Bittersweet - The Bitter the Better!

Bitter herb alkaloids. Can bitter herbs work with taste receptors to defend the body from invasion?

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Quiz

How many categories of herbs are there?

And what are they?
What is? - Definitions

• Bitter: Stimulates secretions of the digestive system. Known to support digestion and balance appetite. (i.e. Wormwood/Artemisia, Golden Seal)

• Alkaloids: Highly active plant constituent containing organic nitrogen compounds. Pronounced physiological actions on humans. Can even be medicine or poison.

• Sweets: Usually a tonic (to tone) herb. Containing carbohydrates and proteins. Known as a “Qi Tonic”.

• Great example: “Licorice Root”. Although sweet in taste, Licorice is often used as a de-toxicant and anti-inflammatory (similar to bitter herbs) and licorice does contain bitter components too.

Herbal Medicine, what is it?

• Known as Botanical/Phytomedicine or Phytotherapy.

• Refers to using a plant’s seeds, berries, roots, leaves, bark, or flowers for medicinal purposes.

• Herbalism has a long tradition of use outside conventional medicine.

• Becoming more mainstream. Improvements in analysis and quality control, along with advances in clinical research, show the value of herbal medicine in treating and preventing disease.

• Plants have been used for medicinal purposes long before recorded history. Ancient Chinese and Egyptian papyrus writings describe medicinal uses for plants as early as 3,000 BC.

Recommending herbs?

You are in the right place at the right time!

• Recently, the World Health Organization (W.H.O.) estimated that 80% of people worldwide rely on herbal medicines for some part of their primary health care.

• In the past 20 years in the U.S., public dissatisfaction with the cost of prescription medications, combined with an interest in returning to natural or organic remedies, has led to an increase in herbal medicine use.
How do herbs work?

• Scientists are not sure what specific ingredient in a particular herb works to treat a condition or illness. Whole herbs contain many ingredients, and they may work together to produce a beneficial effect.
• Many factors determine how effective an herb will be. For example, the type of environment (climate, bugs, and soil quality) in which a plant grew will affect it, as will how and when it was harvested and processed (Better know and trust your source company).
• Herbal supplement use has increased dramatically over the past 30 years.
• Herbal supplements: classified as dietary supplements by the U.S. Dietary Supplement Health and Education Act (DSHEA) of 1994.
• That means herbal supplements, unlike prescription drugs, can be sold without being tested to prove they are safe and effective. However, herbal supplements must be made according to good manufacturing practices. (Univ. Maryland Medical Center 2017)

Bitter Sweet?

• Recent science: stimulation with bitter, ramps up the immune system against gram negative bacteria (bad).
• Sweet taste tends to calm it down, to reduce an “over reaction”.
• 1981 - Harbin, China: Researchers described how to test astragalus polysaccharides (active constituents/immune-promoting).
• Traditional Chinese Medicine: the tonic quality of Astragalus is associated with “sweet taste”.
• Sweet taste: likely be made up of sugars. Various saccharides - tonic action. Tested for increasing resistance to disease as measured by specific immunological tests.
• Conclusion: Astragalus polysaccharides had a marked effect on several immune responses, including a calming effect; this work was followed up in the U.S. and became the basis of recommending astragalus for treatment of cancer patients suffering from chemotherapy-induced leukopenia.

Quiz

• Based upon what we know so far:
1. Which of the following is an example of a sweet herb: Licorice Root or Wormwood?
2. Would the "sweet herb" stimulate the immune system or tend to help it tone or calm down/balance?
This just in: Taste buds are now found everywhere! Especially bitter/sweet ones. These taste receptors (buds) are not only on the tongue, but found throughout the body.

Try to guess for what purpose?

To defend us against dangerous microbes (gram negative). (Scientific American Feb. 2016)

Why are there taste buds all over the body, not just the tongue?

- Taste buds have been named because of their role on the tongue.
- Only recently been discovered in many organs/tissues! (Scientific American 2/2016)
- We now know that even though many of these tissue taste buds never come in contact with food, they play an important role in immunity.
- Bitter receptors cause a hair trigger reaction, i.e. the Airway is lined with millions of bitters to help detect airborne pathogens (gram negative bacteria etc.).
- Bitter taste buds are a part of the 1st line of defense – a hair trigger response.
- If we could help stimulate this process with herbs, could we boost our immune system in times of stress?

Historically YES!

The case for Bitter Sweet

- Antibiotics are known to be over-prescribed leading to dangerous antibiotic-resistant bacteria (MRSA).
- Researchers are looking for ways to naturally work with the immune defenses of the human body.
- For example: Airways. The airway is lined with special epithelial cells that respond to bitters. Used by the body to fight respiratory infection.
- Avg. person takes in more than 10,000 liters of air a day! Why don’t all people then get sicker more often?
- Turns out the answer is on the tip of our tongue (or whole body).
Taste receptors on our tongue (in orange). Help play a disease fighting role!

Taste buds - taste receptors

- Taste receptors detect bitter flavors (and sweet). Turns out, they also defend us against bacteria.
- 1st – they send signals to move “cilia (hair-like projections)” sweeping out debris, bacteria, virus, etc. Acting on Goblet cells (mucus).
- 2nd – taste buds tell cells to release nitric oxide, which kills bacteria and sends out antimicrobial proteins called “defensins”.

“Cilia” isn’t that a song? By Simon and Gar-goblet?
Taste Receptors Recap

- Bitter/sweet taste buds or receptors are now found all over the body (airway, heart, intestines, etc.) not just the tongue.
- Most immune responses take days. Now we know these bitter taste bud receptors act in just minutes! An early warning system to the immune (stimulating cilia/producing nitric oxide).
- Receptors (buds) also send signals to the brain about nutritional value, toxicity, or even medicine of foods. Sense of taste: Bitter, sweet, salty, sour, and savory (umami).
- Bitter receptors or buds are gatekeepers of the digestive system too (help us to decide what to swallow).

Quiz

- Bitter taste buds or receptors are responsible for what?
  A. Stimulating the movement of cilia to help sweep out debris, bacteria, virus, etc.
  B. Tell cells to release nitric oxide (deadly to invading bad bacteria)
  C. They “sense” nutritional value, toxicity, and medicines.
  D. All of the above

Taste Buds – key to survival

- Sweet, salty, sour, and umami, only have one type of “receptor”.
- Bitter has at least 25 different receptors. Known as “Type 2 receptors” or T2R’s.
- Univ. of Iowa discovered that Cilia in lung cells actually beat faster when T2R’s were stimulated by bitter compounds! (J. of Clinical Investigation, Vol.124, No. 3, 1393-1400; March 3, 2014)
- Univ. of Colorado Anschutz Medical Campus – showed evidence that taste bud receptors respond to outside invaders. (Cellular and Molecular Life Sciences, Vol. 72, No.2, 217-236; 1/2015)
Taste to Immune Connection

- Taste buds sensing “bitter”, release nitric oxide (gas).
- Nitric Oxide is deadly to bacteria. It also increases the cilia.
- Our sinuses produce large amounts of nitric oxide to help keep our airways free from infection (and enhance cilia).
- Historically the herb “Boneset (Eupatorium perfoliatum)” has been used for cough, flu, and fever. A bitter herb. This science creates a bigger understanding of why herbs WORK!
- Do you see why now herbs are so popular? Science is catching up to what nature has to offer!

Let’s understand more and act.....

- Bacteria (gram negative) release chemicals that are detected by bitter receptors.
- This starts the whole immune frontline reaction.
- Ingested and applied Bitters may act like bacteria - instigating the same type of reaction.
- So in theory, if we want to help the body better defend itself from invaders, and create molecules like “defensins (antimicrobial)”, bitter herbals have a powerful role. Don’t worry, the “sweets” also help modulate the whole process, and we all get plenty of those!

Quiz

- In the following bronchial/respiratory formula: Boneset, Fennel, Fenugreek, Horseradish, and Mullein, which herb do you know for sure is a “bitter”? This would help make it a great combination for what?
  A. Mullein - Skin concerns.
  B. Boneset - Upper respiratory support and clearing.
  C. Fennel – Hair growth.
  D. Horseradish - Hotdog eating contest, indigestion.
Putting information into action

• Genetically, some people have less “T2R or bitter receptors” than others. Hence, it may be why some people get colds, coughs, and flus more easily than others.
• Increasing the amounts of bitters, at times, may offer greater protection against infection. This has already been tested in sinusitis sufferers. (*J. of Clinical Investigation March 2014*)
• Hence, researchers are trying to make a “drug” which “acts” like a bitter.
• *Didn’t nature already do that?*

Are bitters part of the future of antibiotics?

• *Your food shall be your medicine...*
• Scientists are now looking at foods with bitter compounds like Brussel sprouts, hops, and even citrus fruits, like limes.
• A superstar on the horizon is *wormwood*. It contains “absinthin”. A bitter compound shown to stimulate T2R’s (bitter taste buds).
• Compounds based on “bitters” might someday be used to combat infection without using conventional antibiotics. (*Acta Physiologica Vol. 204, No. 2, 158-168 Feb. 2012*)

Golden Seal (*Hydrastis Canadensis*)

• This herb is a bitter and a tonic.
• Has long been used as “King of the mucous membranes”.
• Used by North American Indians for arrow wounds.
• High in Berberine. Useful against certain gram negative bacteria and supporting blood sugar balance.
• Reported to strengthen the immune system.
**Wormwood** (Artemisia absinthium)

- A bitter tonic herbal using the roots, leaves, and flowers.
- Used for centuries as anthelmintic (anti-parasite).
- Useful for all sorts of digestive complaints such as constipation and indigestion. Used in small quantities for short periods of time and not recommended for children/pregnancy.
- Was even used historically as an antidote for many poisonous mushrooms.

**Essential oils: bitter properties as well**

- The oil of Lime (Citrus aurantifolia) contains limonin - of the citrus bitter category.
- Using the peel of the unripe fruit which contains Limonene, pinenes, camphene, sabine, citral, cyanene, cineols, and linalool.
- Historical use includes fevers, infections, sore throat, and colds.
- Digestive aid as well. However is phototoxic.

**Quiz**

In a blend of essential oils known to help refresh/purify the body and repel insects (containing Spruce, Lemon, Lime Peel, Lavender, Tea Tree, Lemongrass, Citronella, and Peppermint) which one is the bitter we already discussed?

A. Peppermint
B. Lemon Grass
C. Lime Peel
Bitter sweet alkaloid remedies

- Using the discussed herbals and oils can help anyone support healthy lung function, help clear out airborne substances, refresh the body, encourage better digestion, deter parasites, modulate the immune system by both increasing it and balancing it.
- Also they help tone the system and fight off gram negative bacteria, by working with over 25 bitter taste buds in the body.
- How many people do you know you can help with this knowledge?
- Share this information and remedies with anyone, it's easy!

In Summary

- Bitter alkaloids and sweet herbs have been used for centuries.
- Science has now shown that the human body has over 25 bitter taste bud receptors all over the body – for a purpose – immunity!
- Bitter herbs historically may have a powerful impact, yet is starting to be substantiated as the new molecules of modern medicine/science.
- Herbs are once again in the news. That is why they aren’t going away anytime soon. Nature knows!
- When supporting your immune system, digestion, and airways, think bitters!!