

ALOE VERA

A Step-By-Step Guide to Understanding the Health Benefits of Premium Aloe Vera Juice

Aloe vera has been used for health and medicinal purposes for centuries with Ancient Egyptians describing it as the "Plant of Immortality".

Aloe is still popular today in whole leaf extracts for both internal and external use, as well as gels, toothpastes and balms specifically for topical use. The basis of Aloe products extracts the cooling gel from the leaves, which soothes irritation and inflammation, and so is commonly used for stomach ulcers and digestive problems, as well as insect stings, sunburn, wound healing, eczema and psoriasis. In addition, the gel from the Aloe leaves contain a host of anti-viral, anti-inflammatory and anti-microbial nutrients that have shown effectiveness against a number of conditions including cardiovascular disease, cancer, viral infection such as herpes and diabetes.¹

But do you know what's really in your Aloe product? Are you aware of the levels of the active ingredients in the Aloe juice that you drink? In order to buy your finished Aloe product, there needs to be some processing of the original Aloe plant. But this is the rub - many processes can damage the delicate active Aloe ingredients (called bioactive polysaccharides) and many Aloe products dilute these important active ingredients so that there is little bioactivity in the final juice.



So how can you be sure that your Aloe vera juice has the 'slam per gramme' you need to boost your health? Read on to find out the fascinating story behind Aloe vera many health properties and the careful processing of some premium Aloe juices designed to support optimal health. With your new found knowledge you can source an Aloe vera juice with greater levels of bioactive polysaccharides and therefore greater biological performance compared to many other products on the market. You might think that understanding Aloe products isn't necessary when you can pick one of many products off the shelves but it's essential to know the polysaccharide content of your Aloe juice – without this information it is like buying a car without knowing if it has an engine!

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HEALING PROPERTIES OF ALOE VERA

ANTI-INFLAMMATORY ACTIONS

Several studies have shown Aloe vera to be highly effective in reducing inflammation. Inflammation is a key feature of many chronic conditions and diseases, from asthma to arthritis, as well as being a primary response to injury and allergies.²

Studies have shown Aloe juice to be more effective than hydrocortisone cream in reducing skin redness and rashes³, and scientists continue to discover new anti-inflammatory agents in the Aloe leaf. One such compound is a polysaccharide called mannose-6-phosphate, which has been demonstrated to reduce inflammation.⁴ Aloe is also rich in the polyphenol Aloe-emodin, which is thought to suppress inflammatory responses by blocking the expression of certain enzymes called iNOS and COX-2 mRNA.⁵ These are important enzymes that regulate inflammation in the body; an over-expression of them has been linked to certain cancers and other inflammatory diseases.⁶

Aloe also contains the anti-inflammatory agent C-glycosyl chromone, discovered to be as effective as hydrocortisone, in addition to an enzyme called bradykinase, which reduces inflammation by breaking down bradykinin, a peptide that helps set off the processes of inflammation by making blood vessels more permeable.⁷

PROMOTING TISSUE GROWTH

When wounds start to heal, they need more collagen in order to make new connective tissue such as skin and blood. One study identified the ability of Aloe vera to increase the amounts of collagen in healing tissue, and also to increase the amount of cross-links that help to make the tissue stronger.⁸ This happened when Aloe was used both topically and orally.

A further study looked in more detail at how wounds are healed, and noted how both topical and orally taken Aloe vera sped up this process. In the early stages of wound healing, a provisional matrix (ground substance) is laid down first, and then the collagen and other substances needed for new tissue are formed. This ground substance is made of water plus compounds called GAGs (glycosaminoglycans) and proteoglycans (essentially GAGs bound to protein). Wounds treated with Aloe vera were shown to have higher levels of GAGs, especially hyaluronic acid and dermatan sulphate, and were therefore able to produce greater levels of ground

substance, starting off the process of making new tissue.⁹ These studies help explain the mechanisms by which Aloe vera can support both internal tissue healing throughout the digestive tract, as well as the external skin.^{10, 11}

ALOE VERA AND HEALTHY DIGESTION

We often focus on Aloe's ability to reduce inflammation in the bowel, but there are many benefits that Aloe can confer throughout the digestive tract. In a seminal human study, after just 7 days of oral supplementation with natural whole leaf Aloe juice (2oz taken 3 times a day), a cascade of improvements was measured throughout the digestive system, from protein digestion to bowel flora composition.¹²

1. IMPROVED BOWEL MOVEMENTS

As part of the study, stool density was measured, which demonstrated better water holding capacity after consumption of the Aloe juice for 7 days, as well as better bowel transit time, which showed faster pace without signs of diarrhoea or loose stools; the best type of bowel transit for optimal digestion and nutrient absorption.¹³ The result was attributable to improved muscle tone in the bowel, rather than any laxative effect.

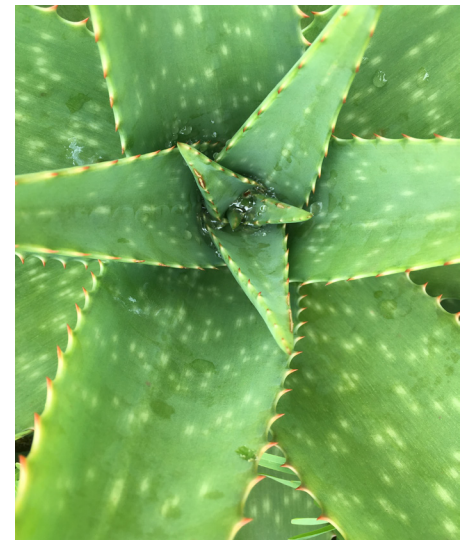
2. BALANCED BOWEL MICROBIOTA

The primary measurement of the study was a stool culture test, which looked at the balance of bowel microbiota in the stools. Gut microbiota have an integral role in our immune response and support healthy digestion and absorption of nutrients.

The stool culture test showed an improved bacterial balance, plus a reduction in yeast like *Candida albicans*. There are no live bacteria in Aloe, so researchers concluded that the action of Aloe vera juice is not that of probiotics supplements, rather an improvement in the underlying conditions that affect the bacterial balance, such as pH levels and bowel transit time.

3. IMPROVING PROTEIN DIGESTION

The study also recorded indican levels in the urine; this indicates the levels of toxic amines produced by the bowel bacteria from protein digestion. Dietary proteins are first broken down in the stomach by pepsin, an enzyme activated by appropriate stomach acid levels. Digestion is continued in the small intestine by further



enzymes released by the pancreas, which are also stimulated by stomach activity. High protein diets and poor digestive processes (e.g. low stomach acid and/or low levels of digestive enzyme production and release by the pancreas) can lead to partially digested proteins entering the large intestines. Here they can be fermented via different gut microbiota. The production of toxic amines in the large intestines, via putrefactive fermentation, has been implicated in the development and progression of a number of bowel conditions including bowel cancer.^{14, 15, 16}

After 7 days of Aloe vera whole leaf juice consumption indican levels had reduced by an impressive 40%. This outcome has a number of implications, including that the Aloe juice had reduced putrefactive activity in the bowel, and also increased the digestion and absorption of dietary proteins in the stomach and small intestine. Aloe may well also have a positive effect in the pancreatic enzyme production and balancing stomach pH necessary for protein digestion.

4. MANAGING INDIGESTION

The seminal study also tested the gastric pH, and found it to have dropped significantly, but only in those whose stomach acidity was too high in the first place. Aloe is described in traditional Eastern medicine as having cooling properties, and many of us have experienced its cooling effect on sunburn. This same property has traditional applications for cooling internal heat too, such as inflammation, peptic ulcers and hyperacidity in the stomach indicating Aloe vera juice as a useful gastro-protective remedy.¹⁷



RESOLVING THE SYMPTOMS OF COLITIS AND IBS

Debilitating bowel problems such as Irritable Bowel Syndrome (IBS), colitis and Crohn's can be characterised by chronic inflammation in the gut, and in more severe cases accompanied by ulcers and/or adhesions. The anti-inflammatory nutrients in some carefully processed Aloe vera juices have been implicated in managing such conditions.

In 2004, a double-blind placebo-controlled test was carried out by scientists in London to gauge Aloe vera's effectiveness against active Ulcerative Colitis (UC). Clinical symptoms were measured, in addition to sigmoidoscopes looking at the smoothness of the mucosa, and examination of the tissue cells under microscope. 27-30% of those taking Aloe vera were shown to be in remission by the end of week 4, compared to only 1-4% of the placebo group, and 37% of the patients taking Aloe vera showed improvement in their score of clinical symptoms, as opposed to 1% in the placebo group.¹⁸

More recent studies have also implicated

Aloe vera juice as an effective part of integrated approach to managing Inflammatory Bowel Disorders (IBDs).¹⁹

Another study demonstrated that some of the bioactive polysaccharides in carefully processed Aloe vera juice not only have anti-inflammatory properties, but also act as prebiotics, supporting the growth of beneficial gut microbiota, important in the management of IBDs and IBS.²⁰



IMMUNE ENHANCING POLYSACCHARIDES

Acemannan, found in high levels in carefully processed whole leaf Aloe vera juice, is a part of a group of polysaccharides, or complex sugars, that have been implicated in supporting immune system function including enhancing T-cell response through stimulating monocyte cells.²¹ Researchers have suggested that this may partly explain why acemannan appears to act as an anti-viral in both humans and animals. Only whole leaf Aloe preparations that have been carefully processed will contain acemannans, so you need to ensure a good quality source of Aloe vera.

ANTI-VIRAL ALOE

Aloe vera contains powerful anti-viral compounds that have been shown to rupture the structure of several viruses, including herpes simplex (cold sores and genital herpes), and viruses associated with shingles, chicken pox and flu.

Scientists studying the anti-viral effect of Aloe vera gel have attributed this property to a group of compounds called anthraquinones, which include the polyphenols important in wound healing. Having witnessed the ability of Aloe gel to break down the HSV-1 virus, which is present in cold sores and genital herpes, the researchers isolated one of Aloe's

anthraquinones, Aloe-emodin, and tested it with further viruses. Aloe-emodin was shown to be active against both forms of herpes simplex, HSV-1 and HSV-2, as well as varicella zoster (shingles and chicken pox) and influenza.²² In fact, 95% of the virus particles treated with Aloe-emodin showed damage to the envelope surrounding the virus.

Acemannan also has anti-viral properties: One group of scientists showed that acemannan stopped the development and replication of not only the herpes simplex virus, but also HIV-1. Two further studies gave acemannan to HIV positive patients and recorded improvements in both T cell counts and antigen levels.²³

ANTI-BIOTIC ALOE

Aloe vera is often described as having antiseptic and antimicrobial properties. One study tested its effectiveness against a range of bacteria and found it to be particularly protective against Gram B bacteria strains such as E. coli.²⁴

One group of Spanish researchers discovered that they could prolong the shelf life of grapes by spraying them with a thin film of Aloe vera extract. After 35 days, the grapes were still tasty and in good condition. The Aloe polysaccharides prevented the fruit from oxidising and deteriorating by protecting the grapes

from oxygen and moisture. In addition, the researchers believed the Aloe helped to combat bacterial and fungal activity to keep the grapes fresher and safely edible for longer.²⁵

More important than food preservation is the fight against the development of multi-drug resistant strains of bacteria including *Acinetobacter baumannii* and *Pseudomonas aeruginosa*, which are highly dangerous nosocomial pathogens that cause the symptoms of skin infections, pressure sores, sepsis, blood stream and wound infections. Unfortunately, these pathogens are immune to the most common antibiotics and contribute to a number of life-impacting infections and mortalities.²⁶ A recent study demonstrated positive concentration-dependent effects of Aloe vera Modified Active Polysaccharides (MAP) on all *Staphylococcus aureus* and *Bacillus subtilis*, *Escherichia coli* and *Enterobacter aerogenes*, and clinical *Pseudomonas aeruginosa* and clinical *Acinetobacter baumannii* bacteria superbug species, particularly on *Pseudomonas aeruginosa*. Anti-inflammatory and antioxidant experiments were also performed demonstrating dose dependent effects confirming the beneficial physiological effects of Aloe vera MAP.²⁷ This is important progress in the development of natural antibiotics to fight super strains of bacteria that are emerging.

ANTI-CANCER ALOE

Mannan fractions from the Aloe plant have also been demonstrated to stop tumour cells multiplying, by inhibiting the T lymphocyte proliferative response in a variety of cancers including liver and colon.^{28, 29} Mannans are believed to have a dual beneficial effect when applied to normal and tumoral cells at the same time by inhibiting the activation of cancer cells and improving that of normal one.³⁰ This essentially means that Aloe vera naturally targets cancer cells and, rather than having a destructive force in the body, simply deactivates them, while strengthening the non-cancerous cells around them.³¹

ALOE VERA, DIABETES AND CARDIOVASCULAR DISEASE

Aloe vera is a traditional remedy for diabetes in the Arabian peninsula, and studies now show why. One study investigated blood glucose levels of 36 people with type 2 diabetes after taking 2 tablespoons of 80% Aloe vera juice daily; their blood glucose levels dropped by 17% in the first 2 weeks, and by 57% at the end of 6 weeks. Not only that, but blood triglyceride levels also dropped by more than half to 45%.³² A second study resulted in a 49% drop in fasting blood glucose levels, and a 52% reduction in blood triglycerides.³³ In a previous study of over 3000 diabetics who took Aloe vera and psyllium husk daily for 2 months, fasting blood sugar levels returned to normal in 94% of participants.³⁴

A recent US double-blind placebo-controlled study took 45 subjects with pre-diabetic blood sugar problems (impaired fasting glucose and impaired glucose tolerance) plus two other symptoms of metabolic syndrome, such as high blood pressure and obesity. They were then divided into 3 groups: one was given an inner leaf aloe vera gel powder, the second an inner leaf aloe vera gel powder standardised with 2% aloein, and the third was a control group. The first group showed a significant reduction in glucose, and fructosamine. The second had significant reductions in HbA1c, fructosamine, fasting glucose, insulin, F2-isoprostanes and HOMA; all markers for blood sugar. The first group also had lowered total and low-density lipoprotein cholesterol levels.³⁵ Another human study The Use of Aloe vera extract in pre-diabetic patients, could revert impaired blood glucose within four weeks, but after eight weeks could alleviate their abnormal lipid profile.³⁶

These studies all implicate the benefits of taking Aloe vera juice for managing blood sugar and fat levels such as with metabolic syndrome.³⁷

SORTING OUT PSORIASIS

Psoriasis is characterised by uncomfortable, itchy patches of inflamed, scaly skin, and is a chronic condition that many sufferers experience throughout their lives. Studies have compared topical use of Aloe vera on psoriasis versus a topical steroid cream; the Aloe treatment fared significantly better.^{38, 39} A Swedish study has also demonstrated significant improvement in 83.3% of the 60 patients studied using Aloe to treat their psoriasis, compared to only 6.6% in the placebo group.⁴⁰

An integrated medicine approach to psoriasis would address many different systems in the body including the digestive system (owing to its role in immune system homeostasis), and not just the skin. Aloe's demonstrated ability to reduce inflammation and irritation in the digestive tract may therefore contribute to managing conditions such as eczema and psoriasis from the inside out using Aloe juice both topically to soothe and clear the skin, and orally to improve the internal and underlying conditions of the disease.

ALOE AGAINST ARTHRITIS

Aloe is often recommended for relief from joint pains, especially in rheumatoid arthritis and osteoarthritis.⁴¹ One study looked at the anti-inflammatory properties of three plant sterols in Aloe vera: lupeol, campesterol and beta-sitosterol. These substances showed an impressive ability to reduce inflammation in arthritis joints, in one case reducing swelling by 79.7%.⁴²

ALOE VERA FOR SPORTS INJURIES

So far we have focused mainly on the inflammation involved in chronic conditions such as psoriasis, stomach ulcers, colitis and arthritis. Aloe vera taken orally and applied topically can be used for a wide range of acute conditions too, and is widely used for sports injuries due to its cooling, anti-inflammatory and healing properties.

Aloe is primarily useful here because of its anti-inflammatory enzymes and plant sterols, including C-glucosyl chromone, which has been shown to be as effective as hydrocortisone in reducing inflammation, but without affecting the thymus.^{43, 44} Aloe may therefore be used topically and orally for injuries like sprains, strains, bruises, swelling, tendonitis, bursitis, muscle soreness or cramps.



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WHAT MAKES A PREMIUM ALOE VERA JUICE?

So you now know of all the many and varied health benefits of topical and internal use of Aloe vera products. But what makes a premium Aloe vera juice and how can you ensure you are taking the most bioactive product?

A premium Aloe vera product contains trace levels of many important vitamins, minerals, amino acids and polysaccharides derived from the Aloe plant leaf. It's the mix of these very special constituents that contribute to the finished Aloe product's overall bioactivity. However, not all Aloe products are created equally. Aloe leaf processing involves several stages with every step potentially causing irreversible degradation of the important polysaccharides and other bioactive constituents. Inconsistent or substandard techniques used in Aloe juice extraction and manufacturing process can affect the final performance, and therefore value, of the finished Aloe product. This means there is a wide range of differing Aloe products currently on the market.

The polysaccharide acetyl mannan (also known as acemannan) is the principle active ingredient of Aloe and the primary marker of Aloe vera product quality and can be carefully extracted by processing the whole leaf from the Aloe *barbadensis*

plant using patented Modified Active Polysaccharides (MAP) technology. This gentle processing technique specifically preserves and enhances essential bioactive polysaccharide activity, including acemannan. In fact, MAP processing of the whole Aloe leaf can deliver a finished Aloe product with over 8% (dry weight) naturally concentrated polysaccharides compared to just 0.5-1% in Aloe juice derived from the inner leaf, the form commonly offered in many products on the market. This means that some premium Aloe vera juice can deliver at least 8-16 times more biologically active polysaccharides compared to many other Aloe, juices greatly impacting product efficacy.

Using the whole Aloe leaf can raise questions about the presence of aloin, a component of Aloe latex (known as bitter Aloes), that's found between the rind and inner leaf and is known for its laxative properties. However, the aloin component of premium Aloe vera juices is carefully extracted via filtration and the aloin content of Golden Aloe is strictly monitored by both qualitative and quantitative checks during the filtration processes. The International Aloe Science Council (IASC) standard for aloin in Aloe products for oral consumption is less than 10 parts per million (ppm) and you will find premium Aloe vera juices normally contain less than 1ppm or aloin, ten times less than the industry standard.



FROM FIELD TO DRUM: THE STORY BEHIND PREMIUM ALOE VERA JUICE

STAGE 1: HARVESTING

In order to preserve the bioactive nutrients found in the Aloe plant, all the processing stages from field to drum need to be carefully monitored and carried out.

Aloe vera juice comes from the Aloe *barbadensis* (Miller) species of Aloe plant grown in different frost-free, preferably organic, locations, around the world including countries like Mexico.

The outermost mature leaves from the Aloe plant are harvested by hand. Careful extraction of each leaf leaves the base intact and sealed preventing potential contamination of the precious Aloe leaf contents. The mother plant is left healthy to thrive for future harvests. The Aloe leaves are swiftly harvested and carefully boxed to avoid damaging the precious outer leaf rind and contaminating the inner leaf with dirt from the field. The leaves are then immediately transported to the processing facility. Time and temperature can greatly reduce Aloe biological activity so this processing stage should be tightly

controlled to retain maximum levels of bioactive Aloe nutrients from its journey from field to drum.

STAGE 2: PROCESSING

The freshly harvested Aloe leaves go through a multi-stage wash to remove microbes and other contaminants from the outer rind. Conveyor belts then propel the whole washed Aloe leaves from the primary washer to inside the processing factory and onto the cutting area. From here, the Aloe leaf tip and sharp spiky edges are removed and the whole leaf undergoes de-pulping and filtration processes to extract the Aloe juice, much like using a home juicing machine but on a much larger scale!

At this stage of processing, natural plant enzymes such as cellulase are added to the juice to help remove impurities and release bioactive polysaccharides that may otherwise be bound to Aloe leaf fibres and lost in the de-pulping process. The levels of cellulase used in premium Aloe vera juice

processing are carefully balanced to ensure optimum extraction of Aloe nutrients from the de-pulped juice but to avoid over processing. Some inferior Aloe products use excessive amounts of cellulase to speed up production and reduce costs. However cutting corners at this production stage may destroy valuable bioactive Aloe nutrients leading to poor quality Aloe juice with little bioactivity.

The next production stage concentrates the Modified Aloe Polysaccharides (MAPs). Polysaccharides in Aloe juice vary in size (i.e. molecular weight measured in kilo Daltons, kDa) from less than 10kDa to greater than 2000kDa. Different fraction sizes have differing levels of bioactivity. As you've read in this education article, the different polysaccharide fractions in whole leaf Aloe juice support our health in a variety of ways.

The MAP processing of premium whole leaf Aloe vera juice naturally retains and enhances some of the most bioactive Aloe polysaccharide fractions, including

the 200-50kDa fraction. This means that each bottle of Aloe vera juice that undergoes MAP processing contains a minimum of 8% bioactive polysaccharides (dry weight), including 3 times more of the 200-50kDa fraction from natural concentration, compared to just 0.5-1% polysaccharides (dry weight) with differing levels of biological performance in Aloe juice derived from the inner Aloe leaf alone. This means that premium Aloe vera juices have increased bioactivity and functionality with at least 8-16 times greater bioactive polysaccharide levels.

FINAL STAGE: PREMIUM ALOE VERA JUICE

The Aloe vera juice is now sealed in suitable liquid drums and transported to the UK in ambient temperature conditions ready for bottling and sale. Of course, transport of freeze-dried Aloe powder is much cheaper compared to transporting drums of Aloe juice. This is why you'll find many Aloe products in the UK are made from Aloe powders, reconstituted with water to save on transport costs. However, these heavily diluted products may contain a fraction of the bioactive polysaccharides compared to what can be found in premium Aloe vera juices, as well as the presence of artificial flavourings, colourings and sweeteners added to some products. It's a case of 'buyers beware', as Aloe vera juices made from reconstituted powders can still claim to "contain 100% natural Aloe" even if the 'juice' contains minimal levels of precious bioactive polysaccharide levels. Beware gels advertising to be made with 99% or 100% pure Aloe: the Aloe they have used may be 99% or 100% pure, but they may only have used a small amount of it in the gel itself, mixed with other, less useful substances. But now you know what to look for in an Aloe product so you can choose the most bioactive and efficacious product.

SUPPLEMENTING WITH ALOE VERA JUICE

Aloe vera juice should be stored in the fridge and 10-50ml whole leaf Aloe vera juice can be taken orally, either on its own or mixed with water or fresh juice, to support digestion and the other host of health benefits we have described in this education article. Try adding Aloe vera juice to your own freshly pressed vegetable juice drinks, such as:

- Carrot, beetroot, ginger and Aloe vera juice
- Cucumber, celery, wheatgrass and Aloe vera juice
- Apple, fennel, Aloe vera juice and mint

Aloe vera juice can also be used topically by soaking onto a cotton wool pad or gauze and applying directly to the skin. Keeping Aloe vera juice in the fridge also means you have a cooling juice to apply in those burb, sunburn, cuts or sting emergencies.

It can also be supplemented alongside digestion enzymes, probiotics and gut supporting botanicals like psyllium husks, L-glutamine, peppermint, turmeric and papaya extract to support optimal digestion and immune system function.

For sports injuries where an ice pack is indicated, the towel used for the pack can be soaked in whole leaf Aloe vera juice. Over the next few days or weeks, Aloe gel (1-2 parts glycerine to 9 parts whole leaf Aloe juice) can be applied as a rub, and the juice can also taken orally to help reduce inflammation and repair damaged tissue. Just as we have seen with wound healing, the polysaccharides in Aloe help to increase collagen III production and collagen cross-linking, as well as the syntheses of hyaluronic acid and dermaton sulphate, all of which are crucial for successful tissue repair.



If you have any questions then please contact the Nutrigold team on 0800 233 5675 or email talk2us@nutrigold.co.uk

This education article was co-written by Dr Elisabeth Philipps PhD with Nutrigold.

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