

Nutraceutical Products of ICAR-CMFRI



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PREFACE

There has been a growing interest in marine nutraceuticals in recent years due to their potential beneficial action for human health. Nutraceutical has also been defined as “concentrated, isolated, or purified” pharmacologically bioactive molecules. Nutraceuticals portray a distinctive intersection of pharmaceutical and food products, and will continue to have great attraction because they are naturally derived concentrated pharmacologically active compound(s), and therefore, are intended to function as “Natural Drug”. Nutraceuticals are clearly not drugs, and unlike synthetic drugs, the potential pharmacologically active substances are derived from natural sources and are concentrated by using green extraction/purification techniques. The purification process eliminates the unnecessary components in the product and increases the quantities of the intended pharmacophore(s), which are specifically active against a particular disease. This apparently leads to greater pharmacological activities of nutraceutical products. Over the last few years, the use of marine organisms for the development of nutraceutical products has attracted interest from the pharmaceutical industries. The rich assemblage of seaweeds and bivalve mollusk Asian green mussel *Perna viridis* in the Indian marine biosphere represents an untapped reservoir of bioactive compounds with valuable pharmaceutical and biomedical use. Seaweeds are often termed the wonder herbs of the ocean due to their potential pharmaceutical properties. Pioneering research at ICAR-CMFRI developed a hitherto unraveled database of bioactive molecules and nutraceutical products from the Asian green mussel *Perna viridis* and various Indian seaweeds responsible to combat various metabolic and lifestyle diseases. This subsequently paved the way for the development of nutraceuticals for use against arthritis, type-2 diabetes, dyslipidemia, hypothyroidism, non-alcoholic fatty liver disease, osteoporosis, low immunity, and hypertension. The Indian nutraceutical market has been growing at a compound annual growth rate of 20 percent for the past three years. With increasing health awareness and the shift towards preventive health care, India’s future in this segment is promising. India’s nutraceutical industry is expected to hold at least 3.5 percent of the global market share by 2023. The nutraceutical market in India is expected to grow from an estimated \$4 billion to \$18 billion by the end of 2025. Considering the fact that the global market for nutraceuticals is huge at USD 117 billion, the Indian nutraceutical industry can realize its potential to combat health issues amidst the Covid-19 wave and can contribute to India’s GDP. These developments point toward the fast proliferation of the specific segments of nutraceuticals in India and their acceptance by Indian consumers and healthcare providers. The development of value-added products from *Perna viridis* and seaweed species also has the potential to expand the opportunities for their downstream value chain augmentation, thereby boosting the livelihoods of resource-poor fisher folk and budding entrepreneurs across the coastal belt. Coupled with a renewed policy focus of the Central government, marine nutraceutical products are gaining momentum in recent times and are poised to create new market opportunities in India.

A. Gopalakrishnan

Director,

ICAR-Central Marine Fisheries Research Institute





GMe

Cadalmin™
Green Mussel extract

A natural remedy to joint pain and arthritis from green mussel

CMFRI has developed Cadalmin™ Green Mussel extract (GMe), which contains 100% natural, marine, bioactive anti-inflammatory principles extracted from the green mussel *Perna viridis*. The product is effective for chronic joint pain/arthritis, improves cardiovascular functioning and is complete nutritional supplement.

The active principles in Cadalmin™ GMe isolated from *P. viridis* were found to competitively inhibit inflammatory cyclooxygenase-2 (COX-2) and 5-lipoxygenase (5-LOX), resulting in decreased production of pro-inflammatory prostaglandins and leukotrienes. *In vivo* animal model studies revealed that the active principles effectively suppressed the edema produced by the histamine, which indicates that they exhibit its anti-inflammatory action by means of either inhibiting the synthesis, release or action of anti-inflammatory mediators.

CONTRAINDICATIONS

Individuals with seafood allergies and hyperuricemia should avoid taking GMe.

INGREDIENTS (60 capsules)

Cadalmin™ GMe (per capsule) active principle 400 mg enriched with 100% natural bioactive ingredients. The active ingredients have been encapsulated in gelatin based capsules.

RECOMMENDED DOSAGE

Two capsules a day after food for the first 3 months, followed by a maintenance dose of one capsule daily. Discontinuation/dosage alteration of the current medication(s) should be based on the advise of a physician.



GAE

Cadalmin™ Green Algal extract

A green remedy to joint pain and arthritis from the seaweeds

A 100% vegetarian nutraceutical from nature for joint pain and arthritis. Cadalmin™ Green Algal extract (GAE) provides a unique blend of 100% natural, bioactive anti-inflammatory ingredients extracted from seaweeds with an eco-friendly "green" technology to combat joint pain and arthritic condition.

The active principles in Cadalmin™ GAE competitively inhibit pro-inflammatory mediators, resulting in decreased production of inflammatory prostaglandins and leukotrienes.

The existing allopathic medication used in the treatment of joint pain and arthritis, are reported to produce several undesirable side effects, especially when used for longer duration. GAE is a green alternative to these allopathic preparations.

The active ingredients are chemically engineered to retain the anti-inflammatory properties for an extended shelf life and stability. Packed in low moisture content 'Naturecaps', Cadalmin™ GAE meets the needs of end users.

CONTRAINDICATIONS

Pregnant and nursing women should consult a physician. People with seafood allergies should consult a physician before taking GAE.

INGREDIENTS (60 capsules)

Cadalmin™ GAE (per capsule) active principle 400 mg enriched with 100% natural bioactive ingredients. The active ingredients have been encapsulated in low moisture content 100% vegetarian based hydroxypropyl methylcellulose capsules.

RECOMMENDED DOSAGE

Two capsules a day after food for the first 3 months, followed by a maintenance dose of one capsule daily. Discontinuation/dosage alteration of the current medication(s) should be based on the advise of a physician.



ADe

Cadalmin™ Anti-diabetic extract

*A green remedy for type-II diabetes
from the seaweeds*

Cadalmin™ Antidiabetic extract (Cadalmin™ ADe) is a nutraceutical product, which provides a unique blend of 100% natural bioactive ingredients extracted from a blend of seaweeds as a natural remedy to type-II diabetes. The bioactive leads with antidiabetic activity were isolated from the seaweeds with an ecofriendly "green" technology. The active principles significantly inhibit dipeptidyl peptidase-4, tyrosine phosphatase, and α -glucosidase, which are responsible to cause type-II diabetes.

Cadalmin™ ADe is a natural alternative to the allopathic medications used in the treatment of type-II diabetes.

The preclinical trial showed no test substance-related general organ or systemic toxicity following long term oral administration of Cadalmin™ ADe.

CONTRAINDICATIONS

People with seafood allergies should consult physician. If pregnant, nursing or under medication, consult your physician before using the product.

INGREDIENTS (60 capsules)

Cadalmin™ ADe (per capsule) active principle 400 mg enriched with 100% natural antidiabetic ingredients. The active ingredients have been encapsulated in low moisture content 100% vegetarian based hydroxypropyl methylcellulose capsules.

RECOMMENDED DOSAGE

Two capsules twice daily for 3 months. Two capsules once daily, thereafter, after monitoring the blood sugar and HbA1c levels. Strictly follow the diabetic diet along with capsule intake. Discontinuation/dosage alteration of the current medication(s) should be based on the advise of a physician.



ACe

Cadalmin™

Anti-hypercholesterolemic extract

A green remedy to joint pain and obesity from the seaweeds

Cadalmin™ Anti-hypercholesterolemic extract (Cadalmin™ ACE) is a nutraceutical product, which provides a unique blend of 100% natural bioactive ingredients extracted from seaweeds with an ecofriendly "green" technology.

Cadalmin™ ACE is a natural remedy of dyslipidemia and obesity from marine source. Bioactive pharmacophore leads from seaweeds were used to develop Cadalmin™ ACE, which can be administered to regulate clinical indicators leading to obesity and dyslipidemia. The bioactive principles in the nutraceutical inhibit hydroxymethyl glutaryl coenzyme A reductase, various target receptors and other rate limiting enzymes, which are responsible to cause obesity and dyslipidemia.

The preclinical trial showed no test substance-related general organ or systemic toxicity following long term oral administration of Cadalmin™ ACE.

CONTRAINDICATIONS

People with seafood allergies should consult physician. If pregnant, nursing or under medication, consult your physician before using the product.

INGREDIENTS (60 capsules)

Cadalmin™ ACE (per capsule) active principle 400 mg enriched with 100% natural bioactive ingredients. The active ingredients have been encapsulated in low moisture content 100% vegetarian based hydroxypropyl methylcellulose capsules.

RECOMMENDED DOSAGE

Two capsules twice daily before food for 3 months. Two capsules once daily, thereafter. Strictly follow the low fat diet along with capsule intake. Discontinuation/dosage alteration of the current medication(s) should be based on the advise of a physician.



AHe

Cadalmin™ Anti-hypertensive extract

*A green remedy to hypertension
from the seaweeds*

Cadalmin™ Antihypertensive extract (Cadalmin™ AHe) is a nutraceutical product, which provides a unique blend of 100% natural bioactives from seaweeds with an ecofriendly “green” technology. Cadalmin™ AHe is a natural remedy for treating hypertension and its related effects from marine source.

The bioactive agents present in Cadalmin™AHe can inhibit the angiotensin converting enzyme to convert angiotensin I (inactive decapeptide) to angiotensin II (a potent vasoconstrictor), and bradykinin (a hypotensive peptide) to inactive components, which are responsible to cause hypertension (high blood pressure).

Long term uses of synthetic anti-hypertensive drugs are reported to produce several undesirable side effects. AHe is a green alternative to these allopathic medications. The preclinical trial showed no test substance-related general organ or systemic toxicity following long term oral administration of Cadalmin™ AHe.

CONTRAINDICATIONS

People with seafood allergies should consult physician. If pregnant, nursing or under medication consult your physician before using the product.

INGREDIENTS (60 capsules)

Cadalmin™ AHe (per capsule) active principle 400 mg enriched with 100% natural bioactive ingredients. The active ingredients have been encapsulated in low moisture content 100% vegetarian based hydroxypropyl methylcellulose capsules.

RECOMMENDED DOSAGE

Two capsules twice daily for 3 months. Two capsules once daily, thereafter. Discontinuation/dosage alteration of the current medication(s) should be based on the advise of a physician.



ATe

Cadalmin™

Anti-hypothyroidism extract

*A green remedy to hypothyroidism
from the seaweeds*

Cadalmin™ Anti-hypothyroidism extract (Cadalmin™ ATe) is a nutraceutical product, which provides a unique blend of 100% natural marine bioactive ingredients with anti-hypothyroidism principles extracted from seaweed, with an ecofriendly "green" technology.

Cadalmin™ ATe is a natural remedy of hypothyroidism from the marine source. The bioactive leads concentrated in Cadalmin™ ATe were found to stimulate thyroid releasing hormone and increase the activity of selenodeiodinase to produce metabolically active thyroid hormones tetraiodothyronine (T4) and 3, 5, 3'-triiodothyronine (T3).

The unique biochemical engineering techniques adopted to retain the activities in the preparation of Cadalmin™ ATe assures higher shelf life. Cadalmin™ ATe has no harmful side effects. The preclinical trial showed no test substance-related general organ or systemic toxicity following long term oral administration of Cadalmin™ ATe.

CONTRAINDICATIONS

People with seafood allergies should consult physician. If pregnant, nursing or under medication, consult your physician before using the product.

INGREDIENTS (60 capsules)

Cadalmin™ ATe (per capsule) active principle 400 mg enriched with 100% natural bioactive ingredients. The active ingredients have been encapsulated in low moisture content 100% vegetarian based hydroxypropyl methylcellulose capsules.

RECOMMENDED DOSAGE

Two capsules once daily in empty stomach at early morning. Discontinuation/dosage alteration of the current medication(s) should be based on the advise of a physician.



AOe

Cadalmin™ Anti-Osteoporotic extract

*A green remedy to osteoporosis
from the seaweeds*

Cadalmin™ Antiosteoporotic extract (Cadalmin™ AOe) is a nutraceutical product, which provides a unique blend of 100% natural bioactive ingredients with anti-osteoporotic principles extracted from seaweeds with an ecofriendly "green" technology.

Bioactive pharmacophore leads from seaweeds were used to develop Cadalmin™ AOe, which can be administered to regulate clinical indicators leading to osteoporosis. The anti-resorptive activity present in active principles of Cadalmin™ AOe inhibits the mediators, which prevent bone matrix mineralization process. Cadalmin™ AOe suppresses the osteoclast activity and increases the alkaline phosphatase activities, which are related to osteoblastic cell formation in bone tissue to combat osteoporotic related disorders and improve the bone health.

Cadalmin™ AOe is a green alternative to the allopathic medications used to combat osteoporosis. The preclinical trial showed no test substance-related general organ or systemic toxicity following long term oral administration of Cadalmin™ AOe.

CONTRAINDICATIONS

Cadalmin™ AOe (per capsule) active principle 400 mg enriched with 100% natural bioactive ingredients. The active ingredients have been encapsulated in low moisture content 100% vegetarian based hydroxypropyl methylcellulose capsules.

INGREDIENTS (60 capsules)

People with seafood allergies should consult physician. If pregnant, nursing or under medication, consult your physician before using the product.

RECOMMENDED DOSAGE

Two capsules twice daily for 3 months. Two capsules once daily, thereafter.



IBe

Cadamin™ Immunoboost extract

*A green remedy to improve immunity
from the seaweeds*

Cadamin™ Immunoboost extract (Cadamin™ IBe) is a novel nutraceutical product, which provides a unique blend of 100% natural bioactive ingredients extracted from seaweeds with an ecofriendly "green" technology to improve the innate immune system.

Cadamin™ IBe increases innate immune response by regulating nuclear factor κ B along with oxidative stress markers, such as inducible nitric oxide synthetase, pro-inflammatory cyclooxygenases/5-lipoxygenase, bradykinin, inflammatory prostaglandins and leukotrienes. The activity of Cadamin™ IBe against oxidative agents causing the production of reactive oxygen species implicated the reduced inflammatory response and greater immunity.

Chemical structure of active principles in Cadamin™ IBe benefits immune health since immune cells recognize (1→3) linkages and are primed by the active principles in the product. The preclinical trial showed no test substance-related general organ or systemic toxicity following long term oral administration of Cadamin™ IBe.

CONTRAINDICATIONS

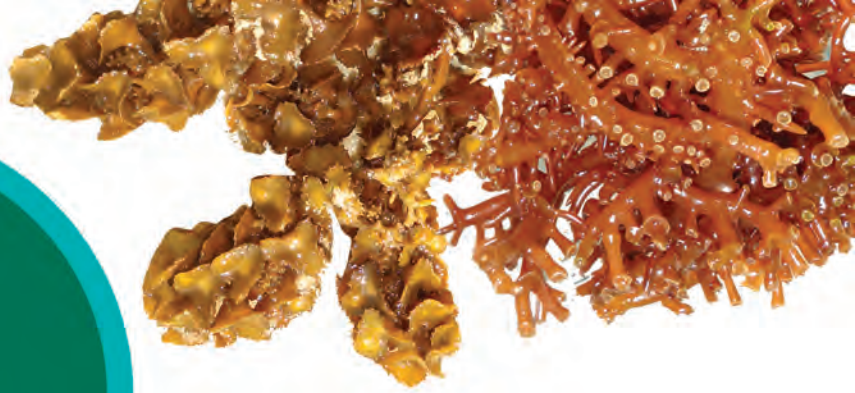
People with seafood allergies should consult physician. If pregnant, nursing or under medication, consult your physician before using the product.

INGREDIENTS (60 capsules)

Cadamin™ IBe (per capsule) active principle 400 mg enriched with 100% natural bioactive ingredients. The active ingredients have been encapsulated in low moisture content 100% vegetarian based hydroxypropyl methylcellulose capsules.

RECOMMENDED DOSAGE

Two capsules twice daily for 3 months. Two capsules once daily, thereafter.



LCe

Cadalmin™ LivCure extract

*A green solution to combat
non-alcoholic fatty liver disease from the seaweeds*

Cadalmin™ LivCure extract (Cadalmin™ LCe) is a novel nutraceutical product, which provides a unique blend of 100% natural bioactive ingredients extracted from seaweeds with an ecofriendly "green" technology to improve the liver health and for use against non-alcoholic fatty liver disease (NAFLD).

This product showed potential to inhibit hydroxymethyl glutaryl reductase and other pleotropic target receptors associated with dyslipidemia and physiopathologies leading to NAFLD. The administration of Cadalmin™ LCe results in significant improvement in liver health along with reduction in deposition of fatty substances and maintaining other liver/lipid parameters within the clinically acceptable limits.

The preclinical trial showed no test substance-related general organ or systemic toxicity following long term oral administration of Cadalmin™ LivCure extract.

CONTRAINDICATIONS

Cadalmin™ LCe (per capsule) active principle 400 mg enriched with 100% natural bioactive ingredients. The active ingredients have been encapsulated in low moisture content 100% vegetarian based hydroxypropyl methylcellulose capsules.

INGREDIENTS (60 capsules)

People with seafood allergies should consult physician. If pregnant, nursing or under medication, consult your physician before using the product.

RECOMMENDED DOSAGE

Two capsules twice daily for 3 months. Two capsules once daily, thereafter.



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