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Optimizing Oral Health in Women: More than Just Lip Service

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Dr. Marcolina and Dr. Fenstemacher report no consultant, stockholder, speaker's bureau, research, or other financial relationships with companies having ties to this field of study.

PART 2 OF A SERIES ON ORAL HEALTH

A WOMAN'S LIFESPAN CAN BE SEPARATED INTO THE FOUR DISTINCT stages of childhood, catamenia (age of onset of first menstrual period), childbirth, and the climacteric (ovarian failure and the cessation of reproductive function),[1] although not all women experience every stage. Each presents unique clinical oral health concerns, which, when properly diagnosed and treated, enhance general medical health and quality of life.[2]

Childhood

Infants and Toddlers. The American Academy of Pediatric Dentistry recognizes baby bottle tooth decay and early childhood caries as significant public health problems associated with recurrent or prolonged consumption of liquids containing fermentable sugars. Measures such as avoidance of both bottle propping and giving bottles to older infants upon sleep will improve oral health.

An oral health consultation by the primary care physician for parent education is suggested within six months of eruption of the first tooth to provide anticipatory guidance for prevention of dental disease. Optimization of maternal oral hygiene will minimize cariogenic bacteria transmission to a child thereby decreasing the risk of developing early childhood caries.[3] Broadbent et al found that children with dental caries in primary teeth were twice as likely to have a demarcated enamel defect in successor teeth, and if early nontraumatic tooth loss occurred, permanent teeth were five times more likely to have enamel defects.[4]

Children and Teens (Catamenia)

Once children master shoe tying, they can manage twice-daily

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tooth brushing and professional cleaning every six months. Twice-daily tooth brushing and flossing with fluoride toothpaste and fluoride rinses should begin when these products can be used without substantial ingestion. Oral fluoride supplementation should be based on local water fluoridation *(see Table 1)*.[5-8]

Dietary education and restriction of simple sugars are necessary to prevent plaque build-up between brushings. Prolonged periods of orthodontic appliance placement often necessitate extra measures to remove trapped food and plaque. Dental irrigation devices like the Waterpik®, interdental cleaning appliances, floss holders, and threaders with woven or waxed floss facilitate the cleaning process. Proper flossing technique is particularly important in the effective removal of plaque from tooth surfaces and appliance/tooth interfaces. Automated toothbrushes can efficiently remove plaque and trapped food particulates from all surfaces. Xylitol-containing mints or gum can be used between brushings to prevent tartar buildup.[9]

These tactics coupled with continued oral hygiene education can overcome the lack of motivation and/or opposition to oral care commonly seen in adolescents and young children. Individualized care must be given to children with special needs such as neurodevelopmental disabilities, metabolic problems (e.g., diabetes), or medication-induced xerostomia. These children often need frequent dental consultation, special training, and/or assistance to accomplish their routine oral care.[10]

Table 1

Oral fluoride supplement dosage schedule

Age	Fluoride Level in Drinking Water (ppm)		
	< 0.3 ppm	0.3-0.6 ppm	> 0.6 ppm
Birth-6 months	None	None	None
6 months-3 years	0.25 mg/d	None	None
3-6 years	0.5 mg/d	0.25 mg/d	None
6-16 years	1.0 mg/d	0.5 mg/d	None

Adapted from: American Dental Association. Oral Topics A-Z: Facts about Fluoride. Available at: www.ada.org//public/topics/fluoride/fluoride_article01.asp. Accessed Nov. 12, 2006.

There are estrogen receptor sites in more than 300 areas of the body, including the oral cavity. The rise in the ovarian sex hormone levels of estrogen and progesterone during puberty and the subsequent phases of the menstrual cycle, particularly ovulation, increase gingival inflammation and exudates. The gingival inflammation that occurs with ovulation, the time of a surge in estrogen levels, improves after onset of menses.

Progesterone and estrogen change the rate and pattern of gingival collagen production, thereby reducing the body's ability to repair and maintain the gingiva. Additionally, elevated estrogen and progesterone levels increase the number of oral anaerobic bacteria and have an effect on the onset and progression of periodontitis by decreasing the phagocytic capacity of polymorphonuclear leukocytes, while increasing release of the inflammatory mediator interleukin-1beta (IL-1b). Sex hormones also increase vascular permeability and enhance proteolytic enzyme interaction with interleukin-6 (IL-6), another inflammatory mediator.[11] Sex hormone effects on the gingiva, which also occur during pregnancy or oral contraceptive use, can be mitigated by reduction of plaque volume and implementation of oral hygiene practices that maintain it.[12]

The Role of Fluoride. When ingested, fluoride becomes incorporated into the dentin and enamel of the teeth, strengthening its resistance to demineralization. Fluoride is also secreted into the saliva where it serves a bacteriostatic function. Topically applied fluorides in toothpastes, mouth rinses, and professionally applied therapies strengthen teeth and augment decay resistance. Community water fluoridation can optimize the naturally occurring fluoride content of water to a level of 0.7-1.2 parts fluoride per million parts of water. Although effective and inexpensive, water fluoridation is only available in communities with a centralized water source. When public water fluoridation is unavailable, fluoride tablets, drops, or lozenges are available by prescription; the correct dosages are provided in Table 1.[8]

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Questions & Comments

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Use of Xylitol Gum. Xylitol is not fermented by most dental plaque bacteria, has an antimicrobial effect on *S. mutans*, and decreases the amount of plaque build-up. Maakinen et al performed a study which showed that xylitol-only gum reduced caries.[9,13,14] Children receiving the highest concentration of xylitol (8.5-9.0 g/d) reduced their caries the most.[10,15] Gums with xylitol are available from homesteadmarket.com and include Spry, B-Fresh, and Epic. Xylitol mints and toothpaste are also available for persons with temporomandibular joint disorders and dental appliances. Four sticks of gum should be chewed for at least 5 minutes after meals or four mints per day should be consumed (equivalent to 4-12 g/d) to achieve benefit.[16] Xylitol should be used cautiously in certain patients as it can also increase formation of renal stones; doses over 12 g/d cause abdominal distension, gas, and diarrhea.[17]

Piercing Considerations. The interest in bodily adornment has increased the practice of intraoral and perioral piercing. Among persons who have nontraditional body sites pierced, the most commonly pierced intraoral sites are the tongue and lip (81% and 38.1%, respectively).[18] Such piercings cause the gums to pull away from teeth and reveal the root surface on the facial and lingual aspects of teeth exposed to piercing jewelry. The lingual aspect of the mandibular incisors is particularly prone to such gum recession.[19]

Intraoral and perioral jewelry have caused chipped or fractured teeth, inflammation, or nerve damage in the piercing site, masticatory and speech difficulty, scar tissue and granuloma formation, lymphadenitis, and chronic sialadenitis. Severe complications from piercing can occur if proper infection control procedures are not followed including hepatitis, tetanus, Ludwig's angina, endocarditis, severe bleeding complications, and brain abscesses. Airway obstructions and aspiration or swallowing of loosened components of jewelry have also been reported.[20-22] Such health considerations are magnified when the patient is immunocompromised and piercing should be avoided in this clinical situation.

Childbirth and Pregnancy

Pregnancy is often regarded as an opportunity for anticipatory guidance for women regarding general and oral health education. The hormonal surge of estrogen and progesterone during pregnancy causes an increase in gum engorgement, friability, and inflammation, which begins in the second month and increases in severity throughout the eighth month. It has become clear that evaluation for periodontal disease should be an integral part of the prenatal examination, although it is not yet entirely clear whether it is a causal or an associated health problem in women who deliver preterm, low birth weight infants.[23]

Offenbacher et al, in a case control study of 124 pregnant women, observed that women who delivered preterm (less than 37 weeks gestation) had significantly worse periodontal disease than control women despite adjustment for the level of prenatal care, parity, age, and tobacco and alcohol use.[24] Jeffcoat et al studied the relationship between maternal periodontal disease and spontaneous preterm birth in a prospective study of 1,313 pregnant women and found that moderate/severe maternal periodontal disease identified early in pregnancy was associated with an increased risk for spontaneous preterm birth independent of risk factors, such as parity, maternal age, level of prenatal care, race, and tobacco use.[25]

Although Michalowicz et al found that periodontitis treatment during the second trimester of pregnancy did not significantly affect the incidence of preterm low birth weight infants, there was a trend in the treatment group for decreased incidence of late complications such as spontaneous abortions and stillbirths as compared to the control group.[26]

Although the underlying etiology of preeclampsia is unknown, it is thought to be related to a generalized intravascular hyperinflammatory state. Boggess et al, in a retrospective analysis of data collected during the Oral Conditions and Pregnancy Study, reported that pregnant patients were at higher risk for developing preeclampsia if they had severe periodontal disease at delivery (adjusted odds ratio of 2.4) or if they had periodontal disease progression during pregnancy (adjusted odds ratio of 2.1).[27]

Oettinger-Barak et al performed a case control study of 30 primigravidas, 15 of which had preeclampsia and 15 were age-matched and maternal status-matched controls.[28] Full mouth periodontal examinations and gingival crevicular (area or sulcus between the gum margin and tooth) fluid samples taken from all patients revealed significantly higher periodontal probing depth (depth of pockets between gum and teeth), as well as significantly higher levels of inflammatory mediators PGE-2, TNF-alpha, and IL-1beta in the preeclamptic group compared to the control group.

Two landmark prospective studies by Kohler showed that children of mothers treated with multiple behavioral and educational interventions to suppress cariogenic oral flora were less likely to have cavities than children of control mothers.[29-32]

Climacteric

While an increase in sex hormones causes oral changes and gingival inflammation in younger women, the decrease in sex hormones after ovarian failure has significant effects in older women. At the time of ovarian failure and afterward, many women experience oral

changes including dry mouth, pain, and burning sensations in the gum tissue as well as taste alterations. Additionally, periodontitis affects 23% of women ages 30-54 and 44% of women ages 55-90.

If periodontitis is not adequately treated, it may be a risk factor for systemic cardiovascular illness, independent of the traditional risk factors.[33] C-reactive protein (CRP) is an acute-phase reactant and elevated levels are a marker for ongoing enhanced systemic inflammation. There is an association between the risk of myocardial infarction and the serum levels of high-sensitivity CRP (hs CRP). This CRP elevation, in the absence of another obvious clinical infection, is felt to be secondary to chronic periodontal disease.[34]

Deliargyris et al, in a case control trial of 40 persons admitted with acute myocardial infarction (AMI), found that the prevalence of periodontal disease and mean serum CRP levels were significantly higher in the patients with AMI than in the control subjects (48% vs. 17%, $P < 0.001$; and 40.2 vs. 7.9 mg/L, $P < 0.001$, respectively).[35] After adjustment for smoking, diabetes, and infarction size, periodontal disease was an independent risk factor for elevated hs CRP levels. Mattila et al, in a prospective seven-year follow-up study of 214 individuals with a mean age of 49, found that poor dental health, as measured by clinical and radiographic methods, was a significant predictor of coronary events even after controlling for age, sex, socioeconomic status, smoking, hypertension, number of previous MIs, diabetes, body mass index, and serum lipids.[36]

Wu et al studied a prospective cohort of 10,000 patients (62% women) from the First National Health and Nutrition Examination Survey and found that after adjustment for age, race, sex, education, income level, smoking, diabetes, hypertension, alcohol use, serum cholesterol levels, and body mass index, periodontitis was significantly associated with an increased risk for total and nonhemorrhagic cerebrovascular accidents.[37]

Immunocompromised Patients

If possible, a careful oral cavity and dental examination should be included in the diagnostic work-up several weeks prior to the initiation of potentially cytotoxic radiation or chemotherapy. Such a practice facilitates the identification of caries, and periapical, third molar and periodontal pathology, which can be treated at least three weeks prior to therapy, thus proactively eliminating potential sources of infection.[38] Both chemotherapy and head and neck radiation cause mucositis (an inflammation of oral mucous membranes) and xerostomia (dry mouth) with the loss of salivary protection. Such complications make eating and drinking difficult, compromising nutritional and immune status. As mucositis heals for 2-4 weeks after chemotherapy, an important means by which to prevent a secondary oral infection due to white cell dysfunction and integumental barrier disruption is to maintain scrupulous oral hygiene.

Teeth should be brushed gently using a soft two- or three-row toothbrush, after meals and at bedtime. Electric and ultrasonic brushes can be used if they don't cause trauma. Alternatively, premoistened sponges on handles (Toothette®, Sage Products, Cary, IL) or a piece of gauze dipped in salt water or a nonalcoholic fluoride rinse can be used to clean the oral cavity. Alcohol-containing mouth rinses dry oral tissues and exacerbate inflammation and pain while saltwater rinses alkalinize oral pH and reduce the growth of bacteria.[39,40]

Waxed or woven floss minimizes soft-tissue damage, but if the absolute neutrophil count is 500 or less or the platelet count is 20,000 or less, patients should not floss.[40] Oral mouth-moistening gels such as Oral B® Mouth Moistening Gel and Biotene® toothpaste contain xylitol, lactoferrin, and lactoperoxidase, which lubricate and protect oral tissues and mimic some of the bacteriostatic effects of saliva.[41] Secondary infections with thrush or viruses are avoided by the use of prophylactic antifungal and antiviral medications as clinically indicated.[8,41,42]

Oral Health in the Elderly

The barriers to optimal oral hygiene in elderly women are multifactorial and include medical illness, diminished manual dexterity and mobility, impaired vision, and medication- or illness-induced xerostomia. Institutionalized elderly have poorer oral hygiene than those living independently in their homes.[43] Poor dental health with accumulation of plaque on dentures and native teeth leads to the emergence of periodontopathic anaerobes from within the plaque flora and to the selection and/or colonization of the gram-negative enteric bacilli (*Escherichia coli*, *Pseudomonas* sp., *Proteus* sp., and *Klebsiella* sp.) in the oral flora.[44]

Elderly, debilitated patients have an increased incidence of hyposalivation, swallowing difficulties, and increased gram-negative oral colonization, which can represent up to 60% of oral flora depending upon their degree of functional impairment.[45] Such conditions predispose them to the development of mixed anaerobic pulmonary infections, primarily aspiration in etiology. Yoneyama showed in a prospective study that elderly nursing home residents who receive daily professionally assisted oral hygiene had a significant decrease in the incidence of pneumonia, febrile days, and death, as well as an improvement in activities of daily living and cognition after one year.[46]

Table 2

Age group dental hygiene issues with mitigating interventions

Age Group	Issues	Mitigating Interventions	Dental Visits
Babies (< 3 y)	Primary teeth	Finger toothbrush after bottles; fluoride supplementation *(see Table 1)*	By age 1 year, then every 6 months
	Baby bottle tooth decay	Bottle propping avoidance; fluoride supplementation	
	Lack of motor skill/cognition	Parental use of washcloth, finger toothbrush gum/teeth rub	
Kids (3-12 y)	Acidic beverages	Dietary education/restriction; dental sealant application	Every 6 months
	Lack of motor skill	Adult supervision; floss holders	
	Orthodontics	Floss threaders; irrigation devices, interdental picks; battery powered toothbrushes; fluoride rinses	Every 3 months
Teens	Acidic beverages	Education/dietary restriction	Every 6 months
	Behavior problems	Patience; novelty devices	
	Orthodontics	Floss threaders; Waterpik; xylitol mints; interdental picks; powered toothbrushes; non-alcohol-based fluoride rinses and toothpaste	Every 3 months
	Xerostomics	Rinses (no alcohol); mouth gels	Every 3 months
	Hormone gingivitis	Flossing devices, woven floss	Every 3 months
Adults	Xerostomics	Biotene toothpaste; no alcohol gel	Every 3-6 months
	Lack of dexterity	Ergonomic toothbrush handles	
Immune-suppressed	Low/absent WBC, platelet counts	Foam brush with saline or non-alcohol fluoride rinse after meals; no flossing with low ANC/platelets	Every 6 months depending on clinical situation
	Opportunistic infections	Prophylactic antifungals, antivirals	
	Mucositis	Dietary management, mouth moisturizing gels, saline rinses	Every 6 months
Geriatric	Xerostomics	Non-alcohol-based mouth moisturizing gels and fluoride rinses Biotene toothpaste; xylitol	Every 6 months
	Lack of dexterity	Oral hygiene assistance; ergonomic toothbrush handles	
	Dementia	Supervised, structure oral hygiene routine; patience	

Maintenance of Dental Hygiene

Barnes et al compared manual and powered toothbrushes and found that both reduced plaque accumulation, but powered toothbrushes removed plaque better and reduced gingival bleeding more. Neither toothbrush type caused significant hard- or soft-tissue abrasion.[13] Toothbrushes should be replaced after three months, because they become less efficient in removing plaque with use after this time.[14] Timers and powered tooth brushes with a built in timing device encourage the optimum 2-3 minutes of brushing required to clean all exposed tooth surfaces.

Finally, without daily flossing, one third of the tooth surface remains unclean.[15] Plaque left on the teeth for as little as 24-72 hours can be converted to tartar via mineralization from saliva. Once tartar has formed on the tooth surface, regular flossing and brushing are ineffective for its removal.[15] Table 2 summarizes age-related dental problems and mitigating interventions for each age group.

Conclusions and Recommendations

Physicians should emphasize that patients follow the recommendations of the American Dental Association regarding oral hygiene practices with twice-daily two-minute sessions of tooth brushing preceded at night by flossing with waxed or woven dental floss or another interdental cleaning device. Professional dental cleaning and evaluation should be recommended twice per year.

Given the effects of oral health on overall health, it is imperative that primary care physicians include oral health screening in all age groups as part of the general medical examination. This screening is especially important in pregnant patients during the prenatal examination and in patients with diabetes, cardiovascular, cerebrovascular diseases, and cancer, particularly if chemotherapy and/or radiation therapy will be part of the treatment course. Oral health hygiene measures are especially important in the geriatric outpatient, nursing home, and in-patient populations, where the risk of aspiration pneumonitis is greatest. ❖

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Increased Urinary Lignan Excretion Associated with Decreased Risk of Uterine Fibroids

By Donald Brown, ND
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Dr. Brown is a consultant for Nature's Way, Inc.

Source: Atkinson C, et al. Lignan and isoflavone excretion in relation to uterine fibroids: A case-control study of young to middle-aged women in the United States. *Am J Clin Nutr* 2006;84:587-593.

Abstract: In a population-based case-control study, women were evaluated to determine if there was a relationship between uterine fibroid risk and phytoestrogen exposure. Female participants were drawn from a larger case-control study of risk factors for uterine fibroids.[1] Final analysis was based on 173 uterine fibroid cases (mean age 45.8 ± 6.3 years) and 173 controls (mean age 44.4 ± 6.7 years). Cases were slightly older, were more likely to be African American and to have a family history of uterine fibroids, had a higher BMI, and were less likely to consume soy foods than controls. The cases and controls did not differ significantly by current smoker status, levels of education and income, number of live births, and prior use of oral contraceptives. In addition to a larger structured questionnaire used as part of the main case-control study, women were asked to complete two dietary questionnaires. These corresponded to the days of their overnight urine collections described below.

Two overnight urine collections (48 hours apart) were analyzed for isoflavonoids (daidzein, genistein, equol, and *O*-desmethylangolensin) and lignans (enterodiol and enterolactone). Urinary creatinine (Cr) concentrations were measured as well. Urinary phytoestrogen data were expressed per mg Cr, which is a commonly used method of adjusting phytoestrogen concentration for variability of urinary output. Logistic regression was used to determine associations between the mean excretion of the two collections and the risk of uterine fibroids. In the evening on which each overnight urine collection began, participants were asked to complete a self-administered, structured questionnaire regarding their diet earlier in the day of the collection.

The mean adjusted excretion of isoflavones (sum of daidzein, genistein, equol, and *O*-desmethylangolensin) did not differ

CME Instructions

Physicians participate in this continuing medical education program by reading the article, using the provided references for further research, and studying the questions at the end of the article. Participants should select what they believe to be the correct answers, then refer to the list of correct answers to test their knowledge. To clarify confusion surrounding any questions answered incorrectly, please consult the source material. After completing this activity, you must complete the evaluation form provided and return it in the reply envelope provided at the end of the semester to receive a certificate of completion. Upon receipt of your evaluation, a certificate will be mailed.

CME Questions

1. **Elevated levels of estrogen and progesterone:**
   a. increase gingival inflammation and exudates.
   b. increase the number of oral anaerobic bacteria.
   c. affect the onset and progression of periodontitis.
   d. All of the above

2. **At the time of ovarian failure and afterward, many women experience oral changes including dry mouth, pain, burning sensations in the gum tissue, and taste alterations.**
   a. True
   b. False

3. **In a prospective study, Yoneyama demonstrated that elderly nursing home residents who receive professionally assisted oral hygiene on a daily basis experienced decreased incidence of which of the following?**
   a. Pneumonia
   b. Febrile days
   c. Death
   d. All of the above

Answers: 1. d, 2. a, 3. d.

significantly between cases and controls: 2.33 ± 5.82 (range: 0.11-50.80) compared with 2.60 ± 5.90 (0.16-43.53) nmol/mg Cr, respectively (P = 0.68). Cases had significantly less (P < 0.01) mean lignan excretion (sum of enterodiol and enterolactone) than did controls: 2.86 ± 3.45 (0.03-20.54) compared with 4.57 ± 6.67 (0.06-60.29) nmol/mg Cr, respectively. In logistic regression analyses of continuous data, total urinary isoflavone excretion was not associated with risk of uterine fibroids. Total urinary lignan excretion and excretion of the individual metabolites were associated with a significantly lower risk of uterine fibroids. The trend for a reduced risk of uterine fibroids with increasing quartiles of lignan excretion was significant (P < 0.01), but in adjusted analyses (adjusted for age, BMI, race, family history of uterine fibroids) this trend was still evident but no longer significant. Such trends were noted for enterolactone but not enterodiol.

Comments

Completed at the Fred Hutchinson Cancer Research Center and University of Washington in Seattle, this interesting study adds another potential health benefit for dietary lignans: prevention of uterine fibroids. Although larger and more focused trials will be needed to confirm these results, there appears to be a growing shift away from primary focus on isoflavones in the diet to lignans. This has especially been the case with regard to prevention of breast cancer (particularly premenopausal) with particular focus on the mammalian lignan enterolactone.[2] It should be noted that soy intake was low in the study population; future trials may determine a possible protective link with soy isoflavones and uterine fibroid risk.

Although focus has been on flax and ground flaxseed as a primary source of dietary lignans, it's important to note the primary lignan in flax, secoisolariciresinol, is first converted to enterodiol by gut microflora and then converted to enterolactone. We are learning that there are dietary and supplemental lignans that direct precursors of enterolactone. One study found that sesame seeds rival flax as a precursor to mammalian lignans and more efficiently raise levels of enterolactone.[3] The primary dietary lignan in sesame seed is matairesinol. A new Finnish study that has been submitted for publication has found that the dominant lignan in wheat triticale, barley, corn, amaranth, and quinoa bran is 7-hydroxymatairesinol (7-HMR).[4] Both matairesinol and HMR are direct precursors of enterolactone. So, while manufacturers of flax and flax extracts have pushed women to increase flax in their diet or supplement with flax extracts, health care practitioners should be aware that population studies showing potential health benefits of enterolactone are probably linked to dietary sources such as the grains mentioned above and sesame seeds as opposed to flax.

Conclusion: Interest in the health benefits of lignans for women continues to grow. Previous studies have found reduced risk of breast cancer (particularly premenopausal) as well as preliminary data suggesting cardiovascular health benefits and some effects on menopausal symptoms such as hot flashes. Although preliminary in nature, this new trial suggests that dietary lignan sources that effectively raise enterolactone levels may be associated with decreased risk of uterine fibroids. ❖

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News Brief

Institute Offers Seminar on Integrative Therapies for Women's Cancers

The Institute of Women's Health and Integrative Medicine is offering a seminar on Women's Cancers in Portland, OR, on Jan. 26-28. The course is focused toward practitioners who seek to develop or further their expertise in the use of nutritional and botanical therapies in combination with conventional cancer treatments and management, the institute says.

The course is designed to give the practitioner advanced skills in evaluation and treatment of women's cancers with an emphasis on evidence-based natural and conventional therapies while also maintaining a respect for the value of clinical experience and empirical knowledge, it says. This course will also pay specific attention to issues in comanagement: antioxidants with chemotherapy and/or radiation, drug-nutrient-herb interactions, maximizing therapeutic outcomes with complementary treatments, and minimizing side effects of conventional treatments.

For more information, see http://instituteofwomenshealth.com/conference, or call (503) 222-2322. ❖

Dear *Alternative Therapies in Women's Health* Subscriber:

This issue of your newsletter marks the start of a new continuing medical education (CME) semester and provides us with an opportunity to review the procedures.

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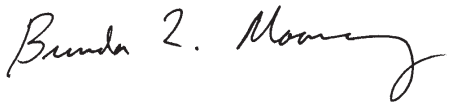

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