Studies on Papaya Leaf Tea

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Conclusion
Introduction:

In this document I bring together information, research and studies that may show the science of systemic and external effect of papaya leaf tea on cancers. The basic theory is that papaya leaf tea is a better oral enzyme therapy for cancers than the enzyme papain (found in the leaf) taken by itself, or than other substitute proteases (protein digesting enzymes). The document reviews the history of enzyme therapy for cancer, new science, and specifically the science of the papaya leaf.

Currently we are testing the effect of the leaf applied externally on skin cancer with the help of a Clemson University lab scientist and a willing and devoted oncologist from Charleston, SC. So far we have seen positive results.

I’ll research for the rest of my life on something that could have stopped or prevented the cancer that took my mother from me. I am anxious for doctors and their patients to know about this scientific possibility that is a wonder of nature and of God; papaya leaf tea.
A. History of Enzyme Therapy

Dr. John Beard

John Beard proved that cancer was the result of failure of the pancreas to produce the needed amount of enzymes. Enzymes control the growth of undifferentiated, or “trophoblast” cells, which can become cancerous. Back in this time pancreatic enzymes were directly injected into the tumor based on a belief that the enzymes could not live through the digestive system. Now we know that they can, thus the use of oral enzyme therapy.


Dr. William Kelley

William Kelley was a Texas dentist who encouraged the use of proteolytic enzymes for treatment of cancers. Some believed that he was a fraud during the 1960’s.

Kelley, WD: "One Answer To Cancer" latest update - 33,000 cancer cases over three decades. New Century Promotions 3711 Altal Loma Drive Bonita, CA 91902 800-768-8484 or 619-479-3829.

Dr. Nicholas Gonzalez
Proponent of Protease Enzyme Therapy for Cancer, Dr. Gonzales carefully reviewed prior clinical studies performed by Dr. Kelley at Cornell University and the treatments were shown to have effect.

“Historically, large doses of proteolytic enzymes, along with diet, nutritional supplements, and “detoxification” procedures, have been used in alternative therapies to treat all forms of cancer, without formal clinical studies to support their use. A 2-year, unblinded, 1-treatment arm, 10-patient, pilot prospective case study was used to assess survival in patients suffering inoperable stage II-IV pancreatic adenocarcinoma treated with large doses of orally ingested pancreatic enzymes, nutritional supplements, “detoxification” procedures, and an organic diet. From January 1993 to April 1996 in the authors' private practice, 10 patients with inoperable, biopsy-proven pancreatic adenocarcinoma were entered into the trial. After one patient dropped out, an 11th patient was added to the study (however, all 11 are considered in the data tabulation). Patients followed the treatment at home, under the supervision of the authors. As of 12 January 1999, of 11 patients entered into the study, 9 (81%) survived one year, 5 (45%) survived two years, and at this time, 4 have survived three years. Two patients are alive and doing well: one at three years and the other at four years. These results are far above the 25% survival at one year and 10% survival at two years for all stages of pancreatic adenocarcinoma reported in the National Cancer Data Base from 1995. This pilot study suggests that an aggressive nutritional therapy with large doses of pancreatic enzymes led to significantly increased survival over what would normally be expected for patients with inoperable pancreatic
Adenocarcinoma."

-“Evaluation of Pancreatic Proteolytic Enzyme Treatment of Adenocarcinoma of the Pancreas, With Nutrition and Detoxification Support” Nicholas Gonzales and Linda Lee Isaacs


Protease Enzymes for Cancer Doctor/Scientists

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B. Enzymes

“All living things depend on the swift completion of thousands of biochemical reactions every hour. High temperatures generally speed up chemical reactions, but all complex life forms have metabolic temperatures below 40°C. In order to increase the pace of biochemistry, life forms are completely dependent on enzymes for virtually every metabolic function. Enzymes are protein molecules that catalyze chemical reactions. They act as intermediaries or facilitators to accelerate biochemical reactions. Enzyme catalysts are supposed to remain unchanged by the reactions they participate in they are recycled to do their jobs over and over again. (1,2)

No biological system is perfect, least of all complex creatures such as mammals. Organs such as the pancreas secrete enzymes to aid in food digestion, but many of these enzymes are damaged or excreted during the process of digestion, absorption, and elimination, and are not recycled.

In other cases enzyme excretion may be insufficient for the needs of an individual, thereby hindering utilization of nutrients. Dr. Edward Howell hypothesized that a diet composed of cooked and processed foods in which the natural enzymes are denatured leads to enzyme insufficiency and stresses the organs which secrete enzymes (e.g. pancreas, duodenum). A lifetime of eating "dead foods" is a contributing factor for chronic indigestion, diabetes, obesity, pancreatitis, and gastrointestinal cancer. (3) It's well know that animals and humans eating what researchers call a "cafeteria diet" (just what you'd imagine all you can eat buffet of
institutional food favorites) suffer inordinately from obesity, diabetes, pancreatitis, ulcers, and gall bladder disease.”

- “Enzymes: What Can and Cannot Be Supplemented”, C. Leigh Broadhurst, PhD
  www.enzymeuniversity.com/artman/publish/printer_118.shtml

C. Effect of Proteolytic Enzymes

“...Dr. Edward Howell, M.D. notes in his seminal work Enzyme Nutrition, that the pancreas (which was just mentioned) has a limited capability to produce enzymes. Add to that the fact that the pancreas is almost always over-worked trying to produce enough digestive enzymes to digest the cooked food that we eat. Cooked, refined and processed foods have no enzymes. The body is at greatest risk of cancer when the pancreas can no longer produce an adequate supply of protein digesting enzymes.

But there is good news! Through diet, we can do something about a scarcity of protein digesting enzymes. It is possible to make it so the pancreas does not have to work so hard. That can be done by significantly decreasing the consumption of animal protein (because animal protein requires lots of protein digesting enzymes), and by eating more raw fruits, vegetables, and nuts, since they are rich in enzymes. And note this: the tropical fruits papaya (and their seeds) along with pineapple are especially important, because their enzymes closely mimic the protein digesting enzymes produced by the pancreas. (That’s why meat tenderizers contain papaya). Our first line of defense against cancer is therefore protein digesting enzymes (and other food enzymes) all of which can be gotten
from raw whole foods...”

-Mauris Emeka, “Defending Against Cancer”, January 5, 2005
National Health Foundation

“The pancreas creates enzymes that digest proteins. Cancer is a foreign protein that the pancreatic enzymes attempt to digest. But the cancer is creating its own chemicals that destroy pancreatic enzymes. Battling cancer can overwork the pancreas, and if it is too weak to begin with, then, as Dr William Kelly states, “a pancreas that cannot metabolize protein cannot protect the body from cancer.”


You must aid your pancreas in its battle with cancer. You can do this by drinking green juices, cutting back on meat proteins, occasional fasting, and by supplementing your diet with pancreatic enzymes. Take pancreatic enzymes when your system is most alkaline: when you awake, and between 2 and 3 in the afternoon. Also be sure to take them with your meals; they are, according to Dr Kelly, the cheapest insurance against cancer.”

-hhttp://www.mnwelldir.org/docs/detox/detox.htm
Cleaning House; the correct way to detox

Enzymes accelerate reactions within body cells. In the human body, the pancreas usually produces enzymes that break down foods into nutrients that the body can use for energy and other functions. Enzyme deficiencies are rare, but individuals who have cystic fibrosis or diseases of the pancreas may not produce
enough natural enzymes to digest foods properly. Papain, an enzyme produced by the tropical fruit, papaya, is proteolytic, which means that it digests proteins. Frequently, papain is included in prescription combinations of digestive enzymes to replace what individuals with cystic fibrosis or pancreas conditions cannot produce naturally. Because it improves digestion in general, papain has also been used orally to treat less serious digestion disorders such as bloating and chronic indigestion. Since parasitic organisms are largely proteins, papain has sometimes been taken internally to eliminate intestinal worms, but this use is rare today.

In several studies of cancer patients, oral enzyme supplements containing papain helped to relieve treatment side effects such as mouth sores and difficulty swallowing. Chemicals in papain may increase immune system function and they may also promote the release of natural chemicals that attack tumor cells. Papain may lessen inflammation, as well. All of these potential effects may make papain-containing preparations useful as an addition to cancer therapy. An oral prescription product containing papain and other enzymes has orphan drug status in the United States for the treatment of multiple myeloma, a form of bone marrow cancer. An orphan drug has received approval from the U.S. Food and Drug Administration (FDA) because it shows effectiveness for treating severe or rare diseases that usually have few other treatment options.

In other research, papain and related enzymes have been studied for oral use in several conditions. Some evidence shows that they may help to prevent complications of diabetes, possibly by lessening protein deposits in the kidneys.
Proteolytic enzymes such as papain may also decrease pain and inflammation associated with rheumatoid arthritis, improve healing of injuries, and reduce swelling after surgery. In Europe, papain is available as an ingredient in several non-prescription products that are sold for relieving inflamed and swollen respiratory tract tissue. General stimulation of immune response and decreases in inflammation are thought to be responsible for some of these observed effects, but other possible causes are not clear. Results of some studies are inconclusive, and more study is needed before papain can be recommended for these conditions.

Topically, papain has been used for skin conditions such as psoriasis. Its ability to break down proteins is used to remove dead tissue from burns, to help skin injuries heal, to remove warts, and to treat ringworm. Cold sores caused by Herpes zoster virus have been treated successfully with both oral and topical papain-containing products. In one small study of individuals with Herpes zoster, an oral papain product was as effective as a prescription antiviral medication in resolving pain, but not redness. A year-long observational study of more than 400 women found that those who ate papaya at least once a week were less likely to have chronic infections with human papilloma virus (HPV), a common sexually transmitted disease. In laboratory studies, topical application of papain has also shown some antibacterial properties, which may be due to papain’s interference with an enzyme that certain bacteria produce. Further study is needed to prove or disprove its possible antibacterial effects, however.

- [http://www.drugdigest.org/DD/PrintablePages/herbMonograph/0,11475,552451,00.html](http://www.drugdigest.org/DD/PrintablePages/herbMonograph/0,11475,552451,00.html)
For about 30 years, a number of work groups have concerned themselves with the influence of proteolytic enzymes on metastasis. In the 1960s, scientists were of the opinion that cancer cell stickiness resulting from a deficiency in enzymes was responsible for the frequent development of secondary tumors. This stickiness of the cancer cells was generally recognized to result from the excessive formation of fibrin.

The close relationship between fibrin (protein) deposits and other types of invasive tissue growth and metastasis is adequately described in international literature and is generally accepted. The discovery of substances, known as adhesion molecules, provided important new impulses for current scientific discussions.

Inflammation also plays a role in cancer spread. Since the endothelium of tissue with inflammatory alterations has a thicker layer of specific adhesion molecules, these are sites where metastasis are more likely to occur. The importance of chronic progress of inflammation in tumor growth and metastasis has been demonstrated in studies which verify the influence of anti-inflammatory therapy on inhibiting metastasis.

Formation of fibrin (protein) on the tumor cell membrane supports this adhesive process and serves as a protective barrier against tumor cell recognition by the immunological system. Proteolytic enzymes (like papain) inhibit both excess fibrin deposition and inflammation, thus helping to prevent the spread of tumor cells.
Indeed, one of the most impressive features of clinical trials for patients with multiple myeloma, breast, stomach, colon and pancreatic cancers, is prolongation of survival time. This may reflect reduced tendency toward cancer spread.

“Systemic Oral enzymes in Cancer Therapeutics” from the Doctor’s Prescription for Healthy Living, Vol4 No6

Proteases (proteolytic enzymes), one of the three main categories of digestive enzymes, are found in the stomach juices, pancreatic juices, and intestinal juices. Proteolytic enzymes help to digest proteins. Plant extracts with a high content of proteolytic enzymes have been used for years in traditional medicine. Besides proteolytic enzymes from plants, such as papain and bromelain obtained from papayas and pineapples respectively, “modern” enzyme therapy additionally includes proteolytic pancreatic enzymes, such as chymotrypsin, trypsin, pepsin and pancreatin. Proteolytic enzymes are used primarily to aid digestion and absorption of proteins contained in food. In addition to aiding digestion, proteolytic enzymes have analgesic, anti-inflammatory, antithrombotic, fibrinolytic, immune modulating, and edema-reducing properties. Results from recent research studies showed that proteolytic enzymes can produce great benefits in cancer therapy by improving the quality of life, reducing both the signs and symptoms of the disease and the adverse effects caused by radiotherapy and chemotherapy, and prolonging the survival time. “Proteolytic enzymes act as immuno-modulators by raising the impaired immuno-cytotoxicity of leukocytes against tumor cells from patients and by inducing the production of distinct
cytokines such as tumor necrosis factor, interleukin (IL)-1, IL-6 and IL-8. There are reports on animal experiments claiming an anti-metastatic efficacy of proteolytic enzymes associated with inhibition of growth and invasiveness of tumor cells. All these antitumoral activities do not depend on the proteolytic activity of enzymes, but of their effects on the modulation of immune functions, including the anti-inflammatory activities and their potential to accelerate wound healing. Proteolytic enzymes are also used in the treatment of pancreatic insufficiency, cystic fibrosis, digestive problems, viral infections, surgical traumas, auto-immune disorders and sports injuries. Enzyme therapy can significantly clear “immune complexes” (combinations of antibodies and antigens) from the body. When the body is incapable of releasing these immune complexes, an inflammatory process begins that can lead to serious disease, often of the autoimmune type. Dramatic results have been reported with the use of enzyme therapy in such diseases as rheumatoid arthritis, multiple-sclerosis, and systemic lupus erythematosus.”

-“Dismantling Cancer” by Francisco Contreras, MD, Jorge Barroso-Aranda, M.D., Ph.D., and Daniel E. Kennedy, Published by Interpacific Press

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Andrographolide Bacillary dysentery Andrographis paniculata Nees
Anisodamine Anticholinergic Anisodus tanguticus (Maxim.) Pascher
Anisodine Anticholinergic Anisodus tanguticus (Maxim.) Pascher
Arecoline Anthelmintic Areca catechu L.
Asiaticoside Vulnerary Centella asiatica (L.) Urban
Atropine Anticholinergic Atropa belladonna L.
Berberine Bacillary dysentery Berberis vulgaris L.
Bergenin Antitussive Ardisia japonica Bl.
Bromelain Anti-inflammatory; proteolytic agent Ananas comosus (L.) Merrill
Caffeine CNS stimulant Camellia sinensis (L.) Kuntze
(+)-Catechin Haemostatic Potentilla fragaroides L.

**Chymopapain Proteolytic; mucolytic Carica papaya L.**
Cocaine Local anaesthetic Erythroxylum coca Lamk.
Codeine Analgesic; antitussive Papaver somniferum L.
Colchicine Antitumor agent; antigout Colchicum autumnale L.
Convallotoxin Cardiotonic Convallaria majalis L.
Curcumin Choleretic Curcuma longa L.
Cynarin Choleretic Cynara scolymus L. (more….)

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**The Value of Plants Used in Traditional Medicine for Drug Discovery**

Daniel S. Fabricant and Norman R. Farnsworth
Program for Collaborative Research in the Pharmaceutical Sciences, College of Pharmacy, University of Illinois-Chicago, Chicago, Illinois, USA

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From the article “Nutrition and Cancer: A review of the evidence for an anti-cancer diet”, Michael S. Donaldson:

Enzymes, especially proteases, if they reach systemic circulation, can have direct anti-tumor activity. Wald et al reported on the anti-metastatic effect of enzyme supplements. Mice inoculated with the Lewis lung carcinoma were treated with a proteolytic enzyme supplement, given rectally (to avoid digestion). The primary tumor was cut out, so that the metastatic spread of the cancer could be measured. After surgical removal of the primary tumor (day 0), 90% of the control mice died by day 18 due to metastasized tumors. In the first group, which received the rectal enzyme supplement from the time of the tumor-removal surgery, 30% of the mice had died from metastasized cancer by day 25. In the second group, which
received the enzymes from 6 days prior to removal of the primary tumor, only 10% of the animals showed the metastatic process by day 15. In the third group, which received the enzyme treatment since the initial inoculation of the Lewis lung carcinoma, no metastatic spread of the tumor was discernible. One hundred day-survival rates for the control, first, second, and third groups were 0%, 60%, 90%, and 100%.


In a similar experiment, an enzyme mixture of papain, trypsin, and chymotrypsin, as used in the preparation Wobe-Mugos E, was rectally given to mice that were inoculated with melanoma cells. Survival time was prolonged in the test group (38 days in the enzyme group compared to 24 days in the control mice) and 3 of the 10 enzyme-supplemented mice were cured. Again, a strong anti-metastatic effect of the proteolytic enzymes was seen.

Science of Proteases (Such as papain in papaya leaves)

"Proteolytic enzymes, also referred to as "proteases," are enzymes that break down proteins into their smallest elements. If this breakdown of proteins happens in your gut, we call the enzymes "digestive," because they help us digest our food. Systemic proteolytic enzymes, however, have a completely different purpose, so please don't confuse the two.

When taken on an empty stomach, proteolytic enzymes will pass through the stomach or intestine lining and enter the circulatory system. This is why they are called "systemic"—once they enter the circulatory system, they circulate throughout the body.

**Why are systemic proteolytic enzymes important?**

The most important thing that systemic proteolytic enzymes do is to break down excess fibrin in your circulatory system and in other connective tissue, such as your muscles. These enzymes bring nutrients and oxygen-rich blood that remove the metabolic waste produced by inflammation and excess fibrin.

For example, If you have an injury or are recovering from a painful condition of any kind and your blood flow is restricted, you will have a longer recovery process. In addition, the exchange of nutrients and oxygen in your body will be limited, and there will be an increase in pain and inflammation.
I searched long and hard to find this incredible image (left) of red blood cells caught in a web of excess fibrin. The fibrin is causing a physical restriction of blood flow. If you look closely, you can see that the cells are actually stuck. Ultimately, those red blood cells cannot get into the capillaries to oxygenate and nourish your muscles and remove the metabolic waste that is causing your pain.

One more important thing to understand: Whenever you’re recovering from a muscle irritation, injury, or surgery, the body uses fibrin to help heal itself. This is normal and healthy. The only problem is that with poor blood flow and a lack of enzyme activity, that fibrin will start to accumulate. If the area in question is slow to heal, an excess of fibrin will appear as clumps of scar tissue in the muscle or at the surgical site. Once this happens, your acute condition becomes chronic.

Now that you know that excess fibrin throughout your circulatory system will severely limit the amount of blood flow to areas that need it the most, you may be wondering how the body tries to compensate for this restriction. The answer is simple: by forcing the heart to work harder and increasing your blood pressure.

**How do you know if you have too much fibrin?**

As I have noted, the body will do what it needs to do to keep us alive—sometimes at great cost to your overall health. Some possible indicators of excess fibrin in your system include: chronic fatigue, slow healing, inflammation and pain, and elevated blood pressure. There is also a medical test to measure something called
"blood monomers."

**The dangers of too much fibrin...**

The medical community has long known that excess fibrin presents a cardiac and stroke risk. Finally, they have acknowledged a link between excess fibrin and chronic systemic inflammation, the true root cause of virtually every disease and painful condition known to man.

*Which conditions do proteolytic enzymes help and how?*

The list below is only a sample of the types of conditions that can be addressed with systemic proteolytic enzymes. If you are still wondering how one little substance can support all of these conditions, remember that they all have one thing in common—excess fibrin, which causes a reduction in blood flow:

*Arthritis, Herniated Disc, Atherosclerosis, Hyper-coagulation, Back Pain, Sciatica, Chronic Fatigue, Spinal Stenosis, Chronic Pain, Strains and Sprains, Fibrocystic Breast, Post-operative Scar Tissue, Fibromyalgia, Traumatic Inflammation, High Blood Pressure, and Uterine Fibroids*

*Which would you rather take—a pain killer or a healing enzyme?*

*Truth is, very few pain killers help heal the body, and in most cases the side effects are rather unpleasant. On the other hand, systemic proteolytic enzymes support the body's ability to heal itself, and they reduce the signs and symptoms of a chronic condition.*

*Can proteolytic enzymes be used with other pain meds?*
I knew you were going to ask. Yes, enzymes can be used if you are taking low-dose non-steroidal anti-inflammatory drugs (NSAIDs), as long as they are taken 60 minutes apart.

How about clinical research?

Where is the proof? There have been untold numbers of clinical studies that have been done on proteolytic enzymes, and we have 76 of the most relevant studies listed on our site. Let’s not forget that these enzymes have been in use in Europe for more than 50 years. And in Japan, some proteolytic enzymes are classified as prescription drugs.

Where do proteolytic enzymes come from?

Some are animal-based, some are plant-based—such as Bromelain and Papain—and some are fungus-based, such as Serrazimes®.

Which types are best and why?

I recommend plant- and fungus-based enzymes because they tolerate the gastric environment better, so more of the enzymes make their way into the circulatory system.

How long does it take to start to work?

Enzymes go to work immediately. The big difference between enzymes and vitamins is the way they are measured. Enzymes are not measured by weight; they
are measured in Units of Fibrolytic Activity, which means how much fibrin they break down in a set amount of time.

The questions you really want answered are: "How long will it take to get pain relief and reduce my inflammation?" and "How fast will my healing happen?"

Truth is, there is no simple answer because the healing process and outcome will be different for everyone.

There are a number of factors that bear on how fast the enzymes will work for you, including dosage, quality of sleep, diet, and physical activity. Even the very treatments you are undergoing to try to get better could be holding you back.

Are proteolytic enzymes safe for continued use?

Yes, proteolytic enzymes should be considered safe for continued use. There are three suggested usage protocols: one is a rotation of 12 weeks on and 4 weeks off; two is to take them continuously; and three is to take them on as-needed basis.

Who should not take proteolytic enzymes?

- Individuals taking prescription blood thinners (Coumadin, Heparin, Plavix)
- Anyone who will be having surgery in less than two weeks
- Individuals with known ulcers of the stomach
- Individuals with Gastroesophageal Reflux Disease. (GERD)
- Pregnant or lactating women
- Individuals currently taking antibiotics
- Individuals with an allergic reaction to pineapples or papayas

Are there any side effects?

Proteolytic enzymes have an excellent safety record, with no significant side
effects reported. With any supplement, however, there is always the risk of
developing an allergy to one or more ingredients. If this happens, you should
discontinue use.

Choosing to try systemic proteolytic enzymes.

Remember, the enzymes are supporting the healing process, so recovery from any
condition is going to take time. You don't just take the enzymes and expect to get
better immediately. By using these enzymes as part of a well-planned recovery
process, you're making a commitment to doing what it takes to make
improvements in your life.”

- “What are Systemic Proteolytic Enzymes and How Can You Benefit From
Them?”,
  by Steve Hefferon healthguidance.org/entry/72261/What-Are-
  Systemic-Proteolytic-Enzymes-And-How-Can-You-Benefit-From-
  Them.html

D. Chemical Properties of Papain
Proteolytic Enzymes: (B=Bromelain, P=Papain, T/C=Trypsin & Chymotrypsin,
SP=Serratia Peptidase)

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Modulation of prostaglandins + - - -
Blocking of adhesion molecules + + + + +

-This Chart taken from Dr.Murray.com 2005 lectures on Inflammation

Papain exhibits characteristics at one end of a spectrum of chemical behaviour with actinidin (EC 3.4.22.14) at the other. Caricain [papaya (Carica papaya) proteinase Ω, EC 3.4.22.30] and ficin (EC 3.4.22.3) each exhibit behaviour intermediate between these extremes.


“To trigger proteolytic action, the...enzymes should be preheated to a temperature conducive for hydrolytic activity of the enzymes, generally within a range of about 140.degree. to about 150.degree. F. A temperature of about 140.degree. F. is optimal for endogenous proteolytic enzymes whereas a temperature of about 150.degree. F. is optimal for extraneous enzymes such as papain.”

-Particulate proteinaceous product containing non-heat-denatured animal protein

Document Type and Number: United States Patent 5162129

Papain breaks down meat and is best known as a commercially-prepared tenderising cooking ingredient. It is important to thoroughly cook treated meat to inactivate the enzyme, which is heat resistant. If treated meat is stored after cooking (say, as a leftover or because it was cooked a long time before serving)
the tenderising action may continue and the meat will digest to an unpleasant texture.

-http://www.bbc.co.uk/dna/h2g2/A9913809

**Physical Properties and Kinetics**

Papain is a cysteine protease of the peptidase C1 family. Papain consists of a single polypeptide chain with three disulfide bridges and a sulfhydryl group necessary for activity of the enzyme.

Molecular weight: 23,406 Da (amino acid sequence)\(^6\)
Optimal pH for activity: 6.0-7.0
Temperature Optimum for Activity: 65 °C\(^2\)
pl: 8.75 \(^1^7\); 9.55 \(^1^8\) Spectral properties:
\(\lambda_{max}: 278 \text{ nm} \(^1^9\)
Extinction coefficient, \(E^1% = 25 \(^1^9\)
Extinction coefficient, \(E_{mM} = 57.6 \) (at 280 nm) \(^2^0\)
Unit Definition: One unit will hydrolyze 1.0 \(\mu\)mole of N-\(\alpha\)-benzoyl-L-arginine ethyl ester (BAEE) per minute at pH 6.2 at 25 °C.

**Specificity**

Papain will digest most protein substrates more extensively than the pancreatic proteases. Papain exhibits broad specificity, cleaving peptide bonds of basic amino acids, leucine, or glycine. It also hydrolyzes esters and amides. Papain exhibits a preference for an amino acid bearing a large hydrophobic side chain at the P2 position. It does not accept Val at the P1' position. \(^1\)

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www.sigmaaldrich.com/Area_of_Interest/Biochemicals/Enzyme_Explorer/Analytical_Enzymes/Papain.html
E. Clinical Studies showing effect of Proteolytic Enzymes

Reference International Patent-Pending December, 2006

The following is the property of the World Intellectual Property Association:

(WO/2006/004226) COMPOSITIONS FOR CANCER PREVENTION, TREATMENT, OR AMELIORATION COMPRISING PAPAYA EXTRACT

DESCRIPTION
COMPOSITIONS FOR CANCER PREVENTION, TREATMENT, OR AMELIORATION COMPRISING PAPAYA EXTRACT

Technical Field The present invention relates to compositions or food compositions for cancer prevention, treatment, or improvement. More specifically, it relates to compositions or food compositions that comprise, as an active ingredient, components extracted by brewing leaves or other parts of the papaya plant (Carica papaya), and that are effective in the prevention, treatment, or improvement of stomach cancer, lung cancer, pancreatic cancer, colon cancer, uterine cancer, ovarian cancer or other solid cancers, or lymphoma, leukemia or other blood cancers.

Disclosure of the Invention Accordingly, the objective of the present invention is to provide compositions or food compositions for cancer prevention, treatment, or improvement that are highly effective in the treatment and prevention of cancer, and yet have few side effects and a high level of safety. As a result of exhaustive research regarding the aforementioned objective, the present inventors
discovered that components of papaya, preferably one or more extracted papaya components obtained by brewing papaya, have superior effects in the treatment of cancer, and that accordingly, they can become compositions or food compositions for cancer prevention, treatment, or improvement with few side effects and a high level of safety, thus completing the present invention. Accordingly, the present invention relates to compositions or food compositions for cancer prevention, treatment, or improvement that comprise as active ingredients one or more components of the papaya plant (Carica papaya), and preferably one or more components extracted by brewing a part of a papaya plant. A more detailed explanation of the present invention is provided below. The present invention uses components of the papaya plant (Carica papaya), preferably components extracted by brewing a part of a papaya plant tissue, as active ingredients. The tissue of the papaya plant may be any of its leaves, roots, stems or fruit, but the leaves are particularly preferable. Preferably, this papaya tissue is dried, and the dried material thus obtained is added to cold water or boiling water, brewed for a long time, and the brew thus obtained is used as an active ingredient.

Alternatively, without drying the papaya leaves (or some other tissue), the leaves may be added to cold water or boiling water and brewed. More specifically, papaya leaves, for example, may be left in the sun, normally for one or two days, and dried to obtain the dried material. One to several of these dried leaves are added to cold water or boiling water (normally 400 ml to 3000 ml), and preferably 500 ml to 1000 ml, and brewed for normally two hours to 15 hours, and preferably three hours to 12 hours. The vessel used for brewing is preferably
not a metal vessel, but rather a glass, wooden, plastic or other vessel. A

component thus obtained, particularly a component extracted by brewing papaya,

comprises the effect of suppressing the proliferation of cancer cells, and can be

used as it is as an active ingredient of the composition or food composition

according to the present invention.

The dose of the brew/extract components or fractionated components thereof to

be administered will depend on the dosage form, symptoms of the subject, type of
cancer or the like. However, for example, when the brew/extract is taken, it is

normally preferable to take an amount of 100 ml to 750 ml per day, every day for

between one month and three months. When the fractionated components are
taken, it is preferable to take an amount of 10 ml to 200 ml per day, every day for

between one month and three months. Also, the present invention provides food
compositions that comprise a papaya (Carica papaya) brew/extract as an
effective ingredient for preventing or treating cancer. In addition to general
foods, a food composition of the present invention may include, for example, a
health food, a functional food, a specified health food, a nutrient supplement, an
enteral nutrient, and the like, but is not limited to these foods so long as it is
effective in preventing or ameliorating cancer. Methods for manufacturing the
food compositions are usual techniques known to those skilled in the art. That is,
a papaya (Carica papaya) brew/extract component according to the present
invention can be combined with an additive acceptable in view of food sanitation, and processed to make a general food, a health food, a functional food, a specified health food, a nutrient supplement, an enteral nutrient, etc. For example, an additive such as a stabilizer, preservative, colorant, perfume, vitamin can be appropriately added to a papaya (Carica papaya) brew/extract component, mixed, and processed by standard methods into a form suitable for a food composition, such as a tablet, pill, granule, powder, capsule, liquid, cream, drink, etc. Furthermore, the food compositions of the present invention include those sold with a description or indication written on the food composition's packaging container and/or in a promotional pamphlet, to the effect that the food composition, and/or an ingredient in the food composition, comprises the effect of preventing, or ameliorating cancer.

Brief Description of the Drawings FIG. 1 depicts graphs showing the anti-tumor effect of a papaya leaf extract according to the present invention on AGS (a stomach cancer cell line: 1000 cells/well and 2000 cells/well, cultured for three days) . FIG. 2 depicts graphs showing the anti-tumor effect of the papaya leaf extract according to the present invention on Capan-1 (a pancreatic cancer cell line: 1000 cells/well and 2000 cells/well, cultured for five days; 40000 cells/well, cultured for four days) . FIG. 3 is a graph showing the anti-tumor effect of the papaya leaf extract according to the present invention on DLD-1 (a colon cancer
cell line: 20000 cells/well, cultured for four days). FIG. 4 is a graph showing the anti-tumor effect of the papaya leaf extract according to the present invention on DOV-13 (ovarian cancer cell line: 3000 cells/well, cultured for two days). FIG. 5 is a graph showing the anti-tumor effect of a 50-fold-diluted papaya leaf extract according to the present invention on Karpas (a lymphoma cell line). FIG. 6 depicts graphs showing the anti-tumor effect of the papaya leaf extract according to the present invention on MCF-7 (breast cancer cell line: 2500 cells/well and 7500 cells/well, cultured for six days). FIG. 7 depicts graphs showing the anti-tumor effect of the papaya leaf extract according to the present invention on T98G (a neuroblastoma cell line: 2000 cells/well and 4000 cells/well, cultured for three days). FIG. 8 is a graph showing the proliferation suppression effect of the papaya leaf extract according to the present invention on HeLa (a uterine cancer cell line). FIG. 9 depicts graphs showing the proliferation suppression effect of the papaya leaf extract according to the present invention on Karpas (a lymphoma cell line). FIG. 10 depicts graphs showing the proliferation suppression effect of the papaya leaf extract according to the present invention on CD26 negative Jurkat (T cell leukemia cell line). FIG. 11 depicts graphs showing the proliferation suppression effect of the papaya leaf extract according to the present invention on CD26 positive Jurkat (T cell leukemia cell line). FIG. 12 shows the results of measurement of the suppression effect of Jurkat T cell proliferation by components of papaya leaf extract fractionated by gel filtration chromatography.
CLAIMS

1. A composition for the prevention, treatment, or amelioration of cancer, comprising as an active ingredient, components extracted by brewing papaya (Carica papaya). 2. The composition according to Claim 1, wherein the active ingredient is an extract of papaya leaves. 3. The composition according to Claim 1 or 2, wherein the active ingredient is a component derived from an extract of papaya leaves that, when subjected to gel filtration chromatography using a gel filtration column filled with cross-linked polyvinyl alcohol gel, said gel filtration column having an exclusion limit molecular weight of 40,000 when pullulan is used as a sample, is eluted in a portion of the eluate equivalent to 50-70 vol.% of the volume of the column.

4. The composition according to any one of Claims 1 to 3 used for the prevention or treatment of solid cancers or blood cancers. 5. The composition according to any one of Claims 1 to 4, wherein the composition is in the form of a drink, powder or tablet. 6. A food composition for preventing or ameliorating cancer, comprising as an active ingredient components of papaya (Carica papaya) extract. 7. The food composition according to Claim 6, wherein the active ingredient is an extract of papaya leaves. 8. The food composition according to Claim 6 or 7, wherein the active ingredient is a component derived from an extract of papaya leaves that, when subjected to gel filtration chromatography using a gel filtration column filled with cross-linked polyvinyl alcohol gel, the
component is eluted in a portion of the eluate equivalent to 50 to 70 vol.% of the volume of the column, wherein the gel filtration column has an exclusion limit molecular weight of 40,000 when pullulan is used as a sample. 9. The food composition according to any one of Claims 6 to 8 used for the prevention or amelioration of solid cancers or blood cancers. 10. The food composition according to any one of Claims 6 to 9, wherein the food composition is in the form of a drink, powder or tablet. 11. The food composition according to any one of Claims 6 to 10, wherein the food composition is a health food, a functional food, a specified health food, a nutrient supplement, or an enteral nutrient. 12. A method for preparing a composition that suppresses the proliferation of cancer cells, the method comprising preparing an extract from leaves or other tissues from a papaya plant, wherein the extract so prepared is a composition that suppresses the proliferation of cancer cells. 13. The method of claim 12, further comprising concentrating the extract. 14. The method of claim 12, further comprising concentrating the extract by at least about two-fold, at least about four-fold or at least about eight-fold. 15. The method of claim 12, wherein preparing the extract comprises brewing the leaves or other tissues from a papaya plant in an aqueous solution. 16. The method of claim 13, wherein the leaves or other tissues from papaya plant are heated in an aqueous solution for about two to about 15 hours. 17. The method of claim 12 further comprising subjecting the extract to column chromatography and collecting an eluted fraction or fractions, wherein at least one eluted fraction so collected is a composition that suppresses the proliferation of cancer cells. 18. A method for preparing a composition that suppresses the
proliferation of cancer cells, the method comprising: (i) preparing an extract from leaves or other tissues from a papaya plant, (ii) subjecting the extract to column chromatography, and (iii) collecting an eluted fraction or fractions, wherein at least one eluted fraction so collected is a composition that suppresses the proliferation of cancer cells. 19. The method of claim 17 or 18, wherein the at least one fraction so collected comprises a component detectable by an RI detector and having a molecular weight selected from about 1700, about 1000, about 700, about 600, about 400 and about 300. 20. The method of claim 17 or 18, wherein the at least one fraction so collected comprises a component detectable by a UV detector at 260 nm and having a molecular weight selected from about 1700 and about 1000. 21. The method of claim 17 or 18, wherein the at least one fraction so collected comprises a component detectable by a UV detector at 260 nm and having a molecular weight from about 300 to about 700. 22. The method of claim 17 or 18, wherein subjecting the extract to column chromatography comprises employing a gel filtration column filled with cross-linked polyvinyl alcohol gel. 23. The method of claim 17 or 18, wherein subjecting the extract to column chromatography comprises employing column having an exclusion limit molecular weight of about 2,000 or higher. 24. The method of claim 23, wherein the exclusion limit molecular weight is selected from about 2,000 or higher, about 4,000 or higher, about 10,000 or higher, about 20,000 or higher, and about 40,000 or higher. 25. The method of claim 23, wherein the exclusion limit molecular weight is about 40,000. 26. A composition obtainable by the method of any one of claims 12 to 25. 27. A composition obtained by the
method of any one of claims 12 to 25. 28. A method for preventing or treating cancer, the method comprising administering to a subject in need thereof an effective dose of the composition of claim 26 or 27. 29. The method of claim 28, wherein the cancer is selected from the group consisting of stomach cancer, lung cancer, pancreatic cancer, liver cancer, colon cancer, uterine cancer, ovarian cancer, breast cancer, neuroblastoma, lymphoma, and leukemia. 30. A method for preventing or treating cancer, the method comprising administering to a subject in need thereof an effective dose of a composition comprising an extract from leaves or other tissues from a papaya plant, wherein the extract is a composition that suppresses the proliferation of cancer cells. 31. A method for preventing or treating cancer, the method comprising administering to a subject in need thereof an effective dose of a composition comprising a fraction or fractions collected by subjecting an extract from leaves or other tissues from a papaya plant to column chromatography, wherein at least one fraction so collected is a composition that suppresses the proliferation of cancer cells. 32. Use of a component of a papaya extract in the preparation of a medicament for the prevention, treatment, or amelioration of cancer. 33. The use of claim 32, wherein the extract is prepared by brewing papaya. 34. The use of claim 33, wherein the extract is prepared by brewing papaya and then filter-sterilizing it. 35. The use according to Claim 32, wherein the extract is an extract of leaves or other tissue of a papaya plant. 36. The use of claim 32, wherein the medicament is used for the prevention, treatment, or amelioration of solid cancers or blood cancers. 37. The use of claim
32, wherein the medicament is in the form of a drink, powder or tablet. 38. The use of claim 32, wherein the medicament further comprises a pharmaceutically acceptable excipient or additive. 39. Use of a component of a papaya extract in the preparation of a food composition for the prevention, treatment, or amelioration of cancer. 40. The use of claim 39, wherein the extract is prepared by brewing papaya. 41. The use of claim 39, wherein the extract is prepared by brewing papaya and then filter-sterilizing it. 42. The use according to Claim 39, wherein the extract is an extract of leaves or other tissue of a papaya plant. 43. The use of claim 39, wherein the food composition is used for the prevention, treatment, or amelioration of solid cancers or blood cancers. 44. The use of claim 39, wherein the food composition is in the form of a drink, powder or tablet. 45. The use of claim 39, wherein the food composition further comprises an additive.

A clinical study in 2001 was performed on 2,339 breast cancer patients. The study was meant to determine the effect of oral enzymes (OE).

A clear reduction in the side effects of radiotherapy and chemotherapy was documented in 74% of the test group and 55% of the control group. Analysis of survival, recurrence, and metastasis demonstrated a reduced number of events in the test group. There was evidence of a beneficial influence of OE on time to event, although the median observation time was too short in these breast cancer
patients to draw definite conclusions. The safety component was judged in 98% of the test group and 76% of the control group as "very good" or "good". In the total sample of 2,339 patients, the rate of OE-associated adverse reactions was 3.2%. All side effects were mild to moderate gastrointestinal symptoms. Conclusion: Complementary treatment of breast cancer patients with OE improves the quality of life by reducing signs and symptoms of the disease and the side effects of adjuvant antineoplastic therapies. This epidemiological retrolective cohort analysis provides evidence that the patients may also gain benefit by a prolongation of the time to event for cancer recurrence, metastasis and survival. OE was generally well tolerated.

PMID: 11561873 [PubMed - indexed for MEDLINE]

-Beuth J, Ost B, Pakdaman A, Rethfeldt E, Bock PR, Hanisch J, Schneider B,

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A clinical study in Slovak Republic with welcomed results:
PURPOSE: To evaluate the impact of an additive therapy with an oral enzyme (OE) preparation given for more than 6 months additionally to standard combination chemotherapy (vincristine/melphalan/cyclophosphamide/prednisone (VMCP)- or methylprednisolone/ vincristine(CCNU/cyclophosphamide/melphalan (MOCCA)-regimen) in the primary treatment of patients with multiple myeloma stages I-III. METHODS: A cohort of 265 patients with multiple myeloma stages I-III was consecutively treated at our institution in two parallel groups (control group (n = 99): chemotherapy +/-OE for less than 6 months; OE-group (n = 166): chemotherapy + OE for more than 6 months). The median follow-up time in the stages I, II, and III for the OE-group was 61, 37, and 46.5 months, respectively; for the control group the respective values were 33, 51.5, and 31.5 months. The primary endpoint of the study was disease-specific survival. Secondary endpoints were response to therapy, duration of first response and side effects. The chosen method for evaluation was the technique of a retrolective cohort analysis with a concurrent control group. Survival analysis was performed by the Kaplan-Meier method and multivariate analysis was done with the Cox proportional hazards model. RESULTS: Significantly higher overall response rates and longer duration of remissions were observed in the OE-group. Primary responders showed a longer mean survival time than non-responders. Additive therapy with OE given for more than 6 months decreased the hazard of death for patients at all stages of disease by approximately 60%. Observation time was not long enough to estimate the median survival for patients at stages I and II; for stage III patients it was 47 months in the control group versus 83 months for the
patients treated with OE (P = 0.0014) which means a 3-year gain of survival time. Significant prognostic factors for survival, in the Cox regression analysis, were stage of disease and therapy with OE. The OE-therapy was generally well tolerated (3.6% of patients with mild to moderate gastrointestinal symptoms).

CONCLUSION: OEs represent a promising new additive therapy in multiple myeloma which will be further evaluated in a randomized phase III trial in the USA.

PMID: 11561871 [PubMed - indexed for MEDLINE]


“Retrolective cohort study of an additive therapy with an oral enzyme preparation in patients with multiple myeloma.”
Clinic of Haematology and Transfusion Medicine, University of Bratislava, Slovak Republic.

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F. Papaya Leaf Tea

Leaf Properties

Per 100 g, the leaves are reported to contain 74 calories, 77.5 g H2O 7.0 g protein, 2.0g fat, 11.3 g total carbohydrate 1. 8 g fiber, 2.2 g ash, 344 mg Ca, 142 mg P, 0.8 mg Fe, 16 mg Na, 652 mg K, 11,565 ug beta-carotene equivalent, 0.09 mg thiamine, 0.48 mg riboflavin, 2.1 mg niacin, and 140 mg ascorbic acid, as well 136 mg vitamin E. Leaves contain the glycoside, carposide, and the alkaloid, carpaine. Fresh leaf latex contains 75% water, 4.5% caoutchouc-like substances, 7% pectinous matter and salts, 0.44% malic acid, 5.3 papain, 2.4% fat, and 2.9% resin.

“Some of Papaya Leaf's constituents include the fermenting agent myrosin, alkaloids, rutin, resin, tannins, carpaine, dehydrocarpaines, pseudocarpaine,
flavonols, benzylglucosinolate, linalool, malic acid, methyl salicylate, another enzyme, chymopapain (latex and exudate), calcium, iron, magnesium, manganese, phosphorus, potassium, zinc, beta-carotene, B-vitamins and vitamins A, C and E”.
- “Papaya Leaf”, by Stacy Chillemi

“The types of herbs or biological ingestibles used by participants were also assessed, as we asked participants to write down the names of herbs/remedies used. Herbs and other biological ingestibles used included green tea, essiac tincture, Chinese herbs, sage tablets, Echinacea, cod liver oil, fresh juice and vegetables, vitamin E, glucosamine, chamomile, peppermint, selenium, mistletoe/Iscador, yeast extract, multivitamins, Ayurveda herbs, vitamin C, soya drinks, dry thyme, dry nettle, nettle tea, nettle or nettle seeds mixed with honey, ginseng, mulberry molasses, shark cartilage, fish oil, ginkgo biloba, milk thistle, minerals (i.e. Zn, Ca, Mg), aloe vera (orally and externally used), papaya tea, beet and carrot juice, paste from olive leaves, a mixture of aloe–honey–rhaki and wine, and angelica herb. Most herbs were used to treat the cancer, although no participant specified for which specific condition they were using which method.”

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G. Malaria

Papaya Leaf as a Malaria Prophylactic

English Title: Comparative efficacy of crude aqueous extract of *Mangifera indica*, *Carica papaya* and sulphadoxine pyrimethamine on mice infested with malaria parasite *in vivo*.  
Personal Authors: Uhegbu, F. O., Elekwa, I., Ukoha, C.  
Author Affiliation: Department of Biochemistry, Faculty of Biological and Physical Sciences, Abia State University, Uturu, Nigeria.  
Document Title: Global Journal of Pure and Applied Sciences, 2005 (Vol. 11) (No. 3) 399-401

Abstract:

The comparative efficacy of sulfadoxine-pyrimethamine (Maloxine) and leaf extracts of Mangifera indica (mango) and Carica papaya (paw-paw) was investigated in Plasmodium berghei-infected mice. Maloxine had the highest efficacy, reducing the parasite count from an average count of 9.4?0.04 to 1.4?0.05 after six days of treatment. The paw-paw leaf extract reduced the malaria parasite count from an average of 9.2?0.06 to 2.6?0.06; while the mango leaf extract showed an average reduction from 9.8?0.01 to 3.2?0.03 after six days of treatment. However, a combination of the two leaf extracts (1:1) exhibited a higher antimalaria efficacy than the separate leaf extracts, reducing
the parasite count from 9.4?0.031 to 2.0?0.15. The public health implications of these findings are discussed.

Publisher: Bachudo Science Co. Ltd.

Use local plants to reduce malaria
Papaya leaf tea

The organisation ECHO reports that many people around the world take a tea of papaya leaves to reduce or completely avoid having malaria...since papaya is found nearly everywhere, it is good to use it. The tea must be taken regularly - twice a week - to have an effect.

You use one fresh leaf which you boil in 2 litres of water. Let it boil a short time and let it rest for some minutes. Drink 1/4 of a cup each time. It is bitter, but it is not poisonous and is used traditionally many places against a variety of problems. You should not eat the raw leaves, however.

You can also make a powder from dried papaya leaves. To make one cup of tea use a quarter teaspoon of powder.


Table 1 - Some plants used in the treatment of malaria in the Domingo Sifontes municipality, Bolivar State, Venezuela.
Bolivar State data Comparative data
Species Family PU PP species Details
Azadirachta indica A.Juss. Meliaceae 1 d Azadirachta indica A.Juss Used to treat malaria in India and Sudan

Bixa orellana L. Bixacea 1, r d Bixa orellana Used to treat malaria in Brazil and Peru

Carica papaya L Caricaceae ft j Carica papaya Used to treat malaria in Brazil and Surinam

Cedrela odorata L. Meliaceae sb mwv Cedrela odorata Used to treat malaria elsewhere

Eucalyptus globulus Labill. Myrtacea 1 d Eucalyptus globulus Used to treat malaria in Venezuela

Heliotropium indicum L. Boraginaceae 1 d Heliotropium indicum Used to treat malaria in Venezuela

Momordica charantia L. Cucurbitaceae 1 d Momordica charantia Used to treat malaria in Brazil, Colombia, Guyana, Trinidad, West Indies, and Venezuela

Parthenium hysterophorus L. Compositae r d Parthenium hysterophorus Used to treat malaria in Venezuela

Petiveria alliacea L. Phytolaccaceae Ep d Petiveria alliacea Used to treat malaria in Brazil

Phyllanthus niruri L. Phyllanthus niruri and P. niruri used to treat malaria elsewhere and

Phyllanthus niruri spp other spp Used in Brazil, Cuba and Surinam

Plantago australis Lam. Plantaginaceae 1 d Plantago australis Used to treat malaria in Venezuela

Scoparia dulcis L. Scrophulariaceae 1, r d Scoparia dulcis Used to treat malaria in Colombia and Venezuela

Senna occidentalis L.Link. Leguminosae 1, r d Senna occidentalis Used to treat malaria in Brazil, Colombia and Venezuela

Solanum spp. Solanacea ep d Solanum spp Used very widely to treat malaria

Spondias mombin L. Anacardiaceae 1 d Spondias mombin Used to treat malaria in Venezuela

Taraxacum officinale Web. Compositae L, r d Taraxacum officinale Used to treat malaria in Venezuela

Verbena litoralis H.B.K Verbenaceae 1 d Verbena litoralis Used to treat malaria in Venezuela

Vernonia spp Compositae sb d Vernonia spp Used to treat malaria in Brazil, Colombia and Venezuela

PU: part of the plant part used: ep = entire plant; ft = fruit; l = leaf; r = roots; s = seed; sb = stem bark. PP: preparations: d = decoction; j = juice; mwv = macerate in white vine.

-Preliminary assessment of medicinal plants used as antimalarials in the southeastern Venezuelan Amazon

Avaliação preliminar de plantas medicinais usadas como antimaláricos no sudeste amazônico Venezuelano

Alejandro Caraballo¹, Brigida Caraballo¹ and Alexis Rodríguez-Acosta²
**Conclusion:**

Just as proteolytic enzymes have shown effect against cancer, the protease papain in the papaya leaf has an excellent chance to prove effectiveness against cancer.

_Papaya leaf “tea”, the dried and cut leaves brewed in hot water, has an_
excellent chance to add effective systemic defense against cancer if we can
drink this on a biweekly basis. Better yet, a bit of the tea leaves can be
added to coffee grounds in the morning, every morning, and many very
helpful medicinal effects might follow. Our tea drinkers have reported
lowered blood sugar, reduced swelling, less sickness, significant change in
mucus in lungs and more. The effect against cancer is one that we must
gang up to fight.

The tea leaves ground to a powder and applied to skin with water or aloe
have brought skin issues to a scab and then have fallen away. This has
happened on my own face. I’m excited about our University studies on
melanoma.

I’m going back to the business of providing the cut papaya leaf to the
market. It does taste good, is inexpensive, and it must be available for
people to use. If science does not convince, maybe enough healthy people
will.