



THE CRYOTIN AND PENZYME TECHNOLOGIES. USING COLD-ADAPTED MARINE ENZYMES IN FOODS, NATURAL PRODUCTS, COSMETICS AND PHARMACEUTICALS

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INTRODUCTION

Penzyme (cod trypsin) is presently used as the active ingredient in a patented process to produce the natural skin care formulation PENZIM for alternative and complementary treatment of various skin conditions, inflammation, pain and for wound healing, as well as for facial cosmetic formulations, and potentially pharmaceuticals for various indications. We refer to these processes and uses as the Penzyme technology (EP Patent 1 202 743 B1; US 6,846,485 B2).

THE SAGA

More than 30 years of research on cold-adapted Cod Serine Proteases (CSPs) from the Atlantic cod has led to novel products & commercial applications in areas of natural products, cosmetics and drugs.

RESEARCH



GUTS

PRODUCTS



ADVANTAGES OF CSPs USE

Lower amounts of enzymes needed due to very high catalytic efficiencies

Allows the use of milder conditions to destroy residual enzyme activities due to heat and pH sensitivity

Penetration through skin and reduction of Disease Associated Proteins (DAPs)

THE PENZYMES

Laboratory results revealed that in cell culture:

Cod trypsin degrades better than other proteases numerous proteins associated with inflammation, arthritis, psoriasis, eczema, rashes etc. such as:

- TNF-alpha, IL-1 and other cytokines; MMP's; Cell surface receptors (CD's) of immune system cells
- Bacterial toxins
- Fungal, bacterial and viral receptors

HYPOTHESIS

The CSPs have therapeutic activities and these therapeutic activities are due to their ability to penetrate skin and cleave DAPs (Disease Associated Protein):

Cell surface receptors
Inflammatory mediators
Bacterial toxins
Fungal, bacterial and viral receptors

But do they penetrate and cleave DAPs *in vivo*?

CLINICAL OBSERVATIONS

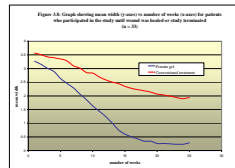
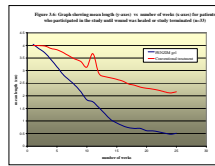
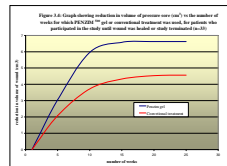
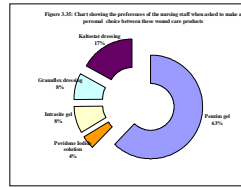
Results on 250 volunteers show efficacy for:

- Osteoarthritis
- Tendinitis
- Fibromyalgia
- Rheumatoid arthritis
- Phlebitis
- Psoriasis
- Eczema
- Dermatitis
- Acne
- Wound healing

CLINICAL TRIALS ARE NEEDED

- Essential for marketing purposes and for the development of pharmaceuticals
- Results of clinical trials from Italy are positive for UV radiation burns, erythema (sunburn)
- Very positive results for wound healing from the University of Malta
- More clinical trials are planned in the near future, both in Iceland, France, UK and India

WOUND HEALING STUDY AT THE UNIVERSITY OF MALTA



A



B

C

A: Photograph showing a pressure sore on the dorsal aspect of the foot before initiation of treatment with Penzim⁵⁰⁰ gel

B: Photograph showing the same pressure sore on the dorsal aspect of the foot after 15 weeks of treatment with Penzim⁵⁰⁰ gel

C: Photograph showing the healed pressure sore after 24 weeks of treatment with Penzim³⁰⁰ gel

MATRIX OF PRODUCTS

	Natural products or cosmeceuticals	COSMETICS	DRUGS
ACTIVE INGREDIENTS	PENZYME FOR PENZIM IN USA	PENZYME	PENZYME
BULK PRODUCTS	PENZIM IN UK	COSMEZYME Mask, Skin, Clean Dr. Bragi's Cosm.	X
CONSUMER READY PRODUCTS	PENZIM IN KOREA & ICEL. OCEAZYM IN FR.	X	X

PENZIM

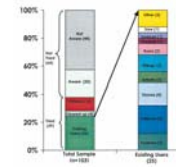
PENZIM - a new concept in skin care

PENZIM - contains super - active cod protease

PENZIM - local and topical treatment



CONSUMER SURVEY ON PENZIM



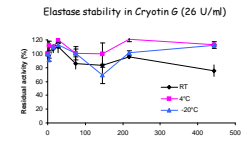
MOST RECENT PENZIM PRODUCT



MOST RECENT COSMETIC PRODUCT



STABILITY OF PENZYME



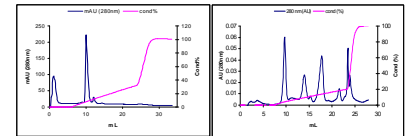
PURITY ANALYSIS USING CHROMATOGRAPHY

Penzyme III

Mini-S column

Penzyme I

Mono - Q column



THERAPEUTIC POSSIBILITIES OF PENZYME FORMULATIONS

Inflammation and pain:

Osteoarthritis, rheumatoid arthritis, fibromyalgia, muscle aches, trigger points, tendinitis, tendosynovitis, phlebitis, lymphangitis, varicose veins and hemorrhoids.

Eczema and various skin indications:

Psoriasis, eczema, such as child eczema, contact dermatitis, seborrhea, allergies to nickel, yeast, milk, chemicals, pharmaceuticals and others, various skin rashes, dry, sore or chapped skin, due to diabetes, weather or other causes, acne and boils, warts, itching and burning skin, insect bites.

Wounds and injuries:

Wounds, sores from burns, cuts incisions, cold sores and shingles, sores caused by chemical burns; swelling, muscle aches, pain caused by injury or accident, such as sprains or broken bones, athletic injuries of various kind.

Fungal infections:

Candida infections, athlete's foot.

CONCLUSIONS

In this investigation we address the foundation for the pharmaceutical efficacy of the marine enzyme preparation Penzyme being based on its ability to cleave and thus reduce the concentration of pathologica proteins such as Interleukin 1, Tumor Necrosis Factor alpha, the cell adhesion molecules of the immune system CD4, CD8, CD54, CD102 and others in cell cultures.

Furthermore, we describe some results of clinical investigations pointing to the efficacy of Penzyme formulations on osteoarthritis, rheumatoid arthritis, tendonitis, fibromyalgia, phlebitis, psoriasis, eczema, dermatitis, UV radiation burns, pressure wounds, acne and scars.

Unique and important characteristics of the Penzyme technology are its very broad function, its marine origin (unrelated species and distant environment) and its potential for topical and local treatment of various indications.