The Science Behind Aloe

The Healing Plant

A meta-analysis in 18 chapters of 325 studies
Edited by Bill H. McAnalley, PhD

These are my notes gleaned from this book. *Anything in italics are specifically my own thoughts, information from other resources, or disclaimers.*

Definition of Some Terms

- Acemannan = A polysaccharide that is the active ingredient of Aloe found in the inner leaf gel.
- Macrophages = Are a type of white blood cell of the immune system that engulfs and digests pathogens, such as cancer cells, microbes, cellular debris, and foreign substances.They are involved in phagocytosis, which acts to defend the host against infection and injury.
- Mannose = a sugar which occurs as a component of many natural polysaccharides.
- Polysaccharides, Polymannans, Oligosaccharides, Oligomannans, Monosaccharides = plant saccharides (sugars) which deliver mannose in one form or another.
- Probiotics = Live, friendly and beneficial bacteria housed in the gut.
- Prebiotics = Mostly fiber that friendly bacteria (probiotics) feed upon

Medical Industry, Drugs, and Food

As a general rule, the medical industry complex does not seek solutions or remedies that contribute to prevention and management of dysfunctions through the intake of food.

They depend on drugs to address problems.

Drugs might contribute to stability in a given area but are notorious for causing instability in other areas. These instabilities are labeled as side effects, which, when they occur, become a direct effect upon the patient.

This, of course, requires more drugs and much of the time increased problems are the result.

Because standards of care exist in the medical community and because people are looking for best outcomes we embrace an integrative healthcare approach. This means we combine the best of conventional medical practices with advanced nutritional support to achieve best patient outcomes.

The Father of Western Medicine, Hippocrates, said, “Let your food be your medicine, and your medicine be your food.” *This quote is not intended as an oversimplification or to discount the contribution made by the medical community. However, on a fundamental level it does contain the practical wisdom for embracing holistic methods as the reasonable first steps toward achieving best patient outcomes.*

This presentation is a focus on the dietary polysaccharide called Acemannan (the active ingredient in the inner leaf gel of the Aloe Vera plant) that can naturally help to maintain proper structure and function of human cells.

More specifically, Acemannan stimulates macrophages in particular, thereby stimulating the human immune system

A healthy immune system can identify and manage aberrant and foreign cells.

The 325 studies, from which the editor (Bill McAnalley, PhD) creates a meta-analysis, provide evidence that scientists are understanding the role of Acemannan in supporting immune health

These studies reveal the mechanisms by which Acemannan can promote optimal health.

Aloe and Acemannan

The basic idea and practice where food (specifically plant-based foods) serves as medicine has been around a long time and exists in all cultures.

Aloe is one of the most famous of these medicinal plants and contains in its inner leaf gel Acemannan.

From a scientific point of view plant saccharides, like Acemannan, must be properly identified, isolated, and stabilized.

As early as 1981 it was discovered in official scientific testing that using fresh Aloe leaves more effectively stimulated cells in a culture than did preserved commercial aloe products taken from the shelf of health food stores.

Though Acemannan has been successfully identified, isolated, and stabilized as early as 1984 most “Aloe containing” commercial products on the shelf to this day contain little to no Acemannan

The studies that accompanied the revelation of Acemannan and its stabilization reveal that Acemannan is responsible for a wide range of biological activities including

- wound healing
- anti-fungal
- anti-bacterial
- antiviral
- hypoglycemic
- anti-inflammatory
- anticancer
- immunomodulatory

- gastroprotective.

A concern early on in the many studies relative to Acemannan is that Acemannan in Aloe is highly labile. This means it becomes easily denatured. It loses its potency soon after the leaf is removed from the plant (usually in 24 to 48 hours)

The Aloe industry does not seem too concerned about this as product manufacturers are known to use improper processes of Aloe products, resulting in little to no Acemannan remaining in the products sent to market.

Manufacturers do not test for Acemannan content in their final products.

However, all the impressive words are used when labeling and marketing Aloe products:

- "100% stabilized Aloe"
- "Certified"
- "Premium Quality"
- "Whole Leaf"
- "Purified"

The term "Stabilized" is only apropos to Aloe products because they contain enough preservatives to control microbial growth.

But, the safety of preservatives is always a concern. Where large amounts of preservative agents are added, this has shown to kill fibroblasts and other cells in a tissue culture. *Fibroblast: A spindle-shaped cell with cytoplasmic processes present in connective tissue, capable of forming collagen fibers.*

None of this equates to Acemannan content.

In a 2004 study, thirty-two (32) products representing most of the world's suppliers of aloe demonstrated a lack of consistency in Acemannan content among aloe products.

Speaking of marketing: A popular marketing term used by many manufacturers of nutraceuticals is that a given nutrient, vitamin, or component will "boost" the immune system. This is most likely true, but "boost" only represents what is generically true about a given product. For fear of misrepresentation, marketers don't dare use the words that describe what is true about Acemannan. Acemannan stimulates, modulates, regulates, stablizes, enhances, and activates the immune system because many studies prove that it does.

Aloe vera and Its Components

With over 130 patents attributable to its stabilization and therefore its utilization, Acemannan is the main name assigned to what is known as Acetylated Polymannose

In short, the main point you will hear throughout this presentation is that Acemannan naturally stimulates immune responses by activating macrophages and other immune cells.

Acemannan efficaciously effects immune modulation that is compatible with the physiological dynamics of the human body.

This is different from the classical drug effect where physiological compatibility may be quickly compromised.

There are two active molecules in Aloe: Aloin and Acemannan

Aloin is in the outer rind and was discovered to have a strong laxative effect.

Acemannan is found in the inner leaf gel and is safe and effective.

(No, there is no Aloin in our Acemannan Extract)

The popular, overused, and often untested term "Safe and Effective" found one of its ultimate tests in the context of Acemannan having been submitted by Carrington Labs in the 1980's to the Food and Drug Administration for use as a drug. It was rejected by the FDA on the basis that it had no toxicity and therefore failed as a drug. Never mind that it turned on the immune system. This gave way for its entrance into the nutraceutical market.

The most historically popular of Acemannan's structure and function is wound healing. Among much ancient history of Aloe (including its mention in the Bible five times), it is said that Alexander the Great led the conquest of Socotra, an island in the Indian Ocean, to control the supply of Aloe

It is also well established that Acemannan in modern times is used for cancer therapy in animals

Injectable Acemannan immunostimulant was approved as a prescription product for veterinarians to treat fibrosarcoma (a form of cancer) in dogs and cats in the early 1990s

Make vaccines work better in chickens.

And, of course, oral intake of Acemannan by humans is a vital subject of this presentation.

Aloe's Effect on Physiology: Structure and Function

Diseases and disorders result when the structure and function of the body's biochemical processes are out of balance.

In an effort to focus on the basic premise that food components are required by all human life to ensure optimal health, humans of all ages must acquire adequate amounts of correct nutrients.

This starts in infants at breast-feeding and continues in adulthood via a healthy diet.

Aloe provides carbohydrates and prebiotics comparable to human breast milk and supplies structural building components and energy. (More about human breast milk as a prototype of Acemannan shortly)

This is why doctors prescribe early on pre-natal vitamin supplementation to ensure good nutrition for both mother and child. Well-nourished mothers produce healthier offspring.

After birth, mother's milk provides infants with required necessary nutrients to maintain normal structure and function of the baby's body.

If nutrient deficiencies or excesses exist this can alter structure and function that can potentially express itself in disease or disorder. This makes all such disorders having a biochemical basis.

Drugs, also, are designed and intended to affect the structure and function of the body.

Because drugs are not a food it ultimately creates additional disturbances that may require additional drugs.

Foods, on the other hand, can restore imbalances but do so without affecting other aspects of physiology.

Food ingredients have the advantage of working in harmony with nature to provide body parts and organs with normal structure and function.

Aloe as a Source of Mannose

Aloe is one of the few plants in nature that is rich in mannose.

Past assumptions said that all the monosaccharides (i.e. mannose) in the body were naturally derived from glucose. Though essential monosaccharides can be obtained through the liver conversion of glucose, it has been established by new evidence that it is important to have direct dietary sources of mannose, as opposed to leaving production of mannose solely to the conversion by the liver.

Mannose is very important especially to cellular communication.

Several cells have been found to reveal active pumps, which are able to selectively move mannose from extracellular fluids into the interior of the cell. These pumps extract mannose from food, assuming it is food that contains mannose.

Mannose is rare in the modern Western diet, but Aloe is a rich source of mannose. Therefore, its nutritional value must not be underestimated, and the health benefits it contributes not be overlooked.

Breast Milk as a Prototype for Acemannan

Human breast milk is a basic model for nutritional requirements, providing the necessary nutrition (proteins, lipids, carbohydrates)

Mannose is found in the milk of all mammals in significant concentrations. This illustrates its dietary importance.

Its importance is further illustrated by the fact that specific pumps in the intestine of humans move mannose from the intestine to the blood.

Though a theory exists that mannose is produced from the glucose in the liver, studies have established that human breast milk contains the mannose that serves as the main source of mannose for infants. So, dietary intake of mannose via breast milk is the most desired way to deliver mannose to an infant, thereby by-passing the liver processes.

Mother's blood provides mannose pre-term. *Because of the presence of mannose in the pregnant body of the mother, mothers with auto-immune diseases have had such diseases go into remission. However, after delivery and after the infant is weaned the auto-immune disease has been known to return.*

After birth, mother's milk provides enough mannose to supply all the infant's needs.

Large quantities of mannose are present in mother's milk as monosaccharides and HMOs (Human Milk Oligosaccharides). This provides a continuous supply of mannose in a time-released manner that are absorbed into the blood of the infant.

This provides a wide range of benefits: immunomodulation, optimal development, and disease prevention.

Studies Demonstrating the Effects of Breast Feeding on Neurological Development

- Breast-fed children score higher on intelligence tests than formula-fed children
- Intelligence test scores correlate with the time-period of breast feeding. (i.e. the longer the time spent on breast feeding the higher the score)

- Breast-fed pre-term children had an 8-point advantage over formula-fed pre-term children (a pre-term infant is a baby born too early, usually before 37 weeks of pregnancy have been completed)
- Breastfeeding is associated with small but detectable increase in cognitive ability in 8–18-year-olds

Additionally

- Breast-feeding decreases the incidence of sudden infant death syndrome (SIDS), autoimmune thyroid disease, celiac disease, diabetes, obesity, atopic dermatitis, allergies and other infections that occur later in life.

Acemannan and Probiotics (Friendly Bacteria)

For each cell in the human body there are ten bacteria in the intestine working for it.

In other words, there are ten times more bacteria in the intestine than there are cells in the human body.

There are ~10^{14} microorganisms in our gut comprising nearly 400 different species

The probiotics (friendly bacteria) in our gut play key roles relative to metabolism, immune system stimulation and regulation, and the memory mechanisms of systemic immunity.

These friendly bacteria digest Acemannan into mannose and mannose-containing oligosaccharides, which mimic the functions of mother's milk

And so, it is no surprise or coincidence that the intestine, where these bacteria are found, contains the special pumps that absorb these monosaccharides (mannose) and move them into the blood stream.

Industrialized Nations vs Non-Industrialized Nations

Interesting dynamics exist when we contrast industrialized nations verses non-industrialized nations.

Industrialized Nations:

- Are more prone to deliver newborns through cesarean section
- Use greater amounts of antibiotics, and
- Formula-feed their infants

Generally, these practices can prevent beneficial organisms from colonizing the intestines and exacerbate various physical problems

Repercussions can be described as probiotic colonies which are less diverse and a reduction in immune protection.

Non-Industrialized Nations:

- Are more likely to experience vaginal delivery
- Breast feeding, and
- Limited use of antibiotics

Generally, these practices are more conducive to building a more diverse colony of beneficial bacteria, which produces enzymes to break the various beta-bonds in HMOs.

Add to the use of antibiotics the inclusion of modern food preservatives and there is even more reason for probiotics to be destroyed or depleted leading to poor digestion and absorption of important nutrients, and, paradoxically, to malnutrition.

Acemannan brings mannose to the adult dietary intake like mother's milk brings mannose to the baby.

Importance of sustained release

Just like a constant supply of oxygen is needed, mannose, too, needs to be maintained at a constant level for optimal health.

The amount of mannose in the blood determines the potency of the immune cell response.

It is true that when dietary mannose is not available, the liver can compensate by producing mannose from glucose.

However, dietary mannose is preferred over the energy-expensive process of liver-based mannose production.

When more mannose is absorbed than is needed, it is quickly converted to energy and eliminated.

Naturally, Acemannan, with the help of probiotics, provides SCFAs (short chain fatty acids) with their many beneficial effects, including a significant contribution to colon health. SCFAs promote colon health by stimulating the growth of epithelial cells, which line the colon, and which also line the jejunum (8 feet in length) and the ileum (12 feet in length), which are parts of the small intestine.

The most important and succinct conclusion of these experiments and studies is that Acemannan is digestible, easily assimilated, and is efficiently used by the body

Studies demonstrate that oral ingestion of mannose can quickly elevate blood mannose concentration. The more mannose is ingested, the more mannose is actually absorbed.

Several studies demonstrate increased activity in the liver, intestine and spleen after mannose is delivered via oral ingestion, intravenous (IV) or intra peritoneal (IP) (via body cavity). IP has only been done with animals.

Moving Mannose Into the Cells & Its Effects

We have already established that mannose in the diet is preferred over mannose produced from glucose in the liver. Mannose Transporters more easily move mannose into the interior of cells, even in the presence of high concentrations of glucose.

Mannose Receptors play an important role as they are found on macrophages and other immune system cells.

The higher the concentration of mannose means they are able to more efficiently stimulate recognition and internalization of Mannose Receptors. Therefore, macrophages are more efficiently stimulated by larger quantities of mannose monosaccharides, oligomannans, polymannans and other compounds

These actions, coupled with the production of various immunological molecules, stimulate the bone marrow to make more stem cells, which can supply more monocytes, more macrophages and other cells involved in wound healing and infection control. (Macrophages are immune cells derived from progenitor (parent) cells found in the bone morrow)

When MBL (Mannose-Binding Lectin) is low in concentration, such an environment induces the production of inflammatory cytokines. High doses of these cytokines can affect normal organ function and contribute to septic shock (possible death). But when the body detects a high mannose concentration it prompts the body to produce more Mannose-Binding Lectin (MBL) keeping inflammation and cytokines at bay.

Acemannan and Macrophages

Acemannan is a powerful macrophage activator. Activated macrophages are deeply involved in self-regulated immunomodulation. This accounts for the broad range of health benefits attributed to Aloe: wound healing, infection control, immunomodulation, etc.

Higher mannose concentrations can better enhance macrophages' natural functions. Acemannan, a good source of mannose, is ideal for this process.

Polysaccharides (i.e. Acemannan) are able to activate macrophages and initiate a potent immune response by helping to stimulate and enhance macrophage activity.

Acemannan and Viruses

Disclaimer: In my opinion, there remains still a great deal of need concerning research about viruses in general. Much conflict and confusion has come to light especially during the Covid scare, the global vaccination strategy, and the new revelations into virus isolation. With all that said, the bottom line of this presentation is that, above all other ideas or perspectives, having a strong immune system that each person takes personal responsibility for, is the number one priority.

Many of the current treatments for viruses are innately toxic to humans.

All antiviral drugs are toxic at any concentration . . . This has spurred the search for new, natural antiviral remedies.

Acemannan has gained importance in research due to its safety and efficacy and the contribution it makes to immunostimulation.

Acemannan stimulates the immune system to provide a wide range of beneficial and therapeutic effects. Acemannan can effectively stimulate the immune system to destroy viruses (and other pathogens) to prevent the adhesion, penetration, absorption and replication of viruses.

Acemannan, Macrophages, and Cancer

One of the functions of macrophages appears to be the prevention of cancer.

This explains the dietary importance of Acemannan as it, too, becomes an important element in preventing cancer.

Dozens of published studies recognize and demonstrate the macrophage-activating effect of Aloe and its active component, Acemannan, in the management of cancer and tumors. This may be a more effective approach for naturally managing cancer, with no innate toxicity or adverse side effects.

Activated immune cells play a major role in the destruction (lysis) and engulfment (phagocytosis) of cancer cells

MBL (Mannose-Binding Lectins), mentioned earlier, can also play a role in the induction of apoptosis (programmed cell death of cancer cells). Therefore, another good reason to include dietary mannose via Acemannan, as it contributes to the production of more MBLs.

Acemannan, with the help of probiotics, provides SCFAs (short chain fatty acids). This function of maintaining balance of probiotics (since probiotics are involved in the production of SCFAs),

and which leads to normal colon physiology, explains the beneficial effects of dietary fiber in reducing cancer risk. Proper metabolism of Acemannan not only provides energy for the bacteria and the host, but also is part of the production of these vital SCFAs.

If you place cancer cells and Acemannan in the same petri dish the Acemannan will NOT destroy the cancer cells. That will not happen in vitro or in vivo. Acemannan stimulates and modulates what is natural to the human body, the immune system, to do its job. One of those jobs being to identify and destroy aberrant (cancer) cells.