Plenary 1- Taking the Spice Route to Health

Mary L. Hardy, MD

Saturday, July 8, 2017
8:15 a.m. – 9:00 a.m.
Taking the Spice Route to Health
Exploring the Boundary Between Food & Medicine

Mary L. Hardy, MD
George Washington University &
Wellness Works

What are Spices?

- Aromatic
- Dried
- Edible
- Plant part: root, bark, stem, bud, leaves, flower, seed, fruit, resin or oil
- Rich in potent phytochemicals
- Often intensely colored
- Culinary & Medical applications

The Story of Spices
How the Most Fabulous Luxury Goods
Changed the World Forever
The Story of Spices- In the Ancient World

- Cinnamon & Cassia were used in mummification
- Cones of wax mixed with spices & other aromatic material were worn at formal occasions
- Spices were buried with the pharaohs
- Offering to gods
- Slave could be bought for 14 lbs of garlic

Herbs & Spices
Ancient Medicine

Medieval Herbal Medicine: Monestary & Physic Gardens
World Wide Spice Trade

New World Spices

- Allspice (Pimenta Dioica): Jamaican Jerk seasoning
- Capsicum species
  - Paprika Capsicum annuum (homozygous recessive)
  - Cayenne Capsicum frutescens
- Vanilla (V. planifolia) Mexican orchid
- Chocolate

Why Spices?

For health and pleasure
Let Food be Your Medicine
and
Let your Medicine Be Food.

Hippocrates

You are What You Eat!

Eat Spices- Live Longer

- Following approximately 200,000 men & 300,000 women for a 7 years in China
- 14% reduction in all cause mortality eating spices 6-7 times per week
- Inverse associations for deaths due to
  - Cancer
  - Heart Disease
  - Respiratory Diseases

Cooking—Good for Your Health

- Meals away from home¹
  - Higher BMI
  - Lower F/V intake
- Cooking at home²
  - Healthier diet
  - 600 less kJ/day
  - Slightly lower fat intake
  - Lower sugar intake
- Eating at home decrease risk of Type 2 DM³


Spices Improve Adherence to “Healthy” Diets

- Better adherence to low sodium diet¹
  - Taught to cook with spices
  - At end 20 weeks, spice group 1000 mg/d less than control
- Better acceptance of lower fat food²
  - Adding spices to low fat foods (meatloaf & vegetables) returned liking to normal fat food AND near normal to pasta.
- Workshop with Deborah Cohen to learn to use spices to support a healthy diet
- Cooking demo healthy meal prep


Top Spice Producing Countries

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>India</td>
<td>1,479,900</td>
<td>1,529,000</td>
</tr>
<tr>
<td>2</td>
<td>Bangladesh</td>
<td>128,517</td>
<td>139,775</td>
</tr>
<tr>
<td>3</td>
<td>Turkey</td>
<td>107,000</td>
<td>113,763</td>
</tr>
<tr>
<td>4</td>
<td>China</td>
<td>90,029</td>
<td>95,690</td>
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<tr>
<td>5</td>
<td>Pakistan</td>
<td>53,647</td>
<td>53,020</td>
</tr>
<tr>
<td>6</td>
<td>Iran</td>
<td>18,628</td>
<td>21,307</td>
</tr>
<tr>
<td>7</td>
<td>Nepal</td>
<td>20,534</td>
<td>20,006</td>
</tr>
<tr>
<td>8</td>
<td>Colombia</td>
<td>16,958</td>
<td>19,378</td>
</tr>
<tr>
<td>9</td>
<td>Ethiopia</td>
<td>27,122</td>
<td>17,905</td>
</tr>
<tr>
<td>10</td>
<td>Sri Lanka</td>
<td>8,283</td>
<td>8,438</td>
</tr>
<tr>
<td>11</td>
<td>World</td>
<td>1,995,523</td>
<td>2,063,472</td>
</tr>
</tbody>
</table>

Source: UN Food & Agriculture Organization⁴
How Can Spices & Culinary Herbs Be Used

- Whole or ground in cooking
- Teas & decoctions or syrups
- Tinctures
- Extracts
- Pharmaceutical forms
- Essential oils inhaled or applied topically

Pharmacology of Spices

*Actions & Constituents*

- Anti-inflammatory
- Cardioprotective & Lipid lowering
- Neuroprotective
- Carminative
- Hypoglycemic
- Anti-microbial
Culinary Herbs & Spices with Anti-inflammatory Effects

**COX 2 Inhibition**
- Basil: Moderate
- Bay Leaves: High
- Black Pepper: Low
- Chilli Pepper: Low
- Clove: Moderate
- Ginger: Low
- Nutmeg: Low
- Perilla: Moderate
- Thyme: Low

**Pro-Inflammatory Macrophages**
- Basil: Mixed
- Bay leaves: Mixed
- Black Pepper: Lowers marked
- Chilli Pepper: Lowers marked
- Clove: Lowers marked
- Ginger: Lowers mod
- Nutmeg: Lowers mod
- Thyme: Lowers mod

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Anti-inflammatory Constituents

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Black Pepper
Black Pepper (*Piper nigrum*)

- Plant part used: dried fruit
- Active ingredient: alkaloid Piperine
- Warming principles
- Traditional uses:
  - Ayurveda: Digestive, Diabetes, TCM, Cold digestive fire

- Enhances digestion
- Stimulates release of pancreatic enzymes
- Decreases GI transit time
- Anti-oxidant
- Lower lipid peroxidation
- Inhibition of Cytochrome P450 enzyme

Piperine Pharmacokinetics

- Crossover, placebo controlled study 8 healthy men
- Piperine 200 mg or control for 6 days
- Day 7 200 mg nevirapine given (non-nucleoside inhibitor of HIV-1)
- Piperine increased absorption of nevirapine by 120-170%


Helpful Chemistry: Food & Medicine

Curcuminoids

Figure 1: Major Turmeric-derived Curcuminoinds

Piperine
Ginger (*Zingiber officinale*)

- One of the most commonly consumed condiments
- Used medicinally by every traditional herbal system
- Use documented in China & India 5000 years
- Imported to Roman Empire from India 2000 yrs ago; trade continued throughout Europe as medicine end of middle ages
- Queen Elizabeth I invented gingerbread man

Ginger (*Zingiber officinale*)

- Plant part used: rhizome
- Active ingredient: Oleoresin
  - 115 components identified
  - Gingerol (primary pungent ingredient)
  - Shogoal (higher in dried ginger)
  - Composition of actives varies based on geographic location
- Traditional uses: colds, nausea, pain relief

Ginger: *Zingiber officinale*

- Part: Rhizome (Raw, fresh)
- Name: Sheng jiang pian
- Prop: Acrid, warm
- Channels: Lng, Spln, Stmch
- Action: Releases exterior and disperses cold; Warms the middle burner & alleviates vomiting (cold in stomach); reduces toxicity of other herbs; Adjusts the nutritive and protective qi
- Dose: 3-9 gm
Ginger: *Zingiber officinale*

- **Part:** Rhizome (Dried)
- **Name:** Dan gan jiang
- **Prop.:** Acrid, hot
- **Channels:** Hrt, Lng, Spln, Stmch
- **Action:** Warms middle & expels cold (external & insufficient yang qi); Rescues devastated yang & expels interior cold; Changes sputum (use thin, watery, white); warms channels & stops bleeding
- **Dose:** 3-12gm

Ginger in Ayurveda

- **Name:** Sunthi (Sanskrit)
- **Fresh:** Ardaka; Dry: Nagara
- **Rhizome used**
- **Dosha:** +P/ -VK
- **Taste:** Pungent, sweet/heating
- **Systems:** Digestive, respiratory
- **Actions:** Stimulant, diaphoretic, expectorant, carminative, antiemetic, analgesic

Ginger in Western Herbal Traditions

- Stimulant
- Rebefacient
-Errhine
-Sialagogue
-Anti-emetic
-Carminative
- Menstrual cramps
- Headache
- Cold
- Warming

King’s American Dispensatory 19th c.
Ginger Scientific Evidence

- Antioxidant
- Anti-inflammatory
  - Cancer
  - Dementia
  - Pain
  - Ulcerative Colitis
  - Asthma
- Antiemetic
- Cardioprotective
  - Increases resistance to oxidation of lipid
  - Inhibits platelet aggregation
  - Lowers cholesterol
- Anti-diabetic
- Anti-cancer effects

Tumeric

Curcumin: Modulation of COX-2 and LOX

\[ \text{COX-2, cyclooxygenase-2; iNOS, inducible nitric oxide synthase; LOX, lipoxygenase; NF-kB, nuclear factor kappa B; iNOS, inducible nitric oxide synthase; NF-kB, nuclear factor kappa B; NO, nitric oxide; RNS, reactive nitrogen species.} \]

Curcumin
Gastrointestinal Disorders: Ulcerative Colitis

Patients & Design: Randomized, double-blind, placebo-controlled multicenter trial of curcumin as maintenance therapy for patients in Japan with quiescent UC (N = 89). All patients received SZ (1–3 g/d; median 2 g/d) or mesalamine (1.5–3 g/d; median 2.25 g/d).

Outcomes:
- CAI
- EI

Curcumin 1 g BID (n=43) or placebo (n=39) x 6 mo

Patients continued on SZ or mesalamine for an additional 6 mo

- Relapse rate lower in curcumin group vs control (4.6% vs 20.5%; P= .04)
- Mean CAI in curcumin group improved from 1.3 at baseline to 1 at 6 mo (P=.038)
- Mean CAI in placebo deteriorated from 1 at baseline to 2.2 at 6 mo (P=.003)
- Patients in curcumin group had improved EI (1.3 at baseline vs 0.8 at 6 mo; P=.001)

BID, twice daily; CAI, clinical activity index; EI, endoscopic index; SZ, sulfasalazine; UC, ulcerative colitis.


Curcumin Phytosome & Symptom Reduction Chemotherapy

Table 3a. Incidence of symptoms and signs (percent of patients with side effects) resulting from chemotherapy as assessed by a diary recorded over a period of two months.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>MEDIAN (%)</th>
<th>CONTROL (%)</th>
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</thead>
<tbody>
<tr>
<td>Nausea and vomiting</td>
<td>40</td>
<td>65*</td>
</tr>
<tr>
<td>Diarrhea or constipation</td>
<td>38</td>
<td>47*</td>
</tr>
<tr>
<td>Malnutrition/weight loss</td>
<td>28</td>
<td>38*</td>
</tr>
<tr>
<td>Memory or cognitive function alteration</td>
<td>22</td>
<td>35*</td>
</tr>
<tr>
<td>Anemia</td>
<td>18</td>
<td>32*</td>
</tr>
<tr>
<td>Neutropenia</td>
<td>28</td>
<td>48*</td>
</tr>
<tr>
<td>Leukopenia</td>
<td>28</td>
<td>65*</td>
</tr>
<tr>
<td>Insomnia</td>
<td>22</td>
<td>31*</td>
</tr>
<tr>
<td>Hypertension</td>
<td>20</td>
<td>23</td>
</tr>
<tr>
<td>Hypokalemia</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Dyspepsia</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Medications required for side effects</td>
<td>56</td>
<td>77*</td>
</tr>
</tbody>
</table>

* P = <.05 compared with control group.

Herbs & Spices for Chemoprevention

Chemopreventive agent

Oleander (venomous)
Artichoke (lethality)
Red grapes, peanuts & berries (inhibitory)
Red chilli (spreading)
Turmeric (tumor)
Pomegranate (hypericin)
Fenugreek, anise, coriander [neurot]
Honey-bee propolis (venom-like, CAY)
Basil & rosemary [nervous]

Aggarwal B et al.
Curcumin & Neuropathic Pain

- Nociceptors activated by inflammatory cytokines released in response to damaged tissue
- Curcumin in animal models decreased neuropathic pain by down regulating TNF alpha and increased release NO2
- Additional effects mediated through a membrane bound metalloproteinase by binding and disabling this protein enzyme


Looking Forward

- Heart Health
- Metabolic Management
- Brain Health & Mood stabilization
- Pain management
- Infection & Immune response
- Women’s Health
- Keynote: didactic
- Case discussions each morning for an hour
- Workshops interactive
- Culinary choices

Questions & Thanks