Herbal Supplements in the Practice of Medicine

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What are we talking about?

- Herbal supplements
  - http://www.peoplespharmacy.com

- Herbal medicine
- Botanical medicine
- Phytomedicine
- Pharmacognosy
History of Herbal Supplement use in “Medicine”

- Gingko biloba probably oldest herb; fossil evidence one million years old
- Ancient Babylonian burial site with herbs, 60,000 years old
- Papyus Ebers from Egypt noted medicinal use of over 700 herbs from 1500 B.C.E.
- Chinese herbalists have used Gingko biloba, gensing and other herbs for over 5000 years. First Chinese study of herbal remedies, *Ben Cao*, written about 2000 B.C.E. by Emperor Shen Nong.
Herbal Supplements

• Are used by 80% of people worldwide as part of their primary health care (WHO)

• In Germany, 600-700 plant-based medicines are available and prescribed by 70% of physicians
Herbal Supplements in the USA

- Are controlled by US Diet Supplement Health and Education Act (DSHEA) of 1994
- Do not need to be tested to prove they are safe or effective
- Cannot be sold with claims of efficacy
Integration of Herbal Medicine into Evidence-Based Clinical Practice

Zhang et al, NCBI Bookshelf, 2011
(http://www.ncbi.nlm.nih.gov/books/NBK92760/)

- Issues include QA QC in preparations
- Research needed on herb-drug interactions (e.g. St John’s Wort and warfarin)
- Subjective versus objective measurements of effect
Used in treatment of BPH

Anti-androgenic like finasteride; weak estrogenic activity

Recent study (2009) did not see difference with placebo

Active ingredient is a plant sterol, beta-sitosterol

Side effects uncommon, but shouldn’t be used by pregnant women
• Alleviates perimenopausal symptoms compared to placebo, especially in combination with black cohosh (Gynecol Endocrinol, 2012)

• Possible photosensitivity

• Significant drug interactions
  – Induces P450s and enhances metabolism of many drugs

• Recommended for depression
  – Functions as an SSRI
Ginkgo biloba

- Used for memory loss
- Extract (GBE) better than any single ingredient
- May work by improving blood flow and is used for intermittent claudication, tinnitus or Raynaud’s phenomenon
- Used in Chinese medicine for asthma
- Drug interaction may result with anticoagulants since GBE inhibits platelet activating factor
Ginseng
Read *The People’s Pharmacy* by Joe and Terry Graedon
(http://www.peoplespharmacy.com/2005/10/18/ginseng/)

- A real clash between Chinese Traditional Medicine and Western Medicine
- Ginseng used for millennia as a general tonic or “adaptogen”
- Very safe
Soy beans rich in weak acting estrogens
Natural Products Found in the Environment Reported to be Estrogenic

Plant Products

- Genistein (isoflavone)
- Luteolin (flavone)
- Resveratrol (stilbene)
- Coumestrol (coumarin)

Symbiosis Between Plants and Bacteria

Legume

Phytochemicals

Rhizobium bacteria

$N_2$ $N_2$ $N_2$ $N_2$ $N_2$
Ninety seven postmenopausal women on soy diet for 4 weeks
Indices of estrogenicity “approached” statistical significance
Anecdotal reports of well being and “premenopausal sense”
Diet Rich in Soy or Soy Isoflavones

• Reduce LDL by 3-5%

• Reduce Blood Pressure by 2mm Hg/day (equivalent to cutting out 2 gm salt/day or losing 2 kg of weight)

• Reduce Hot Flashes by 31% in women ingesting more than 20 mg of genistein.

  – Kurtzer, unpublished meta-analysis
Pharmacology of Soy Isoflavones

• Reduce breast cancer risk (antiestrogen) and alleviate menopausal symptoms (estrogen)
• Agonist or Partial Agonist
• Japanese adults ingest 20-50 mg/day of isoflavones; Americans, 2mg/day
Results presented at N. American Menopause Society meeting, October 4 2012

- No effect on blood pressure, increase in HDL and decrease in LDL
- Improvement in bone density, hot flashes, sexual function and mood in pill and patch users
- Eased anxiety and depression especially among pill users
Why do plants copy our hormones?

After 400,000,000 years this is the best they can do?

I told you not to worry.
“The annual output of cocoa in Ghana couldn't help you”.
Soil Lead Levels in New Orleans (Howard Mielke and team)
Lead and Violence
(Zahran and Mielke, Env Sci, 2012)
DNA methylation in human stem cells altered by lead (Pb)

We are trying to understand how exposure to lead (Pb) causes damage to the brain of children. We are finding that Pb exposure modifies the DNA methylation status of stem cells, which may influence their differentiation fate. (Photo credit: Dr. Marie-Claude Senut and Dr. Douglas Ruden, Institute of Environmental Health Sciences, Wayne State University; work performed in the Cellular Reprogramming Laboratory at MSU)

Work of Senut and Ruden, unpublished
Temperature

Environmental chemicals (PCBs) reverse temperature dependent sexual development in turtles

Bergeron, Crews and McLachlan, EHP 1994
DNA Methylation in Temperature Dependent Sex Determination in European Sea Bass

Navarro-Martin et al. PLoS ONE 2011

Figure 5. Effects of temperature on sb cyp19a promoter methylation levels and correlation with gonadal cyp19a gene expression.
Global warming and sexual plant reproduction

Hedhly et al, 2009
Reconsidering the “New Normal:”
The Impact of *Trauma* on Urban Ecological and Social Diversity

- Part of the Resilient Urban Ecosystem Project
- Funded by NSF in 2009
- Co-Pis – Social Scientist and Biologist
- Faculty expertise includes geology, biology, ecology, sociology, law, mathematics, informatics, modeling and mapping
• Following two disasters, the federal floods of Katrina and the BP oil gusher – common medical finding and complaint was mental health related

• Is Trauma itself and environmental factor?!
Trauma as an environmental factor

Figure 1. EE Reduces Tumor Growth and Affects Biomarkers in Serum, B16 Melanoma Cell Proliferation In Vitro, Signaling Pathways in the Tumors, and Immune Functions (Cao et al, Cell 2010)
Figure 7. Mechanism of EE-Induced Tumor Resistance
Social environment is associated with gene regulatory variation in the rhesus macaque immune system
(Tung et al PNAS 2012)