

DEEP BLUE HEALTH™
NEW ZEALAND

Deep Blue Health New Zealand Ltd
A certified pharmaceutical and
natural health supplement company



SEA CUCUMBER

100% Pure Dried Sea Cucumber

GENERAL HEALTH, IMMUNE HEALTH,
JOINT HEALTH, MOBILITY AND
AN ANTI-TUMOR ALTERNATIVE.



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PURE • POTENT • TRACEABLE

NATURAL HEALTH BENEFITS OF SEA CUCUMBER

Sea Cucumbers are a rich source of high value natural compounds which have therapeutic properties.

These therapeutic properties include neuroprotective, anticoagulant, antimicrobial and antioxidant. Health uses include wound healing and cancer-treatment alternative.



INTRODUCTION

Sea cucumbers have long been considered an important food source in south east Asian cuisine. The popularity of the food, combined with overfishing of preferred species in some areas has, in turn, led to prices increases and depleted sea cucumber stocks. However, there are now numerous commercial farms around the world feeding the demand for China. The use of more prevalent and stable species, or farmed species has allowed companies to explore the use of Sea Cucumbers in medicine without the negative impact on the environment.

There are many traditional health benefits associated with the consumption of Sea Cucumbers, and the popularity of sea cucumber appears to be limited to South East Asia and China. It appears that the genus *Stichopus* of the *Holothuroidea* family is preferred medicinally; however, because demand is so high and supplies are somewhat limited, *Cucumaria frondosa* is now commercially available for food and now being studied medicinally.

It is clear from the research that many bioactive compounds may have been identified in the *Holothuroidea* family; however, some of these compounds may present in just one genus or species rather than being present all members of the *Holothuroidea*. Like plants, there may be some ubiquitous chemicals present in a variety of genus and species. It is thought that some of the phenolic compounds may be defensive mechanisms for the animal.

Therefore, one must consider Sea Cucumbers as a potential source of high value added compounds with therapeutic properties. Compounds including triterpene glycosides, carotenoids, peptides, fatty acids and vitamins and minerals. A greater number of health benefits associated with sea cucumbers has been validated through scientific research. These health benefits include wound healing, neuroprotective, anti-tumor, anticoagulant antimicrobial and antioxidant.

Sea cucumbers are a branch of the Echinoderm family, which includes starfish, sea urchins (Kina) and sand-dollars. They belong to a branch called *Holothuroidea* with more than 1700 species world-wide. The species discussed here is *Holothuria atra*, a species listed as being of least concern by the International Union for the Conservation of Nature (<http://www.iucnredlist.org/search>) and is sourced from the South Pacific, mostly around Fiji. This is the material used in [Deep Blue Health's Sea Cucumber Capsules](#).

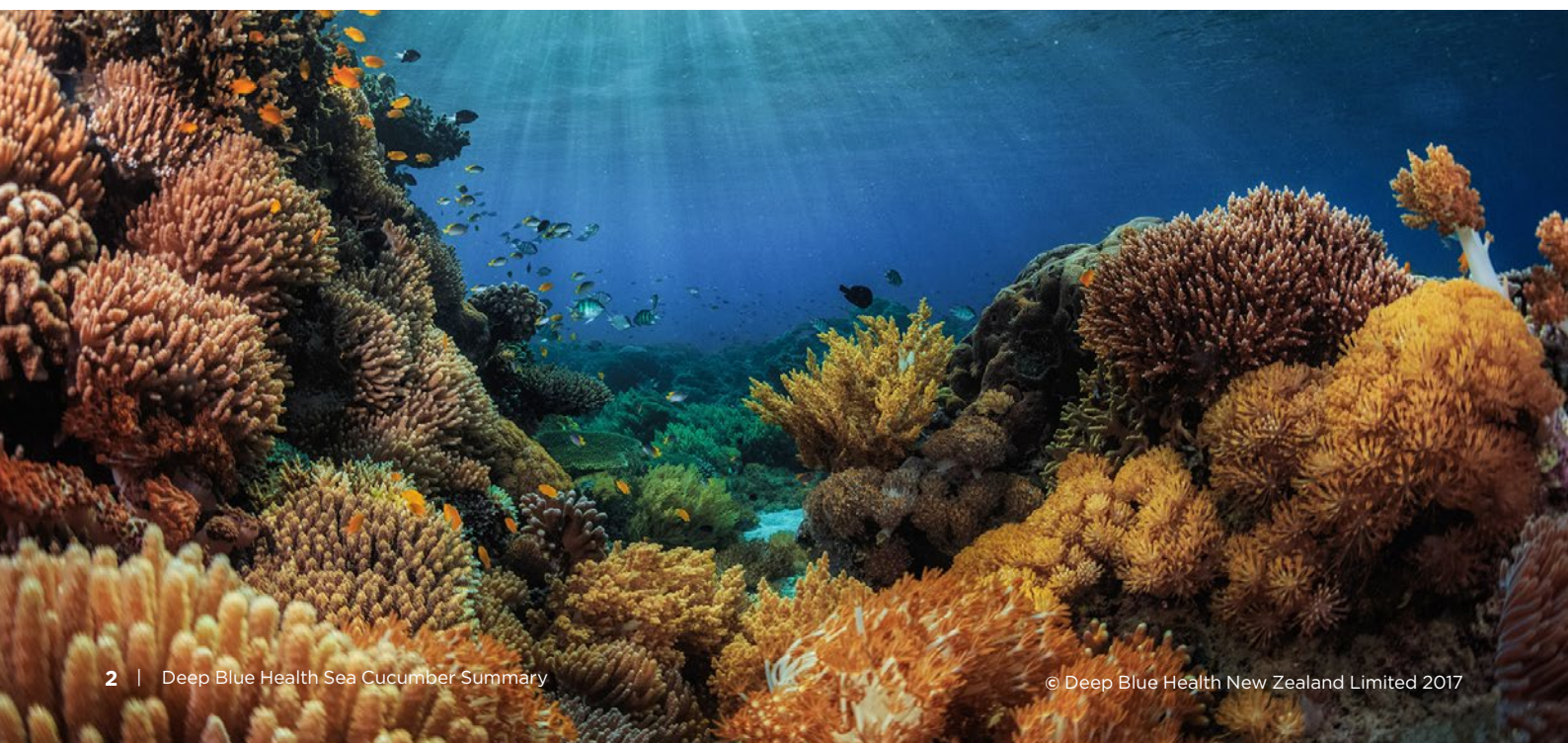
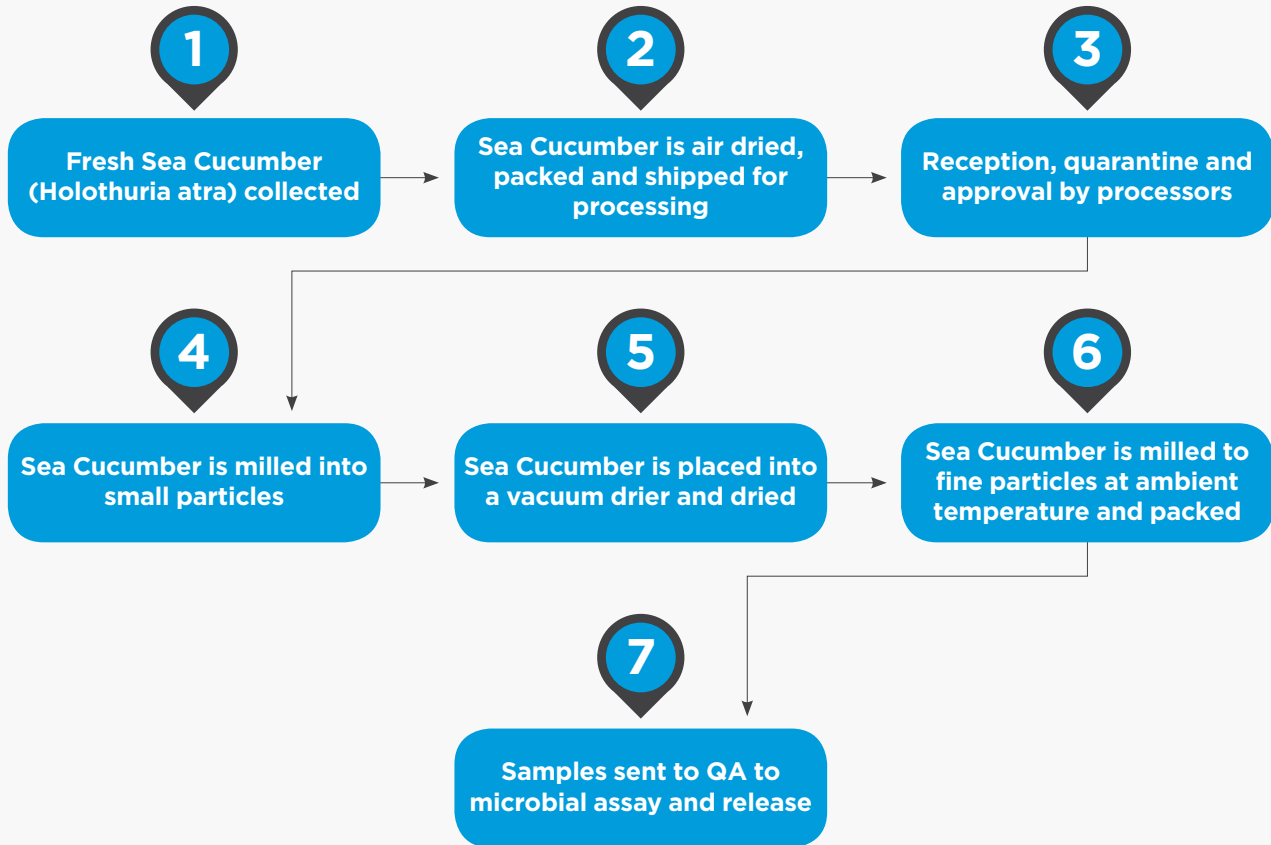
Holothuria atra is described as a sausage shaped organism that can grow up to 60 cm in length; however, 20 cm is by far more usual. It has a smooth, black, pliable skin, often with sand clinging to it. It has a tentacle fringed-mouth at one end, and the anus at the other end. It is broadly found in the tropical indo-pacific regions from the Red Sea through to the Pacific Islands (<http://www.sealifebase.org/summary/Holothuria-atra.html>).



Sea cucumbers are a branch of the Echinoderm family, which includes starfish, sea urchins (Kina) and sand-dollars. The *Holothuria atra* species listed here are of least concern by the International Union for the Conservation of Nature.

PROCESSING AND COMPOSITION OF SEA CUCUMBER

Manufacturing Process for Sea Cucumber



COMPOSITION

Nutritional Information:

ANALYTE	PER 100 g
Protein	64.9 g
Fats - Total	3 g
Carbohydrates	7.5 g
Ash	20.8 g

Biochemical Assays:

Table 1. High Performance Liquid Chromatography analysis of Sea Cucumber Mixed Extract (Esmat et al, 2012).

PEAK NO.	t _R (MIN)	CONCENTRATION (%)	COMPOUND
1	3.331	92.86	chlorogenic acid
2	3.382	2.99	pyrogallol
3	3.713	1.83	rutin
4	3.966	0.067	ascorbic acid
5	4.053	0.097	unidentified
6	4.581	0.51	catechin
7	5.165	0.046	unidentified
8	5.38	1.55	coumaric acid
9	6.477	0.039	unidentified

t_R retention time

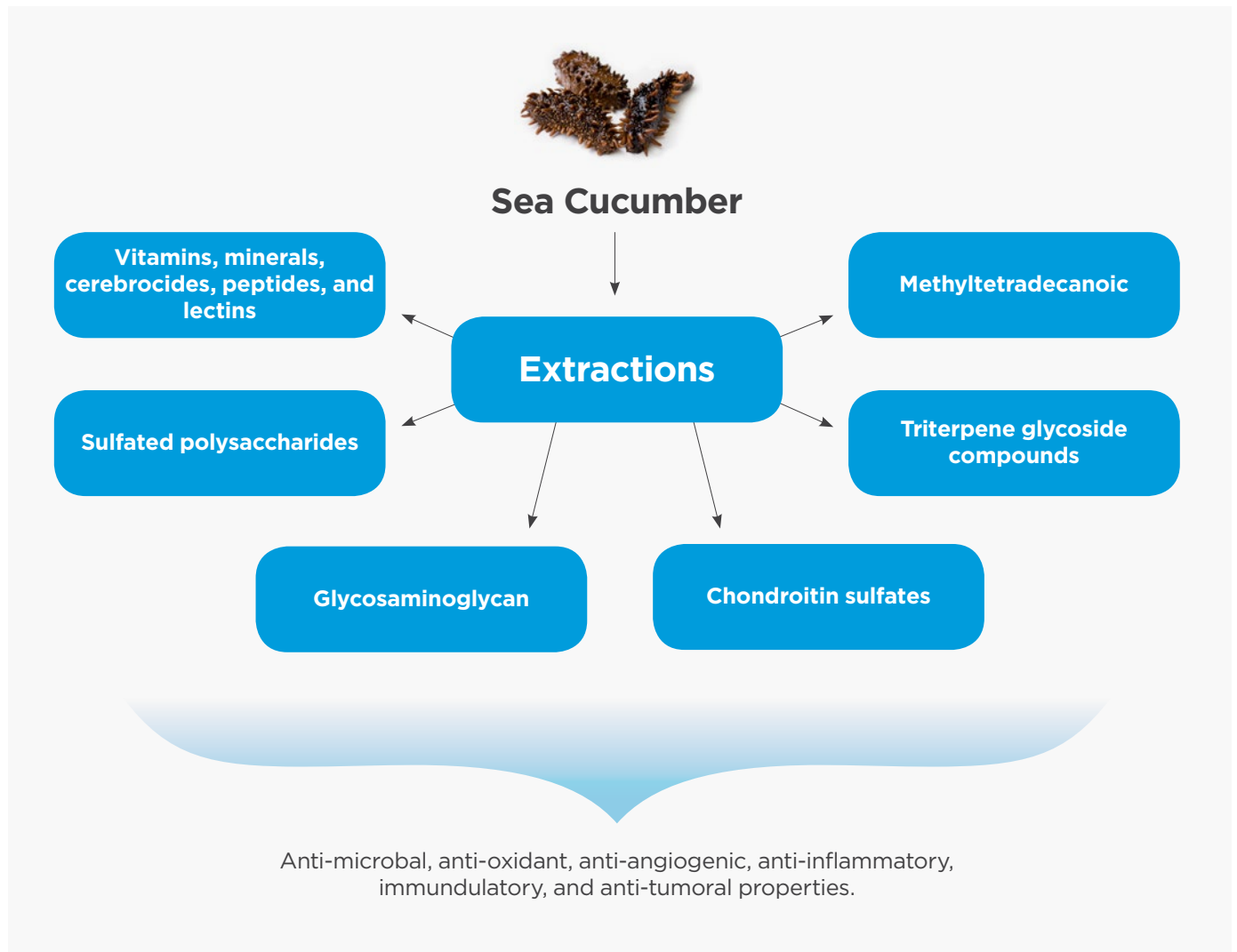
Table 2. Medicinal Action and bioactive compounds of *Holothuria atra* (from Bordbar et al, 2011).

SPECIES	BIOACTIVE COMPOUNDS	MEDICINAL ACTION
<i>Holothuria atra</i>	Steroidal sapogenins, (Phosphate-buffered saline [PBS]), Sulphated triterpene glycosides [Hemoiedemosides A and B], Triterpene glycoside [patagonicoside A], Triterpene glycoside [holothurin B (saponin)], Triterpene glycoside [patagonicoside A], Holostan-type triterpene glycosides [marmoratoside A, 17 α -hydroxy impatienside A, impatienside A and bivittoside D], Bioactive peptides	Antimicrobial Antibacterial and anti-fungal

COMPOSITION CONTINUED...

Biochemical Assays Continued:

Fig. 1. Sea Cucumber Extracts (from Janakiram et al, 2015).



KEY INGREDIENTS

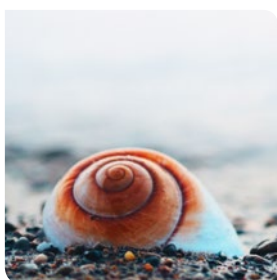
NZ laboratory quality tested.

This product is made under internationally recognised HACCP Principles and Good Manufacturing Practices.



PRONOUNCED ANTIOXIDANT ACTIVITY

Sea cucumbers generally have shown pronounced antioxidant activity. High levels of phenolics and free-radical scavengers



LITERATURE REVIEW

Antioxidant Activity

Sea cucumbers generally have shown pronounced antioxidant activity. High levels of phenolics and free-radical scavengers, particularly Gallic acid were noted in higher quantities of the Holothuria species (H. atra was named specifically).

The antioxidant activity of H. atra has extended to having a hepatoprotective acting in the body. A mixed extract of 14.4 mg/kg prevented liver damage to albino rats. This was attributed physiological active phenolic compounds with antioxidant activity (Esmat et al, 2012).

A single study demonstrated that an extract of H. atra showed potential as an agent to prevent nephrotoxicity. This again was put down to the antioxidant and free-radical scavenging activity (Dakrory et al, 2015).

Cancer

Several studies have been conducted on various metabolites present in Holothuria species and other Holothuroidea species. Triterpenes and saponins have been noted as being present in the genus and these are known to be biologically bioactive.

Extracts of Holothuria atra demonstrated antiproliferative effects against the cervical cancer line Hela and MCF-7 cell (breast cancer cell) lines (Dhinakaran & Lipton, 2014). The triterpenes indicated as being antiproliferative are Calcigeroside B. Alternate studies looking at the Calcigerosides showed moderate cytotoxicity in four human and mouse tumor cell lines (Avilov et al, 2000).

A review of anticancer metabolites by Janakiram et al in 2015 demonstrated the presence of potential anticancer drugs present in the sea cucumber. Holothuria atra was not specifically mentioned although H. tubulosa was.

A review of bioactives of as a source of Anti-cancer drugs was conducted by Janakiram et al in 2015. The authors listed the generic compounds found in sea cucumber from a number of genus and species. Whilst Holothuria atra was not specifically mentioned; it is expected that these compounds will be present in the H. atra too; specifically compounds such as Sulphated polysaccharides (Fucoidans), Glycosaminoglycans and Chondroitin Sulphate.

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LITERATURE REVIEW CONTINUED...

Anti-Viral

Extracts of *Holothuria atra* have been demonstrated to be effective inhibiting Herpes simplex virus in-vitro (Dhinakaran & Lipton, 2014). The studies were conducted on material collected in the Indian Ocean; it is not expected that there will be geographical variations from material collected from different populations.

Anti-Bacterial

An Indian study demonstrated antibacterial action against a number of bacteria (*Aeromonas hydrophila*, *Escherichia coli*, *Enterococcus* sp., *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Salmonella typhi*, *Staphylococcus aureus* and *Vibrio harveyi*) as well as a fish-borne mould *Aspergillus* sp. It is thought the antibacterial action was due to the steroidal sapogenins. It is thought that extracts from *Holothuria* yield great possibility for low cost bioactives from marine sources (Abraham et al, 2002). A further study from Dobretsov et al, 2009) also demonstrated an antibacterial action against *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Streptococcus pneumoniae*,

Streptococcus pyogenes and *Staphylococcus epidermidis*. The authors were primarily concerned with applications as anti-fouling in marine environments; however, as Abraham et al demonstrated, this could have useful benefits as low cost bioactives in medicine.

Anti-fungal

A small study examining extracts of *Holothuria atra* against the common human fungal pathogen *Candida albicans*. *Candida albicans* is a common opportunistic infection of the oral and vaginal mucosa. *Holothuria* extract, even at low concentrations (0.5%) showed anti-candida action without being cytotoxic to the oral mucosa (Parisihni & Revianti, 2013).

Joint Health

The compounds of Glycosaminoglycans (GAGs) and Chondroitin Sulphate have a long history of use in the treatment or prevention of joint pain. A study using GAGs and Chondroitin Sulphate demonstrated a reduction in the erosion of the articular plates of the knee (Campo et al, 2003). The study concludes that the use of Glycosaminoglycans and Chondroitin Sulphate could limit the erosive damage in arthritis.

Immune Health

Sulphated Polysaccharides are a group of compounds, often found in seaweeds, called Fucoidans. The fucoidans are being extensively studied for the immunological action in the body. Whilst the study of fucoidans has thus far been conducted on fucoidans of algae origin; it is not unreasonable to expect that the fucoidans in Sea Cucumber to have a similar action. The work of Janakiram et al, 2015, has shown that the sulphated polysaccharides are present in Sea Cucumber and have an immunological action on the body. (Fig 1. Sea Cucumber Extracts)

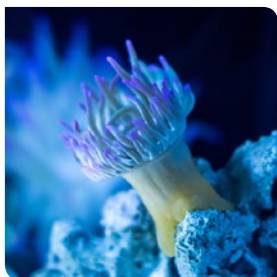
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ANTI-CANCER POTENTIAL

The use of sea cucumber in treating cancer is never recommended as the sole treatment. However, because of the presence of various nutrients present in Sea Cucumber, there may be some justification as an adjunct treatment.



CONCLUSIONS

There is a justification for using Sea Cucumber in aiding general health. The various studies demonstrate Sea Cucumber to be a powerful antioxidant showing that the polyphenols present can help prevent oxidative liver and kidney damage. Polyphenols in the human diet can show benefit in many areas and not just the areas listed in the study. These micronutrients can have profound effects throughout the body.

The use of sea cucumber in treating cancer is never recommended as the sole treatment. However, because of the presence of various nutrients present in Sea Cucumber, there may be some justification as an adjunct treatment. The action is as currently unknown; however, increasing the immunological function in the body may assist the body to kill cancerous cells. This has been attributed the sulphated polysaccharides; however, the presence of polyphenols, vitamins, minerals and other compounds present may be co-factors. It is these compounds that also contribute to antiviral and immunological function of Sea Cucumber.

Sea Cucumber is probably best known as a source of Glycosaminoglycans and Chondroitin Sulphate. These have long been used in complementary medicine to treat joint problems or maintain joint health. There is a growing body of evidence to suggest that there is some direct action on the body.

Overall, as a general health supplement, sea cucumber offers many potential health benefits from what has been studied here in this text to as-yet unknown benefits.

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Various studies demonstrate Sea Cucumber to be a powerful antioxidant showing that the polyphenols present can help prevent oxidative liver and kidney damage.



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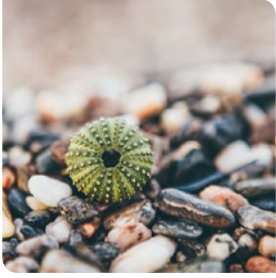
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FREQUENTLY ASKED QUESTIONS

- Q.** Why do Sea Cucumber capsules cost more than some other supplements?
- A.** The cost of sourcing a premium product then preparing, drying, cleaning and then the cost of processing into ready to take capsules comes at a cost. The quality of the finished product is second to none. We know you want the best possible product for your health.
- Q.** Is the gut removed? I think there are some toxins in the gut?
- A.** There are some toxins in the gut of the sea cucumber. The gut is removed, along with any toxins during the cleanings and preparation.
- Q.** How are they processed?
- A.** The fresh sea cucumbers are collected, cleaned (including removal of the gut) and air dried. Once at the processing facility, they are further cleaned to remove any adhering sand and foreign matter. The sea cucumber is milled and then vacuum dried. The dried sea cucumber is milled again to the specific particle size required before being packed and shipped to the pharmaceutical factory. After Quality Control, the sea cucumber is encapsulated and bottled ready for sale.
- Q.** Are there any side effects with this supplement?
- A.** There are no known side effects from taking sea cucumber. However, if you are allergic to seafood, you may be better to avoid taking this supplement or seek further medical advice.
- Q.** Do you use a methanol to extract the sea cucumber?
- A.** No solvents are used (including ethanol or methanol) in the production of sea cucumber.
- Q.** From where is the sea cucumber sourced?
- A.** The sea cucumber is sourced from the clean pacific waters around the tropical island paradise of Fiji.
- Q.** Do you know the variety of sea cucumber that is used in the tablet?
- A.** The genus and species of the Sea cucumber used is *Holothuria atra*.
- Q.** Is there a difference in the varieties and how they affect humans?
- A.** Research is still on-going. However, there are many compounds found to be common across all the sea cucumber genus and species. Compounds such as Glycosaminoglycans and Chondroitins are common to all species. There may be some unique compounds to be found in different genus and species.
- Q.** Japanese and Korean sea cucumbers are highly rated. How do New Zealand Sea Cucumbers compare?
- A.** As above, research is still on-going. The benefits, however, do seem to be similar across sea cucumbers sourced from Chinese, Japanese or Korean waters as those sourced from Fiji. The main difference is that the ocean from around Fiji has much less pollutions and therefore less pollution in the sea cucumber.
- Q.** If I start with 4 x 500 mg capsules per day, when could I expect to reduce to 2 capsules per day?
- A.** Individual result may vary. We would suggest taking 4 x Capsules daily. As symptoms improve you can start reducing the amount to take daily to 2 capsules daily. Increase or decrease as you feel you need it.

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FREQUENTLY ASKED QUESTIONS CONT...

Q. I am looking to buy sea cucumber in easy to swallow tablets. How do you supply your sea cucumber?

A. Our Sea cucumber is supplied in easy to swallow gelatin capsules.

Q. I cannot see on your website how to order some Sea Cucumber Capsules?

A. Click on this link here: <https://www.deepbluehealth.co.nz/products/sea-cucumber> alternatively phone our friendly staff on + 64 9 444 2886

Q. Could you please advise what the “encapsulating materials” are made from?

A. Encapsulation aids are:

Gelatin Hard Shell Capsules

Vegetable source magnesium Stearate (helps to lubricate the sea cucumber to flow into the capsule.

Silicon Dioxide – A free flowing agent.

Q. Unfortunately, I have a rare anaphylactic allergy to ‘mammal’ or anything derived therefrom. Or would it be possible to open the capsules?

A. Allergies to mammal proteins are very rare. If you are allergic to beef products in particular you can open the capsule and consume the content.

Q. Is liquid Sea Cucumber better absorbed than Sea Cucumber capsules?

A. All capsules are designed to disintegrate in under 30 minutes. In practice the capsules release their contents in under 15 minutes. There will be no significant difference between liquid sea cucumber and sea cucumber capsules. The stomach does the digestion. Absorption of the sea cucumber takes place further down the gut.

Q. Do you take with or without food?

A. It makes no difference whether you take with or without food. You will digest and absorb the sea cucumber in the same way.

Q. I’ve heard I can get some irritation from touching or consuming sea cucumber?

A. If you touch or consume fresh or live sea cucumber, it is possible to get some irritation. However, our sea cucumber is properly prepared and should not cause any irritation. If irritation does occur, stop taking the product and seek medical advice.

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