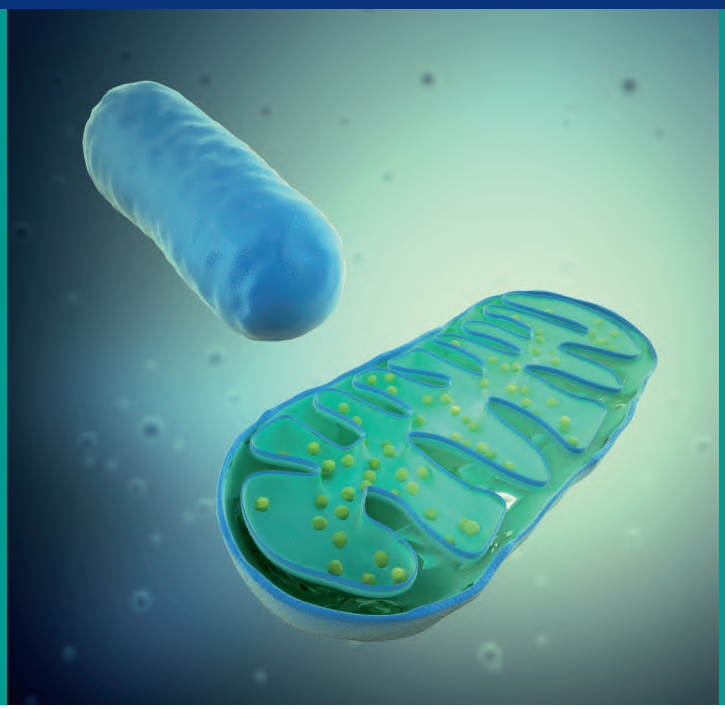
The Haug Report

Preparation



Enzyme Yeast Cells for Prevention and Therapy

Enzyme Yeast Cells Dr. Wolz®

- Biological Immunomodulation and Active Protection
- Mitochondrial Cell Health
- Detoxication, Stabilization, Regeneration

Research Results on Efficacy

Haug

Inhalt

Enzyme Yeast Cells Dr. Wolz® – Healthy Cell Respiration in the Mitochondria as a Basis for Health

Current Research Findings and Efficacy Proof

1. Introduction

Cell health is highly dependent on the functionality of the mitochondria as central target structures during illness, toxication or pathological situations related to oxidative stress. According to new research findings, these include neurodegenerative and cardiovascular diseases as well as Diabetes mellitus and tumourous diseases.

The best protection against mitochondrial dysfunction entails the supply of the mitochondria with the bioactive nutrition necessary for their functioning. The enzyme yeast cells are most suitable due to their high degree of bio-availability and the 70 % similarity of the genetic make-up with that of humans.

Hitherto, it was cumbersome to offer proof of whether or not supplying the body with such defined micro-nutrients could contribute to the strengthening of body performance and the immune function. Novel processes of establishing biomarkers are currently available and have enabled the generation of scientific knowledge to this effect. These complement the past research findings and lessons of experience about the efficacy of Enzyme Yeast Cells Dr. Wolz®.

This report discusses research findings and offers information on the structure, significance, and mode of efficacy of the enzyme yeast cells with reference to applicability in adjuvant therapy of carcinosis, fatigue syndrome and immunomodulation in recurrent infections.

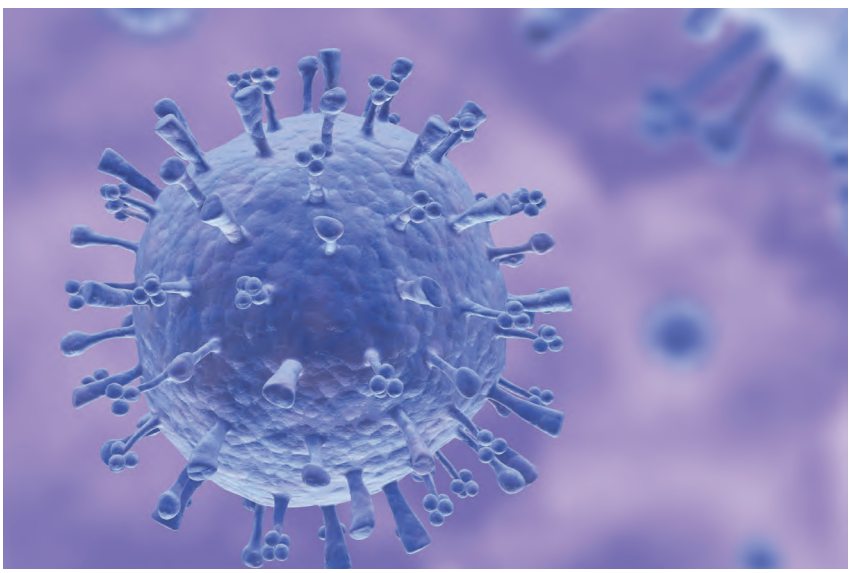


Figure 1 A healthy immune system protects the organism against intrusive pathogens such as viruses and bacteria. © 2ndpic/Fotolia

1.1 Enzyme yeast cells: Use in traditional and modern medicine

For more than 5000 years, cultivated yeast has been a companion of mankind and was used in folk-medicine as remedy, vital substance provider as well as a pharmaceutical product. This was evident in Antiquity, during the time of Hildegard von Bingen as well as Sebastian Kneipp and has continued into Modern Times. Cultivated yeast was used, among others in the production of vaccines (hepatitis).

Yeast therapy was for the first time described on a papyrus roll around 1500 BC. The Greek medic Hippokrates used yeast as natural remedy and Paracelsus was not short in praise to describe it as heavenly medicine. During Antiquity, yeast was used for skin ailments, inflammation and digestive complaints. During the Middle Ages, monks used it as a protective agent against pest. Indeed, yeast has a wide range of application in folk-medicine.

Nowadays, it is widely acknowledged that yeast cells increase unspecific cellular immunity, constitute secretory IgA and stimulate intestinal mucosa.

This is due to the polymerous carbohydrates such as ß-1,3 and ß-1,6 dendritic glucans found in the enzyme yeast cell

There is evidence in medical and biochemical research about the current use of enzyme yeast cells which include:

- Cell metabolism and cell protection
- Regeneration and body performance
- Detoxication and strengthening of the immune system
- Prevention of early signs of aging
- Intestinal-related immunity

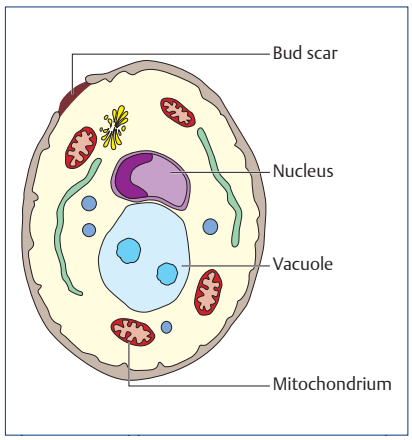


Figure 2 Yeast cell structure.

Yeast cells are 70 % similar to human cells and are therefore often used in research on human metabolic processes. As early as Antiquity, yeast was used as a medicament. There are three types of yeasts: Dry yeast, medical yeast and enzyme yeast cells Dr. Wolz®

wall. The properties of the yeast cell wall are responsible for stimulating large scavenger cells (phagocytes), killer cells and T-lymphocytes. Many worldwide scientific research groups corroborate the findings on glucans. These include the studies by Bogwald (Norway), Kanai, Mashiba, Matsumoto and Katsuragi (Japan) as well as Di Luzio (USA).

1.2 Yeast cells in science

Yeasts are one-celled fungi, constitute their own independent kingdom biologically and are considered historically as the precursors of the plant and animal kingdoms. In spite of one billion years of evolutionary development between humankind and yeast, the basic mechanisms of their cell structure and cell metabolism have remained similar. Yeast was the first organism whose gene map was researched upon. The subsequent research on the human gene map revealed a close match of 70 % between the human and yeast gene.

Nowadays yeasts are used as model organisms to study the metabolism of humans and the process of aging as well as gain insight into the cancer diseases. In this context the Nobel Prize for Medicine was awarded to Leland H. Hartwell (2001) for research on the origin of cancer and the cell-cycle regulation. The research was carried out on the yeasts as model organisms.

Thus, Nobel Prizes have been awarded to yeast cell-related research e. g. telomere research, protein metabolism and cell cleavage, DNA repair as well as immune defence. This highlights the importance of enzyme yeast cell preparations in medicine.

1.3 Characteristics of yeast preparations

Yeast cells (**Figure 2**) contain numerous enzymes that are also found in human organisms. The respective use of the yeast depends on the method of breeding and whether it was subsequently heated after breeding due to the denaturalisation-effect of the yeast on heating. Yeast is used industrially, e.g. baking yeast and beer yeast (Saccharomyces cerevisiae). The use of yeast in naturopathy, however, requires the breeding of a product whose enzymes are continually active. Accordingly different species of yeast are produced as food or medicinal supplements namely:

- **Dry yeasts** which are available in powder or tablet form. In this form the yeast structure has been destroyed by heat. Dry yeast preparations are used, among others, in the provision of Vitamin-B (brewing industry).
- **Medical yeasts** which multiply in the intestines and are usually used, among others, against diarrhoea.
- **Enzyme Yeast Cells Dr. Wolz®:** Are bred by oxygenation, do not undergo a heating process, remain enzymatically active and do not multiply in the intestines. The yeasts are used in the production of preparations for immune modulation, strengthening and regeneration.

1.4 Enzyme yeast cells: Production process retains the bio-active ingredients

Enzyme yeast cells are produced by a special process of Dr. Wolz' oxygenated enzyme fermentation (**Figure 3**). The process ensures the genesis of young and fresh yeast cells, quite different from yeast powder or tablets, capable of remaining biologically and enzymatically active - also in the mitochondria. Thus:

- Dr. Wolz' oxygenated enzyme fermentation process enables the yeast enzyme to grow as a pure culture under optimal aerobic conditions.
- The enzyme yeasts are cultured with natural and biological nutrient mediums such as fruit juices, wheat germ extracts and trace elements. They are filled in their natural liquid medium without preservatives.
- Fermentation occurs in temperatures under 32° C, continuous temperature control and oxygenation.

A day's dosage of enzyme yeast cells (e. g. Zell Oxygen® plus) contains approximately 200 billion yeast cells with 30 to 50 mitochondria in each yeast cell. On the other hand, a single enzyme yeast cell contains an effective spectrum of essen-

Figure 3 Dr. Wolz' oxygenated enzyme fermentation.

tial amino acids, vitamins, mineral nutrients, cell components like nucleotides, glutathione, coenzymes and trace elements bound in enzymes. In fact Enzyme Yeast Cells Dr. Wolz® can be referred to as a biochemical laboratory. The form of the biologically active ingredients remains unaltered because the yeast cells do not undergo heating during production. Thus, the cells in the Enzyme Yeast Cells Dr. Wolz® are attuned in such a manner that their cleavage in the human body is out of question, a factor that highly supports the resorption of their micro-nutrients in the human cells.

An important prerequisite for the activity of enzymes is the presence of co-enzymes. These include co-enzymes that are supplied in co-junction with nourishment, e. g. B-vitamins, Vitamin-C and K as well essential trace elements. Analogically, fruits and vegetables are some of the raw materials used in Dr. Wolz' oxygenated enzyme fermentation. With the aid of Oxygen Radical Absorbance Capacity (ORAC-value) the supply of secondary plant material such as anthocyane and flavonoids from fruits and vegetables is optimised.

Enzyme yeast cells are produced by Dr. Wolz' oxygenated enzyme fermentation. This guarantees the biological and enzymatic activity of the yeast cells.

2. Efficacy and ingredients of Enzyme Yeast Cells Dr. Wolz®

2.1 Glucans in immunomodulation

The cell wall of enzyme yeast cells is made up of immune-stimulating glucans, referred to in scientific research as biological response modifiers, i. e., immunomodulation. Glucans are carbohydrate polymers comprising of linked glucose molecules (β-glycosydic molecules).

The anti-tumoural characteristics of glucans are closely attributed to the linkage structure of the glucose-chains. Particularly the polysaccharides of the beta-D glucans can as a result of receptor inducing connectivity bolster specific action with regard to the function of microphage and killer cells (**Figure 4**).

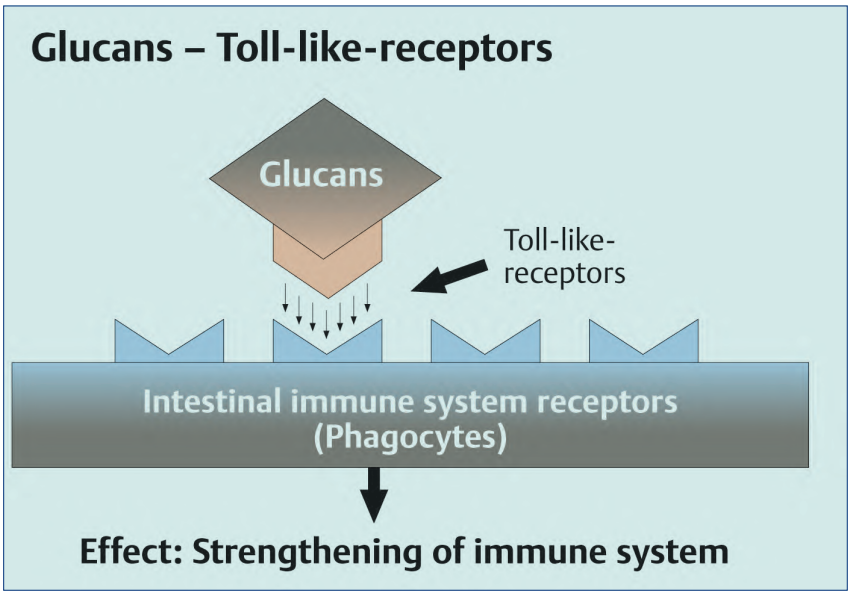


Figure 4 The docking of glucans to phagocyte-specific receptors stimulates the immune system.

The cellular approaches for triggering immune-stimulating, anti-carcinogenic and anti-oxidative effects have elevated the importance of beta-glucans in clinical medicine. This is related to the widely accepted knowledge that beta-glucans enter the organism via the lymphatic tissues of the intestinal mucosa and their sustained intake enables systemic and organ-specific interactions. This is accompanied by, among others, the expression of enzymes with anti-oxidative effects as well as the increase in the cellular activity of glutathione peroxidase and superoxide dismutase.

Consequently, several scientific studies have been carried out globally to corroborate the efficacy of glucans. They include studies by: Bøgwald (Norway) [3], Kanai [18], Mashiba [21], and Matsumoto [22] (Japan), Sonck (Belgium) [25] as well as Di Luzio [9], Liu [20] and Hong (USA) [14]. The studies show the capacity of glucans to activate the macrophages, thus putting them on the alert. While in the activated state, macrophages are able to act quickly and efficiently against pathogens. Beta glucans can be used to protect tumour patients against infections during cytostatic therapy that is generally known to limit immune competent cells. For example, studies in Japan indicate a lower rate of 4.8 % infection-related deaths in the group using beta-glucans compared to a 30 % death rate in the control-group. Moreover anti-microbial, anti-arteriosclerotic and anti-inflammatory characteristics are attributed to in vivo and in vitro beta-glucans.

On the same lines, beta glucans produced from yeast are capable of preventing post-operative infections, thus limiting the use of antibiotics. Experiments in animals have shown the efficacy of beta-glucans in protecting against anthrax, and in case of infections, they limit the bacterial attack of the lungs and thereby prolong life. In addition, the intake of beta-glucans prevents the onset of bacterial and parasitic infections as has been proven in animal experiments regarding Staphylococcus aureus and Coccidia where the activity of phagocytes is significantly increased.

2.2 Reduction of endogenous and exogenous stress factors

The human body is endowed with an inborn and acquired immune system. The inborn immune system possesses the capabilities of differentiating between invasive pathogens and the body's own cells. The acquired immunity on the other hand is activated by the inborn system and is capable of building anti-bodies and memory cells against a wide range of pathogens that would otherwise be difficult to trace.

The yeast cell walls contain glucans that are recognised by the body's inborn immune system by releasing cytokines, e. g. anti-inflammatory cytokine interleukin 4, 10 and 12 for immunomodulation and overreaction prevention. Particularly interleukin 10 stands out as the most important anti-inflammatory cytokine, whereas interleukin 12 is capable of repairing the damage caused by DNS and also stimulating T-killer cells. Within such a Modus operandi, glucans are capable of reducing the damaging effect of endogenous and exogenous stresses. Indeed for many years, the Japanese have been using glucans in adjuvant cancer therapy as well as against recurrent infections.

2.3 Comprehensive care of body cells with biologically active substances

In spite of their mono-preparation characteristic, enzyme yeast cells are unique due to their nature to provide the human cell with all the important nutrients necessary for healthy metabolism (**Table 1**). Enzyme yeast cells thus balance the micro-nutrient shortcomings experienced particularly after disease, chemotherapy and radiotherapy as well as during immune deficits e. g. in winter. Enzyme yeast cells are well suited for such application due to the 70 % similarity between their cells and those of humans and thus exhibit high bio-availability.

The thin walls of enzyme yeast cells are ideal for absorption and utilization in the human body. Nonetheless, the gastric acid does not destroy the yeast cell walls and it is not until they get to the small intestines that the digestive enzymes compel the enzyme yeast cells to release their biological ingredients into the body. In that state, the enzyme yeast cells are not multipliable and it is only their nutrient ingredients that are available for the body.

The most important ingredients of enzyme yeast cells include enzymes (such as the anti-toxic enzyme superoxide dismutase), the base of the cell structure (e. g. nucleotides for epithelial cells of the intestinal mucous membrane), trace elements for buttressing the body's resilience (e. g. zink), detoxication elements (e. g. selenium, vitamins (e. g. vitamins B 12, D 3), secondary plant ingredients (e.g. „free radical catchers", anthocyans and flavonoids) as well as a wide range of biologically effective components.

2.4 Detoxication and cell protection against free radicals

The cell stress induced by free radicals is a well known vicious cycle. This leads to the entire body reacting to inflammation to the extent of continuously producing free radicals. In the process, oxygen is set free in the form of highly reactive oxygen species (ROS) which are likely to lead to pathophysiological alterations, thus accelerating the aging process (**Figure 5**).

2.4.1 Oxidative stress

Free radicals are usually produced by the body as natural metabolic products with specific roles to play. The sustained equilibrium between free radicals and other natural detoxication mechanism is important for the health of the body. To the extent that the intake and formation of free radical is higher than can be provided by the body's own detoxication function, one refers to the situation as oxidative stress. The causes of uncontrolled over-production of free radicals leading to disorders in the body's self-regulation are among others; environmental stress, malnutrition, physical and psychical stress, medicament, injuries and inflammations.

Not surprisingly, the natural detoxication efficiency of the human body reduces with increasing age. This is accompanied by the reduced capability of the body to adequately repair damaged cells due to reduced immunity. It is therefore necessary to assist the body in its purification and detoxication processes with the view to maintaining the metabolic functions as well as achieving optimal socio-psychological satisfaction. Enzyme yeast cells are therefore an important source of sufficient micronutrients whose enzymatic

Tab. 1 Bio-active ingredients of enzyme yeast preparations [13].

Vitamins	Mineral compounds and trace elements	Amino acids (extracts)	Enzymes and co-enzymes	Further biologically active components	Secondary plant ingredients
Vitamin B 1, B 2, B 6, B 12, biotin, folic acid, niacin, pantothenic acid, vitamin C, beta-carotin, (provitamin A), vitamin E, provitamin D 2	e. g. Potassium iron, selenium chromium zinc	e. g. Arginine, cysteine, methionine, glutamine	e. g. Catalase, cytochrom oxidase, superoxide dismutase, NADH, co-enzyme Q 6, co-enzyme Q 10	Glucan, mannan, choline, nucleotide, glutathione, mitochondrial DNA-sequencing, 6000 different proteins, SH group-rich scleroproteins, glucosamin, peptides, cardiolipin, ergosterol	Anthocyanins, flavonoids, lycopene, carotinoides

co-factors lead to the catalysis of different metabolic processes in the human body.

2.4.2 Mitochondrial dysfunction

Free radicals are mainly produced in the mitochondria and whenever there is disorder, it is initially the function of the mitochondria that is destroyed resulting into mitochondrial dysfunction. This leads to a reduced efficiency of the ATP-synthesis, energy deficits, increased oxidative stress, as well as a high mutation of the mitochondrial DNA. Regardless of the fact that the mitochondria possess their own DNA, they do not have the mechanism to repair themselves. The vicious cycle will therefore be triggered by further mitochondria mutation and transfer of DNA-disorders.

Mitochondrial dysfunction is likely to lead to the functional insufficiency of the affected cells and tissues and to early cell decline as well as to mutagenic changes as described above. The initial indications for this insufficiency, also manifested in younger segment of the population, are muscle pain and rapid muscular fatigue. Indeed there is an increase in the number of diseases associated with mitochondrial dysfunction, e. g. neurodegenerative diseases such as Alzheimer's disease, cardiovascular diseases, Diabetes mellitus, Parkinson's disease and other tumour diseases.

The 4 most important functional mechanisms of Enzyme Yeast Cells Dr. Wolz® are:

- Enzyme yeast cell walls contain glucans which activate macrophages and thus modulate the immune system.
- Glucans induce the release of anti-inflammatory cytokines leading to a reduction of endogenous and exogenous stress factors.
- Enzyme yeast cells provide the human cell with the necessary micro-nutrients and have a higher bio-availability.
- Enzyme yeast cells complement the body's detoxication and protect against free radicals.

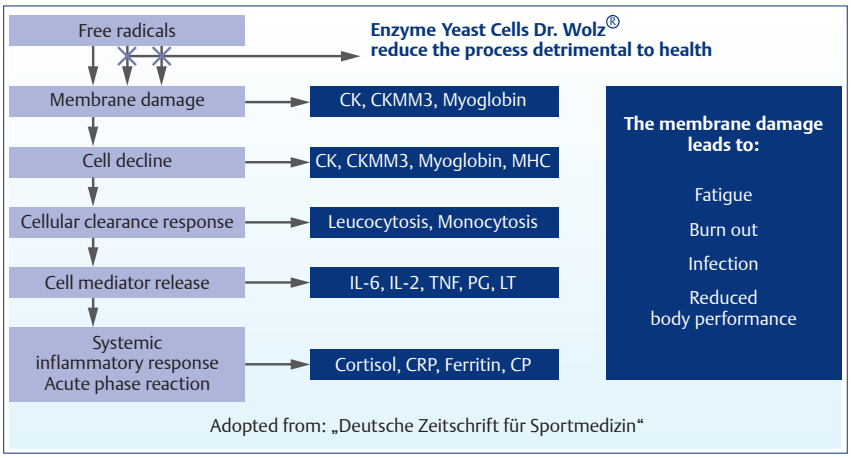


Figure 5 Mode of action of Enzyme Yeast Cells Dr. Wolz®.

Besides causing adverse effects on the mitochondria, the oxygen radicals with their quick and aggressive characteristics are most likely to lead to oxidative changes with further damage to important biomolecules e.g. nucleinic acid, proteins, lipids and carbohydrates.

The application of Enzyme Yeast Cells Dr. Wolz® is capable of breaking the mitochondrial dysfunction cycle by:

- Substituting the micro-nutrients e. g. selenium, zinc, vitamin D, vitamins, B-complex and Q 10 in order to strengthen the functioning of the cells.
- Interception of free radicals and the detoxication process by secondary plant ingredients, glutathione, enzymes, NADH and superoxide dismutase.

3. Study and research findings on enzyme yeast cells

In 1969, many years of scientific research by the biotechnologist Siegfried Wolz paid dividends with the development of the enzyme yeast cells. This ground breaking innovation by Siegfried Wolz was inspired by the team work with the renowned oncology researcher Dr. Dr. P.G. Seeger. Similar inspiration came from Prof. Dr. Feodor Lynen who succeeded in isolating the most important component of metabolism, co-enzyme A, from the yeast cell. Siegfried Wolz was a scientific assistant to Prof. Dr. Feodor Lynen who earned the Nobel Prize for Medicine for his work in 1964.

Enormous scientific research on efficacy has been carried out since the innovative discovery of the enzyme yeast cell as an immune modulating supplement and strengthening preparation 40 years ago. By 1974, the oncologist Prof. Dr. med. Siegmund Schmidt recommended the use of the yeast remedy Zell Oxygen® because it contains essential enzymes besides ingredients such as cysteine, glutathione, lysin, methionine and choline. By biotransformation, these ingredients assist the body in neutralizing the intruding environmental pollutants.

Additional impetus for enzyme yeast cell research was offered by the Australian medic and researcher Dr. Robert Buist of the International Society for Clinical Nutrition. Buist's research findings revealed a positive correlation between burnout syndrome and mitochondrial dysfunction caused by oxygen deficiency syndrome. Due to the known ability of enzyme yeast cells to facilitate better cell respiration, Buist recommended the application of Zell Oxygen® preparations with proven positive results against chronic burn-out syndrome and also cancer disease for alleviating "oxygenal hunger" in the tissues [4].

Similarly, in 1983 Prof. Dr. Ewald Dörling (Hamburg) carried out a series of studies on test persons of different age

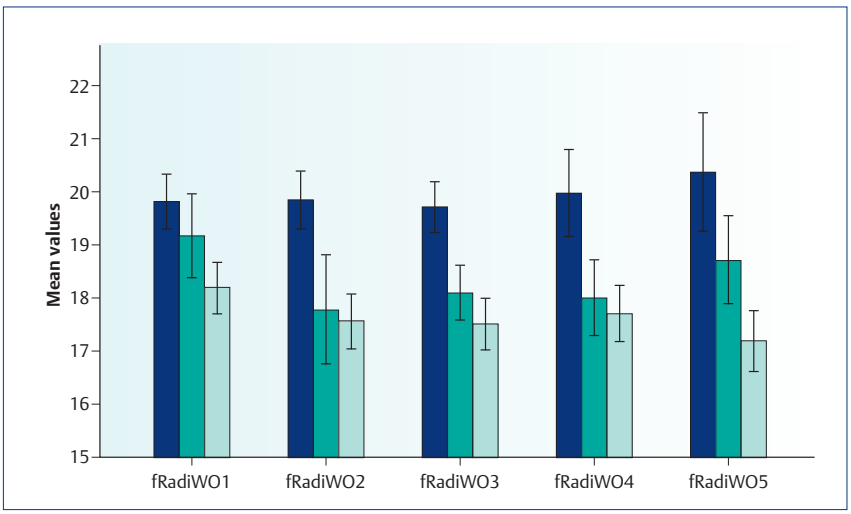


Figure 6 Mean values (U/ml; x ± SEM) of free radical concentration in each of the 5 capillary blood samples (1, 2, 3, 4, 5 corresponding to 0., 60., 120., 180., 240. minutes.) based on the 3 test-phases (U-1: blue, U-2: petrol, U-3: light green) [7].

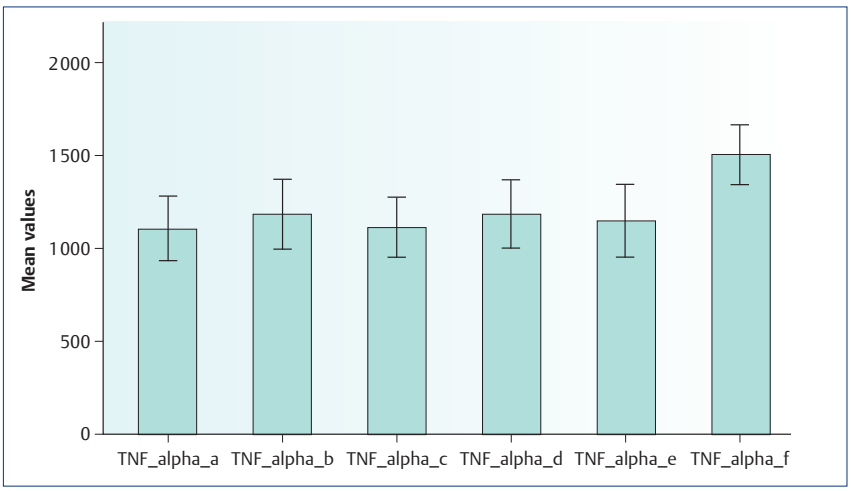


Figure 7 Mean values (pg/ml; x ± SEM) of the TNF-alpha concentrations for the 3 test phases (a, b correspond to U-0 for 0. and 240. minutes; c, d correspond to U-1 for 0. and 240. minutes; e, f correspond to U-2 for 0. and 240. minutes) [7].

groups with the preparation Zell Oxygen®. By using the cycloergometer, the objective was to test the variables; reaction time, performance and recovery quotient. The research findings exhibited an increase in the performance variable for each test person as well as an improved endurance of the body organism as result of Zell Oxygen® use [10].

In 1991, more empirical research by Prof. Dr. Ewald Dörling regarding Sanuzella® ZYM revealed the stimulating-specific efficacy of the preparation on improving the organism's resistance regarding physical, chemical and chemical sensors as well as boosting the body's vitality and performance [11].

More than 10 years later, corresponding results were also established in a study at the University of Applied Science in Hamburg. In 2003, performance-oriented rowers were given Sanuzella® ZYM for 6 weeks. As expected, the test persons exhibited less signs of fatigue during training and considerable improvement was documented with regard to the variables; energy, trainability, and agility [17].

Dr. Pablo Pereda Gonzalez from the University of Valladolid in Spain also carried out a double blind study on athletes on the efficacy of Sanuzella® ZYM. According to the findings the ingredients of Sanuzella® ZYM significantly contributed to the improvement of body performance of the athletes. The preparation is applicable in all preventive and acute processes where cell respiration in the mitochondria appears cumbrous. This includes muscular stress as well as the ingestion of substances harmful to the respiratory chain of the cell. Even for anaemic AIDS patients as well as those with cirrhosis of the liver, the use of Sanuzella® ZYM preparations significantly improved their general well-being, muscular situation and the blood picture. The study by Gonzalez additionally revealed a positive correlation between the intake of Sanuzella® ZYM by patients with severe diseases and the improvement in their physical and psychical condition [23].

Although numerous past scientific studies have confirmed the efficacy of enzyme yeast cells, more research is still being carried out with modern methodological tools. The section below discusses some of the modern findings and their corroboration of the efficacy of enzyme yeast cells.

3.1 University of Freiburg: Positive effect on immune reaction and oxidative stress

There is consensus among experts on the role free radicals play in the onset of numerous chronic diseases. Though short-lived, radicals are aggressive molecular fragments and the highly probable cause for inhibited cell function. They change and thus destroy the structure of important molecules such as DNA, proteins, lipids as well as carbohydrates. This is one of the most important reasons of recommending a balanced diet and anti-oxidative nutritive substances for all persons and especially for athletes [8].

The current Freiburg study supports the findings on the efficacy of Zell Oxygen® Immunkomplex as a nutritional supplement in purposefully stabilising anti-oxidative regulation [7, 8]. The study was specifically carried out to establish the effects of a micro-nutritional ingestion of Zell Oxygen® Immunkomplex on the immunological and anti-oxidative regulation. The study comprised of 11 clinically healthy test persons 20–50 years old. Daily in the morning, the testers consumed 30 ml of Zell Oxygen® Immunkom-

plex. The immunity condition of the test persons was documented three times viz; at the start of the study (pre-check: U 0), after a week of the control phase (intervention begin: U 1) and at the end of the intervention (U 2).

In the U 1 and U 2 phases the test persons took the test product at the beginning of each examination. The status of the oxidative stress was established by taking capillary blood samples and the free radicals measured by electron spin resonance spectroscopy. The measurements were carried out at the beginning of the examination (0. minutes) and subsequently every 60th minute for 240 minutes. The immunity status was established via the activating degree of cellular immunity. The TNF-alpha-secretion was measured in venous heparin-sodium full-blood count after an ex-vivo LPS-stimulation at the beginning of the examination (0. minutes) and at the end of the examination (240 minutes).

According to the study findings:

- Reduced values ($p < 0.01$) of the concentration of free radicals were measured after the intake of the test-preparation compared to the measurements at the beginning of the examination. With increasing process of the examination, the free radical values dropped significantly and were lowest at the end of the examination in the 240th minute (**Figure 6**).
- Significant changes were noticeable in TNF-alpha-secretion during the course of the examination. Initially stable concentrations of TNF-alpha were identifiable after the LPS-stimulation U 0, U 1 and at the beginning of the examination U 2 (0. minutes). After the ingestion of Zell Oxygen® Immunkomplex (measurement time U 2, 240. minutes), significantly high LPS-sensitivity was noticeable with a TNF-alpha value increasing by more than 30%. (1148 + 652 vs. 1505 + 537 pg/ml; $p < 0.01$) (**Figure 7**).

The electron spin resonance spectroscopy is a measurement process that delivers instantaneous and direct information about oxidative stress. It measures the free radicals directly. This is in contrast to previous measurements where free radicals were measured indirectly by evaluating the metabolites or intermediary products in comparison to different assessment values. Before the onset of electron spin resonance spectroscopy, as is argued by several experts, most measurements were carried out inaccurately with regard to anti-oxidative regulation, oxidative stress and the resultant damage they cause.

Concerning the ingredients of the test-product (Zell Oxygen® Immunkomplex) in the Freiburg study, the researchers considered the importance of the expression or activation of enzymatically effective ingredients such as superoxide dismutase, glutathione peroxidase and catalase, besides anti-oxidatively effective secondary plant substances. The researchers were also cognisant of the fact that the adaptability of enzymatically effective ingredients to increased exposition of free radicals has indeed been properly documented. However, bio-chemical and cell-biological effects are likely to be influenced also by trace elements e. g. zinc, selenium and manganese as well as the embodied biological substances such as beta-glucans, mannane, glucosamine, and SH group-rich scleroproteins.

The most possible anti-oxidative and anti-inflammatory protective effect seems to be triggered by secondary plant compounds. This is likely to be due to a biological training effect of the cellular system. It can therefore be deduced that such adaptability also occurred during the testing process of Zell Oxygen® Immunkomplex in the Freiburg study, according to Delbert and the rest of the research team. According to the findings, the ingestion of Zell Oxygen® Immunkomplex leads to acute and chronic changes which can best be explained by analysing the cellular adaptability [8].

The researchers conclude that the regular supply to the body with the test product (Zell Oxygen® Immunkomplex) is most likely to induce positive adaptability of immunological and anti-oxidative regulation. Therefore the application of the preparation is likely to offer several advantages in preventive health and also in complementary therapy [7,8].

The study of the University of Freiburg exhibits a significant positive influence of Zell Oxygen® Immunkomplex on the blood concentration of free radicals.

- **The ingestion leads to a reduction of the free radical concentration based on the possible adjustment of anti-oxidative regulation.**
- **The proven efficacy makes the product appropriate for application in preventive health and complementary therapy.**

Zell Oxygen® Immunkomplex offers a targeted contribution to the stabilisation of anti-oxidative regulation. There is proof that the regular intake of the preparation for a period of about 4 weeks reduces the concentration of free radicals and significantly improves the regulation of cellular anti-oxidative system. The intake of the product is justified in cases where the body requirement for secondary plant compounds is not balanced by normal diet as well as in cases where the oxidative equilibrium during stress and strenuous situations needs to be stabilized [8].

3.2 Medical School of Freiburg University: Quick regeneration in sports, the effect of exercise stress and status of anti-oxidants

Although moderate body exercise reduces the rate of infections, competitive athletes are more prone to infections and are always at risk of injury. Such situations can prove very challenging for both professional athletes and also for amateur athletes especially when training must be interrupted or stopped while preparing for a competition. The prevalence of injuries is more pronounced in athletes because of a diminished immune system and reduced resistance which are more intensive many hours after training [2]. In this “open window” phase, the athletes are more susceptible to infections.

Figure 8 Athletes derive great proven benefits from Dr. Wolz enzyme yeast cell preparations. © Thomas Stange/istockphoto; imitated situation

In the study by the School of Medicine of the University of Freiburg, after a six week ingestion of the enzyme yeast cell preparation of Sanuzella® ZYM, the healthy athletes, compared to the control group, exhibited lower values of muscle stress, cell damage and inflammation-related blood levels for myoglobin, fibrinogen and total creatinase. The enzyme yeast cell contains bio-active substances that are fed to the organism. This enables a positive effect on the biological as well as bio-chemical characteristics of the immune system and muscle metabolism.

Against this background, the application of enzyme yeast preparations is more appropriate for athletes preparing for competitive sports. Evidence to this effect is contained in a study by König et.al from the Freiburg University's School of Medicine [19].

In a non-blind pilot-study, the researchers used 9 test persons to examine the effect of Sanuzella® ZYM Dr. Wolz (a combined preparation of enzyme-active yeast cells and ant-oxidants) on the reactions of systemic muscle-cell stress as well as anti-oxidative regulation. The subjects underwent regular intensive endurance sports in two phases. The first training phase of six weeks was without the test-product ingestion whereas the second six week phase was carried out with the test-product intake. After each examination phase, blood parameters were controlled twice: 1. in resting state and 2. one hour after an exhausting physical exercise (comparable to 15 km cross-country run). The two phases showed significant differences in the blood parameters namely:

- Reduced serum levels of the soluble interleukin 2 receptor ($p < 0.05$), fibrinogen ($p < 0.01$) and fibronectin ($p < 0.01$) values in resting state after a 6 week intake of the yeast cell preparation.
- After the endurance training, significant differences were observed between fibrinogen and fibronectin values. The muscular cellular stress reaction values (myoglobin $p < 0.01$, CKMM3 $p < 0.05$) were considerably reduced and the concentration of manganese superoxide dismutase ($p < 0.05$) was lower.

According to the research team, significant positive influence on the muscle-cellular and systemic stress reaction was proven after the intake of the yeast cell preparation, besides indications of improved anti-oxidative regulation.

The research therefore clearly shows that enzyme yeast cells reduce the damage to the mast cells and thus considerably limit the resultant inflammatory reaction of the entire body.

The researchers recommend the testing of the preparation in chronic degenerative diseases due to the relevance of the test-parameters regarding the pathogenesis of these diseases [19].

The merit of the research lies in establishing, for the first time, the positive effects of a yeast preparation on the stabilisation of the performance and reduction of stress for athletes. Accordingly, after taking the preparation, the test-persons exhibited significant improvement in muscle and immune-cell function as well as lower cell damage. The enzyme yeast cell therefore evidently provides the organism with essential nutrients which positively influence the immune system and muscle metabolism [2].

3.3 Institute Prof. Dr. Georg Kurz: Ability to bind free radicals and the high anti-oxidative potential

Laboratory tests can also be carried out to verify the anti-oxidative characteristics of enzyme yeast cells that have been proven in vitro and in vivo [15]. The anti-oxidative effects of the nutritional supplement with enzyme yeast cells were analysed in the laboratory by an independent research group by aid of Oxygen Radical Absorbance Capacity test (ORAC). The ORAC values confirmed the enzyme yeast cells' anti-oxidative potential akin to food or food supplements. This implies enzyme yeast cells have the capability of binding free radicals (**Figure 9**).

With 30 ml of Zell Oxygen® Immunkomplex an ORAC test value of 5520 µmol/l was measured. The measurement value of Zell Oxygen® antiaging was 8560 µmol/l based on a day's dosage of 20 ml. For comparative purposes, 30 g of broccoli exhibit an ORAC-value of 700 µmol/l and 30 ml orange juice correspond to 250 µmol/l. The Deutsche Gesellschaft für Ernährung (German Nutrition Society) recommends a daily con-

Independent laboratory tests confirmed the anti-oxidative potential of Sanuzella® ZYM and Zell Oxygen Immunkomplex® per daily serving based on the extremely high ORAC-value of 8500 and 5500 respectively.

Figure 9 Oranges have an ORAC value of 750 and the Sanuzella® ZYM preparation an ORAC value of 8500. © peaches/Pitopia

sumption of 5 servings of fruits and vegetables to attain an ORAC-value of circa 3000 µmol/l.

3.4 Institute for Cell Biological Test Systems: Anti-inflammatory and immune stimulating effects at the cell biological level

According to Prof. Peter C. Dartsch (Dartsch Scientific GmbH: Institute for Cell Biological Test Systems), the enzyme yeast cell preparation in vitro trials on the cell-biology of animals proved effective based on the significant ORAC values. The following sub-section discusses the findings by Dartsch.

3.4.1 Zell Oxygen® Immunkomplex: Immunomodulation and cell protection

The research questions of the cell biological analysis on Zell Oxygen® Immunkomplex preparation were as follows:

- Is it possible for the energy metabolism of connective tissue cells to be stimulated in order to facilitate cell-renewal and vitality?
- Is it possible to stimulate the macrophage-related cells so as to support non-specific immune defence?
- Is it possible to neutralize excess free oxygen radicals circulating in the blood and thus prevent the damage to the organism by exogenous environmental influences and/or oxidative stress?
- Is it possible to inactivate endogenous and locally generated excess oxygen-free radicals in the tissues?

The tests were carried out with different methodological systems. The intake of the preparations was done based on the package insert recommendations whereby 20–30 ml per day were consumed for an average blood concentration of 7 mg/ml as well as an average body-fluid concentration of 0,5 mg/ml.

The following results emerged for Zell Oxygen® Immunkomplex:

- Anti-oxidative effect on oxygen radicals: The preparation combination reduces the harmful effects of exogenous environmental radicals or oxidative stress on the metabolic imbalance.
- Anti-inflammatory effect of endogenous radicals: The local excess of reactive oxygen radicals, such as those arising from inflammation processes, is neutralized, with the degree of neutralization being dependent on the dosage quantity.
- Immune stimulating effect: Depending on the dose, the preparation contributes to the stimulation of the energy metabolism of the macrophage-related cells; i. e. the stimulation of the non-specific immune defence.
- Cell renewal and vitalisation effect: The observed effects of the preparation on the cultured connective tissue fibroblasts lead to the stimulation of the cellular energy metabolism and thus contribute to the promotion of cellular activity and performance.

All in all, the use of Zell Oxygen® Immunkomplex is explicitly recommended for the neutralization of excess reactive and harmful oxygen radicals (**Figure 10**) and for stimulating immune defence as well as performance [6].

3.4.2 Sanuzella® ZYM sportsline: Reduction of cell damage

The following research questions, also similar to those in Zell Oxygen® Immunkomplex preparation, were posed with regard to the cell biological analysis of Sanuzella® ZYM sportsline preparation:

- Is it possible to stimulate the energy metabolism of connective tissue cells and thus allow cell-renewal and vitality?
- Is it possible to trigger non-specific immune defence by stimulating macrophage-related cells?
- Is it possible to prevent the damage to the organism by exogenous environmental influences and/or oxidative stress by neutralizing excess free oxygen radicals circulating in the blood?
- Is it possible to inactivate endogenous and locally generated

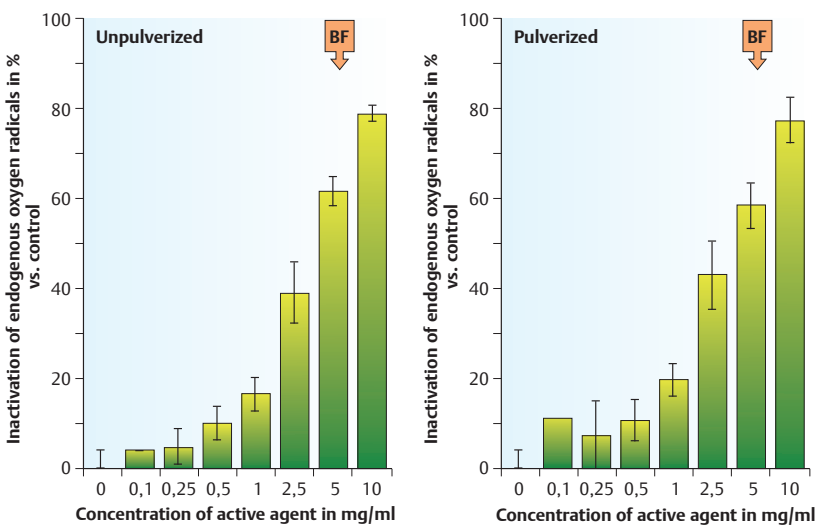


Figure 10 Anti-inflammatory effect on endogenous radicals [6].

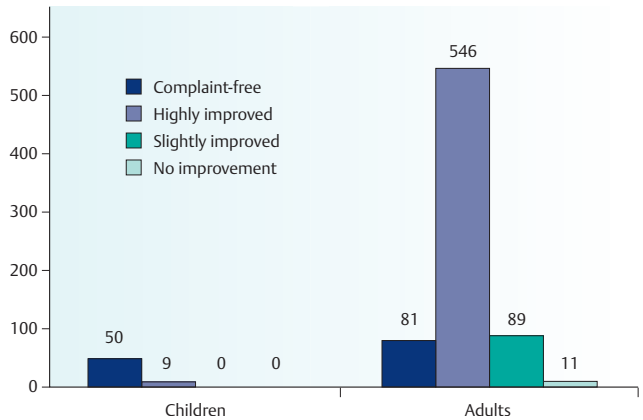


Figure 11 Results of therapy with Zell Oxygen® Immunkomplex from Wolfgang Spiller naturopathic practice.

excess oxygen-free radicals in the tissues?

The test concentrations of Sanuzella® ZYM sportsline were done with different analytical systems. The point of departure was a mean concentration of 6 mg/ml in blood as well as 0,3 mg/ml body fluid. The results of the tests were quite favourable to Sanuzella® ZYM sportsline and included:

- Cell renewal and vitalising effect: The combined preparation significantly stimulates the energy metabolism of connective tissue cells. It leads to an in vivo improvement of renewal/regeneration, vitality and performance.
- Immune stimulating effect: Sanuzella® ZYM sportsline preparation supports a highly pronounced non-specific immune defence.
- Inactivation of free radicals: Sanuzella® ZYM sportsline inactivates by a rate of 50 % exogenous free radicals from the environment or oxidative stress as well as local excesses of reactive oxygen radicals in the tissues.

As a result of the in-vitro tests, it can be concluded that Sanuzella® ZYM sportsline promotes the general immune defence, improves regeneration and body performance [5].

Studies from the Institute of Cell Biology Test Systems have verified the anti-inflammatory effect of enzyme yeast cells in neutralising excess reactive oxygen radicals with regard to the body's own regulation system. Additionally, the preparations manifestly have immune-stimulating, cell renewing and vitalising effects.

3.5 Applied studies from naturopathic practice

Over and above the research findings discussed in this report, there are a wide range of examples from medical practice which support the efficacy of enzyme yeast cells. A case in point is the application of enzyme yeast cells by the renowned oncologists Dr. Josef Issels as well as Prof. Dr. Julius Hackethal to cancer patients. Nowadays, enzyme yeast cell application is well-anchored in complementary cancer treatment.

The naturopath Prof. Dr. Serge Jurasunas from Capital University of Integrative Medicine in Washington (USA) has applied enzyme yeast cells to many thousands of cancer patients and has documented considerable improvement of the patients' blood levels and immune system [16].

A recent example of applied studies is from the naturopathic practice of Wolfgang Spiller based at Villingen-Schwenningen. Between January and December 2010 a total of 786 patients (including 59 children) were treated with Zell Oxygen® Immunkomplex in the context of a holistic biological therapy. The children suffered mainly from chronic and recurrent infections, atopic diseases and allergies. The adult patients had to do with chronic-degenerative diseases, arthropathy, gastrointestinal complaints, hypertension, depression, tumours and auto-immune reactions. In most of the cases, the patients had had more than 5 diagnoses, been theraparized multiple times with immune suppressants and had to make do with allopathic long term medicine. As it were, the immunological and metabolic regulation processes were unsatisfactory.

With the expectation of making a turn-around in the patients' clinical picture, they were treated three times daily with 10 ml of Zell Oxygen® Immunkomplex for three months. The objective was to improve their immunological and metabolic regulation situation as well as generate enough gene reparative material for the improvement and healing of the complaints. After the therapy, nearly all patients reported exhibiting generally high significant body performance improvement, increased vitality, improved concentration and more psychic balance. Most patients were wholly or partially complaint-free leading to considerable reduction of allopathic medicine or indeed complete discontinuation. The children exhibited a significantly reduced rate of infection (**Figure 11**), [26].

4. Conclusion: Enzyme yeast cells are unique preparations with proven efficacy

Enzyme yeast cells are naturopathic regeneration and strengthening preparations for cell protection and immunomodulation that have been in use for more than 40 years. Enzyme yeast cell preparations contain a wide spectrum of micro-nutrients from fruits, vegetables and trace elements, vitamins, bioactive enzymes, co-enzymes and immuno-modulation glucans. The special production process using oxygen-enzyme fermentation, according to the inventor Dr. Wolz, ensures that the globally unique enzyme yeast cells remain biologically and enzymatically active.

The positive efficacy characteristics of enzyme yeast cells have been documented in several lessons of experience and application observations including in vivo and in vitro studies. A case in point entails the research findings at the University of Freiburg and also the Institute of Cell-Biology Test Systems. The two entities gave enzyme yeast cells a clean bill of health regarding their highly positive effect on the blood concentration of free radicals. This is important due to the general consensus among medical experts on the role free radicals play in the on-set and development of chronic diseases and cancer.

In summary, based on the research findings and application observations described in this report the following conclusions can be drawn. Enzyme Yeast Cells Dr. Wolz®:

- Enhance the immunological and anti-oxidative regulation;
- Ensure faster regeneration in sports;
- Inactivate free radicals;
- Renew and vitalize cells;
- Reduce muscle-cellular and systemic stress reaction;
- Reduce oxidative stress;
- Are immunomodulating;
- Reduce inflammatory reactions;
- Have a high bio-availability.

Enzyme yeast cell preparations have been successfully applied for cell regulating therapy in naturopathic-oriented practices and clinics for many years in more than 30 countries. These include:

- Adjuvant therapy against cancer diseases;
- Chronic fatigue syndrome;
- Immunomodulation during recurrent infections.

Moreover, athletes who range from leisure sportspersons to Olympic Champions use enzyme yeast cell preparations in order to optimise their performance by ensuring an accelerated regeneration phase [13]. Enzyme yeast cell preparations are recommended by the Olympia Base in Freiburg, professional bodies such as the Rowing Associations of Germany, Olympic champions, and the International Society of Orthomolecular Medicine.

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Company Portrait

Dr. Wolz Zell GmbH – In health service since 1969

Dr. Wolz
— Seit 1969 —
Natürlich, nachweislich wirksam

For more than 40 years, Dr. Wolz Cell Company, situated in Geisenheim/Rheingau Germany, has been developing and producing highly effective preparations for complementary therapy. The constant communication with naturopathic oriented medical practitioners, clinics, and scientists all over the world contributes to the innovative research of Dr. Wolz Cell Company.

Dr. Wolz ensures the highest quality standards of the preparations and production process. Elaborate quality control of harmful substance residues as well as the use of best naturally pure raw materials are the pure biological basis of Dr. Wolz preparations. Dr. Wolz Cell Company has earned the internationally recognized quality certificate DIN EN ISO 9001:2008 (Development, Production, Marketing, Sales and Distribution) as well as the certified HACCP-Concept.

TÜV SÜD ISO 9001 HACCP

Biotechnologist Siegfried Wolz, Inventor of Enzyme Yeast Cells

The foundation stone of the company's success was laid by the firm's founder Siegfried Wolz with the discovery of Enzyme Yeast Cells. The bio-technologist was able to develop, with the aid of a special process, yeast cells with oxygen enzyme fermentation, which remain biologically active and due to their similarity with the human cells, provide numerously unique vital substances.

Besides preparation on the basis of Enzyme Yeast Cells Dr. Wolz®, the company offers a wide range of orthomolecular preparations with natural, biological ingredients, from prevention and regeneration preparations, including agents for intestinal health to targeted balance of deficiency symptoms in vital substances.

Dr. Wolz Zell GmbH is an embodiment of many years of research. The conceptual design of the products has the objective of directly operating at the pivotal point of our health system – the cell respiratory system. Thus, health at the cell-level is directly strengthened since it is the origin of health, strength, endurance, well-being and a strong immune system.

„With our naturally proven and effective preparations, our vision is to help mankind maintain life-quality as long as possible"

The Company Management: Angela Wenzel (née Wolz) and Dr. med. Dipl. Ing. Georg Wolz.

Preparations based on Enzyme Yeast Cells Dr. Wolz®

On the basis of Enzyme Yeast Cells Dr. Wolz® six preparations were developed for a variety of health care applications

Zell Oxygen® plus	**Prevention und Regeneration** ▸ orthomolecular basis preparation for the daily prevention and regeneration ▸ for healthy cell function and effective cell protection Contains the rich Yeast Cells Dr. Wolz® with protective enzymes as well as mineral nutrients, vitamins, vital trace elements (selenium, zinc and chromium)
Zell Oxygen® Immunkomplex	**Strengthening of Immune System** ▸ a complete spectrum of vital elements, offers long-lasting strength to the immune system ▸ for regeneration during adynamia, nutritional deficits, or physical resilience Contains the rich Yeast Cells Dr. Wolz® with protective enzymes as well as high value beta-glucans, mineral nutrients, vitamins, vital trace elements (selenium, zinc and chromium) and secondary plant substances from fruit and vegetable complexes
Zell Oxygen® ZYM anti-aging	**Anti-Aging** ▸ Works by actively protecting the cell, inhibiting aging and degeneration processes ▸ Improves physical performance und regeneration Contains the rich Yeast Cells Dr. Wolz® with protective enzymes and secondary plant substances, bio-flavonoids, Q 10 as well as mineral nutrients, vitamins, vital trace elements (selenium, zinc and chromium)
Sanuzella® ZYM sportsline	**Performance enhancement** ▸ For shortening regeneration time and enhancing performance ▸ For strengthening the body's immunity, especially for sports persons Contains the rich Yeast Cells Dr. Wolz® with protective enzymes and secondary plant substances, bio-flavonoids, Q 10 as well as mineral nutrients, vitamins, vital trace elements (selenium, zinc and chromium)
Zell Oxygen® + Royal Jelly	**Strengthening Resistance** ▸ For activating the physical power after diseases or excessive stress ▸ For general resistance strength, especially in elderly persons Contains the rich Yeast Cells Dr. Wolz® with protective enzymes and 600 mg fresh royal jelly per 1 drinking vial
Zell Oxygen® formula	**Vitality and Beauty** ▸ For healthy hair growth, splendid skin appearance, vibrancy and vitality ▸ Especially suitable for women in balancing menopausal shortcomings Contains the rich Yeast Cells Dr. Wolz® with protective enzymes and 300 mg fresh royal jelly, 300 mg millet extract, 300 mg soya isoflavones (non-genetically modified), evening primrose oil, vitamin B 5, biotin, D 3

Further Information
Therapists can order the current compendium with the list of products as well as a free preparation sample. On request, the scientific research findings discussed in this report can be made available. The Haug Report is available in both German and English languages.

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