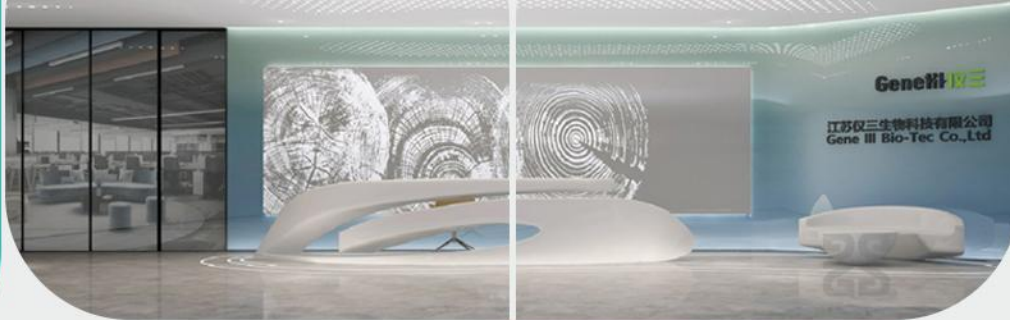




GeneIII

GENEIII BIO-TEC CO.,LTD

International Top-Notch Supplier of **Ergothioneine** Raw Materials

Quality Advantage

99.97% High Purity · Stable with No Unpleasant Odor

Production Capacity Advantage

cGMP Pharmaceutical-Grade Platform for Industrial-Scale Production · Monthly Capacity of 3 Tons

Cost Advantage

Synthetic Biology · Cell Factory Technology · Reduce costs to 1/10

PART 01 Market Insights

Ergothioneine, One of the Fastest-growing Cellular Anti-aging Raw Materials

- Ergothioneine is a powerful antioxidant, with cellular physiological protection functions, such as scavenging free radicals, whitening, countering photoaging, repairing, anti-inflammatory, boosting immunity, and preserving cell health. According to Global InfoResearch's projections, Ergothioneine's global sales are expected to reach \$810.4 million by 2027, with a compound annual growth rate (CAGR) of 56.17% between 2021 and 2027.
- The number of skincare products containing Ergothioneine has been rapidly increasing. By June 2022, a total of 6,696 skincare products had been registered! As per the *2023 Global Super Ingredient Trends White Paper* by Tmall International, As per the *2023 Global Super Ingredient Trends White Paper* by Tmall International! It has become a "rising star" among effective skincare ingredients!

“Ergothioneine is a True Longevity Nutrient” — Bruce AMES

"Ergothioneine is a true longevity nutrient. Ergothioneine EGT is a natural and potent antioxidant that prevents or limits damage caused by free radicals, safeguarding DNA and proteins from oxidative harm and maintaining cellular health. It possesses **anti-inflammatory properties** and offers effects such as **cardiovascular disease prevention, deceleration of skin aging, protection against UV damage, and the postponement of aging.**

Dr. Bruce AMES, a member of the U.S. National Academy of Sciences, an expert in cancer and aging, and a professor in the Department of Biochemistry and Molecular Biology at the University of California, refers to Ergothioneine as the “**longevity nutrient.**”

— *Proceedings of the National Academy of Sciences of the USA (PNAS)*



Bruce AMES

Member of the National Academy of
Sciences in the United States

Expert in Cancer and Anti-Aging
Biochemist

Professor in the Department of
Biochemistry and Molecular Biology at the
University of California

Basic Information of Ergothioneine

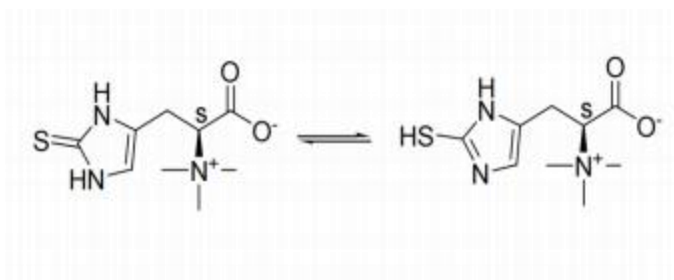


- ③ In 1909, the natural antioxidant - Ergothioneine (EGT) was first isolated by the French pharmacist Charles Tanret from ergot fungi. It has also been found in other mushrooms such as [Reishi](#) and [Matsutake](#). [Reishi contains 80mg/kg of Ergothioneine](#), and its yield is 500kg per acre with 40g of EGT.
- ③ In 1998, Ergothioneine was introduced to the cosmetics market by Estée Lauder.
- ③ In 2017, the European Union approved L-Ergothioneine as a new food ingredient, allowing its application in dietary supplements.
- ③ During 2021-2022, international well-known brands have witnessed rapid growth in products containing Ergothioneine, including Estée Lauder, Clinique, Elizabeth Arden, and Cosme Decorte.

Product Information

- Ergothioneine (L-Ergothioneine)
- Alias: EGT
- Appearance: White powder
- Recommended Usage Level: **0.1%-2%**

Chemical Structure



Market Applications of Ergothioneine

Cosmetics Sector

Ergothioneine is a high-value and high-profit skincare ingredient, recognized as a precious natural antioxidant. It exerts potent repairing effects on skin cells and stimulates the cellular antioxidant defense system, which impedes pigment formation and deposition. As a result, it effectively combats aging by **brightening, improving dullness, and diminishing fine lines**. Ergothioneine is an approved cosmetic additive in compliance with Chinese standards.

Food and Health Sector

Ergothioneine, as an ingested product, demonstrates the ability to protect brain health and enhance cognitive function. It effectively promotes metabolism and immune function in the human body, leading to the benefits of **slowing down the aging process, improving sleep, and nourishing Qi and beauty**. In 2017, the European Union authorized the use of Ergothioneine as a new food ingredient. In August 2019, Ergothioneine received GRAS (Generally Recognized as Safe) certification from the U.S. FDA, allowing its application in regular food products.

Pharmaceutical Sector

Ergothioneine, when taken internally, can be used to treat conditions such as **cancer, cardiovascular diseases, and central nervous system disorders**. When used topically, it is effective in **treating skin and inflammatory diseases**, demonstrating significant efficacy in dermatological treatments.

Essential Ingredient of Clinique, Estée Lauder, La Mer, Yves Saint Laurent and Origin



Core Ingredient of Oral Health Supplements in Europe and America



PART 02 Technological Advantages

GeneIII Bio-Tec Introduction



Jiangsu GeneIII Bio-Tec Co., Ltd. was established in August 2021, with its headquarters located in Nanjing, the ancient capital of the Six Dynasties. It is a synthetic biotechnology company that integrates research and development, production, and sales. The founding team has years of collaborative experience, and most core members come from top multinational companies with extensive management expertise in various fields. The core technology originates from the team led by [Dr. Wang, a pharmaceutical doctor from Oregon State University and a postdoctoral researcher in biomedical science from UIUC in the United States](#). In the field of synthetic biology, they possess unique research and development capabilities and patented technologies, with 60% of the company's employees holding doctoral or master's degrees.

[GeneIII focuses on the field of human health and beauty](#), continuously conducting research and development to address industry pain points. The company strives to safeguard the health, beauty, and happiness of every user through high-quality products and services.

COMPANY VISION

Focusing on the fields of human health and beauty, and relying on synthetic biology technology, we are committed to providing customers with higher quality products and services, benefiting all human beings.

COMPANY VALUES

Four Satisfactions



[Customer Satisfaction](#) | [Employee Satisfaction](#) | [Shareholder Satisfaction](#) | [Social Satisfaction](#)



LEADER: An outstanding leader with comprehensive management experience in building businesses from scratch to billions in scale.



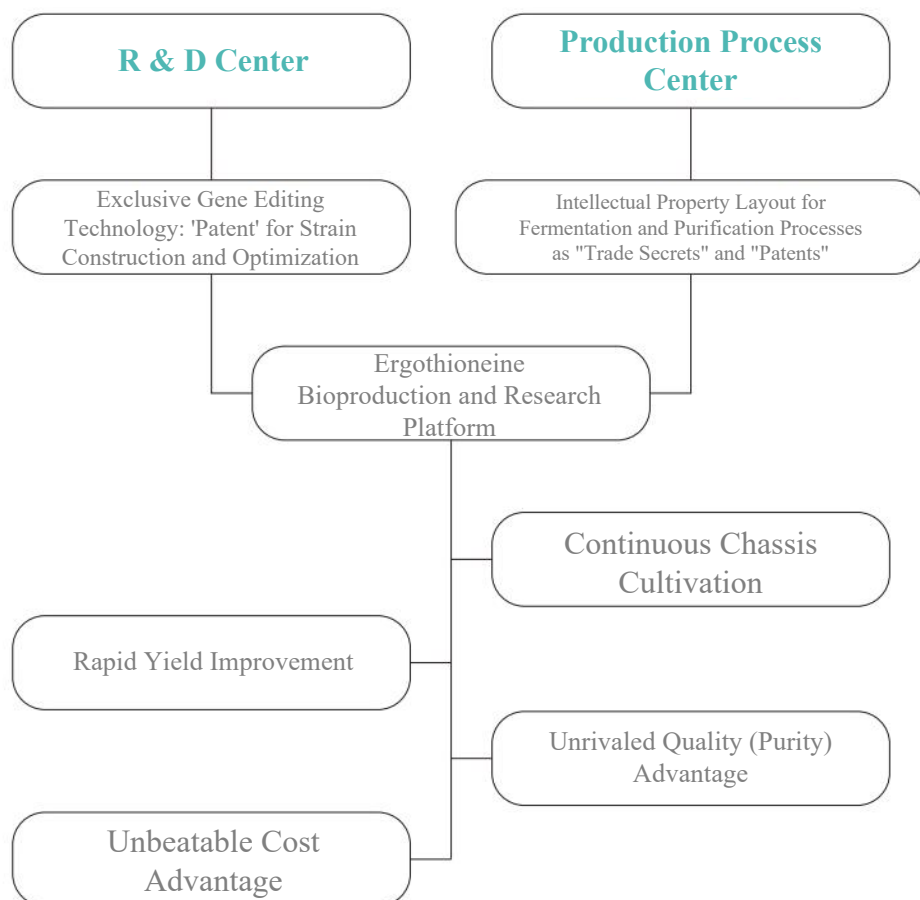
WEI DING

Founder & Chairman
GeneIII Bio-Tec

25 years of experience in top leading brands in the Chinese market, overseeing businesses from inception to a billion-dollar scale.

- Master's degree in Materials Engineering from the University of Nevada, USA.
- Former Senior Vice President of A.O. Smith Corporation and President of A.O. Smith (China) Investment Co., Ltd.
- Former CEO and Chief Executive Officer of Hegii Group.

Ergothioneine (EGT) Value Chain Development Capability



Synthetic Biology Production and Research Platform



As a domestic supplier of EGT Ergothioneine raw materials, GeneIII Bio-Tec possesses a 1,000 sqm research and development base, a Class 10w clean raw material factory, and a professional research team led by 3 industry Ph.D. holders and comprising over 60 research personnel from renowned domestic universities. Since its establishment, the company has invested 80% of its funds into research and development.

GeneIII Ergothioneine Production Plant

The GeneIII Biotechnology Production Plant is primarily focused on **microbial fermentation** to produce characteristic raw materials for pharmaceuticals and drug intermediates. It covers **a total area of approximately 413 mu**. It has been honored with titles such as Municipal Industrial Microbial Pharmaceutical Engineering Technology Center, Innovative Enterprise, and High-tech Products.



Production Standards

The production plant adheres to C-GMP requirements, utilizing state-of-the-art testing equipment and maintaining a strong reputation.

Raw material product quality complies with CP/USP/EP/JP and other quality standards.

Raw Material
Warehouse

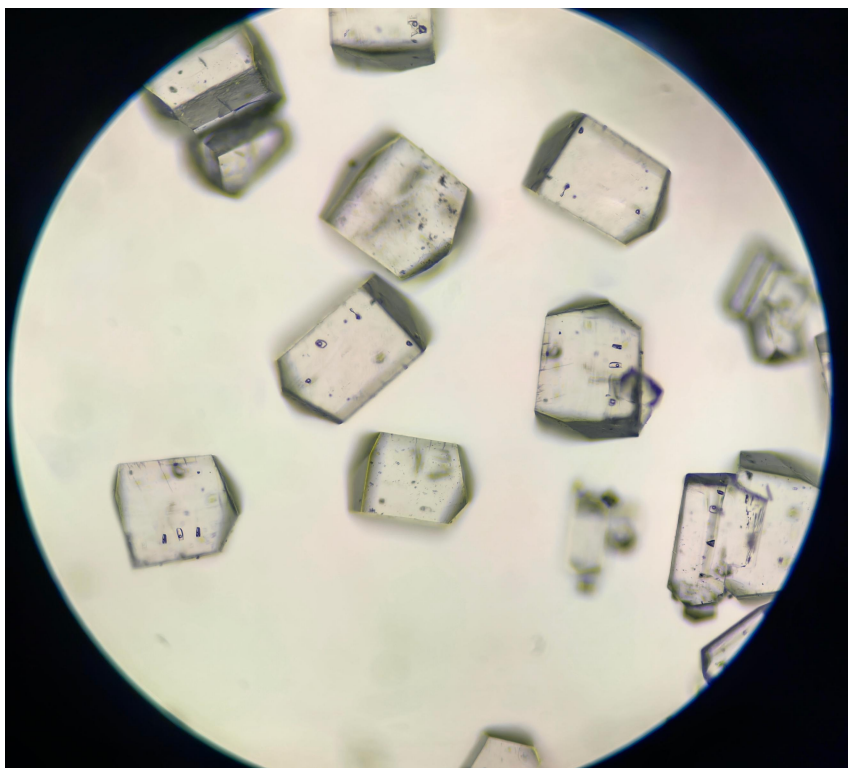


Production
Workshop



GeneIII Ergothioneine Finished Product

Ergothioneine Crystal Structure



Ergothioneine Pure Powder



GeneIII Ergothioneine Raw Material Purity Testing



报告编号: SHA01-23110824-FX-01R2 页码: 3 / 5

分析结果

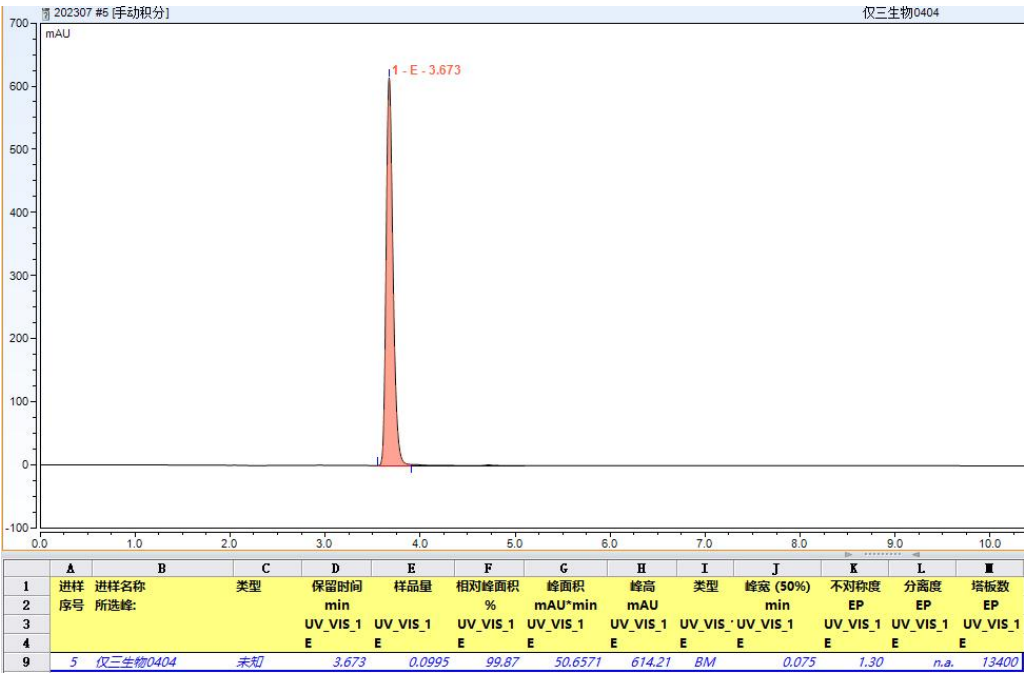
样品名称	测试项目	测试结果/%	CAS No.	测试仪器
麦角硫因	麦角硫因 (纯度)	> 99.99	497-30-3	HPLC
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备注:
1. 麦角硫因纯度采用 HPLC 面积归一法测试, <0.01%的杂质峰未做积分。

****报告结束****

Ergothioneine Purity

99.999%



[illegible]

The image shows the SGS logo at the top left. Below it, the text 'To: Mr. Rajaraj' is on the left, 'JANU 14/2014/40' is in the center, and 'Date: 1/1/2014' is on the right. The main part of the image is a photograph of a white evidence bag. A ruler is placed vertically to the left of the bag, and a scale is placed horizontally below it. The bag has some text on it, including 'SGS' and 'JANU 14/2014/40'. Below the photograph, there is a caption in Tamil: 'பெரிய கைப்பை (பெரிய கைப்பை)'. At the bottom, there is a paragraph in Tamil: 'பெரிய கைப்பை (பெரிய கைப்பை)'. The text is in Tamil and appears to be a caption or description of the photograph.

FDA Certificate (United States)

FDA U.S. FOOD & DRUG ADMINISTRATION

U.S. Food and Drug Administration
12420 Parkview Dr. Room 2036
Rockville, MD 20857
www.fda.gov

Via UPS
Return Receipt Requested

July 13, 2018

Mr. Luo
General Manager

Dear Mr. Luo,

The U.S. Food and Drug Administration (FDA) conducted an inspection classification of this facility is "voluntary action indicated" ("VAI"). Based on this inspection, this facility is considered to be in a minimally acceptable state of compliance with regards to current good manufacturing practice (CGMP).

A VAI inspection classification indicates that, although investigators found and documented objectionable conditions during the inspection, FDA will not take or recommend regulatory or enforcement action because the objectionable conditions do not meet the threshold for action at this time. Despite this facility inspection classification, FDA recommends that you address any observations noted on the Form FDA 483 issued at the conclusion of the inspection or otherwise conveyed to you following the inspection. If not corrected, the same or similar conditions could lead to a future inspection being classified as "official action indicated" ("OAI").

This letter is not intended as an endorsement or certification of the facility. It remains your responsibility to ensure continued compliance with CGMP.

An inspection classification of VAI for CGMP compliance will not directly negatively impact FDA's assessment of any pending marketing application referencing this facility. Please note, however, that application approval will depend on a product- and application-specific facility assessment conducted by CDER's Office of Pharmaceutical Quality. This letter does not address or reflect FDA's decision making with respect to any potential non-CGMP compliance issues.

FDA has concluded that this inspection is "closed" under 21 CFR 20.64(d)(3), and we are enclosing a copy of the narrative portion of the Establishment Inspection Report (EIR). It may reflect redactions made by FDA in accordance with the Freedom of Information Act (FOIA) and 21 CFR part 20. This, however, does not preclude you from requesting additional information under FOIA.

If you have any questions regarding this letter, you may contact Mr. Kevin Gonzalez via telephone at +1-240-402-0550 or email at Kevin.Gonzalez@fda.hhs.gov.

Sincerely,

Kevin Gonzalez
Kevin Gonzalez
Branch Director
Division of Foreign Pharmaceutical
Quality Inspections

DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Food and Drug Administration

CENTER FOR DRUG EVALUATION AND RESEARCH

Division of Quality Surveillance Assessment
Inspection Assessment Branch
10903 New Hampshire Avenue
Building #51, Room 4216
Silver Spring, MD 20993
TELEPHONE: (215) 717-3008
FAX: (301) 847-8742

June 15, 2015

Mr. Xie
General Manager

Reference FEI 3000291692
Reference inspection date (s): January 26-29, 2015

Dear Mr. Xie:

We are enclosing a copy of the establishment inspection report (EIR) for the inspection that the U.S. Food and Drug Administration (FDA) conducted at your premises on the referenced locale and date(s). When the Agency concludes that an inspection is "closed" under 21 CFR 20.64(d)(3), it will release a copy of the EIR to the inspected establishment. This procedure is applicable to EIRs for inspections completed on or after April 1, 1997.

The Agency continually works to make its regulatory process and activities more transparent to the regulated industry. Releasing this EIR to you is part of this effort. The copy being provided to you comprises the narrative portion of the report; it may reflect redactions made by the Agency in accordance with the Freedom of Information Act (FOIA) and 21 CFR Part 20. This, however, does not preclude you from requesting additional information under FOIA.

If there is any question about the released information, feel free to contact me at the above address or number.

Sincerely,

Vlada Matusovsky
Vlada Matusovsky
Consumer Safety Officer
Inspection Assessment Branch

Enclosure: EIR

DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Food and Drug Administration

CENTER FOR DRUG EVALUATION AND RESEARCH

Office of Manufacturing and Product Quality
Division International Drug Quality
International Compliance Branch
10903 New Hampshire Avenue
Building #51, Room 4216
Silver Spring, MD 20993
TELEPHONE: (301) 796-3197
FAX: (301) 847-8742

28 May 2013

Mr. Yang
Quality Director

Reference: FEI 3002806683

Dear Mr. Yang:

We have completed our review of the Establishment Inspection Report (EIR) for the inspection conducted at your Active Pharmaceutical manufacturing facility in China, China by Investigator Paul Bellamy during the period of 15 April 2013 and 18 April 2013.

Based on the profile class covered during the inspection, we are classifying your facility as acceptable. This letter is not intended as an endorsement or certification of the facility. It remains your responsibility to assure continued compliance with current good manufacturing practice (CGMP).

Please be advised that all manufacturers must register annually as required by 21 C.F.R. § 207.40. Information on how to register is available at http://www.fda.gov/cder/drls/registration_listing.htm

Additionally, we enclose a copy of the establishment inspection report (EIR). Releasing this EIR to you is part of FDA's effort to make its regulatory process and activities more transparent to the regulated industry. It is being provided to you for information purposes only and may reflect some redactions made by the Agency in accordance with the Freedom of Information Act and 21 C.F.R. Part 20. Copies provided to other requestors may have additional redactions of trade secret and confidential commercial information.

If you have any questions regarding this letter, you may contact me at the above address or number.

Sincerely,

Tsedenia Woldehanna
Tsedenia Woldehanna
Compliance Officer
Division of International Drug Quality

Enclosure: EIR

PART 03 Ergothioneine Raw Material

Basic Information of Ergothioneine

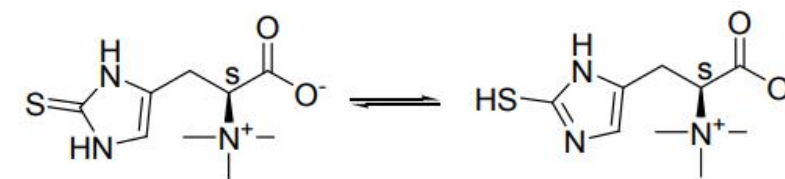


- In 1909, the natural antioxidant - Ergothioneine (EGT) was first isolated by the French pharmacist Charles Tanret from ergot fungi. It has also been found in other mushrooms such as [Reishi](#) and [Matsutake](#). [Reishi contains 80mg/kg of Ergothioneine](#), and its yield is 500kg per acre with 40g of EGT.
- In 1998, Ergothioneine was introduced to the cosmetics market by Estée Lauder.
- In 2017, the European Union approved L-Ergothioneine as a new food ingredient, allowing its application in dietary supplements.
- During 2021-2022, international well-known brands have witnessed rapid growth in products containing Ergothioneine, including Estée Lauder, Clinique, Elizabeth Arden, and Cosme Decorte.

Product Information

- Ergothioneine (L-Ergothioneine)
- Alias: EGT
- Appearance: White powder
- Recommended Usage Level: **0.1%-2%**

Chemical Structure

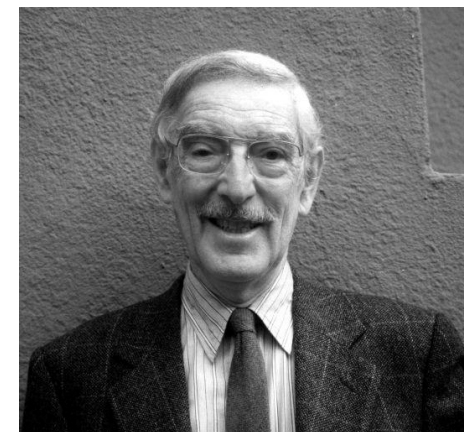


“Ergothioneine is a True Longevity Nutrient” —Bruce AMES

"Ergothioneine is a true longevity nutrient. Ergothioneine EGT is a natural and potent antioxidant that prevents or limits damage caused by free radicals, safeguarding DNA and proteins from oxidative harm and maintaining cellular health. It possesses **anti-inflammatory properties** and offers effects such as **cardiovascular disease prevention, deceleration of skin aging, protection against UV damage, and the postponement of aging.**

Dr. Bruce AMES, a member of the U.S. National Academy of Sciences, an expert in cancer and aging, and a professor in the Department of Biochemistry and Molecular Biology at the University of California, refers to Ergothioneine as the “**longevity nutrient.**”

— *Proceedings of the National Academy of Sciences of the USA (PNAS)*



Bruce AMES

Member of the National Academy of
Sciences in the United States

Expert in Cancer and Anti-Aging

Biochemist

Professor in the Department of
Biochemistry and Molecular Biology at the
University of California

"Convergence of Cosmetics and Food"

Anti-Aging Ingredient

- Reishi is a precious Chinese medicinal herb often referred to as the "Herb of Immortality." The ancient text *Shennong's Herbal Classic* records that consuming Reishi leads to "prolonged life, a lighter body, and eternal youth," while the *Compendium of Materia Medica* describes it as "beneficial for the eyes, nourishing the liver, and calming the spirit." In Chinese medicine, there is a concept of "medicinal food sharing the same source," and Reishi has held a significant position in Chinese medical history. Scientific literature has confirmed that the reason behind Reishi's potential for longevity lies in its content of Ergothioneine, which plays a vital role in **antioxidation, delaying aging, and replenishing qi and blood**. As people age, the Ergothioneine content in the body gradually decreases. **Consuming Reishi is believed to help increase the Ergothioneine levels internally.**
- As an ingredient in topical skincare products, Ergothioneine can **improve skin dullness, roughness, fine lines, and enhance skin radiance**. When taken orally, Ergothioneine can help **delay aging, improve sleep, and nourish and beautify from within**. As people age, the Ergothioneine content in the body gradually decreases.
- GeneIII Bio-Tec employs two core technologies: Bacillus Chromosome Editing Technology and Oscillating Gene Expression Regulation. This has allowed us to achieve **a high purity of 99.87% Ergothioneine extraction**, and apply this high-quality and highly active ingredient to skincare and oral health products, achieving the synergy of external care and internal nourishment.



Certificate (EDQM)

Certification of Substances Department

ATTESTATION OF INSPECTION

Inspected site	No. 21, Founder Road Beibei District China-400 714 Shuitu Town
Holder of the Certificate of Suitability	No. 21, Founder Road Beibei District China-400 714 Shuitu Town
References of CEP dossier	CEP 1997-103 / Tobramycin
Inspection dates	20/06/2018 to 22/06/2018
Scope of the inspection	The inspection focused on the compliance with the information provided in the above-mentioned application for a certificate of suitability, as well as the implementation of a suitable Quality Management System based on the Good Manufacturing Practice as laid down in the EU Rules governing Medicinal Products in the European Union, Volume 4.
Conclusion	The company operates in accordance with the application submitted and the requirements of the Resolution AP-CSP (07) 1. This attestation is valid only in conjunction with a valid version of a CEP for the dossier mentioned above.

EDQM Inspection Reference number: INSP 2017-008 P01
Strasbourg, 24 August 2018

[Signature]
On behalf of the
Director of EDQM

[Stylized logo]

Address: 7 Allée Kastner, CS 30026
F-67081 Strasbourg (France)
Tel: +33 (0) 3 86 41 30 30 - Fax: +33 (0) 3 86 41 27 71 - e-mail: cep@edqm.eu
Internet: http://www.edqm.eu

EDQM Certificate

Certification of Substances Division

ATTESTATION OF INSPECTION

Inspected site	No. 22, Chuangzao Road Beibei District China-400 700 Dongyang
Holder of the Certificate of Suitability	No. 22, Chuangzao Road Beibei District China-400 700 Dongyang
References of CEP dossier	CEP 1997-103 / Tobramycin
Inspection dates	23/03/2015 to 25/03/2015
Inspector / Name of organisation	Mr ROQUE Daniel, AGENCE NATIONALE DE SECURITE DU MEDICAMENT ET DES PRODUITS DE SANTE, France ; Mr PARASCHOS Sotirios, EDQM, Council of Europe.
Scope of the inspection	The inspection focused on the compliance with the information provided in the above-mentioned application for a certificate of suitability, as well as the implementation of a suitable Quality Management System based on the Good Manufacturing Practice as laid down in the EU Rules governing Medicinal Products in the European Union, Volume 4.
Conclusion	The company operates in accordance with the application submitted and the requirements of the Resolution AP-CSP (07) 1. This attestation is valid only in conjunction with a valid version of a CEP for the dossier mentioned above.

EDQM Inspection Reference number: INSP 2015-019 P01
Strasbourg, 23 September 2015

[Signature]
On behalf of the
Director of EDQM

[Stylized logo]

Address: 7 Allée Kastner, CS 30026
F-67081 Strasbourg (France)
Tel: +33 (0) 3 86 41 30 30 - Fax: +33 (0) 3 86 41 27 71 - e-mail: cep@edqm.eu
Internet: http://www.edqm.eu

EDQM Certificate

ANSM REPUBLIC OF FRANCE
Agence nationale de sécurité du médicament
et des produits de santé

Part 2
Manufacture of active substance. Names of substances subject to inspection :
TOBRAMYCIN(en) / TOBRAMYCINE(fr)

3. MANUFACTURING OPERATIONS - ACTIVE SUBSTANCES

Active Substance : TOBRAMYCIN

3.1 Manufacture of Active Substance by Chemical Synthesis
3.1.2 Manufacture of crude active substance
3.1.3 Salt formation / Purification steps : Chromatography
3.3 Manufacturing of Active Substance using Biological Processes
3.3.1 Fermentation
3.5 General Finishing Steps
3.5.1 Physical processing steps : Centrifugation
3.5.2 Primary Packaging (enclosing / sealing the active substance within a packaging material which is in direct contact with the substance)
3.5.3 Secondary Packaging (placing the sealed primary package within an outer packaging material or container. This also includes any labelling of the material which could be used for identification or traceability (lot numbering) of the active substance)
3.6 Quality Control Testing
3.6.1 Physical / Chemical testing
3.6.2 Microbiological testing excluding sterility testing

2015-09-02 Name and signature of the authorised person of the Competent Authority of France

Le chef du pôle inspection des matières premières
Direction de l'inspection

[Signature]
Guillaume RENAUD

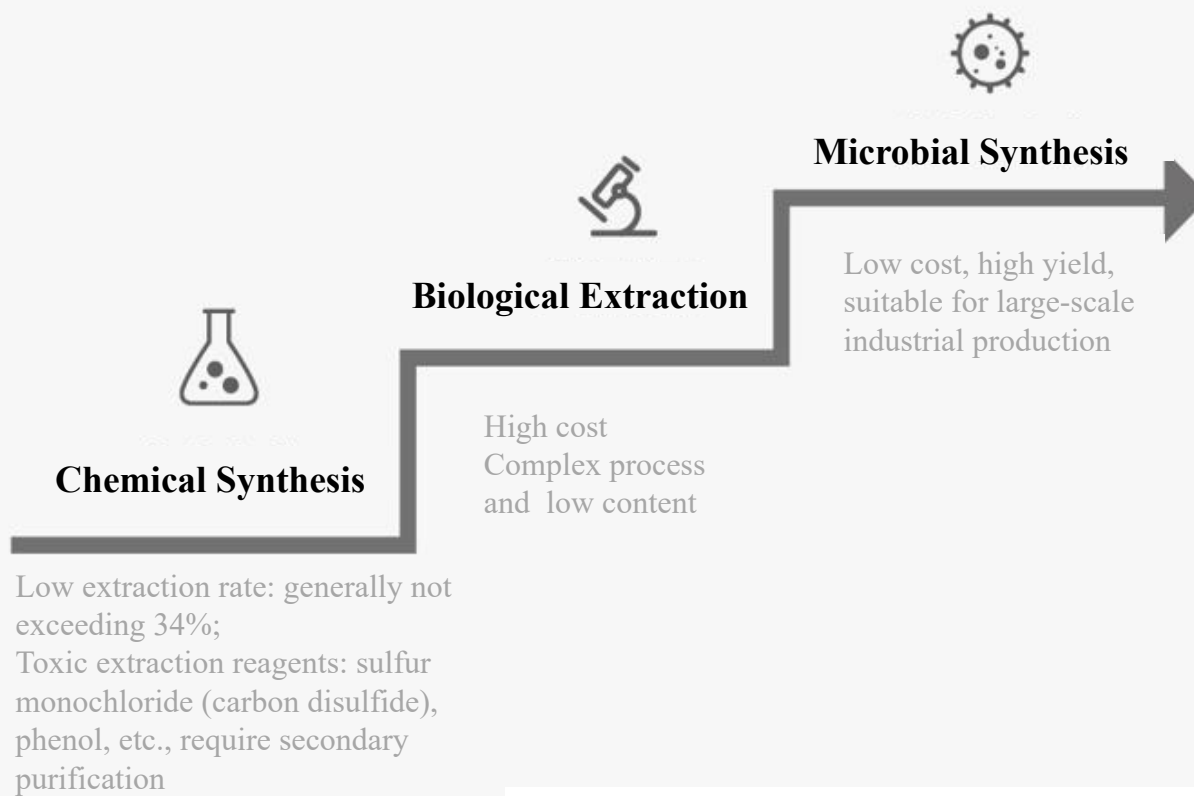
Mr. Guillaume Renaud
French National Agency for Medicines and Health
Product Safety
Tel: +33 1 55873912
Fax: +33 1 55873912

Online EudraGMP: Ref key: 30303 Issuance Date: 2015-09-02 Signatory: Mr. G. Renaud Page 2 of 2

143147 boulevard Anatole France - F-93285 Saint-Denis La Réunion - Tél. : +33(0)1 55 87 30 00 - www.ansm.sante.fr

GMP Certificate

Ergothioneine Extraction Method



New Generation of
Pure Ergothioneine



**Microbial
Fermentation**
Natural safety



High purity
Purity > 99.87%



**Easily soluble
in water**

Revolutionizing with Synthetic Biology Technology, Achieving Mass Production of Ergothioneine

2017



The market price of Ergothioneine is
\$30 million per kilogram

Ergothioneine can only be imported from overseas and is **extracted from rare fungi**. The price reaches as high as \$30 million per kilogram in the market.

2021



The market price of Ergothioneine is
\$300,000 per kilogram

As biotechnological extraction techniques mature, the price of Ergothioneine has decreased to \$300,000 per kilogram, but it still remains **as precious as gold**.

2022



GeneIII Biotechnology has achieved mass production,
breaking through the sky-high prices.

Chief Scientist Dr. Wang has brought **two patented technologies** to GeneIII Bio-Tec: Bacillus Chromosome Editing Technology (enhancing product conversion rate) and Oscillating Gene Expression Regulation (ensuring stable and safe conversion process), **enabling high-purity mass production of Ergothioneine, controlling costs, and bringing this valuable ingredient from the heaven to the world.**

ERGOTHIONEINE

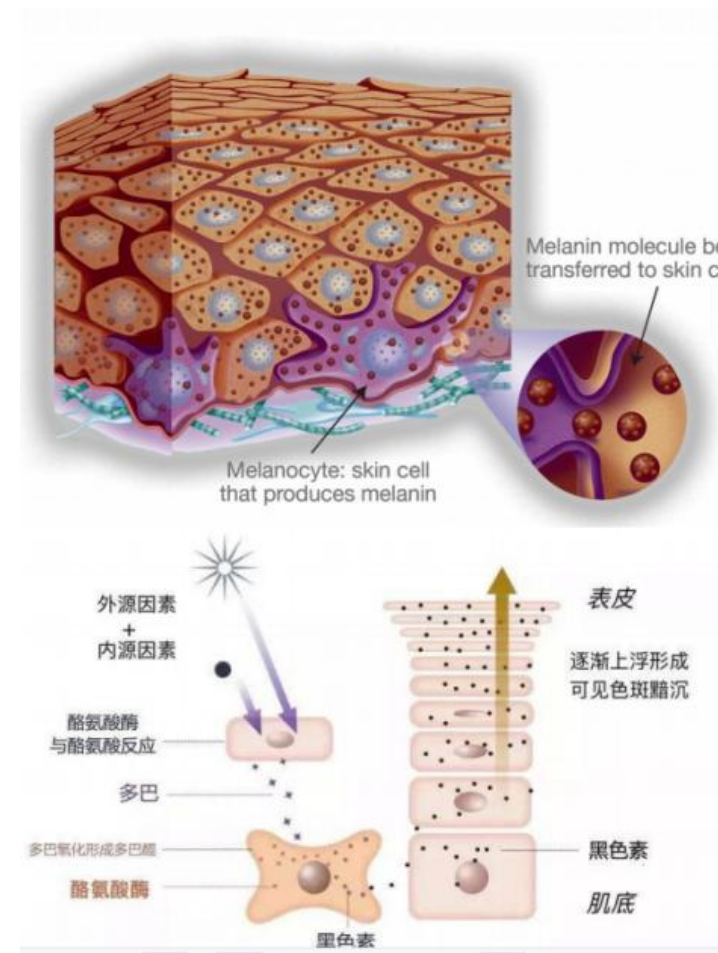
PART 04 Functional Characteristics

Oxidation, the Culprit of Aging

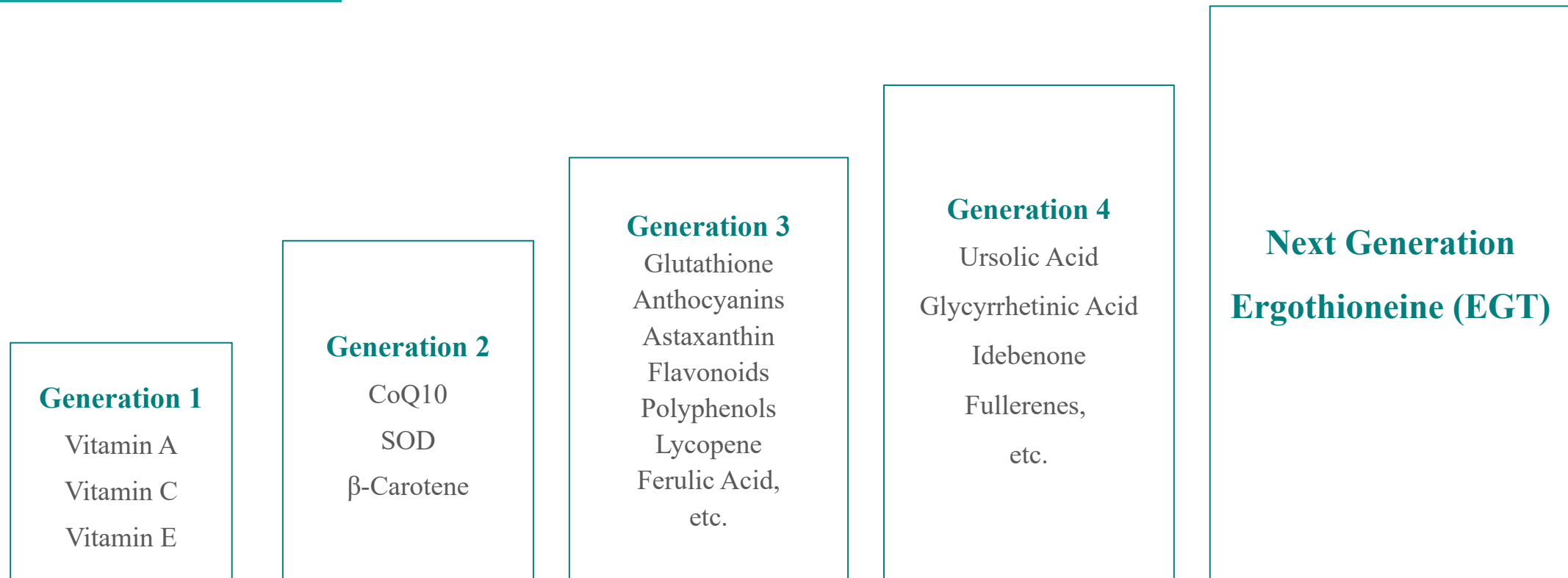
"Oxidation equals aging," and human aging is a continuous process of oxidation. When cellular oxidation intensifies, it leads to aging issues such as dull and lifeless skin, wrinkling and sagging, dryness and peeling, and a waxen and yellowish complexion. Intensified oxidation can accelerate premature aging.

Factors such as stress, screen radiation, and ultraviolet exposure can induce **skin damage** and **aging** through various harmful effects, including the generation of reactive oxygen species (ROS), apoptosis of epidermal cells, inflammation, and collagen degradation in fibroblast cells. Reactive oxygen species induce the generation of **oxidative free radicals** in the skin, causing skin to become yellowish, dark, and lifeless, enlarging pigmentation into dark spots, disrupting metabolic functions in the body, and subsequently accelerating aging.

To combat aging, effective antioxidant measures are crucial.



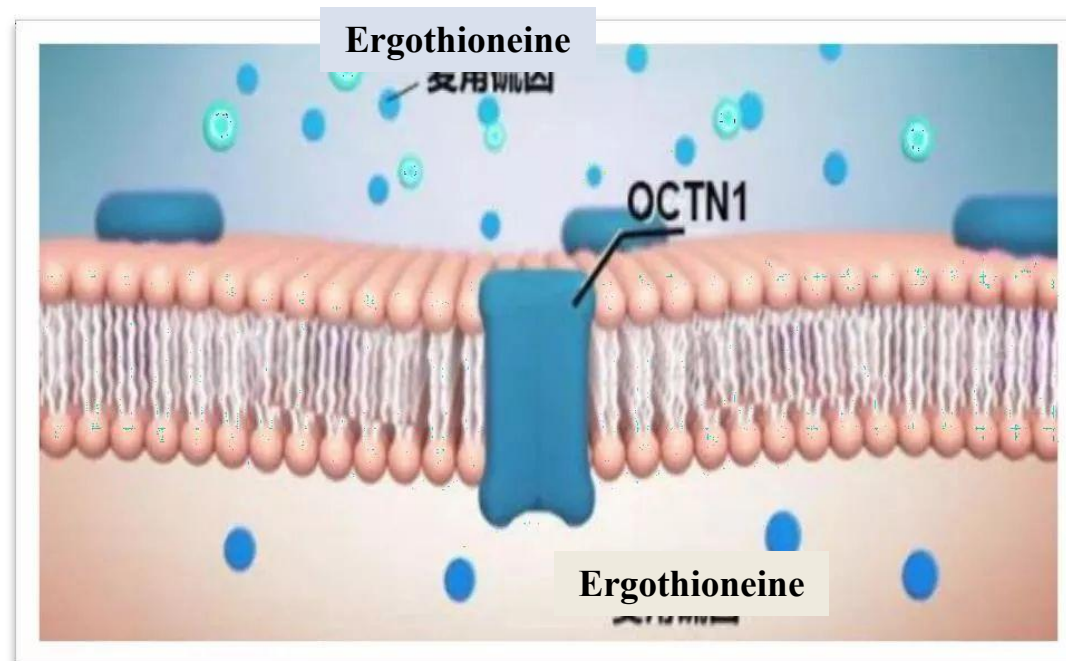
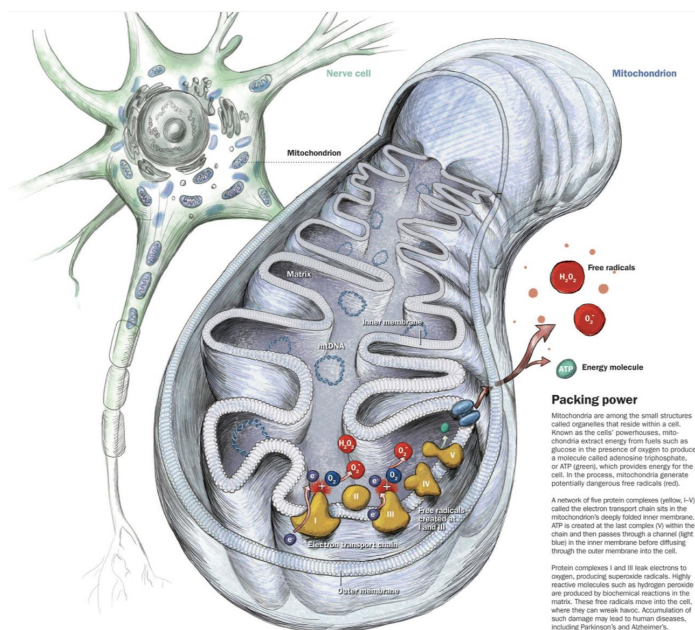
Ergothioneine, the Next-Generation Natural Antioxidant



Mode of Action | Antioxidants that Enter Cell “Mitochondria”

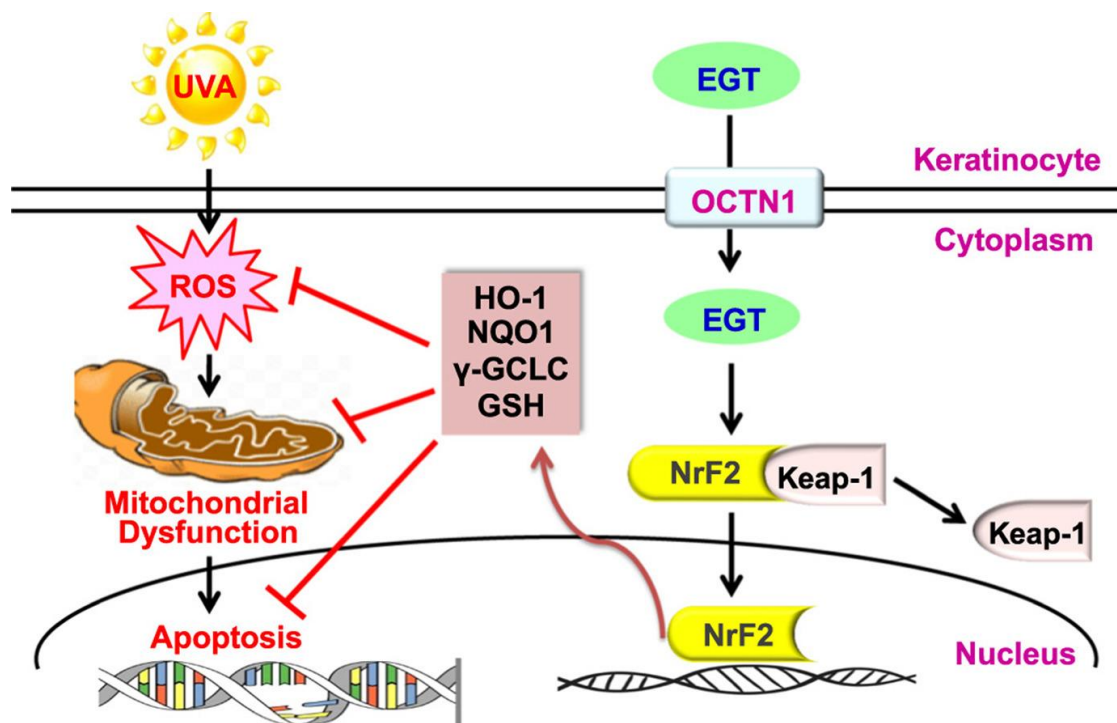
Research has shown that few natural antioxidants can enter cell mitochondria, but Ergothioneine (EGT) has a clear mode of action and can enter cell “mitochondria” as an antioxidant.

This is because there is a significant amount of Ergothioneine-specific transport protein OCTN1 present on the keratinocytes and fibroblasts of the skin. Ergothioneine can pass through the cell membrane via OCTN1, enter the cell mitochondria directly, and effectively neutralize reactive oxygen species, exerting its antioxidant effects.



Mode of Action | Ergothioneine Activates the Endogenous Antioxidant System and Works in Conjunction with Other Antioxidants.

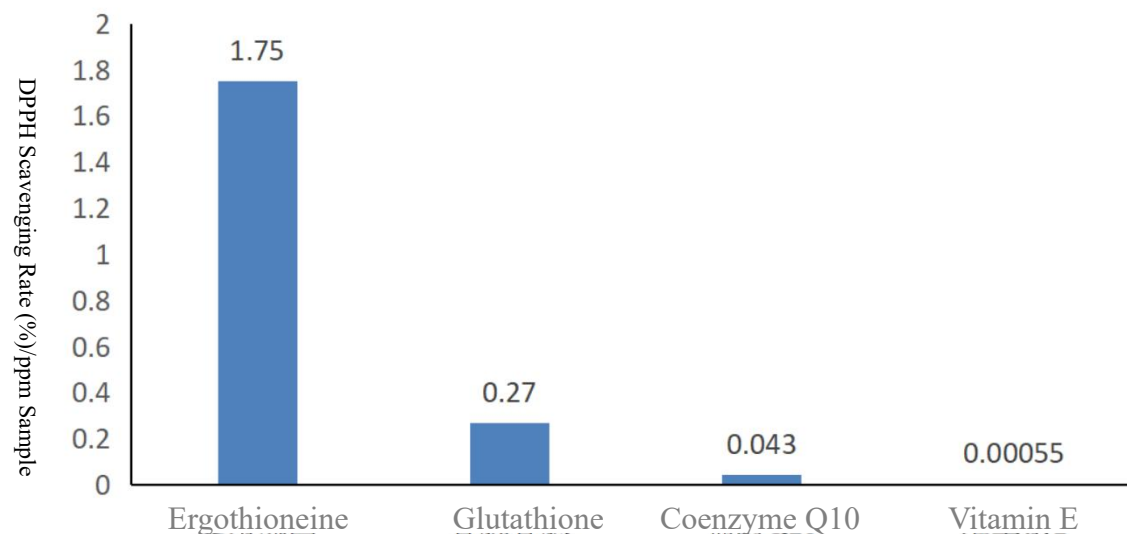
Ergothioneine enters the cell mitochondria, efficiently eliminating free radicals and activating antioxidant enzymes such as **glutathione peroxidase** and superoxide dismutase, which are capable of scavenging reactive oxygen species (ROS). This leads to a highly effective antioxidant effect and **enhances the endogenous antioxidant levels in skin keratinocytes**.



Dermato-protective properties of ergothioneine through induction of Nrf2/ARE-mediated antioxidant genes in UVA-irradiated Human keratinocytes. Free Radical Biology and Medicine. 2015

Efficacy of Ergothioneine | Powerful Antioxidant Power

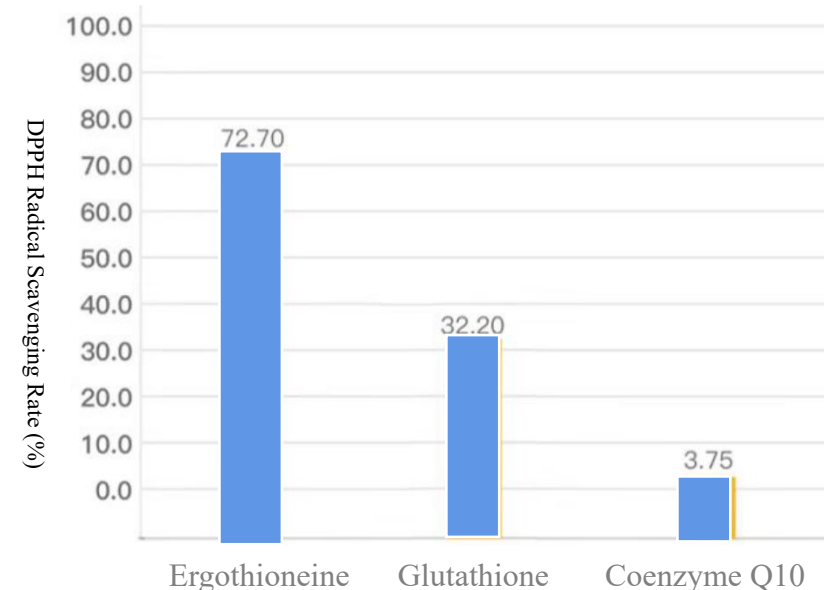
Comparison of DPPH Radical Scavenging Ability



Data Explanation: DPPH Scavenging Rate (%) is calculated by dividing the corresponding sample concentration (ppm), for example, 1 ppm of ergothioneine can scavenge 1.75% of DPPH radicals under the experimental conditions.

Internal testing results conducted in the GeneIII laboratory show that at the same concentration, Ergothioneine has 6 times the free radical scavenging ability of glutathione, 40 times that of Coenzyme Q10, and 3000 times that of Vitamin E.

Comparison of Antioxidant Ingredients in Free Radical Scavenging
(concentration at 50 ppm)



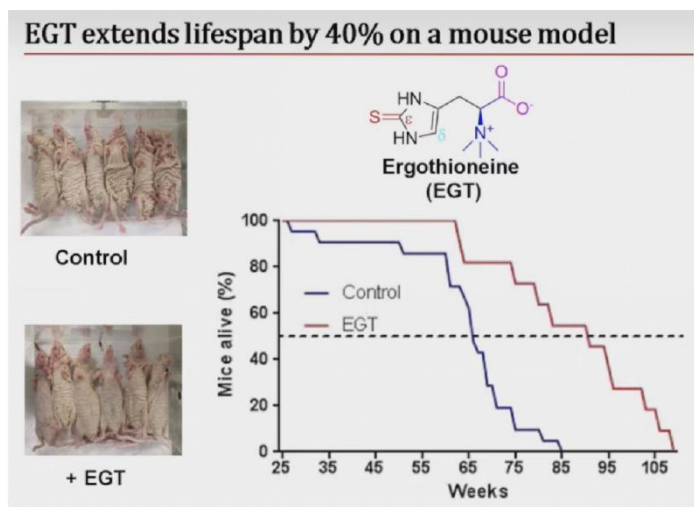
*Data from third-party independent laboratories also demonstrate that at the same concentration, Ergothioneine has 2 times the free radical scavenging ability of glutathione and 20 times that of Coenzyme Q10.

Data from third-party independent laboratories also demonstrate that at the same concentration, Ergothioneine has 2 times the free radical scavenging ability of glutathione and 20 times that of Coenzyme Q10.

Efficacy of Ergothioneine | Delaying Aging

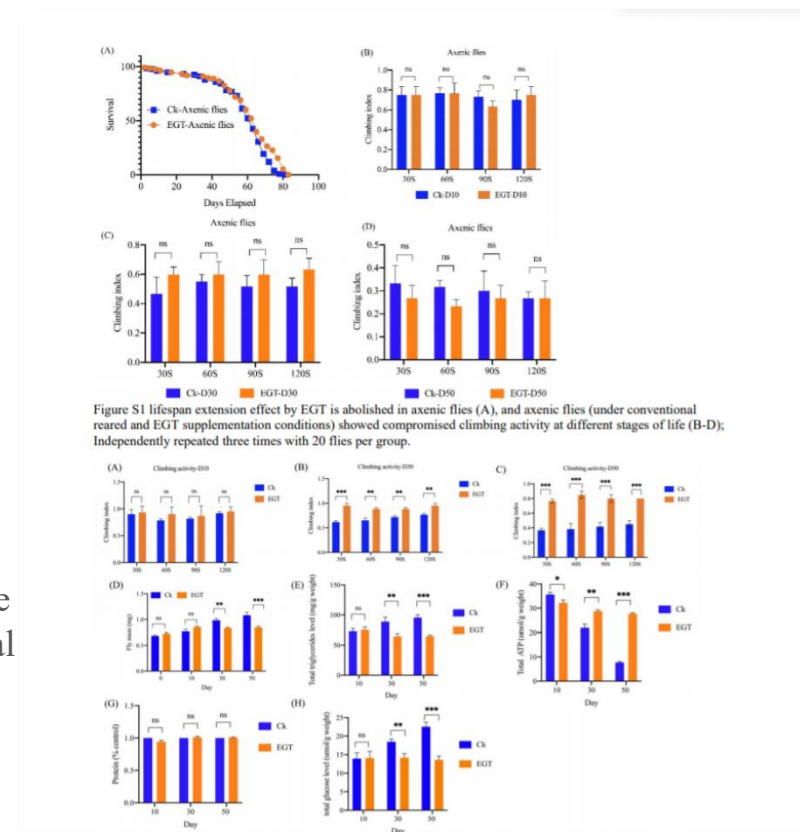
Ergothioneine can extend the lifespan of mice by 40%.

At the 2023 Shanghai Synthetic Biology Industry Summit, Professor LIU Pinghua from Boston University shared the latest research findings: Ergothioneine can extend the lifespan of mice by 40%.



Research indicates that Ergothioneine can prolong lifespan by maintaining mitochondrial health.

Studies have shown that Ergothioneine can regulate peroxisomal fatty acid oxidation to maintain normal mitochondrial function and extend lifespan.



Efficacy of Ergothioneine | Improved Sleep

Ergothioneine acts through various biological mechanisms to improve sleep difficulties in humans.

Ergothioneine protects against stress-induced sleep disturbances.

Transl Psychiatry. 2020 May 28;10(1):170. doi: 10.1038/s41398-020-0855-1.

Ergothioneine, a metabolite of the gut bacterium *Lactobacillus reuteri*, protects against stress-induced sleep disturbances

Yoshiki Matsuda¹, Nobuyuki Ozawa¹, Takiko S Kosuke Suzuki², Yusuke Kawano³, Iwao Ohtsu

Affiliations + expand

PMID: 32467627 PMCID: PMC7256047 DOI: 1

Free PMC article

Limitations of this study should be noted. First, the mechanisms underlying improvement of the MDD-like symptoms in the SDS rats by oral ergothioneine administration remain unelucidated. It is plausible that oral ergothioneine simply ameliorates SDS-induced inflammatory events in the periphery (especially in the intestinal flora), which in turn inhibits the MDD-like symptoms via unknown mechanisms. Second, we did not produce any CNS data related to disturbed sleep and inflammation. This is partly because of the lack of knowledge regarding the CNS center responsible for disturbed sleep associated with MDD, a major behavioral phenotype recapitulated in the current model. Nonetheless, we focused on the septohippocampal pathways that generate the hippocampal REM theta oscillation⁶⁵, since REM theta powers most significantly correlated with the MDD-like social interactions in our SDS rats treated with antidepressants³ and L-ergothioneine (Supplementary Fig. 3). Further study is warranted to clarify the related CNS changes. Finally, we cannot exclude the possibility that the bacterial flora of SDS-administered SD rats was influenced by that of BN rats, considering that they had direct contact.

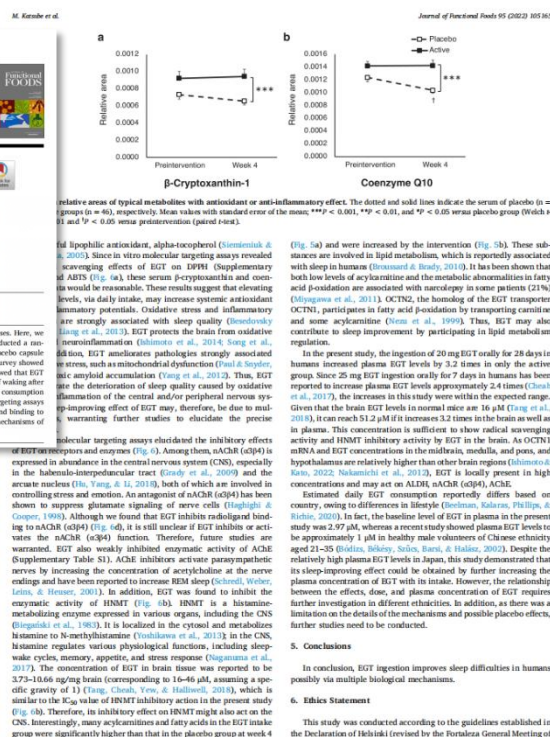
Transl Psychiatry. 2020 May 28;10

Ergothioneine, a metabolite of the gut bacterium *Lactobacillus reuteri*, protects against stress-induced sleep disturbances

Yoshiki Matsuda, Nobuyuki Ozawa, Takiko Shinozaki, Ken-Ichi Wakabayashi, Kosuke Suzuki, Yusuke Kawano, Iwao Ohtsu, Yoshitaka Tatebayashi



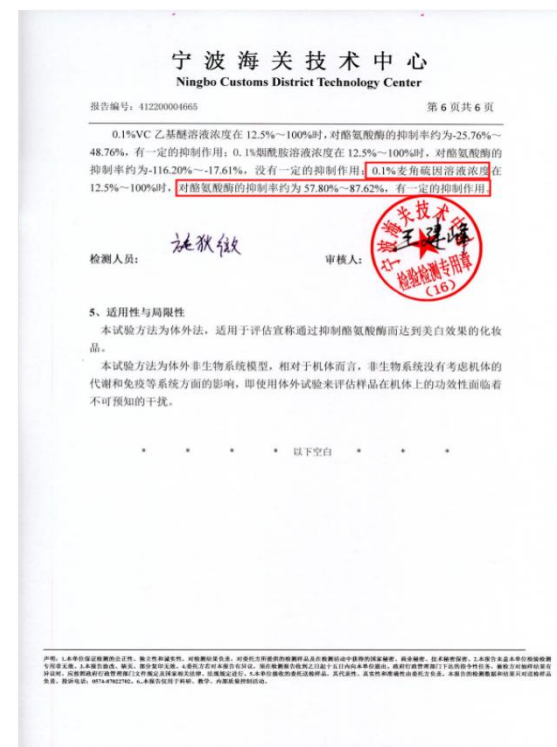
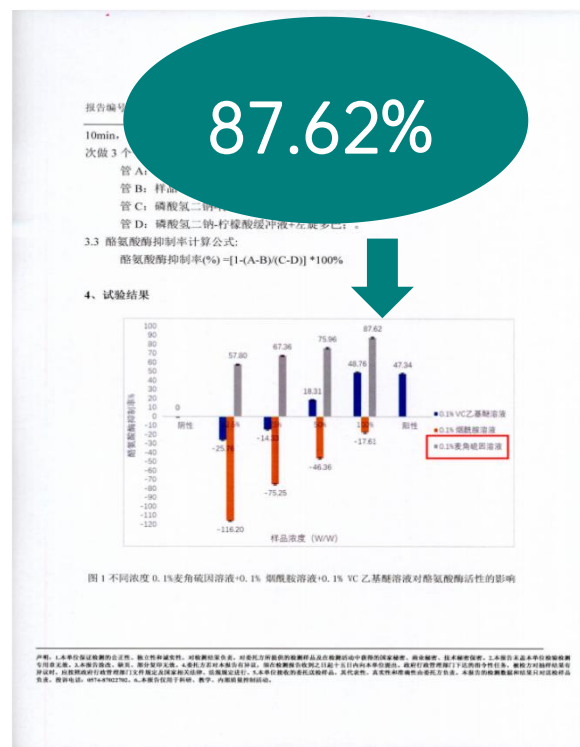
Contents lists available at ScienceDirect Journal of Functional Foods
journal homepage: www.elsevier.com/locate/jff



Efficacy of Ergothioneine| Inhibiting Tyrosinase for Skin Brightening

The human epidermis contains various amino acids, among which tyrosine can be converted into melanin under the action of tyrosinase, leading to skin darkening and even the formation of age spots, freckles, and other blemishes.

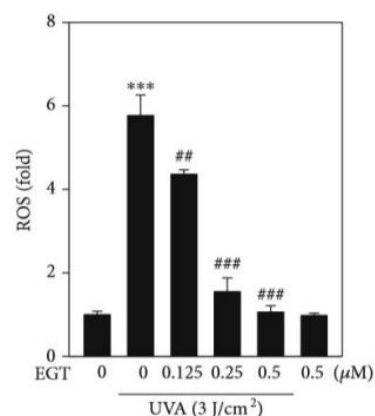
According to data from independent third-party professional laboratories, **0.1% (1000PPM)** of ergothioneine can achieve a tyrosinase inhibition rate of **87.62%**, thus providing the benefits of **reducing yellowness, brightening the skin, and whitening**.



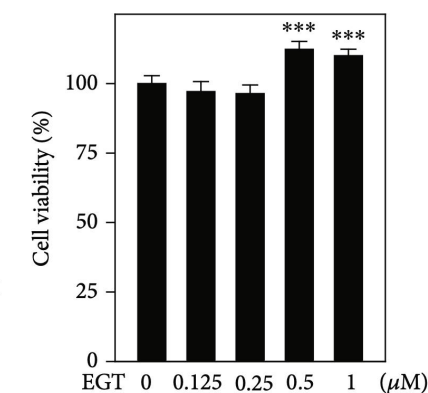
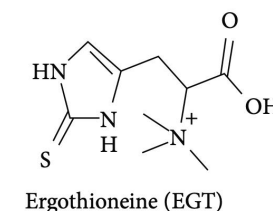
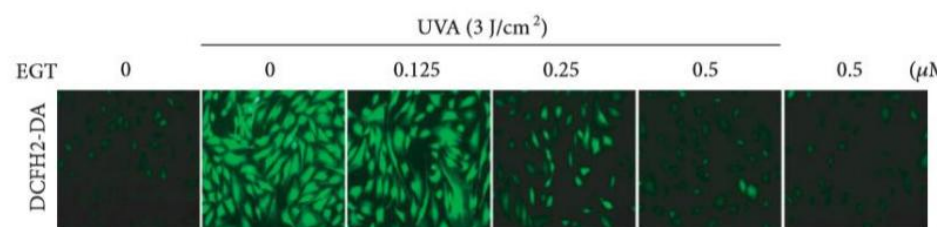
Efficacy of Ergothioneine | UV Aging Resistance

Ergothioneine protects human skin fibroblasts from UV damage

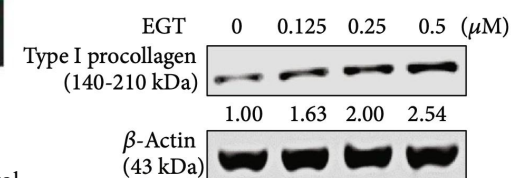
Ergothioneine not only increases their survival capacity but also reduces the degradation of MMP-1 and enhances the production of type I collagen in these cells.



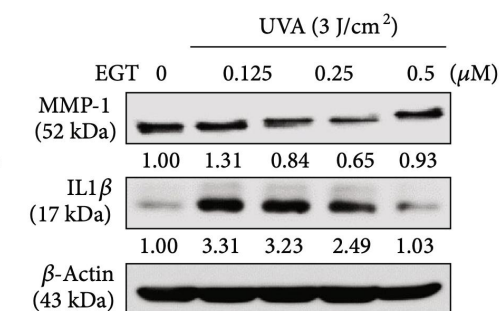
(a) Cells were pretreated with EGT (0.125-0.5μM) for 24 hours and then exposed to 3J/cm² UVA. DCF was used to display intracellular ROS levels, which were measured using fluorescence microscopy (200x magnification). Compared to untreated control cells, ***p<0.001; compared to UVA-exposed cells, #p<0.01 and ##p<0.001



(b)



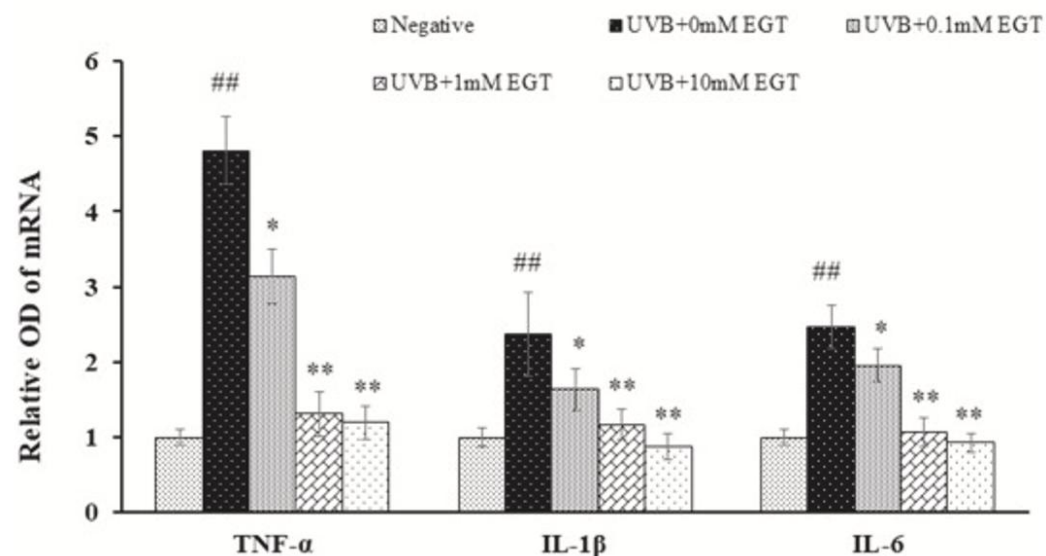
(c)



(d)

Efficacy of Ergothioneine | Anti-Inflammatory Effect

Ergothioneine can inhibit the production of inflammatory factors in UV-induced keratinocytes.



Compared to the blank control, cells treated with Ergothioneine showed a significant reduction in inflammatory factors, and the effect exhibited a dose-dependent relationship with the concentration of Ergothioneine.

Hyun Ju Ko, et al. Ergothioneine alleviates senescence of fibroblasts induced by UVB damage of keratinocytes via activation of the Nrf2/HO-1 pathway and HSP70 in keratinocytes. Exp Cell Res. 2021

Research has shown that Ergothioneine possesses powerful anti-inflammatory properties, making it a potential candidate for treating inflammatory diseases.

Springer Link

Home > NeuroMolecular Medicine > Article

Original Paper | Published: 16 October 2020

Effect of Ergothioneine on 7-Ketcholesterol Induced Endothelial Injury

Sally Shuxian Koh, Samantha Chia-Yi Ooi, Natalie Man-Yin Kee-Mun Cheah, Barry Halliwell, Deron R. Herr & Wei-Yi

NeuroMolecular Medicine 23, 184–198 (2021) | Cite this article

4814 Accesses | 27 Citations | 2 Altmetric | Metrics

Since 7KC is mainly formed by free radical attack on cholesterol, its ability to produce inflammation may be a way in which the oxysterol could propagate oxidative stress. COX2 metabolizes arachidonic acid to produce eicosanoids which are proinflammatory in nature. Moreover, free radicals, such as superoxide radicals, are formed by the metabolism of arachidonic acid (Marks and Furstenberger 2000). Although this study focusses on endothelial cells, it is likely that this process could also occur in other cell types of the body. The findings of a potent anti-inflammatory properties of ET could position it as a therapeutic candidate for treatment of inflammatory diseases. Besides ET, phytochemicals from a large number of plants around the world have been reported to have anti-inflammatory effects (Reviewed in (W.Y. Ong et al. 2017).

7KC can be taken up through the diet, e.g. meat products that are exposed to sunlight and heat (Hernandez Becerra et al. 2014). However, more recent studies indicate that much of the dietary 7KC is metabolized by the liver (Lyons et al. 1999), and that most circulating 7KC is endogenously produced by oxidation of cholesterol within the body, e.g. in hypercholesterolemia or diabetes mellitus (Murakami et al. 2000). A protective effect on brain endothelial cells suggests that ET might be useful as a nutraceutical for the prevention or management of neurovascular diseases, such as stroke or vascular dementia. Moreover, the ability of ET to cross the BBB could point to its usefulness in combatting 7KC that is produced in the CNS during neuroinflammation (W. Y. Ong et al. 2003; He et al. 2006; Kim et al. 2010), e.g. in chronic neurodegenerative diseases (Testa et al. 2016) and possibly COVID-19-induced neurologic complications (Cheah and Halliwell 2020; W. Y. Ong et al. 2020).

Further studies are necessary to elucidate the detailed mechanism of the protective effect of ET against 7KC-induced inflammation.

Efficacy of Ergothioneine | Relief of Post-COVID-19 Symptoms

Research indicates that Ergothioneine may alleviate symptoms and improve prognosis in COVID-19 patients.

Ergothioneine has the potential to prevent COVID-19 pathologies such as acute respiratory distress syndrome (the primary cause of COVID-19 mortality), mammary oxidative damage, and endothelial dysfunction.

Journal Pre-proof

Ergothioneine, recent developments

Irwin K. CHEAH, Barry HALLIWELL

PII: S2213-2317(21)00016-1

DOI: <https://doi.org/10.1016/j.redox.2021.101868>

Reference: REDOX 101868

To appear in: *Redox Biology*

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5. Role of ergothioneine in infectious diseases

5.1.1 Coronavirus infectious disease 2019 (COVID-19)

The highly contagious severe acute respiratory syndrome coronavirus 2 responsible for the devastating COVID-19 pandemic, has infected more than 44 million individuals and led to almost 1.2 million deaths across the globe at the time of writing (WHO COVID-19 situation reports). The battle to curb coronavirus infections has given rise to both repurposed and novel therapeutics to reduce the severity and duration of illness. We suggested that ET might alleviate symptoms and improve prognostic outcomes of COVID-19 patients [165], since it can protect against the underlying pathologies implicated in COVID-19, e.g. acute respiratory distress syndrome (the main cause of mortality in COVID-19) [80], excessive oxidative damage [60, 166, 167], inflammation [76, 77, 168], and endothelial dysfunction [119, 127]. The presence of ET in major organs could also protect them

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Journal Pre-proof

from injury due to a hyperactive immune response and prevent permanent damage (e.g. fibrosis) [25, 26, 54, 72, 78, 79, 169].

Gene 汉三生物

ERGOTHIONEINE

PART 05 Clinical Research

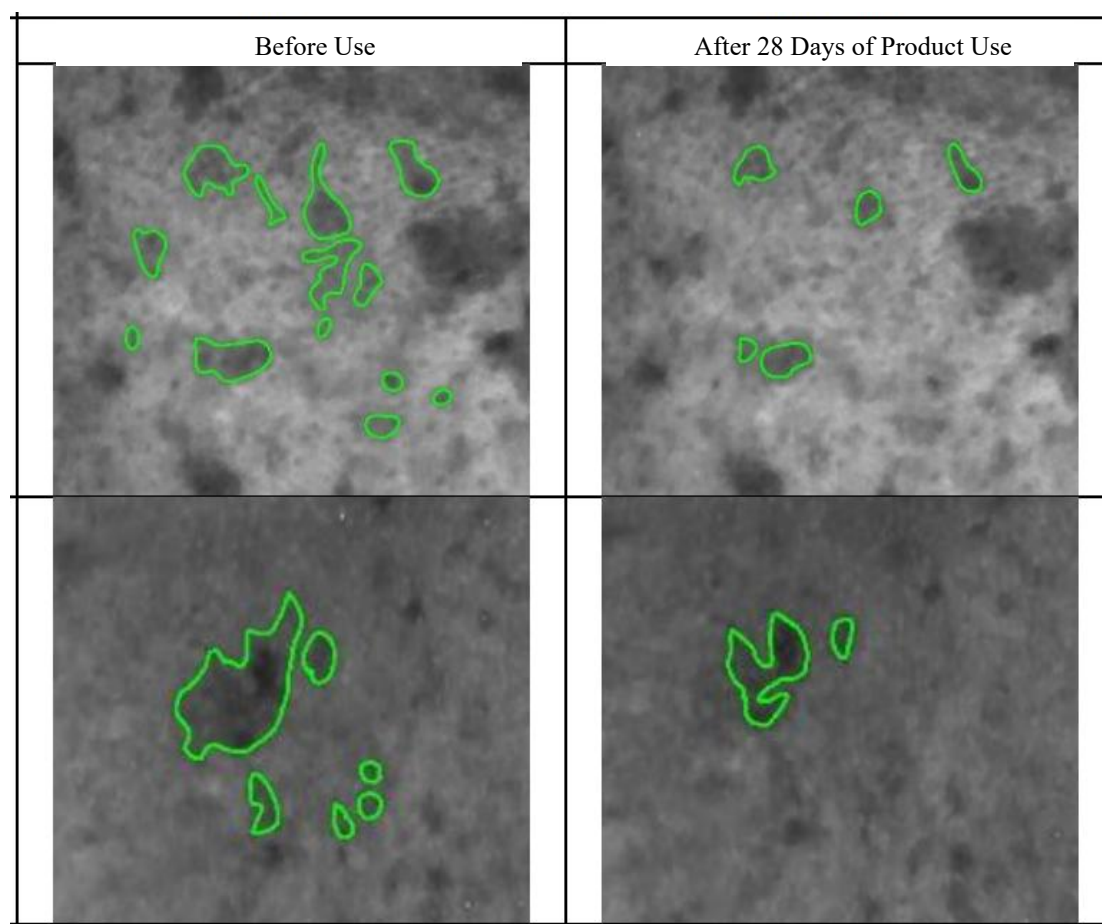
Diminishing Fine Lines and Anti-Aging



After 28 days of using Ergothioneine products, the number of wrinkles reduced by **-34.21%**

Testing Standard: Entrusted to a third-party authoritative testing institution, the evaluation of anti-wrinkle efficacy was conducted on 33 participants with facial eye-corner wrinkles grade greater than 1 (DO). The evaluation utilized methods such as changes in eye-corner wrinkle area (PRIMOS), eye-corner wrinkle volume (PRIMOS), eye-corner wrinkle area (VISIA), and a self-assessment questionnaire completed by the subjects.

Improvement in UV Spots

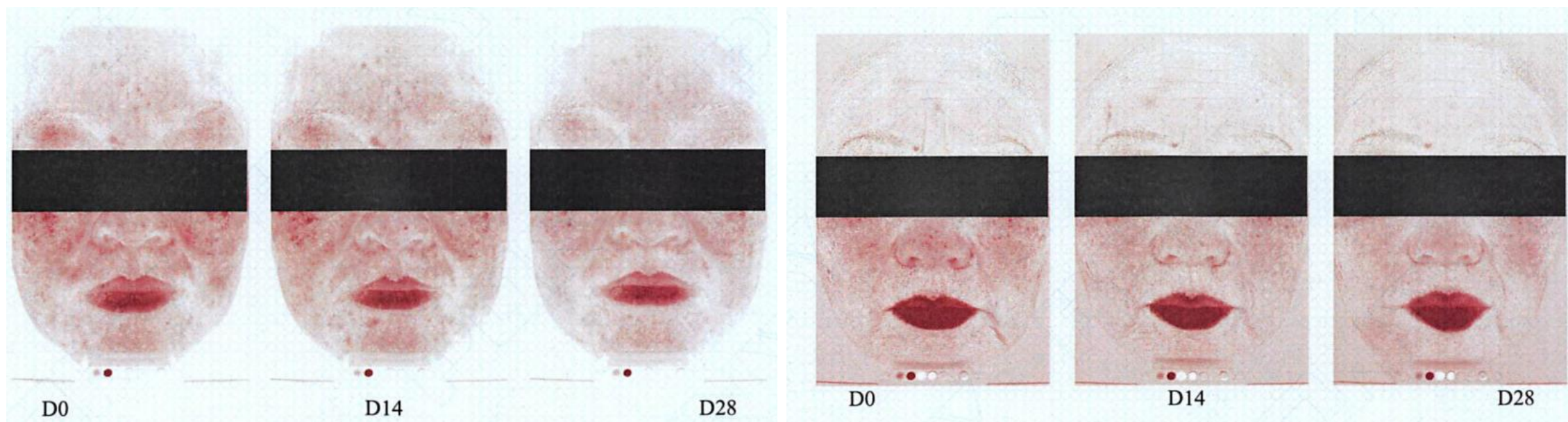


After 28 Days of Using Ergothioneine Product

Reduction in Skin UV Spots Area: **-11.11%**

Testing Standard: The product was tested by 32 Chinese volunteers who continuously used the essence product for 4 weeks. The evaluation was done through instrumental testing, comparing the before and after results, to verify the product's efficacy in reducing melanin content and improving UV spots.

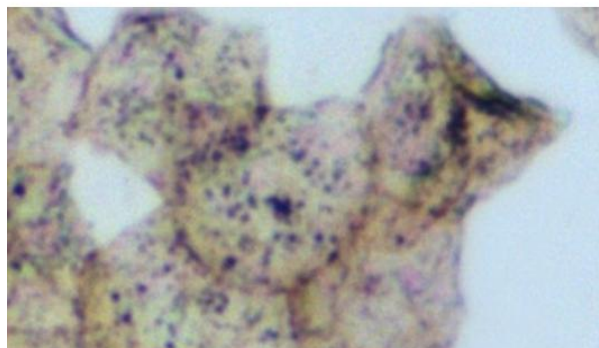
Improvement in Skin Redness



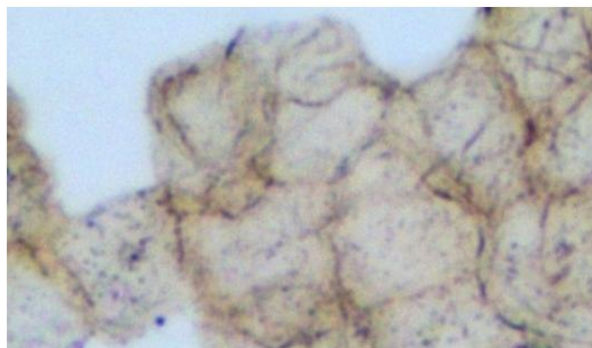
After 28 days of using Ergothioneine product, reduction in skin redness area: **-9.44%**

Testing Standard: The product was tested by recruiting 33 healthy female participants aged 25 to 55 years with a lactic acid irritation test score of 3 or above and a sensitive skin questionnaire score of 18 or above. The participants used the test samples continuously for 28 days. The evaluation was conducted using instrumental testing, image analysis, and assessment questionnaires to observe the changes before and after 14 and 28 days of product usage.

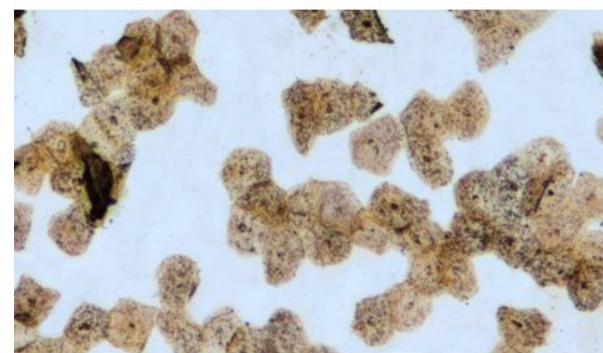
Skin Brightening and Melanin Reduction



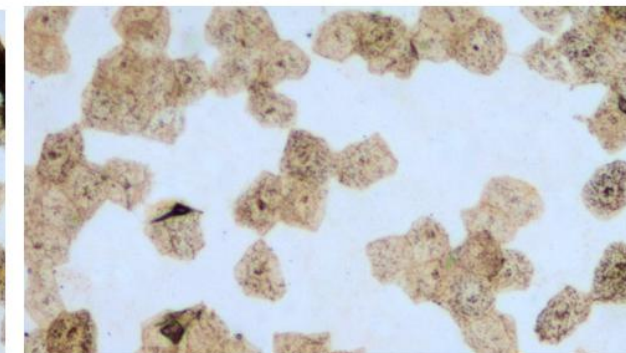
Before



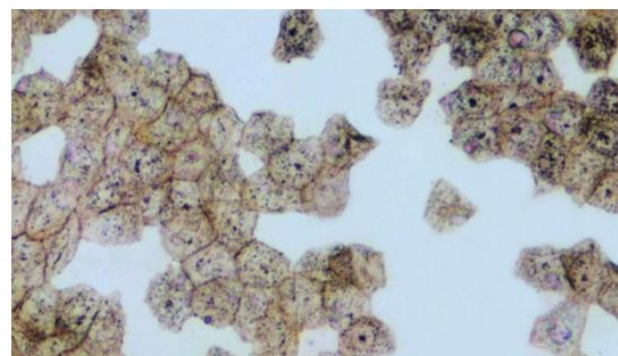
After 28 Days of Product Use



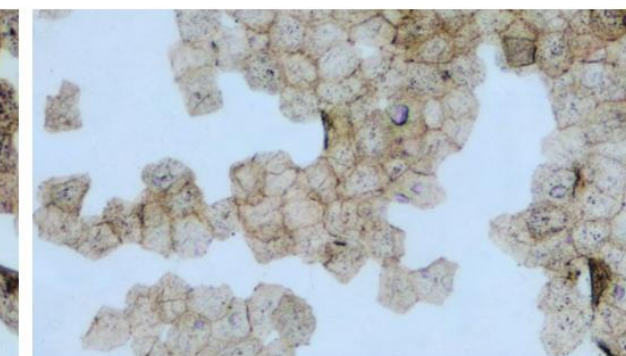
Before



After 28 Days of Product Use



Before



After 28 Days of Product Use

Changes in Skin Melanin Content After 28 Days of Using Ergothioneine Product.

Experimental Conditions: The imaging results were obtained from living human subjects who used the product for 4 weeks. Skin tissue was collected for melanin analysis, and the study did not involve cell cultures.

Testing Standard: The product was tested by recruiting 32 Chinese volunteers who used the essence product continuously for 4 weeks. The evaluation was conducted using instrumental testing, before and after comparison, by a third-party authoritative testing organization to verify the effectiveness of the product in reducing melanin content.

ERGOTHIONEINE

PART 06 Ergothioneine Technical Information

GeneIII Ergothioneine (EGT) Technical Information

Project	GeneIII Ergothioneine (EGT)
Description	Manufacturing and Preparation of Microbial Fermentation Technology
Purity	99.97%
Appearance	White Powder Crystals
Odor	Slight characteristic odor, nearly odorless
PH	4.5-6.5

Raw Material Application Case: HA&EGT

By adopting technological innovations, GeneIII has successfully achieved large-scale production of Ergothioneine and integrated this self-developed compound into its skincare brand, HA&EGT. The Ergothioneine content in HA&EGT reaches **1000+PPM**, which is 20-100 times higher than similar products in the market. Within six months of its launch, Bohemian Beauty **set an industry record** with single-product sales **exceeding 3.4 million RMB** in a single livestream session.



Ergothioneine Application & Recommended Dosage

Application Fields	Claims of Benefits	Mechanism of Action	Recommended Dosage / Usage	Suggested finished product formula pH value
Beauty and Skincare	Antioxidant & Anti-Aging	Clearing free radicals, protecting mitochondria, preventing telomere damage and inhibiting skin protein glycation reactions	0.1%-0.5%	4.5-6.5
	Whitening & Brightening; Prevention of Post-Aesthetic Treatment Hyperpigmentation	Inhibiting tyrosinase activity and reducing melanin formation	0.1%-0.5%	4.5-6.5
	Sun Protection & Anti-Photoaging	Anti-UV, inhibiting UV-induced peroxidation reactions, and expression of inflammatory factors/ β -gal and MMPs	0.1%-0.5%	4.5-6.5
	Anti-Inflammatory	Inhibiting inflammatory factors	0.1%-0.5%	4.5-6.5
Food and Health	Anti-Aging	Preventing oxidative damage, repairing DNA damage, inhibiting cell apoptosis, and enhancing cell vitality	2.82 mg/kg body weight (bw) per day for infants, 3.39 mg/kg bw per day for toddlers and 1.31 mg/kg bw per day for adults including pregnant and breastfeeding women. * Source of recommended dosage: EFSA	
	Whitening	Inhibiting tyrosinase dopachrome tautomerase and reducing melanin formation		
	Antioxidant & Anti-Aging	Clearing free radicals, targeting mitochondrial protection, and preventing telomere damage		
	Antidepressant	Inhibiting proliferation of neural stem cells and promoting neuronal differentiation		
	Cognitive Improvement	Inhibiting β -amyloid and cisplatin-induced neuronal cell apoptosis		
Medicine and Health	Anti-Inflammatory	Inhibit inflammatory factors, reducing systemic and joint inflammation response		
	Cardiovascular Protection	Statin-like effect, mitigating adverse effects of 7-KC on the body		

Raw Material Application Case: GeneIII Ergothioneine Capsules

In 2023, GeneIII independently developed and launched the GeneIII Ergothioneine Capsules for oral consumption. As a dietary supplement, the Ergothioneine Capsules have achieved breakthroughs in safety, content, and quality. These capsules are formulated with Ergothioneine raw material exclusively developed by GeneIII, containing 25mg of Ergothioneine per capsule. Supplementing with one capsule in the morning and one in the evening is equivalent to consuming the Ergothioneine content found in one pound of fresh reishi. These Ergothioneine Capsules have demonstrated remarkable effectiveness in **improving sleep quality, delaying aging, and enhancing vitality and appearance**. They have garnered unanimous acclaim from consumers.



20 Times Anti-Oxidant Ability

resist the element of aging activate the cellular activity

+2 Times
ability of scavenging free radical is 2 times than that of GSH
the Pinnacle of Antioxidant

+ 20 Times
ability of scavenging free radical is 20 times than that of Coq10

straight to mitochondria
maintain cellular activity

the the Choice of Human DNA

Third-party lab data shows:
At the same concentration, the ability of EGT to scavenge free radical is 2 times than that of GSH, 20 times than that of Coq10.

Chief Scientist: Postdoctoral Fellow in Biomedical Science from UIUC, USA



YANG WANG

Chief Scientist of GeneIII Biotechnology

Ph.D. in Pharmacy, Oregon State University, USA

Postdoctoral Fellow in Biomedical Science from UIUC, USA

- Head of an Independent Laboratory at Nanjing University of Science and Technology, and Master's Supervisor
- Inventor of Bacillus Chromosome Editing Technology, published in the international authoritative journal *Nucleic Acids Research*, praised by Professor Richard Losick in Harvard University as "A great step ahead in Bacillus genome editing."
- Recipient of various scholarships including Academician Jin Shanbao Scholarship, CSC Scholarship from the Ministry of Education, Pearl Achievement Scholarship, and Nanjing University of Science and Technology "Excellent Plan" Scholarship.

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**Looking Forward to
Your Cooperation!**
