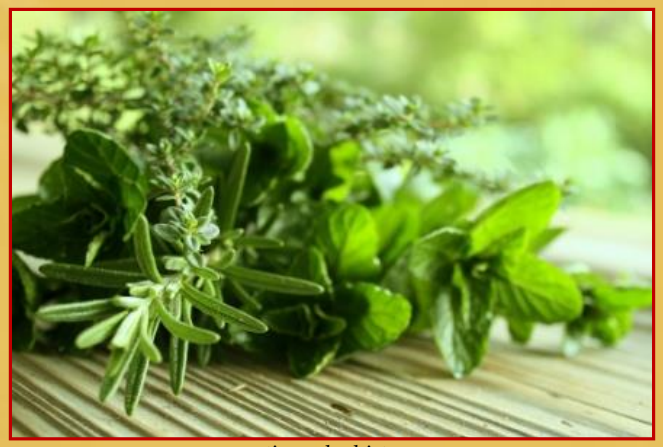
Herbs and Spices in Health and Disease

What is an Herb?

- A plant or plant part (such as leaves, flowers, or seeds) that is used for its flavor, scent, and/or therapeutic properties
  - In the culinary sense, herbs are leaves of plants that can be used either fresh or dried to season food
  - Botanical =herb



www.rusticgardenbistro.com

United States National Arboretum, 2006; Viuda-Martos et al., 2011

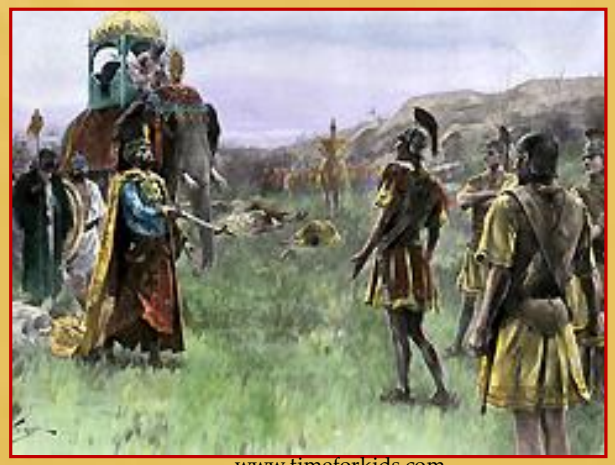
What is a Spice?

- *Aromatic vegetable substances, in the whole, broken, or ground form, whose function in food is seasoning rather than nutrition…no portion of any volatile oil or other flavoring principle has been removed.* (FDA, 2009)
- Most spices originate from plant fruits (nutmeg, black pepper, cardamom)
- Spices can also originate from the leaf (e.g., thyme), bulb (garlic clove), bark (cinnamon), root (ginger), seeds (cumin), or stigma of the flower (saffron)

United States Food and Drug Administration (FDA), 2009; United States National Arboretum, 2006; Viuda-Martos et al., 2011

Historical Context

- First documented use of herbs and spices dates back to 50,000 B.C.
- Alexander the Great's campaigns in Central Asia (330 B.C.) introduced the adoption of spices among Asian, Persian, Indian, and Greek cultures
- Spice trade flourished during the second century A.D. along the "Silk Road"



www.timeforkids.com

Kaefer and Milner, 2008; The Academy of Nutrition and Dietetics (The Academy), 2013

Current Context

- Today, herbs and spices are used for flavoring, food preservation, and/or medicinal purposes
- The rising prevalence of chronic diseases, increases in health care costs, and widespread consumer usage has ignited research interest
- Culinary use may help to lower salt, fat, and sugar intake, and may encourage variety in diet

Kaefer and Milner, 2008; The Academy 2013; The National Center for Complementary and Alternative Medicine (NCCAM), 2013

Current Context

- Today, more than 1500 botanicals are sold in the US
  - Consumer sales were more than $5 billion in 2011
- About 40% report using Complementary and alternative medicine (CAM, i.e., therapies outside of the conventional medicine) in the past 12 months
  - At least 63% of the general population do not disclose the use of CAM therapies to their physicians

Birdee and Yeh, 2010; NCCAM, 2013

Top-Selling CAM Herbal/Dietary Products

Food, Drug Mass Market		Natural and Health Food Market	
Product	U.S. Dollars (Billion)	Product	U.S. Dollars (Billion)
Cranberry	65.4	Flax seed and/ or oil	18.4
Garlic	35	Wheat and barley grass	17.7
Saw palmetto	31.8	Tumeric	16.9
Soy	28	Aloe vera	13.7
Ginkgo	25.9	Spirulina/blue green algae	9.2
Milk thistle	21.1	Milk thistle	8.6
Black cohosh root	16.9	Elderberry	6.2
Echinacea	15.9	Saw palmetto	6.1
St. John's wort	12.2	Echinacea	5.9
Ginseng	11.1	Cranberry	5.1

Source: Lindstrom A, Ooyen C, Lynch ME, Blumenthal M. Herb supplement sales increase 5.5% in 2012: herbal supplement sales rise for 9th consecutive year; turmeric sales jump 40% in natural channel. *HerbalGram: The Journal of the American Botanical Council*. 2013; 99: 60–65.

Common Challenges

Challenges in Scientific Research

- Poor feasibility and replication issues in many human clinical trials
  - What were the active constituents used?
  - Dosing safety?
  - How do herbs and spices fit within the context of our usual diets?

Mathieu, 2007; NCCAM, 2013

Challenges in Scientific Research

- Quality randomized controlled trials are lacking
  - Smaller sample sizes, poor study design, adverse events are not always reported
- Possible conflict of interest, single researcher group led studies
- Generalizing the results to a broader population

Ackermann et al., 2001; Mathieu, 2007; NCCAM, 2013

Challenges in the Regulatory System

- Dietary Supplement Health and Education Act of 1994
  - The manufacturer is responsible for ensuring that the product is safe before it is marketed
  - Dietary supplements are considered *safe until proven unsafe* by the FDA
- Supplements are usually self-prescribed

FDA, 2013; Nestle, 2007

Challenges in the Media

- Products advertised claim to be “scientific breakthroughs”, “new discoveries”, “miracle cures”, and “one product does it all”
- Product recommendations based on a single study
- Health frauds

FDA, 2013; Mathieu, 2007; Wansink, 2006

Herbs and Spices in Health and Disease

GINGER

Latin: *Zingiber officinale*

- Perennial plant commonly grown in India, Jamaica, and China
- Underground root is called the rhizome
- Traditional medicinal usage dates back to over 5000 years ago
- Consumed as fresh or dried root, tablets, capsules, liquid extract, tincture, tea, candied, powdered or ground

National Standard Monograph, 2013; NCCAM, 2013

GINGER

Latin: ***Zingiber officinale***

- Non-volatile constituents contribute to *pungency* (example, gingerols, oleoresins)
- Volatile oils contribute to *odor* (example, monoterpenoids)

http://www.mountsinai.org

Ali et al., 2008; National Standard Monograph, 2013; NCCAM, 2013

Ginger: Scientific Evidence

- Randomized controlled trials support that ginger reduces the ***severity and duration*** of nausea or emesis during pregnancy
  - Up to 1g of dried ginger/day may be safe and effective for pregnancy-associated nausea and vomiting when used for a short time-period (≤ 4 days)
  - No adverse events reported
  - Side effects may include gas, bloating, and heartburn

Borrelli, 2005; National Standard Monograph, 2013; NCCAM, 2013; Willetts, 2003

Ginger: Scientific Evidence

- Caveats
  - Daily consumption of amounts >1g of dry weight is not advised (purported abortifacient)
  - Safety is unclear

Borrelli, 2005; Grzanna et al., 2005; National Standard Monograph, 2013; NCCAM, 2013; Willetts, 2003

GARLIC

Latin: *Allium sativum*

- Originated from central Asia over 6,000 years ago
  - Member of the lily family, derived from the bulb or clove of the plant
  - Referred to as the 'nectar of the gods' , 'camphor of the poor'
- Traditional use in Egyptian medicine dates back to 1550 B.C.

National Standard Monograph, 2013; NCCAM, 2013

GARLIC

Latin: *Allium sativum*

- **Allyl organosulfur compounds** and their derivatives contribute to pungency
  - Intact garlic has sulfoxides **(alliin)**
  - When raw garlic is cut or crushed, the sulfoxides are converted into thiosulfinates **(allicin)**
- Heating, microwaving, or drying can substantially reduce the sulfur compounds

Butt et al., 2009; National Standard Monograph, 2013; NCCAM, 2013; Rivlin, 2001

Garlic: Scientific Evidence

- Short-term effects of garlic on **serum lipids**
  - dehydrated garlic powder may elicit: sm**all** reductions in the total cholesterol
  - powdered garlic tablets may elicit small reductions in **blood pressure**
- Long-term effects on lipids remain unknown

Ackermann et al., 2001; National Standard Monograph, 2013; NCCAM, 2013; Rahman and Lowe, 2006; Reinhart, 2009

Garlic: Side effects

- Headache, fatigue, odor (breath and body), diarrhea
- Potential for herb-drug and herb-dietary supplement interactions

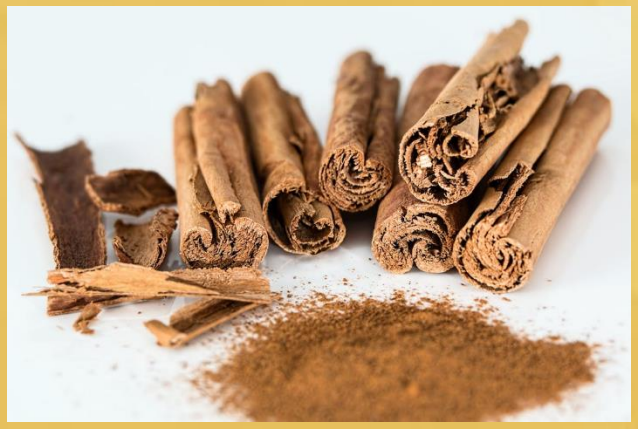
http://healthyhomemarket.blogspot.com

National Standard Monograph, 2013; NCCAM, 2013

CINNAMON

Latin: ***Cinnamomum zeylanicum; Cinnamomum cassia***

- Native to Sri Lanka and India
- Tree bark is naturally rolled when sun-dried
  - Contains essential volatile oils including cinnamaldehyde and eugenol
- One of the oldest herbs known, mentioned in Chinese texts 4,000 years ago
- Traditional medicinal use in Egypt and parts of Europe date back to 500 B.C.



National Standard Monograph, 2013; NCCAM, 2013

Cinnamon: Scientific Evidence

- **Moderate benefit** in **reducing plasma glucose** in type-2 diabetics
- Cinnamon's ability to prevent diabetes in patients with pre-diabetes is unknown
- Safety and efficacy needs to be established
- Side effects: allergic reactions, nausea, vomiting

Baker et al., 2008; National Standard Monograph, 2013; NCCAM, 2013; Ranasinghe et al., 2012

TURMERIC

Latin: ***Curcuma longa***

- Native to India
- Used as a spice and as a coloring agent in food/cosmetics for its yellow-orange color
- *Curcumin* is the main bioactive compound
- Used in traditional Chinese and Ayurvedic medicine
  - Digestion, arthritis pain, and applied to the skin to alleviate eczema symptoms

http://www.silkroadspices.ca

National Standard Monograph, 2013; NCCAM, 2013

Turmeric: Scientific Evidence

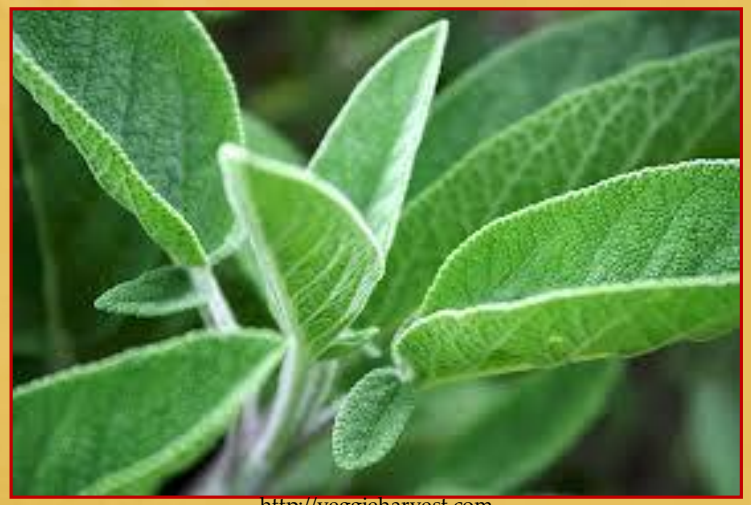
- High-quality clinical evidence for use of turmeric (or curcumin) in humans is lacking
- Preliminary animal and laboratory studies suggest that curcumin may have anti-inflammatory, anticancer, and antioxidant properties
- Side effects: allergic reactions and gastrointestinal distress with high doses

Dhillon et al., 2008; National Standard Monograph, 2013; NCCAM, 2013; Shehzad et al., 2010

SAGE

Latin: ***Salvia officinalis, Salvia lavandulaefolia***

- Originated in Southeastern Europe
- Leaves are chewed whole, dried and ground into a powder, prepared as a fluid extract, tincture, or essential oil, or pressed fresh for the juice
- Traditional European medicine refer Sage extracts as having memory-improving properties
- Folk remedy for hoarseness, coughs, and sore mouths and throats



http://veggieharvest.com

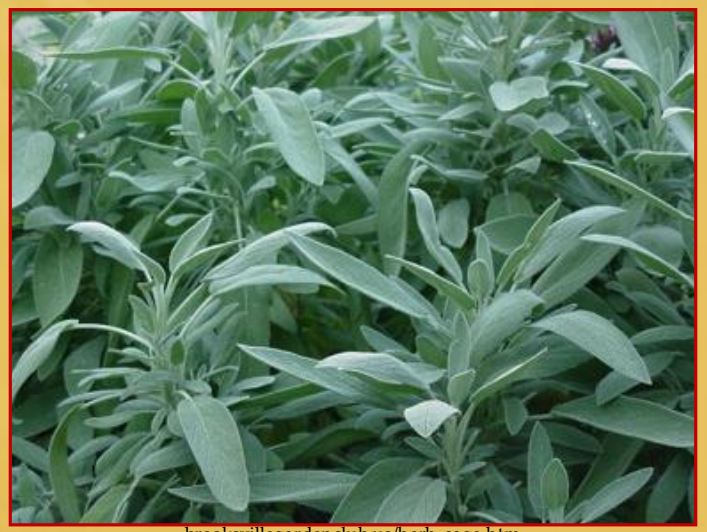
National Standard Monograph, 2013; NCCAM, 2013

Sage: Scientific Evidence

- Initial clinical evidence exists supporting the use of Sage for Alzheimer's disease and improvement of mood, cognition, and memory
- May improve cognition by inhibiting the enzyme acetylcholinesterase (thus prevents breakdown of Acetylcholine)

Sage: Side Effects and Toxicity

- Sage oil contains the neurotoxin **thujone,** which has epileptogenic properties
- Taking large amounts of sage leaf (at least 15g) may result in vomiting, seizures, and kidney damage
- Ingesting 12 drops or more of the *essential oil* is considered as a toxic dose



brooksvillegardenclub.us/herb_sage.htm

National Standard Monograph, 2013; NCCAM, 2013

FENUGREEK

Latin: ***Trigonella foenum-graecum***

- One of the oldest medicinal plants, originated from India and northern Africa
- In ancient Rome, fenugreek was purportedly used to aid in labor and delivery
- Fenugreek and type-2 diabetes management
  - Mean fasting blood glucose levels improved

http://www.123rf.com

National Standard Monograph, 2013; NCCAM, 2013; Yeh et al., 2003

Fenugreek: Precautions

- Pregnancy
  - Given its historical use for inducing childbirth, pregnant women should use caution when taking fenugreek

http://www.speedyremedies.com

National Standard Monograph, 2013; NCCAM, 2013

SWEET BASIL

Latin: *Ocimum basilicum*

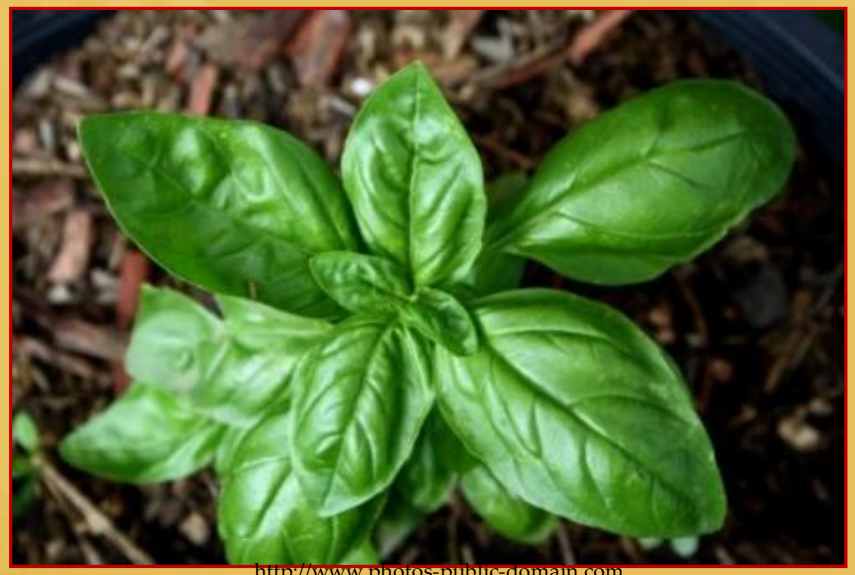
- Annual plant originating in Asia and Africa
- Made its way to England from India in the mid 1500s and arrived in the U.S in the early 1600s
- Commonly used in Italy, Turkey, Thailand, and India
- The constituents methyl chavicol, eugenol, and linalool contribute to flavor and scent
- Folk remedy: relieve stress, fever, and gastrointestinal disorders

http://inabraw.wordpress.com

The Herb Society of America, 2003; National Standard Monograph, 2013; NCCAM, 2013

Sweet Basil: Scientific Evidence

- Laboratory studies have investigated sweet basil for its antiviral and antibacterial effects
- Insufficient clinical evidence in humans to support the use of sweet basil for any condition
- Side effects are rarely reported aside from allergy



http://www.photos-public-domain.com

National Standard Monograph, 2013; NCCAM, 2013

CAYENNE (Red Pepper)

Latin: ***Capsicum annuum, Capsicum frutescens***

- Shrub that originated in Central and South America
  - Native Americans have used cayenne in food and medicine for at least 9,000 years
- Commonly used in traditional Ayurvedic, Chinese, Japanese, and Korean medicinal systems
  - Applied to the skin for arthritis and muscle pain
- The level of pungency (heat) depends upon the capsaicinoids content, primarily **capsaicin**

Windycityorganics.com

Mason et al., 2004; National Standard Monograph, 2013; NCCAM, 2013; Singletary, 2011

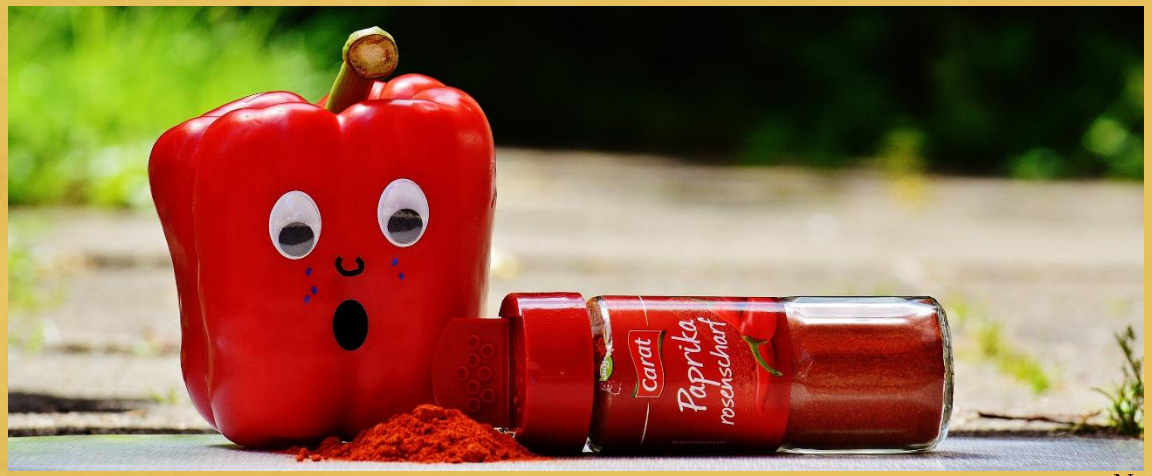
Cayenne: Scientific Evidence

- Topically applied capsaicin has only **poor to moderate efficacy** in the treatment of chronic musculoskeletal or neuropathic pain

Mason et al., 2004

Cayenne: Side effects

- When used orally, may cause mouth and throat irritation, gastrointestinal irritation, stomach pain, and may damage the taste buds
- Topical application may cause burning, redness, and irritation
- Inhalation may cause cough



National Standard Monograph, 2013; NCCAM, 2013

Next Steps

Herbs and Spices: Where from here?

- Being current about the literature
- The influence of media
  - Using media to stay knowledgeable about recent developments, and not necessarily drawing conclusions
  - Direct reporters and consumers to credible sources of food- and nutrition-related information

FDA, 2013; Mathieu, 2007; Wansink, 2006

Thank You!

olivegardensouprecipes.com