Coral Calcium: Fact and Conjecture

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Substantial interest among both consumers and scientists surrounds coral calcium (1), but much confusion prevails about the characteristics and clinical outcome of the use of this dietary supplement. Emerging brands of coral calcium trumpet their own advantages while arguments prevail about which is the best type of coral calcium material in established brands. Consumer choices of coral calcium supplements are complicated by the availability of more than 150 different, neophytic brands of coral calcium.

There is no doubt that absurd and preposterous treatment claims have been made about coral calcium, especially in TV infomercials. This misleading marketing can only contribute to perceptions of lack of integrity in segments of the dietary supplement industry (1,2); and these actions beleaguer the important movement forward of natural medicine and pharmacy.

This article is intended to separate fact from fiction concerning the origin, characteristics and potential benefits of the fascinating mineral supplement, coral calcium. On the one hand, I believe that coral calcium is a valuable holistic mineral supplement; but on the other hand, I feel that this category of dietary supplement has been harmed by marketing hype that transcends any current level of scientific knowledge about the biological actions of marine coral minerals in humans.

Sources of Coral Calcium
Coral sand from Okinawa, Japan is the precursor material used to make coral calcium supplements, but coral remnant material from Tonga, Jamaica and Brazil has been used in some coral calcium supplements sold in the U.S. There has been variable disclosure of the source of coral sand used in some coral calcium supplements and some of the supplements have been "cut" with plain calcium carbonate. Furthermore, some formulations contain potentially toxic additives, e.g. cesium – vide infra. Only coral sand harvested from the islands of Japan's Okinawa prefecture has a precedent of health benefits. (1,3)

Live coral secretes an exoskeleton consisting both of carbonate-rich minerals and of other minerals derived from the tepid sea water surrounding these islands. Coral sand can be collected from the floor of the shallow seas surrounding the Ryukyu Islands or from the land masses of the islands themselves (1). This ocean sediment originates in part from debris that falls from coral reefs, but it may contain other debris of marine origin (Figure 1). High quality coral sand is not contaminated with heavy metals or organic pollutants (1).

Living reefs are not disturbed during collection of the undersea sand, and there is arguably no evidence of damage to the ecology during the collection of the source material for coral calcium (1). Although coral sand is composed of a significant amount of dead coral, other components of this sediment may include variable amounts of marine plant life and dead unicellular marine life (1,3) (Figure 1).

Coral calcium is a holistic mineral supplement, and the term "coral calcium" is itself, in fact, a misnomer that can result in confusion and misunderstanding about the potential biological actions of this supplement (1). Coral calcium is composed principally of calcium carbonate, which is present in percentages ranging from 24% to 30% in coral "sediments" collected undersea, and from 33% to 40% in land-collected coral sand. These source materials may also contain from less than 1% to 15% approximately of magnesium in the form of carbonate when collected undersea. Typically, magnesium carbonate levels in coral sand are found in a range of less than 1% to 1.5%. It is notable that as many as 70 or so different trace elements are present in coral calcium often in parts per million (1). The complex components of the coral sand from
which coral calcium is derived confound a clear understanding of its functions as a dietary supplement.

Differences in Coral Calcium Supplements

An undersea as opposed to a land source of coral calcium is a key difference in coral calcium-containing supplements: Other differences are to be found in the collection techniques, processing, mineral content, and ultimate supplement formulations—consisting of coral calcium capsules with or without additives, soft gels, powders, and coral sand in teabags with or without additives—of the coral calcium material. (1,2)

Much disagreement surrounds the issue of whether undersea- or land-collected coral sand is a preferential source of coral calcium in terms of health benefits. Overall, the health benefits of coral calcium are largely attributed to its abundant content of minerals that are often deficient in the Western diet, but the product may work by homeopathic or “biochemic” mechanisms (cell salt therapy) (1). Furthermore, both the trace minerals and macroelements present in coral calcium are believed to be “naturally chelated” (4) and the calcium component of coral calcium appears to be well absorbed by the body (1,4,5).

Some coral sand collected below sea level claims to contain a balance of calcium and magnesium in a ratio of 2:1, but its advantages over other types of coral are not clear. However, it is arguable that any source in nature provides calcium and magnesium in a perfect ratio of 2:1 and in preliminary testing, this material appears to have the physico-chemical characteristics of dolomite (a form of limestone) (1). Coral calcium is most often used in solid dosage capsule forms, powders or in the form of tea bags used to create potable, ionized water (1). There is no significant precedent for the use of soft gels or tablets of coral calcium and poor dissolution of tablets or caplets could reduce mineral absorption from coral calcium (1).

Scientific Studies of Coral Calcium

In animal experiments, the absorption of calcium from coral calcium is greater than that from calcium caseinate, hydroxyapatite, or inorganic calcium carbonate (5). Addition of hydrochloric acid to most forms of coral calcium produces almost complete ionization of calcium within 20 minutes or so (1). Studies in rats and humans show that supplemental coral calcium made from such sand undergoes absorption of up to about 60% to 70% after oral ingestion (4,5).

In studies at Japan’s Kagawa Nutrition University, coral calcium given in a balanced composition of 600 mg of calcium with 300 mg of magnesium, and thus providing a 2:1 ratio of the two elements, produced improvements in bone mineral density (6). The greatest increases in bone density were noted in subjects given a regimen of milk and supplemental coral calcium followed by strength training and walking (6).

In another Japanese study, at the Higashi Sapporo Hospital, 2.8 g/day of coral calcium, in a 2:1 calcium:magnesium ratio, was given over a 3-month period to more than 20 patients with a variety of common diseases (7). During this period the patients’ systolic blood pressure was reduced from an average of 140 mm Hg to 132 mm Hg, their total cholesterol fell modestly and they showed a tendency toward increased serum high-density lipoprotein (HDL) cholesterol and a decrease in triglycerides. Additionally, reductions were also observed in such symptoms as headache, heart palpitations, peripheral edema; and in several cases reductions in anger, anxiety and muscle spasm were noted (7). These are open-label, pilot clinical trial observations of limited conclusive value (7).

At the Aichi Syukutoku University, coral calcium-treated water was given to 12 healthy individuals in order to study its effects on central nervous system (CNS) function as measured by an electroencephalograph (8). Volunteers who ingested the alkaline-ionized coral calcium-treated water showed a measurable increase in total alpha-1 wave activity and an increase in alpha-2 wave activity in comparison with those who consumed tap water (8). These results were interpreted as implying that coral calcium may have a stabilizing effect on the CNS, with a tendency toward promoting a central nervous system status consistent with body relaxation (8).
In a study conducted in 2002, the effects of a 2.8 g/day dosage of coral calcium in a 15:1 calcium-to-magnesium ratio—a ratio similar to that of coral calcium made from certain types of undersea-collected or land-derived coral sand—were examined in a small group of patients with diabetes mellitus (9). Over a 3-month period, the regimen improved blood sugar control in half of the diabetic subjects, although the small size of the study population did not permit statistical evaluation of the results (9). Although the study investigators noted that there were many reasons why coral calcium could improve blood sugar control in diabetic persons, they cited the most important as being the observation that a 17:1 ratio of calcium to magnesium appeared to be optimal for insulin production and action (9).

In addition to the findings in these various studies, Japanese authors have reported that rapid swings in blood calcium levels may be less common with the use of coral calcium and other supplements made from marine calcium sources than with conventional calcium supplements (3,10). This observation has no clear explanation.

Studies at the Institute of Clinical and Pharmacokinetic Study in Japan, using chewing gum containing coral calcium and solid dosage coral calcium, respectively, in nine individuals with heartburn and eight with nonspecific abdominal complaints indicated that coral calcium produced complete relief of symptoms in all nine patients with heartburn and one quarter of those with nonspecific digestive complaints. Again, these promising digestive benefits of coral calcium were demonstrated in limited, open-label observations.

Coral Calcium and Aging

In addition to its use as a mineral source, coral calcium has emerged as a supplement within the category of "anti-aging" products. Although other factors, such as lifestyle and diet, unquestionably play major roles in the documented longevity of the Okinawan people (1,2), their longevity may be related, in part, to the mineral-enriched environment of their islands (2). Moreover, there are precedents for implicating mineral-enriched diets in good health and long life (1,12,13). For example, the long average life span of the Hunzas of India/Pakistan has been potentially related to their drinking of mineral-enriched glacial water, or "glacial milk." (13) However, the Hunzas are also vegetarians with diets rich in whole grains, vegetables, and dietary fiber (13).

In terms of the value of dietary calcium for cardiovascular health, the native Indian populations of Guatemala provide an interesting precedent. These Indians often have an intake of at least 1200 mg of calcium per day—a figure identical to the new Recommended Dietary Intake (RDI) of calcium for adults in the United States—largely as a consequence of their using limewater in the baking of tortillas. (13) On the other hand, the high per-capita dietary intake of calcium in Finland is offset by its derivation mainly from dairy products, which have a high content of saturated fat and cholesterol, thus probably explaining Finland's highest population death rate in the world from heart disease (14).

In order to determine whether it might have effects that retard the aging process, researchers have begun to examine how coral calcium influences longevity in animals. In one study conducted at Japan’s Saitama Medical School, 22 rats were divided into two groups and given the same diet except that one group was given regular tap water while the other received alkaline ionized water treated with coral calcium. The group of animals given coral calcium water had a longer life span than their counterparts (15) (Figure 2), but the results did not reach good statistical significance. Coral calcium seems to exhibit limited anti-cancer activity in vitro and it may reduce metastatic disease in mice inoculated with tumor cells (16).
Conclusions
The future of coral calcium as a dietary supplement is clouded by hyperbolic or distorted claims for its benefits, and also because some manufacturers have added innocuous or potentially dangerous ingredients to it. For instance, cesium has been added in milligram amounts to some coral calcium. Yet cesium has no biologic role in humans and it can cause cardiac arrhythmias when used in dietary supplements. This public health risk has prompted cardiologists at the Cleveland Clinic to issue physician advisories on the potentially life-threatening risk of supplements containing this element (17). Cesium additives to coral calcium are risky and should not be used in routine mineral supplements, such as coral calcium (18,19), but such coral calcium products are widely touted in association with illegal claims of benefit in cancer treatment and prevention.

Many treatment claims for coral calcium are based on anecdotal, spurious or frankly untrue information (1). There is, for example, no credible evidence that coral sand collected on land is more beneficial than that collected from under the sea, and vice versa (1), despite the rhetoric (2). The real issue in the potential efficacy of coral calcium is its quality as used in a supplement. Only coral calcium collected without harm to coral reefs, and free of heavy metals and organic pollutants, should be used in supplements. www.coralcalciummagazine.com (20)

References


