Overview of clinical and epidemiological studies that include dietary seaweed

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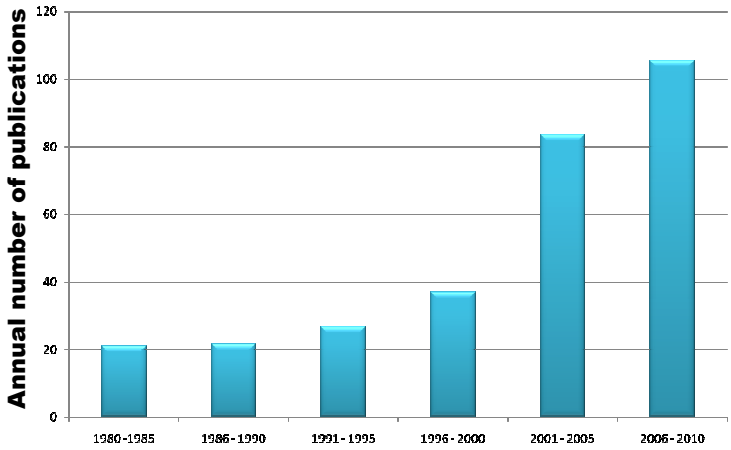
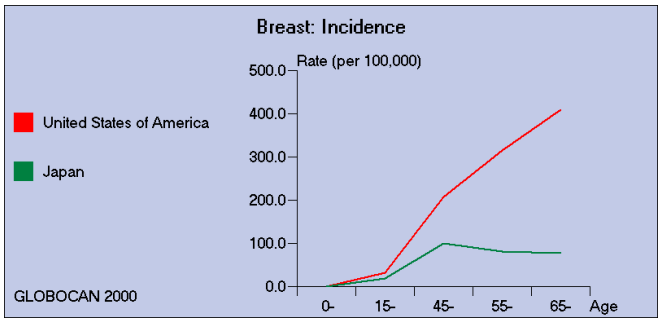
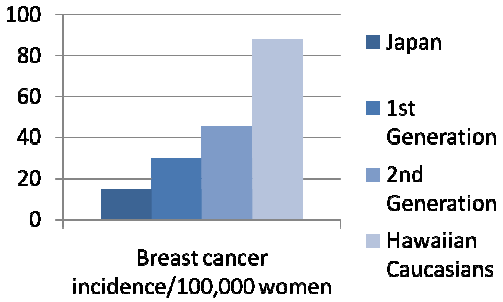
Annual publications on seaweed indexed in the Library of Medicine



Breast Cancer





Or is it Diet Related?

JAPAN: The Ukita family of Kodaira City

Seaweeds

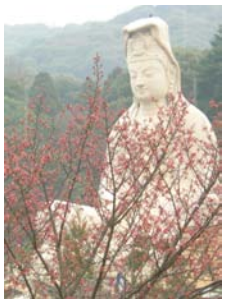
http://www.time.com/time/photogallery/0,29307,1626519_1373664,00.html

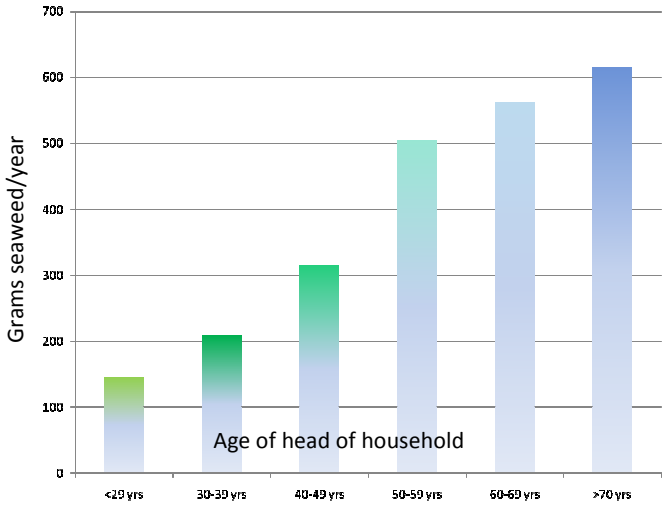
Thickening, stabilizing, and smoothing agents:

- ***Dairy products***
- ***Salad dressings***
- ***Dental impression compounds***
- ***Antacid formulations***

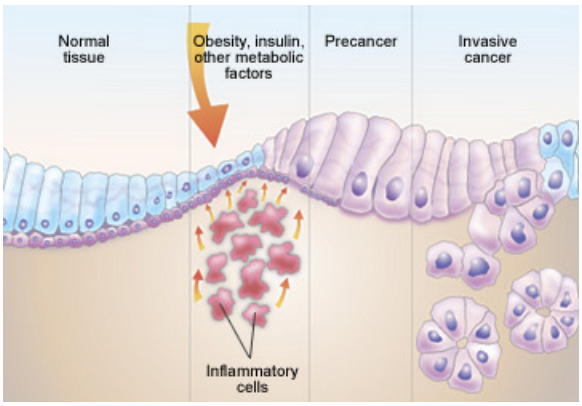
http://www.time.com/time/photogallery/0,29307,1626519_1373664,00.html

Annual household consumption of seaweed in Japan (2006)

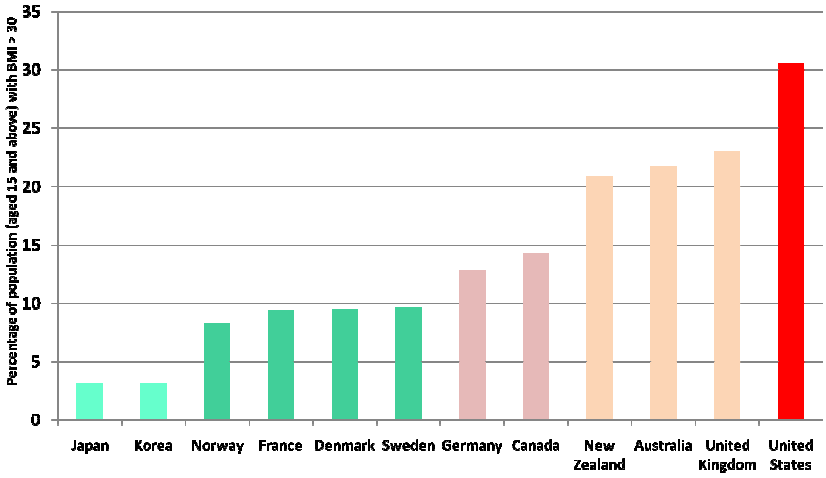




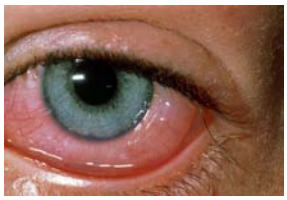
Nagataki, 2008



How fat is your country?

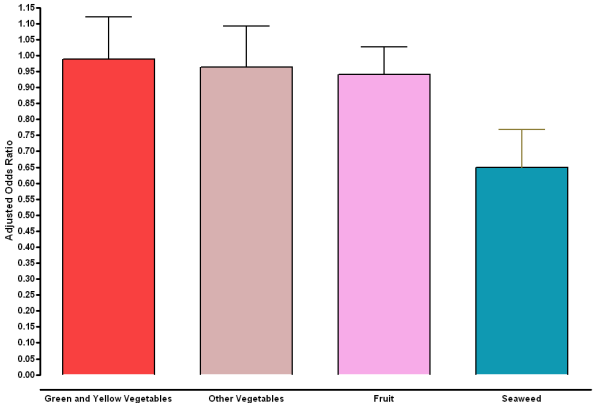


Organization for Economic Co-operation and Development http: //www.nationmaster.com/graph/hea_obe-health-obesity



Medical Treatment for Allergies during Pregnancy

(1002 pregnant Japanese women who had received drug treatment for allergies in the previous 12 months)



Miyake, 2006

What makes brown seaweeds different from land plants?

<u>Unique sugars</u>
- Fucoidan 2 – 12% of seaweed
- Beta glucans

<u>Unique carotenoids</u>
- Fucoxanthin (gives brown seaweed its color)

<u>Unique chemical defenses</u>
- Phlorotannins

<u>Rare fiber</u>
- Alginate

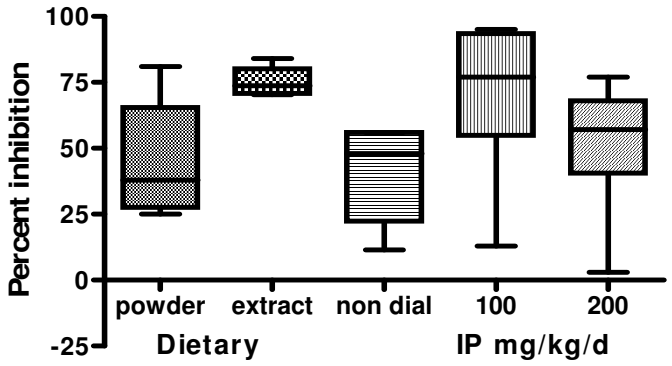
<u>Unusual omega-3 fatty acids</u>
- Stearidonic acid (18:4n3)

Each has been shown to prevent or treat cancer in animals

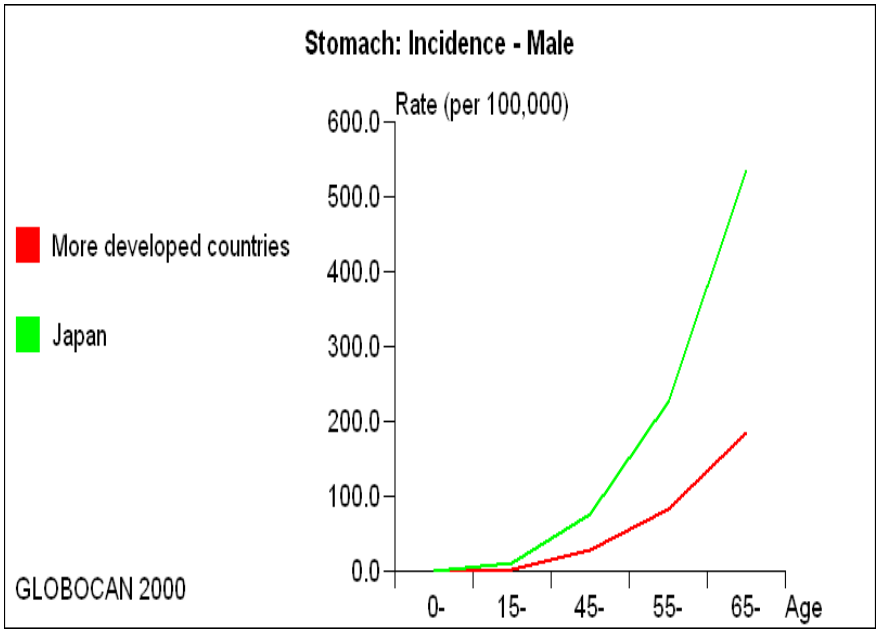
Algal adaptations to desiccation and rehydration

Osmoprotective mechanisms such as **Dimethylsulfoniopropionate (DMSP)**

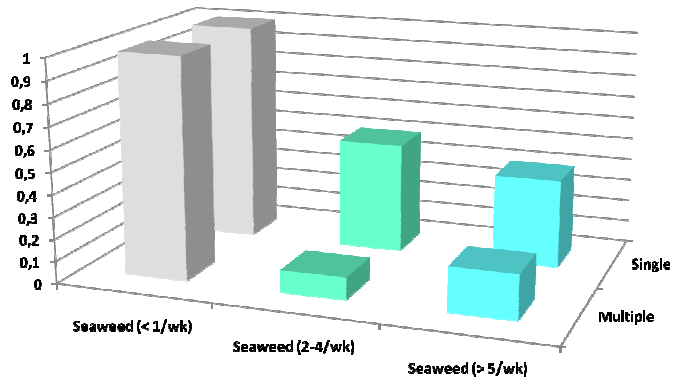
Inhibition of Sarcoma 180 tumors in Mice



Yamamoto, Cancer Letters, 1986

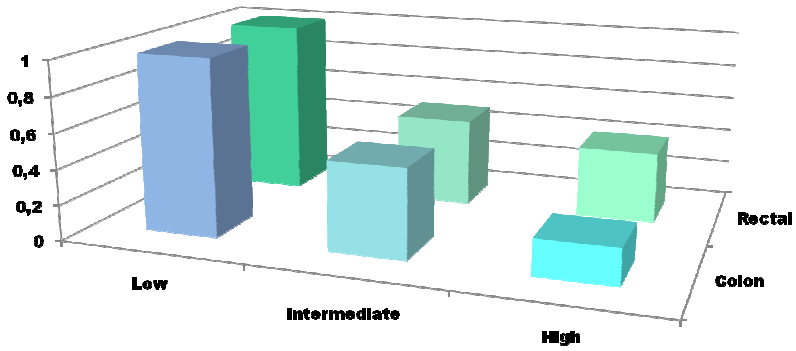


Relative Risks of Single and Multiple Stomach Cancers



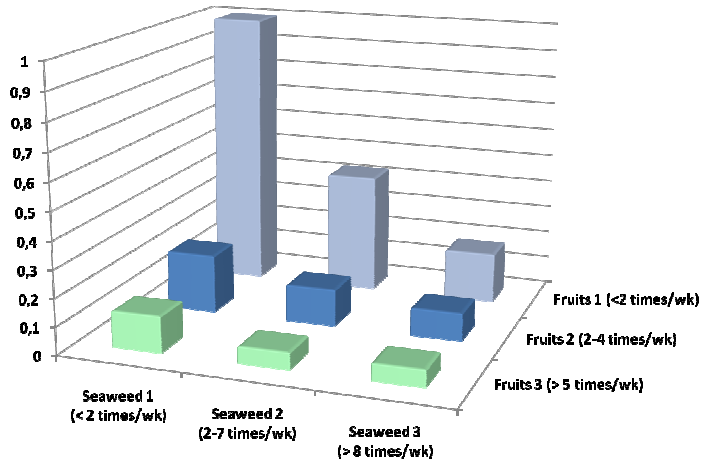
Hoshiyama, 1992

Colon and Rectal Cancers Relative Risk by Frequency of Seaweed Consumption



Hoshiyama, 1993

Joint risk of esophageal cancer: seaweed and fruit intake



Nakachi, 1988

Relative risk of breast cancer in Korean women

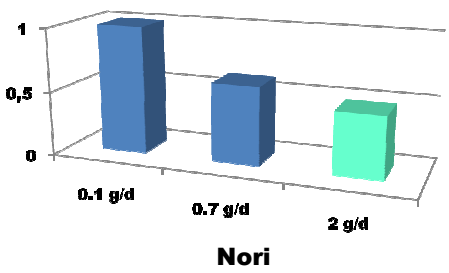
Type of seaweed

Form (dried nori vs fresh/wet wakame)

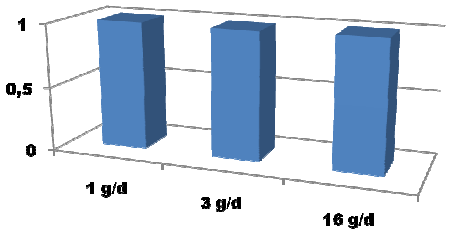
Very low intake compared to Japan (12 g/d wet and dry seaweed combined)

Lowest group < 1/m compared to 2-4/wk high wakame

Lowest nori = 1/wk

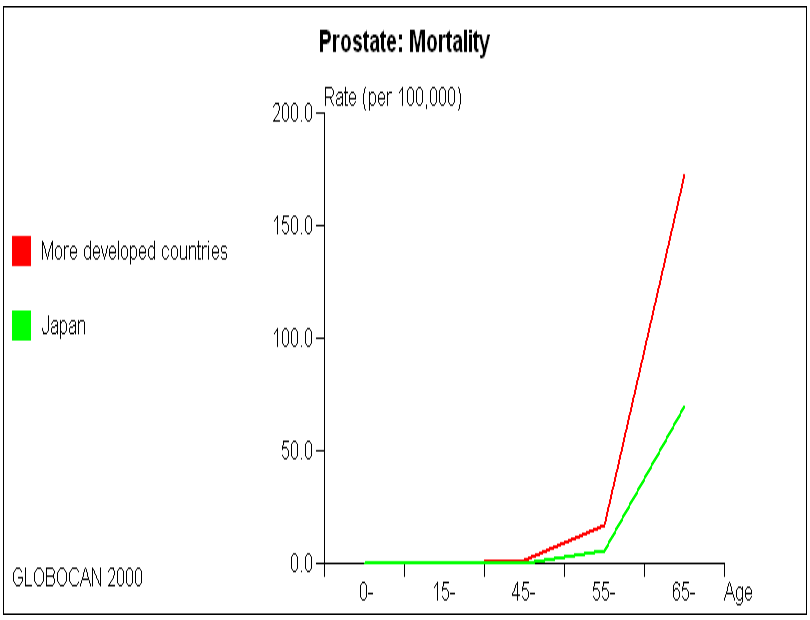


Nori

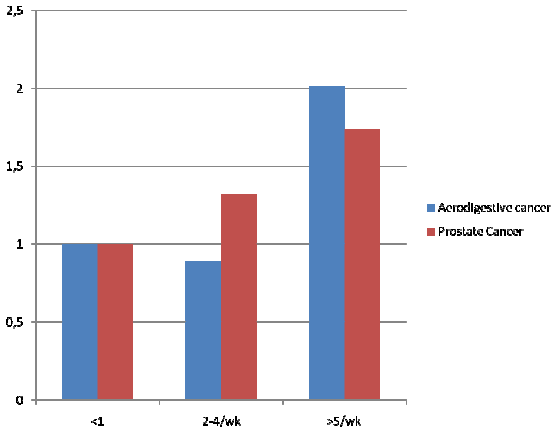


Wakame

Yang, 2009



Aerodigestive tract cancers (buccal cavity, pharynx, esophagus, larynx) and prostate cancers in 7995 men of Japanese ancestry living in Hawaii followed for 20 years



Chyou, 1995; Severson 1989

Informal use of seaweed in the US for prostate cancer

When my PSA goes up, I take the seaweed and it goes right back down.

Some members of the local Man to Man prostate support group have been using seaweed [Sargassum] for 10 years, he said.

But the group hasn't had much luck getting doctors to come to their group to discuss seaweed.

http://www.sunnewspapers.net/articles/tsnews.aspx?ArticleID=435682&pubdate=4/17/2009

Americanization of seaweed

Soak **2-8 hours**,
Throw out the soaking water
Pressure cook with soy sauce and vinegar for 10 minutes

Seaweed becomes **tender**, with
The **texture of spaghetti**, and does
not have the strong fishy smell or taste.

This enables us to enjoy these pearls of the ocean on a regular basis **rather than only as a last resort while you grimace and hold your nose**.

Cooking

Sea Vegetables Extraordinaire

Demi Herbert

Since most people today work, whether they are married or single, I am always looking for ways to enable people to include macrobiotic dietary practices in their lives. So, in my classes, I regularly talk about organization and creativity, giving people options so that there can be adjustments in their cooking and their lifestyles which allow them to eat in a way that sustains good health.

One particular food group that is very helpful in sustaining good health is sea vegetables. I feel that sea vegetables are so important to a macrobiotic way of eating that making them glamorous and exciting should be a priority. My other concerns have been to make sea vegetables more digestible, absorbable, and quick to prepare.

Now, I love sea vegetables, but the first two years I was eating a macrobiotic diet, very few of them entered my mouth because they smelled so bad and tasted worse. I was fortunate about this time to meet Steve Gagné, a macrobiotic teacher, whose ideas about sea vegetables gave me some food for thought. Steve had already explored ideas about soaking, rinsing, and cooking times, and that was only a beginning.

Bear in mind that my intent here is to make sea vegetables attractive and delicious so people will include these nutrient-rich vegetables in their daily diet, not the way they have been traditionally cooked is not necessarily the only way.

So what is it that I do differently than what is traditionally explained by teachers and cookbooks?

Soaking Time

Let's begin with soaking time. Since forever, it seems that the prevailing view was to soak sea vegetables anywhere from three to thirty minutes. Then the soaking water was used for cooking, and the cooking times varied anywhere from 5 to 60 minutes.

I offer a different approach. Hijiki is the strongest tasting of the sea vegetables. I soak it for 6-8 hours; arame, which is more tender can be soaked 4-5 hours; sea palm and fronds – maybe 2-4 hours; kombu can be soaked for 2-4 hours depending on what you are going to do with it.

I gently lift the sea vegetables out of the soaking water and place them in a strainer. I try not to disturb the bottom of the water where the residue always seems to be gritty. I then throw out the soaking water. Believe it or not, I have not been struck dead by a bolt of lightning yet! I realize that I am throwing out a small amount of minerals, but I am also getting rid of some of the heavy metals that are in our oceans. The trade-off, I think, is worth it if it enables us to enjoy these pearls of the ocean on a regular basis rather than only as a last resort while you grimace and hold your nose. I then submerge my strainer into water, swish the vegetables around two or three times until the water runs relatively clear. I now always use the soaking water from kombu (which has been rinsed) for cooking.

Pressure Cooking

Using a pressure cooker (preferably a small one), cook the previously soaked sea vegetable with 1 tablespoon of soy sauce and 1 tablespoon vinegar or water for 10 minutes. What a surprise! Hijiki, for example, becomes tender and takes on the texture of spaghetti. In addition, it does not have a strong fishy smell or taste. It is my favorite sea vegetable and most people find it delicious prepared this way. In my cooking classes, students went from ugh! to hmm! with second and third helpings.

Tastes and Colors

Since sea vegetables generally tend to be black, what can be done to perk them up? I put them together with common everyday ingredients that remind people of the foods they have been accustomed to. I go for strong tastes that intrigue the palate. I use olive oil, a variety of sesame oils, wine vinegars, balsamic and raspberry vinegars, herbs (both fresh and dried), lemon, lime, nut butters, parsley, cilantro, mint, sweeteners, string beans, cabbage, watercress, basil, and on and on.

Very important to this whole process is the inclusion of some kind of oil in the final phase of preparation. Some of the minerals in sea vegetables are oil soluble so this stage is crucial for absorption and, of course, taste.

One last issue that needs to be addressed is quality. The sea vegetables and condiments that you use need to be best quality.

Bon appetit!

Arame and Curried Cabbage

1½ ounces arame
5 cups thinly sliced green cabbage
1 Tbsp. balsamic vinegar
1 Tbsp. soy sauce
1 Tbsp. extra virgin olive oil
1 Tbsp. (or to taste) curry powder
salt and pepper

Soak arame 4-5 hours. Discard soaking water and rinse two more times. Pressure cook arame in 1 tablespoon of soy sauce and 1 tablespoon of balsamic vinegar for 10 minutes. Cook at the

Three Clinical Studies

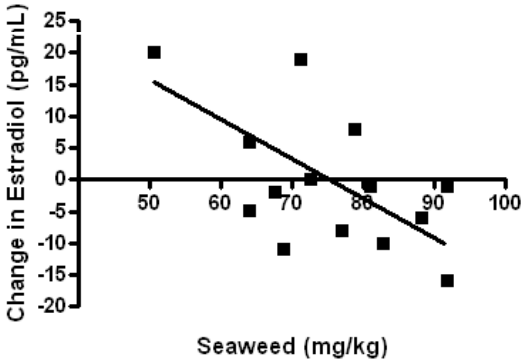
Estrogen metabolism

Metabolic Syndrome

HIV

UNIVERSITY OF SOUTH CAROLINA

Dose response of seaweed on estradiol in 15 healthy postmenopausal women

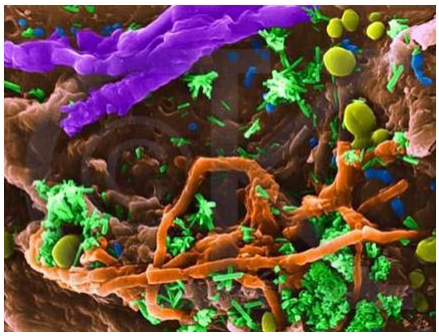


Placebo vs Seaweed
p=0.006
r^2=0.45

Teas, 2009

Postmenopausal women in Japan weigh 54kg (119 lbs)

Postmenopausal women in the US weigh 76 kg (167 lbs)



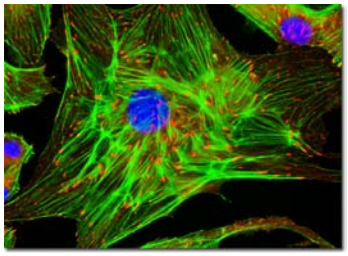
Fiber decreases transit time, increases bulk, so some estrogen trapped within fiber

Women in Japan excrete about 3 times as much estradiol as US women

http://images.google.com/imgres?imgurl=http://www.nutrition.arizona.edu

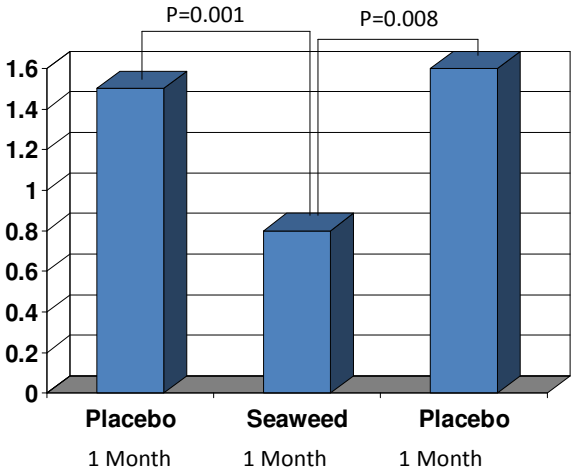
Urokinase plasminogen activator (uPA) and its receptor (uPAR)

uPA is a protease that degrades the extra cellular matrix and promotes invasive migration of breast cancer cells

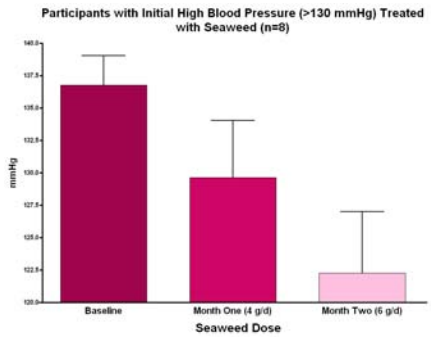


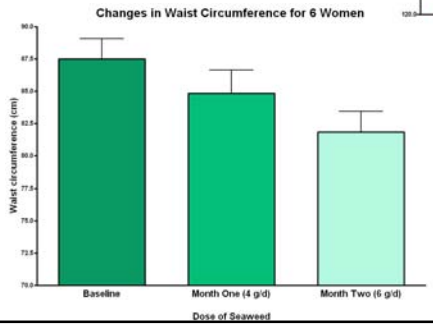
Also important in wound healing, inflammation, cell adhesion

Urinary urokinase receptor levels (N=15)



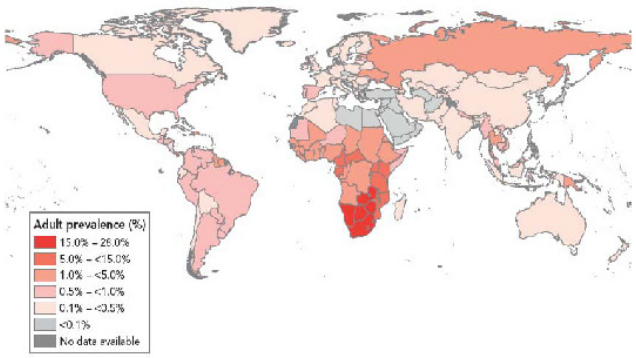
Metabolic Syndrome





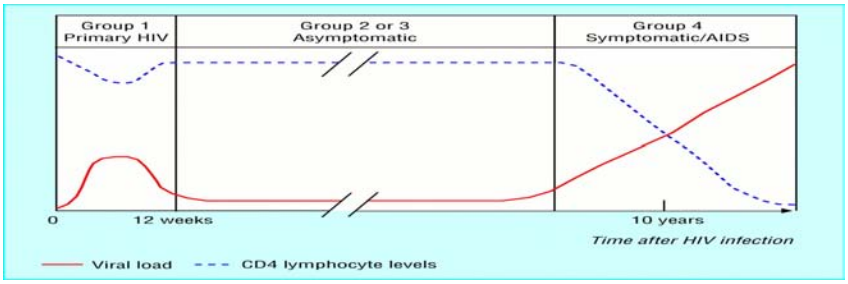
Teas, 2009

A global view of HIV infection
33 million people [30–36 million] living with HIV, 2007



UNAIDS

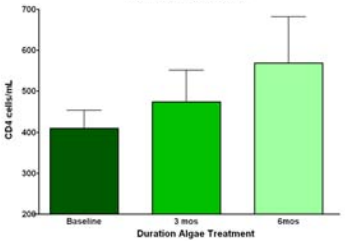
Study 3. Algae and HIV

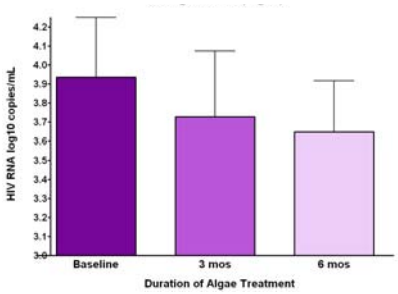


12 subjects with HIV were referred by their physician to our study because of declining CD4 counts and increasing viral load but not yet meeting CDC guidelines for needing antiretroviral therapy

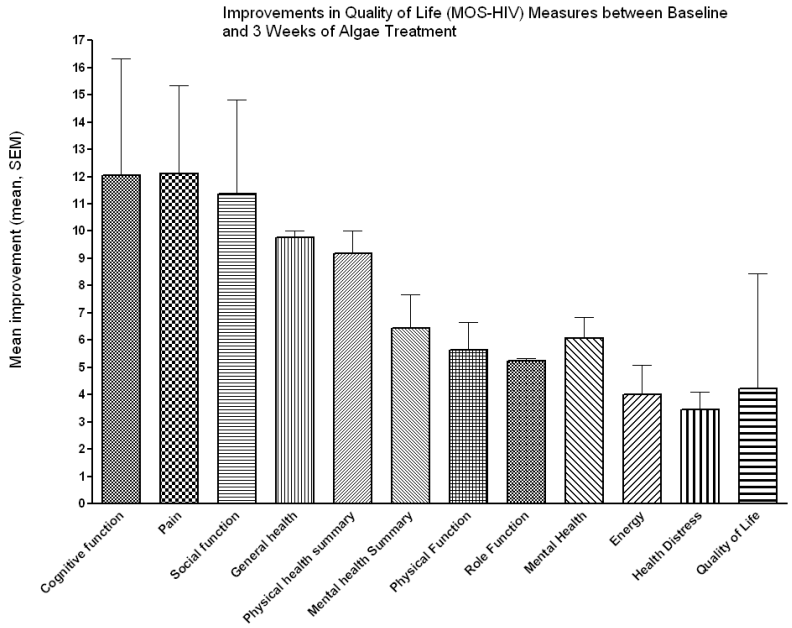
International AIDS Symposium, Bangkok

A pilot study of Undaria and Spirulina in people with HIV



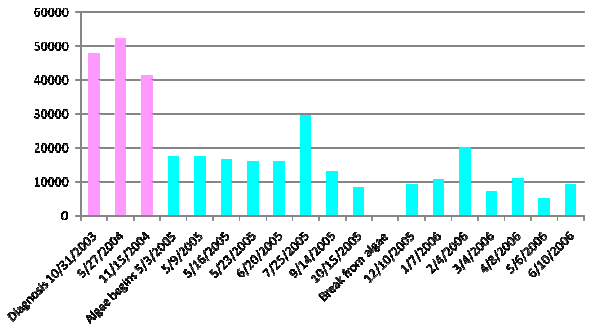


5 g/d for 6 months (n=5)



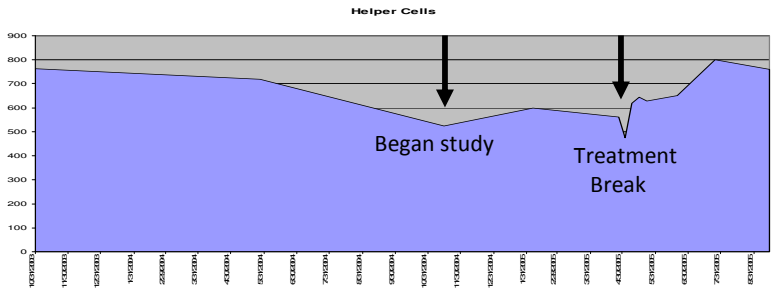
Subject 7
Seaweed and Spirulina

HIV viral load



Example Subject #7 (seaweed plus spirulina)

CD4 Helper Cells



“Let your food be your medicine and your medicine your food”

(Hippocrates, 460-c. 370 BC)

... only a drug can treat, cure or prevent any disease.

Dietary Supplement Health and Education Act of 1994 (DSHEA)

http://www.fda.gov/food/labelingnutrition/labelclaims/ucm111447.htm

Conclusions

In seaweed consuming countries, more seaweed is better

The type of seaweed may be important

In non-seaweed consuming populations, 5-6 g/d of seaweed is safe and associated with

Normalizing blood pressure

Decreasing estrogen and estrogen-related metabolic effects (waist circumference)

May stabilize or diminish HIV viral load and Increase immune response in people with HIV

More Research is Needed

Soriano S.A.

SUSAN G. KOMEN FOUNDATION

MARINOVA

EARTHRISE

UNITED STATES DEPARTMENT OF DEFENSE

UNIVERSITY OF SOUTH CAROLINA