-deficient (anaemic) offspring were determined before starting the 21 day treatment with either SHA or reference substance (Aktiferrin).

Offspring exposed to iron-deficiency pre- and postnatally had body weight 60% less than that of the control group. Red blood cell (RBC) count, mean volume of erythrocytes (MCV), haemoglobin (Hb) haematocrit (Htc), serum iron concentration

(Fe), and transferrin saturation (Sat) were significantly lower, ratio of zinc-protoporphyrine/hem (ZP) and total iron binding capacity (TIBC) were significantly higher.

Both in the offspring of Aktiferrin- and SHA treated animals, the value of Hb, Htc, MCV overtook the value of RBC, ZP, Fe and TIBC approximated the values of the offspring of the control group. There was no significant difference between the effects of Aktiferrin and SHA.

Conclusively, according to the animal experiments, SHA (HUMET® -R) is outstandingly suitable for the therapy of the iron-deficiency anaemia and it is equally effective with Aktiferrin for iron content. (38) ([Top](#)) ([Bottom](#))

3.2.3. Investigation of the cardioprotective effect

Heart failure and several types of arrhythmia due to ischemic heart disease play a central role in the mortality rate of cardiovascular diseases.

The aim of the study was to demonstrate the antifibrillatory effect of the endowed humic acid (SHA) during reperfusion period following 25 minute coronary occlusion in isolated rat cardiac preparation. It was possible to obtain experimental data about the cardio-protective action of HUMET® -R syrup given in repeated-dose long-term administration.

SHA was administered in an oral dose of 10 mg/kg for two weeks. At the end of the treatment, the heart was exteriorised, a canule was inserted into the aorta, and perfusion was carried out for 10 minutes maintaining constant perfusion pressure, according to Langendorff. During this period, a canule was introduced into the right atria using Neele's method. The value of 'pre-load' and 'after-load' was kept constant during the entire period of the experiments.

In these experiments, the coronary blood flow, the aortic blood flow, the heart rate, and the left ventricular end diastolic pressure (LVEDP) were measured. The ratio of onset of the ventricular fibrillation (VFF) and the first derivative of the upstroke phase of the left ventricular pressure (i.e.: contractility: dp/dt_{max}) were calculated.

The results of the experiments are shown in the Table 1.

[Table 1:](#)

Anti-ischemic effect of 2-week EHA-treatment

Treatment	CBF ml/min	AF ml/min	HR min ⁻¹	VF %	+dp/dt_{max} kPa/s	LVEDP kPa
before ischemia	22.9	43.4	265	0	1026± 45	0.51
(n	± 0.9	± 1.5	± 6.0			± 0.0

= 8)						4
after ischemia	20.4 ± 0.9	13.3 ± 2.5	260 ± 3.9	87.5	609 ± 53	1.53 ± 0.0 9
SHA treatment 10 mg/kg p.o. for 2 weeks (n = 8)	24.5* ± 0.8	24.5* ± 2.8	263 ± 3.0	12.5*	788* ± 36	1.09* ± 0.0 8

p<0.05 X ± S.E.M. (after ischemia or SHA)

Two weeks oral administration of 10 mg/kg SHA could improve all parameters, which became pathologic after ischemia. Although the dose-dependent character of the response remains to be studied, the cardio-protective effect of SHA seemed to be proven.(39) ([Top](#)) ([Bottom](#))

3.2.4. Effect of HUMET® -R on the mobilisation of toxic heavy metal in pigs

Experiments were performed in pigs (body weight range was 16.2-18.2 kg at the beginning of the study). HUMET® -R syrup was given in three different doses 2.5; 7.5; 20 ml/day/pig (i.e.: 1.1, 3.3, 8.8 mg/kg/day humic acid).

The aim of the study was to investigate the effect of the preparation on the elimination of ²⁰³Hg isotope from the organism and vital organs.

The treatment with HUMET® - R syrup started 5 days before the administration of the Hg-isotope and lasted 11 days after the administration of the isotope. The changes of the elimination from the total body and the fate of radioactivity of faeces, urine, and several organs were measured.

The results of the study are summarised in the Table 2:

[Table 2:](#)

Influence of HUMET® -R on the mobilisation of ²⁰³Hg isotope

(expressed in percent of Hg activity; 503.9 kBq = 100%).

Dose mg/kg/day	Fæces	Urine	Fæces/Urine	Total
Control (n = 4)	52.8 ± 2.3	12.1 ± 4.4	4.36	64.9± 2.8
1.1 (n = 4)	53.8 ± 4.0	13.0 ± 4.4	4.14	66.9± 0.9
3.3 (n = 3)	60.2 ± 6.1	15.4 ± 7.9	3.91	75.6± 1.9
8.8 (n = 4)	67.9 ± 9.5	18.1 ± 10.1	3.71	86.6± 3.5

mean ± S.E.M.

From the above results, one can observe that HUMET® -R syrup increases the amount of ²⁰³Hg in the fæces, the urine and, total value, in tendency. Apart from the lowest dose (1.1 mg/kg/day), the same trend was observed in the other organs, as well. However, numerical value was not given due to the great standard deviation and the low case number. The effect proved to be dose-dependent. Namely, increasing the doses, the biological effect increases. In spite of the non-significant data, it seems evident that one can obtain positive results by performing the experiment with suitable animal numbers.(40) [\(Top\)](#) [\(Bottom\)](#)

3.2.5. Effect of the humic acid on the regeneration of the hæmo-poetic system

According to the results of our preliminary experiments, there is a possibility to develop a therapeutic preparation for the prevention or regeneration of the damage of the hæmo-poetic system by using the humic acid and endowed humic acid.

It is known that humic acids are hetero-polycondensates containing highly variable components. They are allomelanins, which can be found in soils, coals, and peats that develop during the slow decomposition of plant residues by means of their chemical and biological transformation.

They contain polymerised phenolic macromolecules, their composition highly depends on the place and time of their origin.

Their chelate forming with metal ions, and especially their iron-binding activity, is well known. Their practical application has been discussed since the Fifties in the literature.

The humic acid preparation, which is the basic material of HUMET® -R, can advantageously affect the regeneration of the haemopoetic system damaged by ⁶⁰Co-gamma irradiation.

We could not find any literature data or reference about such biological effectiveness of the humic acid.

Detailed examination was performed in animal experiments using several doses of whole-body gamma irradiation to develop a treatment procedure, which could be applied in the human therapy as well. The biological effectiveness of the humic acid preparation produced was demonstrated in the following experimental arrangement:

I. Experimental animals

At the beginning of these experiments, the animals were randomised according to body weight. They were male animals (b.w. 190-220 g) of Wistar strain (HUMAN Vaccine and Pharmaceuticals, Co., Ltd., Gödöllő, Hungary). The animals were kept in rooms with controlled temperature ($23 \pm 3^\circ \text{C}$), relative humidity of $60 \pm 10\%$, and alternative lighting (light / dark cycle by 12 hours) and in type II plastic cages (5 animals / cage). Drinking water and normal and humic acid enriched foods were provided *ad libitum*.

Rats were adapted to the experimental conditions for two weeks. During the experiments, the general clinical state of the animals were controlled daily.

II. Active substance applied

The preparation, which contained 5-15% humic acid, was given by gavage in several doses to the experimental animals.

III. Whole-body irradiation

Whole body irradiation of the rats was carried out in a special plastic restraint cage (40 animals/cage). This dose of irradiation was 7.0 Gray (Gy) (dose intensity: 0.82 Gy/min). The LD50/30 value: 7.5 Gy, which was characteristic for this rat strain.

IV. Haematological examinations

On the day 0, 7, 14, 21, and 28 of the experiment, the abdominal aorta was prepared for blood sampling in ether anaesthesia. Haematological parameters determined were leukocytes (WBC), red blood cells (RBC), haemoglobin (Hgb), haematocrit (Htc), platelet (TRO), reticulocyte (RET). Determination was made with types PHA-1 and PHA-2 automatic device (made by MEDICOR, Hungary). The measurement error of the system was 1-3%.

V. Experimental groups

In these experiments, treatment with several doses of humic acid preparation was performed in groups of 30 animals. On the figures, the mean value characteristics to the Wistar strain were always demonstrated.

Group 1: Whole body irradiation with 7 Gy ^{60}Co gamma radiation (standard food + drinking water)

Group 2: 7-day pre-treatment with humic acid (240 mg/animal/day active ingredient), then whole-body irradiation with 7 Gy and further four-week treatment with 240 mg/animal/day dose of humic acid

Group 3: Whole-body irradiation with 7 Gy then, single-dose administration of 240 mg/animal/day dose of humic acid

Group 4: Seven-day pre-treatment with humic acid (90 mg/animal/day) then, whole-body irradiation with 7 Gy and further four week treatment with 90 mg/animal/day dose of humic acid

Group 5: Whole-body irradiation with 7 Gy then single-dose treatment with 90 mg/animal/day dose of humic acid

Statistical analysis of the test was used for the evaluation of the experimental data.

VI. Results

Evaluation of the haematological and chemical parameters demonstrated that, independently of the treatments applied, each value was in the proximity of the reference value corresponding with the regeneration of the haemopoetic system, at the end of the experiment (28 day).

Hæmatological parameters of the rats, treated in the different ways, the changes of leukocytes (WBC) and thrombocytes of the 240 mg/animal/day treated group *and* those of the 90 mg/animal/day treated group were demonstrated on the Fig 1, Fig 2 *and* on the Fig 3, Fig 4, respectively.

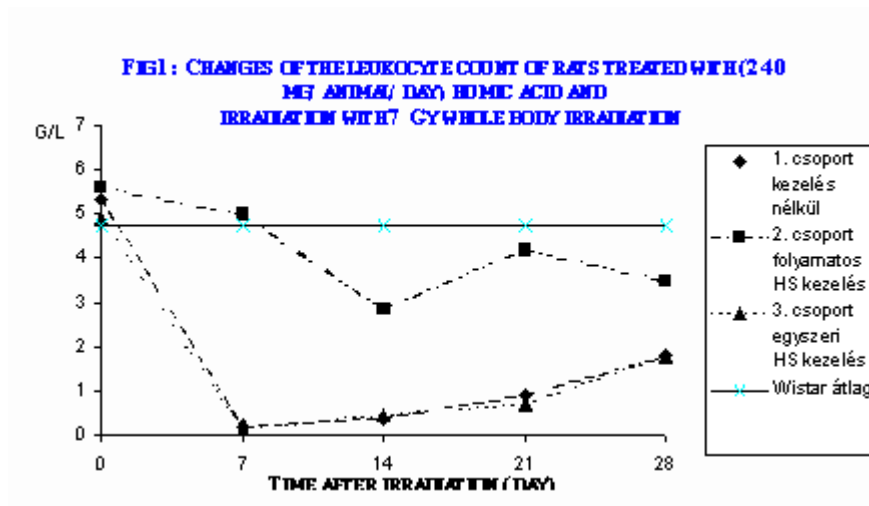
The results obtained after treatment with 240 mg/animal/day dose:

It was stated that count of leukocytes and thrombocytes significantly decreased one week after whole body irradiation (Group 1, i.e. control group) and in animals which were treated with humic acid by single administration (Group 3). In case of the single-dose administered humic acid, only the thrombocyte count showed moderate increase of regeneration during the third week.

In the animals of the control group (Group 1), the regeneration counts of both leukocytes and thrombocytes appeared only on the third week after irradiation.

In the animals which were pre-treated and following the 7 Gy whole-body irradiation further treated with 240 mg/animal/day dose of humic acid (Group 2), there was no damage of the haemopoetic system. Thus, the count of leukocytes and thrombocytes remained in the proximity of the reference values which were characteristic to the Wistar strain.

Our experimental results demonstrated that humic acid / humin preparation given in adequate dose (240 mg/animal/day) and using the appropriate treating arrangement (pre-treatment at first, then maintenance treatment after irradiation), could prevent the damage of the haemopoetic system due to high-dose irradiation with ionisation irradiation (Fig 1 and Fig 2).

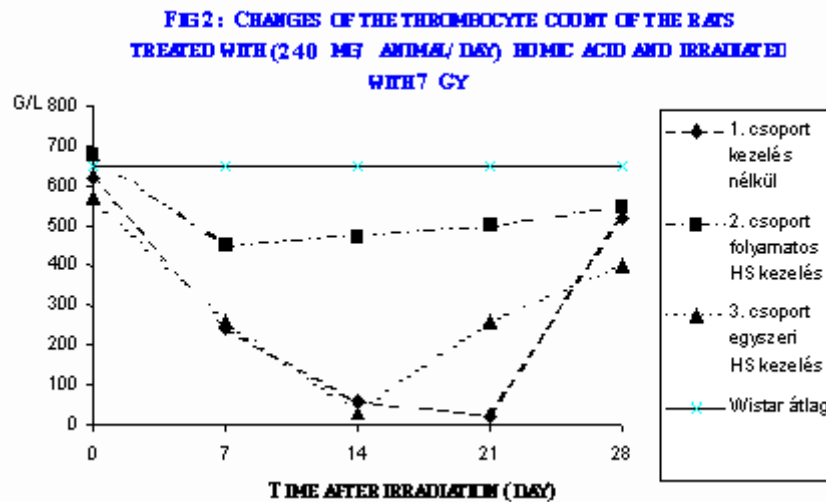


1=Group 1 without treatment (control group)

2=Group 2 continuous HS treatment

3=Group 3 one HS treatment

Wistar average



1=Group 1 without treatment (control group)

2=Group 2 continuous HS treatment

3=Group 3 one HS treatment

Wistar average

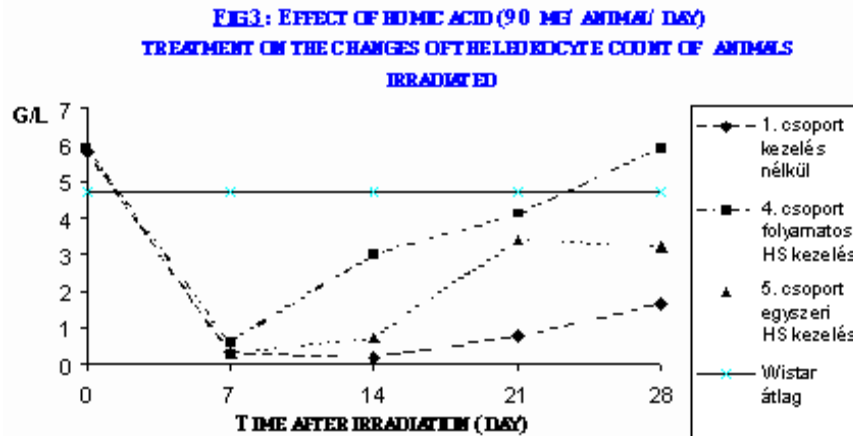
Results obtained after the treatment with 90 mg/animal/day/dose:

One week after whole-body irradiation, both in single-dose and continuously treated animals, the leukocyte count and the thrombocyte count significantly ($p < 0.05$) decreased.

Low cell count was measured also on the second week after irradiation in the irradiation control (Group 1) and single-dose treated (Group 5) animals.

In the animals of the control group which were only irradiated (Group 1) the regeneration of both leukocyte and thrombocyte counts started only after the third week.

In the animals given 90 mg/animal/day humic acid treatment, if humic acid pre-treatment was used (Group 4), the regeneration of both cell types started intensively already after the first week. Until the end of the second week, the values were similar to those of the control animals (Fig 3 and 4).



1=Group 1 without treatment (control group)

4=Group 2 continuous HS treatment

5=Group 3 one HS treatment

Wistar average

1=Group 1 without treatment (control group)

4=Group 2 continuous HS treatment

5=Group 3 one HS treatment

Wistar average

Conclusively, one can state that, after a whole-body irradiation with high-dose ^{60}Co gamma radiation, the normalisation of radiation-caused haemopoetic changes was evoked by several therapeutic doses of humic acid preparation.

The most advantageous effect was obtained in the animals, which were also pre-treated (before irradiation) with the preparation of the patent.

The results of these experiments showed that the humic acid/humin preparation might be properly applied for the prevention of the damage of the haemopoetic system, and for the efficient facilitation of the regeneration of the haemopoetic functions already damaged.

Biological efficacy of the humic acid/humin preparation provided the possible successful application of this therapeutic material in human therapy in-patients who were exposed therapeutically or accidentally to ionisation radiation (reactor accident or accidental ionisation of patients or staff). Further experiments show that above preparation is suitable for the acceleration of the regeneration of the haemopoetic damage due to chemotherapeutic treatment.(41) [\(Top\)](#) [\(Bottom\)](#)

4.CLINICAL OBSERVATIONS

4.1. Study of the effects on the serum iron level

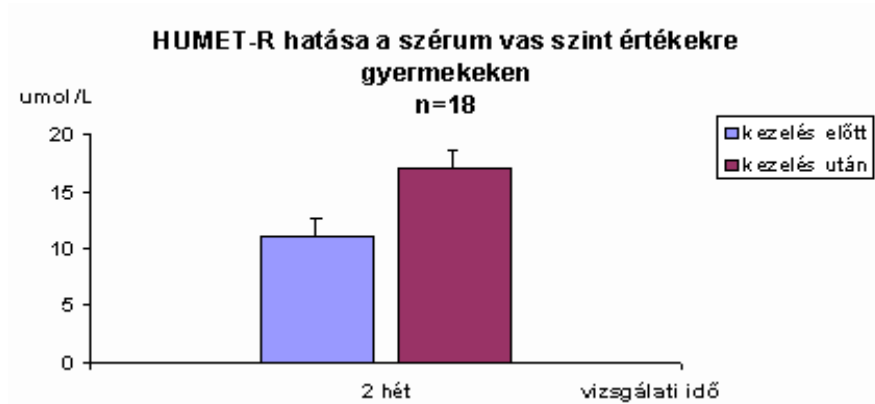
The study was performed in an open clinical trial (Dept. of Paediatrics, Erzsébet Hospital, Hódmezővásárhely, Dr. P. Szűts, Dr. P. Koszó) in anaemic children (age 1-18 years).

Anaemia was diagnosed by complete blood count analysis from a blood sample taken before oral administration of HUMET® -R syrup.

In the case of a small child, 2x1 ml (for age 1-2 years), 2x2.5 - 5.0 ml (for age 2-3 years old) of HUMET® -R were given maximum for 3 weeks. Therapeutic efficacy was demonstrated by checking the total body count on the weeks 2 and 4 after treatment. Twenty-two persons were involved in this study.

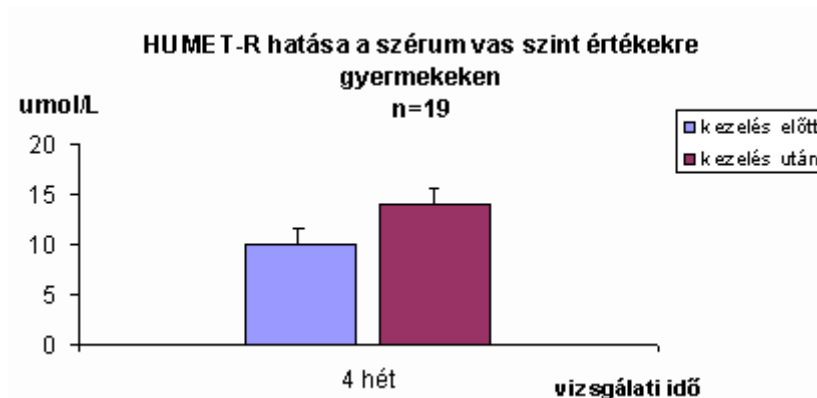
Results are demonstrated in the following figures 5, 6:

Fig. 5: Effect of HUMET® -R on the serum iron level in children



Kezelés előtt =Before treatment
Kezelés után =After treatment
2 hét=2 weeks
Vizsgálati idő=Observation period

Fig. 6: Effect of HUMET® -R on the serum iron level in children (n=19)



According to the results of the study, three weeks oral treatment with adequate doses of HUMET® -R caused significant increase of the serum iron level which was a marked effect on the week 4, too (i.e.: one week after cessation of treatment).(42) [\(Top\)](#) [\(Bottom\)](#)

4.2. Effect of Humet®-R Syrup in volunteers working in cadmium exposition

The aim of the study was to investigate the influence of the regular intake of HUMET® -R syrup, (which contains ten essential elements bound to the mixture of the humic acids and is distributed as a therapeutic product) on the biological parameters (blood and urine cadmium concentration) of subjects working in cadmium exposure conditions; and on their clinical laboratory parameters (haemopoiesis, liver and kidney function) characteristic to their health status.

The workers involved in the study were involved partly in battery production, and partly in over-plating some component with cadmium; the performance of these technical processes needed very simple activity.

The persons studied were exposed to cadmium in the workplace and their blood cadmium level (90 nmol/L) or the urine level (10 nmol/mmol creatinine) remained within the determined biological limit values.

The patients were examined three times: record of the basic state (examination No 1) which was followed by a six-week voluntarily intake of HUMET® -R syrup in daily dose of 10 ml (examination No 2), and on the week 14 after cessation of the treatment (examination No 3).

All patients were free of symptoms and complaints and remained capable of work during the entire period of investigation. There was no intermittent disease or illness.

In the course of the study, for characterising the degree of exposure, the biological exposure parameters of cadmium were measured, as follows: level of cadmium concentration in the blood and urine samples (value of quantitative urine determination was corrected to be the creatinine concentration), the effect on the haemopoiesis (total quantitative blood count, serum iron concentration, iron-binding capacity and saturation), the value of the liver function (serum bilirubin concentration, the activity of aspartate amino-transferase (GOT), alanine aminotransferase (GPT), gamma-glutamyl transferase (GGT), and the values of the kidney function (study of general state, and sediment, quantitative protein concentration of urine, N-acetyl-b D-glucoseamidase NAG) activity, the concentration of serum creatinine, carbamide and uric acid (urate). From the results of the study, the three examinations (basic state, after six-week treatment with HUMET® -R, and on the week 14 after the treatment) of 16 male patients regarding the cadmium concentration of the blood and urine and the results of the other laboratory parameters are demonstrated in the Tables 3 & 4.

[Table 3:](#)

Changes of the blood and urine cadmium content in volunteers

Measurement (n = 16 males)	Blood Cd (nmol/L)	Urine Cd (nmol/mmol creatinine)
Basic state	8.5 ± 5.7 (2.3 - 23. 3)	1.0 ± 0.6 (0.3 - 2.6)
6 weeks after HUMET® R treatment 10 ml/day	7.2 ± 4.8* (2.5 - 18. 4)	1.3 ± 0.7* (0.4 - 2.8)
on the week 14 after treatment	1. ± 4.6* (1.1 - 17. 3)	1. ± 1.1* (0.5 - 5.0)

X ± S.D. *p < 0.05

[Table 4:](#)

**Effect of HUMET® -R treatment on haematological
and urine parameters in cadmium exposition**

Parameter	examination		examination		examination		Significant difference p<	
	No 1	No 2	No 2	No 3	No 3	1.vs.2.	2 vs.3	
tested	mean ± S.D.		mean ± S.D.		mean ± S.D.			
Red blood cell count (T/1)	5.17 0.17	5.06 0.20	5.01 0.28	0.05	NS			
Hæmoglobin (g/L)	152.8 4.8	149.1 6.3	153.4 6.2	0.01	0.05			
Hæmatocrit (%)	46.1	44.7	44.8	0.01	NS			

	1.6	2.3	1.9		
MCV (fl)	88.8	87.9	89.3	0.01	0.001
	3.1	3.4	3.7		
Leukocyte count (G/L)	6.6	6.7	7.4	NS	0.01
	1.3	1.8	1.8		
GPT (U/L)	47.1	38.6	41.9	0.05	NS
	36.0	26.7	25.1		
Urate (micromole/L)	432.7	334.6	340.0	0.001	NS
	110.0	116.7	76.6		
Urine protein (mg/mmolcr.)	9.6	5.9	6.2	0.05	NS
	17.4	12.5	6.8		

Decrease of the blood cadmium concentration (15 and 13%) and the increase of the urine cadmium concentration (25 and 56%) were significant both in response to the six-week HUMET® -R treatment and at the end of the treatment-free period (week 14). It was noteworthy that at the end of the six--week HUMET® -R treatment the serum GPT activity (from 47.1 to 38.6 U/L), the urate concentration (from 432.7 to 334.6 micromol), the total protein concentration of the urine (from 9.6 to 5.9 mg/mmol creatinine) significantly decreased.

Conclusively it can be stated that the regular daily intake of HUMET® -R syrup decreased the absorption of the cadmium and increased its urinary elimination. In respect to the outstandingly cumulative potency of cadmium in the human organism, this clinical finding has extraordinary importance from the point of view of prevention.

[\(Top\)](#) [\(Bottom\)](#)

4.3. Study on the Effect of HUMET®-R on the Lead Level of Urine and Blood in Healthy Adult Population

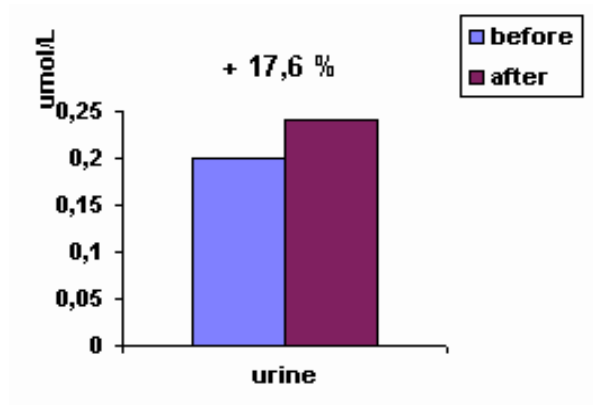
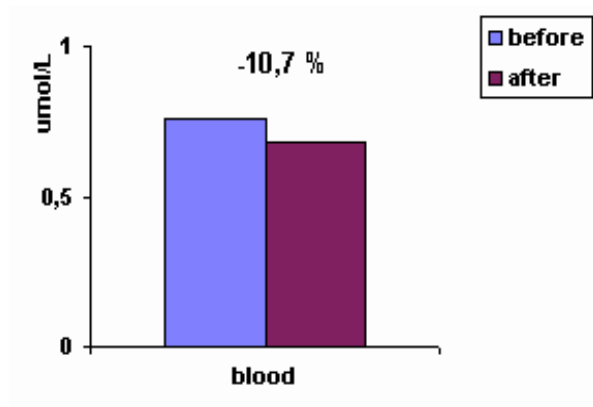
The aim of the experiment was to study the effectiveness of HUMET®-R on reducing the lead level of urine and blood in a city-dwelling volunteer population.

51 persons were included in the experiment (25 men and 26 women), aged between 18-60 years.

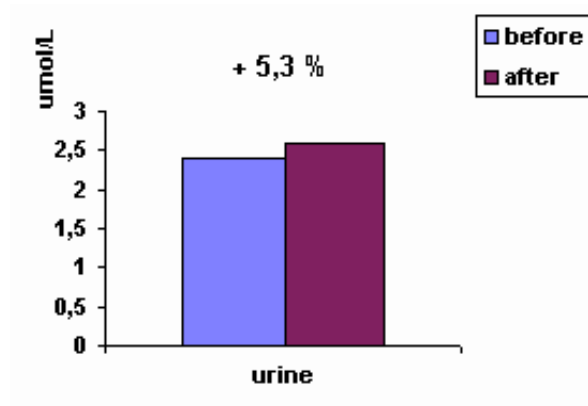
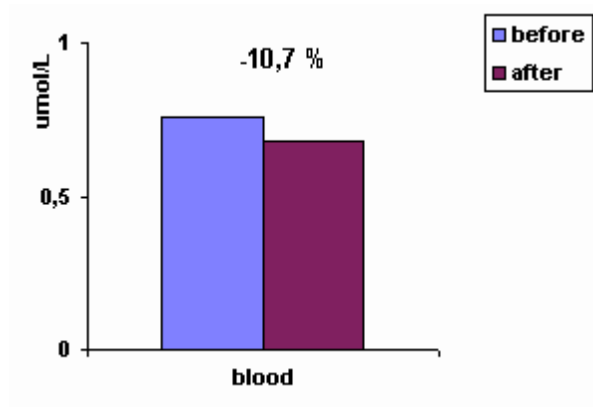
The laboratory samples of blood and urine were obtained before the administration of HUMET[®]-R syrup and after a 14-day treatment, using the recommended daily dosage.

From the 51 person volunteers for the study, 11 proved to have moderate lead exposure thus this sub-group was evaluated separately. The results are shown below:

Blood (n=51) and Urine (n=46) Lead Levels upon HUMET[®]-R administration Healthy Adult Population



Blood (n=11) and Urine (n=7) Lead Levels upon HUMET[®]-R administration in Lead Exposed Workers



From these results it can be safely concluded that, for the exposed volunteers (determined as lead level above 1.0 m mol/L blood), the lead content of the blood dropped significantly after 2 weeks of treatment. However, the expected elevation of lead level in urine was not significant.

The same tendencies were observed in the non-exposed group, but for them the changes were insignificant.

[\(Top\)](#) [\(Bottom\)](#)

4.4. Study on the effect of HUMET®-R treatment on lead poisoned patients(43)

9 patients were treated at the Department of Internal Medicine of Szent György Hospital between August and October 1994 with lead poisoning due to paprika tainted with minimum (Pb_3O_4).

Of the 9 patients 3 required Ca-Na-EDTA acute treatment which eliminated the symptoms of lead poisoning quickly (after the third day of treatment).

and RVO₂ , LA and RVO₂ (both Htc and lactate are proportional with the aerobic performance) in low Htc group (value < 0.43), the same correlation was negative in the high Htc group (value > 0.47).

Based on this three week HUMET® -R treatment, one can state that the result of the treatment is the optimisation of the value of Htc and Hb and approximation of the physiological reference values. (44) ([Top](#)) ([Bottom](#))

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Fulvic Acid Report

Fulvic Acid: The Miracle Molecule

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Introduction

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Fulvic acid (not to be confused with folic acid) is rapidly being recognized as one of the key elements in many outstanding health and scientific breakthroughs of the 21st century. Scientists and doctors throughout the world are beginning to discover fulvic acid and are starting to recognize its extraordinary potential. At Vital-Earth Minerals, we have no doubt that this interest will increase dramatically as ongoing findings are released to the world, and as word-of-mouth spreads the amazing news about this phenomenal element.

SECTION
3
[Toxic](#)
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Fulvic acid has always occurred naturally in organic plants and soils, yet its recent discovery and tremendous value is now just beginning to be recognized. It can balance and energize cell life and biological properties it comes into contact with.¹ If the individual cell is restored to its normal chemical balance and electrical potential, we have given cells life where death and disintegration would normally occur.²

SECTION
4
Experiments
[Human](#)
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Doctors have known for years that everyone needs at least 90 nutrients to maintain optimum health. These nutrients include a minimum of 59 minerals, 16 vitamins, 12 amino acids and 3 essential fatty acids. But eating good tasting food and swallowing a lot of vitamin pills does not guarantee absorption or utilization of these vital nutrients. When the body does not absorb nutrients the door is open for disease.

SECTION 5
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Scientists have found that fulvic acid is the element that makes nutrients absorbable, which gives it the ability to make a dramatic impact on all kinds of diseases and health problems that afflict us today. They call it the elixir of life and theorize that without it, nothing would live.

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Fulvic Acid – The Miracle Molecule

“If I had to chose between the liquid mineral and electricity, electricity would have to go.”

Dr. Clyde Sandgrin

Fulvic acid is being called Nature’s Miracle Molecule, because it does so many things ... it wears so many hats. Reported claims of benefits are a little short of astonishing. For internal use they are:

- Increased energy
- It’s a ferocious antioxidant and free radical scavenger
- Chelates heavy metals and body toxins, removing them from the system
- Transports nutrients into the cells
- Extends the time nutrients remain active – potentiates the availability of essential nutrients

- Increases metabolism of proteins, contributing to DNA and RNA synthesis
- It's a powerful natural electrolyte
- Restores electrochemical balance
- Increases activity of a host of enzyme systems
- Helps rebuild the immune system
- Increases bioavailability of nutrients and minerals

Reported beneficial claims for external use:

- Treating open wounds, cuts and abrasions
- Healing burns with minimum pain or scarring
- Eliminating discoloration due to skin bruises
- Killing pathogens responsible for athlete's foot
- Acting as a wide spectrum anti-microbial and fungicide
- Treating rashes, skin irritations, insect and spider bites
- Neutralizing poison ivy and poison oak

SECTION
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Introduction
[Electrolytes](#)

The agricultural benefits of fulvic acid have enormous potential to heal soils of the world and to neutralize radioactive and toxic wastes.

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Fulvic Acid, Origin and Overview

In the Beginning

In the beginning the earth was blessed with optimum organic growing conditions. The soil had a wealth of minerals, trace elements and rich humus soil teeming with microbes. The earth's minerals had not been depleted from over-farming, therefore the soil was exceptionally

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The vegetation was very lush and abundant, as is evidenced by ancient remains that geologists call humic deposits. These deposits are quite rare and can be found in various areas of the world. Even more rare are deposits of humic substance that are exceedingly rich in a little known substance called fulvic acid.

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Fulvic Acid – Supercharged Electrolyte

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Fulvic Acid has been called one of the most important natural miracles related to life itself. It is an acid³ created in extremely small amounts by millions of beneficial microbes working on decaying plant matter.⁴

Because of fulvic acid's low molecular weight⁵ (small molecules) it has the ability to readily dissolve and bond minerals and nutritional elements into its molecular structure. Nutrients that have been chelated by fulvic acid are in an ideal natural form to interact with and be absorbed by living cells.⁶ Fulvic Acid is so powerful that one single fulvic acid molecule is capable of carrying 60 or more minerals and trace elements into the cells.

Fulvic Acid is Lacking in Food Crops

It is a well known and publicized fact that our soils are sick from poor agricultural practices. The sterile soil conditions brought on by the overuse of pesticides, chemical fertilizers and erosion prohibit microbial activity and the formation of fulvic acid.

Fulvic acid that is essential for maximum human health has been missing from our diets for generations.

Re-mineralization of our bodies without the fulvic acid (that should be in the plants we eat), has little benefit. People are sick with degenerative and deficiency related diseases now more than ever. Fulvic acid supplementation is a good start toward reversing this situation.

Supercharged Electrolyte, Antioxidant, and Free Radical Scavenger

Cellular electrical energy could be called the life force of the body. When electrical energy is reduced in cells, they disintegrate and die. It is believed that electrical and chemical balances within the cell can be created and controlled by electrolytes ... the body's mini battery chargers.

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Scientists tell us fulvic acid is one of the most powerful natural electrolytes known to man. These supercharged molecules balance cellular life ... restoring the electrical potential that was once normal to the cell by charging, regenerating, regulating and delivering their living energies to the living cells.

Fulvic acid maintains the ideal environment⁷ for dissolved mineral complexes, elements, and cells to bio-react electrically with one another causing electron transfer, catalytic reactions, and transmutations into new

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minerals.⁸

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It helps with human enzyme production, hormone structures, and is necessary for the utilization of vitamins. It has been found to be essential to living cells in carrying on metabolic processes.

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It is also one of the most powerful natural antioxidants and free radical scavengers known. It has the unique ability to react with both negatively and positively charged unpaired electrons and render free radicals harmless. It can either alter them into new useable compounds or eliminate them as waste.

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Fulvic acid can similarly scavenge heavy metals and detoxify pollutants.

Fulvic Acid Mineral Complexes are Better than True Colloidal Minerals

You may have heard all the excitement about colloidal minerals. But true colloidal minerals by themselves are not readily useable by cells. It is the fulvic acid *in conjunction* with minerals that makes them effective. Many colloidal minerals on the market contain a small amount of fulvic acid, which is responsible for any results they may produce. Vital-Earth's **Fulvic Mineral Complex** contains a whopping 42% fulvic acid.

Fulvic Acids Further Defined

Individual cells when properly nourished, are capable of producing many of their own amino acids, enzymes, and other factors necessary for all metabolic processes. Each cell, in addition to other processes, burns its own energy, maintains itself, manufactures its own enzymes, creates its own proteins, and duplicates itself.⁹ It is essential to understand that the total metabolism of the body is the sum of the metabolic operations carried on in each individual cell.

Growth & Maintenance Nutrients

Scientists have identified at least 90 growth and maintenance nutrients which must be continuously supplied to the body to sustain healthful life. These nutrients include amino acids, major and trace minerals, vitamins and other nutritional factors.¹⁰ When these factors are supplied to our cells, the cells then create the building blocks of our life process. The building blocks present in the metabolic machinery are, in the great majority of cases, the same in other organisms of extremely different types.¹¹

Humans can produce all but eight amino acids within their cells. The very

complex process of all metabolic functions are carried on within the cell. If we fail to supply the cell with essential growth and maintenance nutrients we will experience a breakdown of these functions. When the breakdown is substantial we have the onset of disease or the manifestation of some related defect.

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Sick Soils, Sick Plants, Sick People

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In the beginning, our naturally fertile soils contained adequate amounts of humic and fulvic acids produced by resident microbes within the soil. They delivered nutrients and minerals to the plants.

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Largely our modern agriculture aims at one goal ... an abundance of saleable products. Food quality is sacrificed for food quantity. Since the farmer is paid by the bushel, yield is more important than nutritional content. To control disease and force yield, excessive amounts of nitrate fertilizers are applied to the soil. Such practices stun and destroy the indigenous microbial life within the soil, which destroys vital humic and fulvic acids.

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Gone Are The Minerals

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When microbes are depleted from the soils, they are no longer present to convert inorganic minerals into organic minerals needed by plants. Excessive use of nitrate fertilizers inhibits the formation of normal plant proteins and stimulates an over-abundance of unused amino acids that attracts insects.¹² Since pests were created to eat diseased plants this introduces the ideal environment for increased infestation because of increased insect food supply. The farmers reaction is to apply more pesticides and fungicides to save his infested crop. This in turn inhibits or destroys even more vital microorganisms that are essential in converting minerals to plant nutrients.

Unsafe Foods

These deficient, pesticide laden products are turned into “cash”, which the farmer thinks is the bottom line. Lacking in organic trace elements and other nutritional factors, but long on chemical residues from pesticides, insecticides and herbicides, these nutritionally hollow product end up on the table of America. Without taste, and deficient in organic minerals and nutrients, we peel, boil and overcook what remains and then ask “why am I sick”.

The Vitamin Connection

New breakthroughs are just beginning to emerge in the use of increased dosages of vitamins and minerals for treatment of some ailments. However, it is crucial to remember that vitamins cannot complete their function in the cell's metabolism without the presence of the appropriate and specific mineral co-factor and fulvic acid.

Cell Wall Permeability and Absorption

One of the strongest advantages of fulvic acid minerals is that absorption greatly exceeds traditional tablet supplements. As with any nutrient or supplement, the only way your body can benefit, is if it is absorbed. Fulvic acid enhances this process.

Fulvic acid makes elemental minerals and vitamins more absorbable by complexing them (refines, purifies, combines and re-refines) into organic, ionic forms that are easily transported into and through membranes and cell walls. Once the nutrients meld into the fulvic acid complex, they become bioactive and bioavailable.

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The Fulvic Acid Connection

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Humic and fulvic acids have a fascinating effect on living organisms. Fulvic acid chelates and binds scores of minerals into a bio-available form used by cells. These trace minerals serve as catalysts to vitamins within the cell.¹³ Additionally, fulvic acid is one of the most efficient transporters of vitamins into the cell.

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The Enzyme Connection

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An enzyme is a catalyst that does not enter into a reaction but speeds up or causes a reaction to take place. Enzymes are complex proteins. Enzymes are the life force behind vitamins and minerals. Without enzyme activation in the stomach, food would simply rot, elimination would not take place, thought would cease and we would die.

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At the cellular level, the burning of glucose in cells for instance, requires

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the action of several enzymes, each working on the substrate of the previous reaction. Each cell of the body, when properly nourished, is capable of producing the enzymes needed for complete metabolism.¹⁴ Research has shown that fulvic acid improves enzymatic reactions in cells and produces maximum stimulation of enzyme development.¹⁵

Free Radicals & Antioxidants

If a healthy body is your goal, then you must take action to protect yourself against free-radical attacks.

Dramatic increases of free radicals in our air, food and water in recent years have put a tremendous strain on the body's natural defense mechanisms. Our first line of defense against free radicals is a generous supply of free radical scavengers, called antioxidants.

Free radicals are highly reactive molecules or fragments of molecules that contain one or more unpaired electrons.¹⁶ They circulate through the body causing great mischief in bonding to and injuring tissues. In addition to destroying tissue, they magnify the probability that injured cells will become susceptible to a great many infections and diseases, or mutate and cause cancer.

According to Sesesi, Y. Chen and M. Schnitzer, fulvic acid has the ability to dramatically reduce the oxidative effects of free-radicals. This means fulvic acid could potentially help your body ward-off disorders such as cancer, premature aging, wrinkling of the skin and arthritis ... all of which are thought to be hastened by oxidation.

Antioxidants

In recent years frantic efforts have been made to locate and isolate compounds with an extraordinary affinity for free radicals. Entire industries have evolved around such efforts, with nearly every vendor of health food products offering possible solutions. There are three identified categories of free radicals, and numerous identified free-radical scavengers, Vitamin A, C, E, Gamma-Linoleic Acid, L-Cysteine, L-Glutathione, Selenium, and CoQ10 are the best known. Each one of the free-radical scavengers eradicate a different category of free-radicals. Its very complicated to get the right form of nutrients, in the correct amounts, along with all the co-factors needed to make them work.

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For an antioxidant to bind a free radical, the antioxidant molecule must have unpaired electrons of equal and opposite charge to that of the unpaired electrons of the free radical.

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Fulvic Acid, the Super Antioxidant

We have found that fulvic acid is a powerful, natural electrolyte that can eradicate any form of free-radical. It can act as an acceptor or as a donor in the creation of electrochemical balance. If it encounters free radicals with unpaired positive electrons, it supplies an equal and opposite negative charge to neutralize the bad effects of the free radicals. Likewise, if the free radicals carry a negative charge, the fulvic acid molecule can supply positive unpaired electrons to nullify that charge. Fulvic acid plays the role as a bi-directional super antioxidant.

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In Summary

Fulvic acid is a bio-available chelated molecule that can also chelate. As a refiner and transporter of organic minerals and other cell nutrients, it has the ability to turn bad guys into good guys by chelating and humanizing free radicals. Depending upon the chemical makeup of the free radical, they can be incorporated into and become a part of life sustaining bio-available nutrients. In the event that the chemical makeup of the free radical is of no particular benefit, it is chelated, mobilized and carried out of the body as a waste product

Many of the substances that make up humic matter have yet to be discovered and catalogued among the know and documented organic chemicals. We are beginning to realize that what we know about Fulvic Acid is just the tip of the iceberg.

Information Concerning Possible Toxic Minerals

"Poisons in small doses are the best medicines; and the best medicine in too large doses are poisonous."

A famous quote by Wm. Withering

Consumption of plant derived mineral fulvic complexes by humans for many years has shown that they will not build up in the body tissues as do

metallic minerals. The following observations and theories describe the reasons why:

Cells have the ability to accept or reject minerals, including *aluminum, lead, arsenic, mercury*, etc., at their discretion when presented as organic fulvic acid complexes. It should be considered that these minerals may not necessarily be present to “nourish” cells, but are needed to act as “electrodes” in the fulvic electrolyte solution. In that capacity they are probably most essential for bio-reactions, electron transfer, catalytic reactions and transmutations.

Fulvic acid carries complexed minerals in “trace” amounts only, and should not be confused with metallic minerals. Fulvic acid has the ability to complex and remove toxic metals and other minerals from the system. Fulvic acid mineral solutions have been ingested by people for many years, yet have never been shown to cause toxic mineral build-up in humans.

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It is obvious that when metals, minerals and trace elements become complexed into fulvic acid, they take on an entirely new property of availability, unlike their original form.

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It is when fulvic acid is not present that one should seriously worry about toxic buildup from any source. This could account for the health problems that are causing concern today in our “fulvic starved” society.

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Aluminum makes up 12% of the Earth’s crust, and is the most abundant metallic element. Aluminum is found in biological quantities in most plants grown in soil. Most of our food crops contain 20 – 200 ppm or more of aluminum. In crops today this concentration would normally be in the absence of fulvic acid.

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Known biological function of Aluminum is to activate the enzymes succinic dehydrogenase. It increases survival rate of newborn infants, and according to professor Gerhard Schrauzer, head of the department of chemistry at UCSD, is an essential mineral for human nutrition.

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In a study that appeared November 5, 1992 in the science journal, NATURE, Frank Watt, et al (University of Oxford) used a highly accurate laboratory technique to quantify the levels of aluminum in the brains of Alzheimer’s patients. To their great surprise, they found the same levels of aluminum in the brains of the non-Alzheimer’s control as they did in their Alzheimer’s patients. Watts believes that aluminum contaminated stains gave faulty results in the early studies that highlighted aluminum as a health risk.

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Science is just learning about other supposedly toxic minerals

Arsenic

It is now generally accepted that arsenic in trace levels, is an essential element for optimal health and longevity. The levels of arsenic that most people ingest in food or water are not usually considered to be of health concern.

Despite all the adverse health effects associated with arsenic exposure, there is some evidence that low levels of exposure may be beneficial to good health. Test animals maintained on a diet deficient in arsenic did not gain weight normally, and they became pregnant less frequently than the control animals maintained on a diet containing a more normal (but low concentration) of arsenic.

Arsenic has been found to be essential for survivability of newborn babies and also neonatal growth. Arsenic has been shown to promote the growth rate in animals and prevent carpal tunnel syndrome in humans

Smokers and cadmium

Like most plants, tobacco contains trace amounts of cadmium and lead. It is interesting to note that people that smoke tobacco have about twice as much cadmium in their bodies as do nonsmokers. Higher levels of lead are also found in smokers. It would stand to reason that burning converts the natural organic plant forms to a metallic or toxic form causing buildup in the body. This also could be direct evidence proving the safety of natural organic plant forms of these metals.

Mercury and Selenium

The metabolic antagonism between mercury and selenium results in the protection from selenium poisoning by mercury, and the protection against mercury poisoning by selenium.

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Taking too little zinc is at least as important a health problem as taking in too much zinc. Without enough zinc in the diet, people can experience loss of appetite, decreased sense of taste and smell, slow wound healing, and skin lesions. In severe cases in children, too little zinc can cause poorly developed sex organs and dwarfism.

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Agency for Toxic Substances and Disease Registry, Public Health Statements: Arsenic, Aluminum, Mercury, Zinc, Selenium, Cadmium, Lead.

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Kehoe, R.A., et al.: Manganese, Lead, Tin, Aluminum, Copper and Silver in Normal Biological Material. J. Nutr. July 1940. Pages 85 – 98.

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Human Experiments With Fulvic

The Healing & Regenerative Influences of Low Molecular Weight Humic Substances (Fulvic Acid) On Human Tissues and Cells

Tests¹⁷ were conducted by Dr. W. Schlickewei¹⁸ and five associates¹⁹ at the University Hospital in Freiburg, Germany, on human patients requiring transplantation or replacement of bone during surgery. The transplantation of bone tissue is required in about 15% of all cases of replacement surgery of the locomotor apparatus, and it is generally applied to reconstitute and repair actual defects in bone.

Human donor tissues have become scarce due to special legal requirements and necessary additional testing because such tissues have a high danger of transmitting the HIV virus and hepatitis. There are also obvious disadvantages to using bone grafts from other areas of the same patient's body because they require a second operation and prolong the length of time in surgery. The only other known substitute source available in large enough quantities for clinical use, was animal bone in the form of inorganic calcium compounds (bovine calcium hydroxyapatite), and although these were well tolerated by the body, they showed no signs of being resorbed.

Remarkable bone regeneration and resorption characteristics were identified when the animal bone implants were impregnated with a low molecular weight humic substance

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(fulvic acid) prior to transplant into patients. The bone implant then became highly osteoconductive, and served the host tissue as a “guide-line” for the deposition of newly developing bone tissue. The same transplant procedure without the fulvic acid showed no signs of regeneration during the course of the experiment.

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While on the lookout for a new group of active agents with the ability to promote wound healing, the doctors came across the humic substances. The doctors said that the bone resorption is most easily explained by the known ability of humate to induce the activation of leucocytes. They said that previous experiments had established that the humic substances are able to bind to calcium-containing compounds, stimulate granulocytes, and block the infectivity of the HIV virus.

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Summary: In this clinical test and previous experiments, fulvic acid has been shown to activate and stimulate white blood cells, promote healing, turn inorganic calcium into an organic bio-active cellular regenerative medium conducive to new bone growth, stimulate cellular growth and regenerate, and inhibit the HIV virus.

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Animal Experiments with Fulvic

Early studies with livestock animals were conducted by Dr. Charles S. Hansen, D.V.M. in the state of California from the early 1960's through 1967 on an experimental basis. Dr. Hansen's test included a blend of fulvic and humic acid used as a feed additive. He also used fulvic acid alone as a treatment for specific ailments in livestock. The results of supplement feeding and treatment included:

Dairy Cows

- After 2 months of supplement no bacterial or viral infections
- Herd of over 300, after 3 months on supplement increased butterfat production of 15%
- Herd on supplement cut back on high protein rations with no decrease in production
- All cows on supplement experienced more complete

digestion

- Cows with bacterial infection (mastitis) treated with 1 pint fulvic acid solution recovered to full production in 12 to 24 hours
- When using antibiotics to treat mastitis the recovery was only 50% - 70% after 2 to 3 weeks.

Hogs

- Animals on the supplement experienced better and more complete digestion
- The free choice supplement in 36 hrs acted as an excellent vermifuge (de-worming agent)
- The supplement completely eliminated Necro, a bloody diarrhea in hogs

Mink

- Animals on the supplement experienced more complete digestion
- When on the supplement were less vicious, more docile
- Supplemented animals ceased fur chewing
- Successfully eliminated most diseases common to mink herds

Poultry

- Supplementing to feed acted as a vermifuge
- Pullets given supplement were free of most diseases
- Pullets on supplement experienced more complete digestion of other feeds in diet
- Pullets on supplement produced eggs of superior shell hardness and quality

The results of these early tests support the known benefits which fulvic acid provides to all living systems, plant or animal. They indicate that fulvic acid may very possibly become the most important factor in health management in the future.

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The Colloidal Myth

Definition of Colloidal

A colloid is: "A state of matter in which the matter is dispersed in or distributed throughout some medium called the dispersion medium. The

matter thus dispersed is called the disperse phase of the colloid system. The particles of the disperse phase are larger than the ordinary crystalloid molecule, but not large enough to settle out under the influence of gravity.¹

Colloids as defined in physical chemistry are: A. A colloidal system, one in which a finely divided solid is suspended in a liquid: such colloids range from solutions to gels. B. A colloidal suspension. C. A substance that when suspended in a liquid will not diffuse easily through vegetable or animal membrane.²

According to Remington's *Pharmaceutical Sciences*: "colloidal mineral particles each consist of many aggregates, and each aggregate contains many molecules." Thus it stands to reason that colloidal minerals exist in particle sizes many time larger than some other mineral forms.

Because of their size, true colloidal minerals are not absorbed by the body.³

Remember ... fulvic acid is the key to outstanding health benefits ... not colloidal minerals.

¹ definition of a colloid – Dorland's Illustrated Dictionary, 24th Edition

² definition of colloids – Random House Dictionary of the English Language

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