

Women's Oral Health:

Is There a Hormonal Link?

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“Women have special oral health needs and considerations that men do not have. Hormonal fluctuations have a surprisingly strong influence on the oral cavity. Puberty, menses, pregnancy and menopause all influence women’s oral health and the way in which a dentist should approach treatment.”¹

On July 9, 2002, the National Institutes of Health (NIH) halted a major study, which was evaluating the risks of synthetic hormone replacement therapy (conjugated horse estrogens and medroxyprogesterone acetate, Prempro) versus the benefits of combined estrogen and progestin in healthy, postmenopausal women. The study was halted after NIH researchers cited an increased risk of invasive breast cancer, coronary heart disease, stroke and pulmonary embolism with the estrogen/progestin replacement therapy. Initial media coverage did little to differentiate the results found with Prempro from potential problems with other estrogen/progesterone replacement options. As a result, some patients discontinued hormone replacement therapy (HRT) altogether.

In this setting, physicians, patients and pharmacists are reevaluating the risks versus the benefits of HRT. Such evaluations often discuss the hormonal link to osteoporosis, Alzheimer's disease, chronic urinary tract infections and postmenopausal vaginal atrophy. Oral health is an area that is seldom mentioned, yet one that has a significant link to both estrogen and progesterone levels. Changes in hormone levels such as those that occur during puberty, menses (menstruation), pregnancy and menopause have long been associated with the development of oral health problems and are well documented in the literature. This article discusses oral health as it relates to hormonal changes. It attempts to support compounding pharmacists in their counseling efforts with patients who are evaluating the risks versus the benefits of HRT by discussing changes that involve the teeth, gums and mucosal surfaces. It also attempts to guide dental professionals who are presented with a patient's dental health changes that reflect hormonal changes.

Puberty

At puberty, the production of sex hormones (estrogen and progesterone) increases to a level that remains relatively constant throughout the normal female reproductive phase. A number of studies²⁻⁴ have shown that increased sex-hormone levels correlate with an increased prevalence of gingivitis. Gingival tissues and the subgingival microflora respond with a variety of changes to the increasing hormone level at the onset of puberty. Microbial changes reported during puberty can be attributed to changes in the microenvironment seen in the gingival tissue response to the sex hormones, as well as the tendency of specific bacteria to proliferate due to the higher concentration of hormones present.⁵ This is seen with *Prevotella intermedia* (*P. intermedia*), a gram-negative anaerobe that can substitute estrogen and progesterone for vitamin K, an essential growth factor.⁶ In addition, *Caprocytophaga* species, another gram-negative bacteria, increases in incidence as well as in proportion. Both organisms are believed responsible for the increased bleeding tendency noted in puberty.

Menses

For many women, the arrival of the monthly menses evokes corresponding oral changes. These can include the activation of herpes labialis, aphthous ulcers, prolonged hemorrhage following oral surgery and swollen salivary glands.⁷ The degree of oral changes that occur with the onset of menses can vary significantly among women just as the actual menses can vary among women. Some women are not aware of any gingival changes at all, while others complain of bleeding and swollen gums in the days preceding their menstrual flow. These complaints usually resolve once menses begin. During the menstrual cycle, there are marked differences in the clinical presentation of most women with normal gingiva versus inflamed gingiva. Occasionally, there is a minor increase in tooth mobility due to the increase in gingival exudate produced by inflamed gingiva. Some women note a pattern of occurrence of aphthous ulcers and herpes labialis lesions that correspond to their menstrual cycle. The lesions appear during the luteal phase of the cycle and heal following menstruation.

Pregnancy

There is a popular notion that pregnancy causes tooth loss, and it is often mistakenly explained that calcium is withdrawn from the mother's teeth to supply fetal requirements. There is no histologic, chemical or X-ray evidence to support this notion. However, given the significant increase in gingivitis that

occurs during pregnancy due to the hormonal changes accompanying pregnancy, it could be promulgated that this is the reason for tooth loss during that time.

Gingivitis is the most prevalent oral problem associated with pregnancy, usually occurring in 60% to 75% of all pregnant women.⁸ Gingival changes usually occur as a result of local irritation and poor oral hygiene. However, the hormonal vascular changes accompanying pregnancy often exaggerate the inflammatory response.

During pregnancy, the ratio of bacterial anaerobes to aerobes shifts. *Bacteroides melaninogenicus*, *P. intermedia* and *Porphyromones gingivalis* all increase during pregnancy. They are the bacterial flora most associated with gingivitis,⁹ and all mirror the increased levels of progesterone and estrogen found during pregnancy. The shift in the anaerobe to aerobe

ratio is a result of change in the subgingival microenvironment caused by an accumulation of active progesterone during pregnancy. *P. intermedia* can substitute an essential growth factor, vitamin K, with progesterone and estrogen. A 55-fold increase in the level of *P. intermedia* has been shown in pregnant women as compared with nonpregnant controls.⁸

A study by Vittek et al¹⁰ has shown that human gingiva has receptors for progesterone and estrogen. Therefore, when the plasma levels of estrogen and progesterone increase, the presence of these hormones in gingival tissue also increases. Several studies summarized by Nyman¹¹ have shown that sex hormones have specific effects on gingival tissue. Progesterone causes a dilation of the gingival capillaries, which results in edema and an increase in the accumulation of inflammatory cells. Estrogen

decreases keratinization of the gingiva and increases epithelial glycogen, resulting in a reduction of the integrity of the epithelial barrier.

Progesterone also has been shown to alter both the rate and pattern of collagen production in gingiva, which results in a reduced ability to repair and maintain the gingiva. Finally, the breakdown of folate, a requirement for the maintenance of healthy oral mucosa, is increased in the presence of increased levels of sex hormones.¹² This results in a folate deficiency, which increases the inflammatory destruction of the oral tissue by inhibiting its repair.

To summarize, with the increased levels of sex hormones found in pregnancy, the defense mechanisms necessary for the maintenance of good oral health are compromised, the protection of the gingival environment is reduced, and certain bacteria harmful to the oral environment are allowed to increase.

Menopause

If we can demonstrate the relationship between oral health and hormone fluctuations, then we must certainly see some changes in oral health at the time of menopause, when production of sex hormones diminishes and ultimately ceases. This is of significant interest because it has been estimated that the average woman can expect to live one third of her life after her last menstrual period.¹³ Although there is no defined etiology to explain the development of the following most common oral problems cited in menopausal women, the relationship of these problems to decreased hormonal levels is significant.

Oral Discomfort

Occurrences of pain, burning sensation, eg, burning mouth syndrome, altered taste perception and xerostomia (dryness of the mouth) are common complaints among a significant number of postmenopausal women. Eighty percent of the women suffering from burning mouth syndrome are patients whose pain began from 3 years pre- to 12 years postmenopause.¹⁴ Grushka¹⁴ summarized that postmenopausal women

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who complained of oral discomfort were relieved after the administration of estrogen either systemically or topically.

Oral Mucosal Changes (Gingival Atrophy, Menopausal Gingivostomatitis)

Several clinical and experimental studies, as summarized by Zachariassen,¹³ have been performed on the oral cytology of postmenopausal women to determine the physiological basis for the oral discomfort of menopause. These studies have demonstrated that the oral mucosa is in many ways similar to the vaginal mucosa. Both are composed of stratified squamous epithelium and both demonstrate a desquamative growth pattern. It has long been established that the cytology of the vaginal epithelium is an excellent marker of ovarian hormonal levels, both during the menstrual cycle and menopause. The role of estrogen is one of maturation and keratinization; the decrease in estrogen levels accompanying menopause results in a decrease in keratinization and atrophy of the vaginal mucosa. The linkage between changes in the oral epithelium and hormonal changes has not been as well established.

Estrogens are known to affect cellular proliferation and keratinization in sensitive epithelium. In fact, Vittek et al¹⁵ have concluded a direct influence of sex hormones on the oral mucosa. However, other researchers have not been able to demonstrate the direct correlation between ovarian hormone levels and changes in the oral mucosa. It would be a safer consideration to state that the postmenopausal patient presenting to her dentist with oral discomfort and to her obstetrician/gynecologist with complaints of vaginal dryness could be helped with both problems by the administration of estrogenic hormones.

Salivary Changes

It has long been assumed that salivary flow decreases with increased age. Researchers' attempts to correlate a hormonal involvement with decreased salivary flow have demonstrated inconsistent findings. It is now generally accepted that major salivary gland output

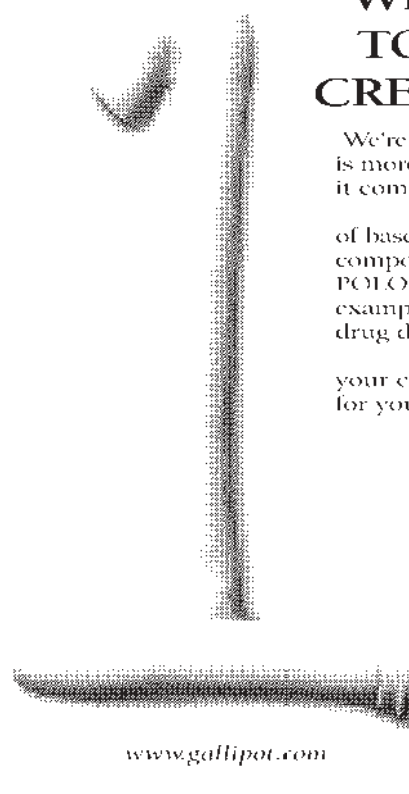
does not diminish with advancing age if the individual is otherwise healthy. The topical application of estrogen on the buccal mucosa or systemic estrogen supplementation has demonstrated no change in the quantity of saliva or salivary flow rate.

Osteoporosis

The most studied and established problem associated with the hormonal deficiency found in menopause is osteoporosis. Osteoporosis is a reduction in bone mass with deformity; pathologic fractures; and, occasionally, associated pain. Osteoporosis leads to more than 1.5 million fractures each year, with most of those affected being women.¹⁶ Overall mortality from complications of fractures resulting from the osteoporotic process ranges from 10% to 20%.

Osteoporosis is caused by a deficiency of the bone-resorption/formation process, with an increase of resorption,

decrease in actual bone formation or a combination of both. The impact of osteoporosis orally is that generalized bone loss from systemic osteoporosis may render the jaws susceptible to accelerated alveolar bone resorption. The compromised mass and density of the maxilla or mandible in a patient with systemic osteoporosis also may be associated with an increased rate of bone loss around the teeth or the edentulous ridge. Birkenfeld et al¹⁷ support the hypothesis that systemic bone loss may contribute to tooth loss in healthy individuals, as women with low bone mineral density tend to have fewer teeth compared with controls. Tooth loss may also be related to skeletal bone mass. Jeffcoat et al¹⁸ have shown that when skeletal bones lose mass, the mean bone density of the mandible also decreases. The correlation between oral bone loss and systemic bone loss is becoming so apparent



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that future modifications in dental X-ray techniques may be used as a diagnostic tool for early identification of patients with osteoporosis so they can be referred to their physicians for medical assessment.

Because of the strong correlation between skeletal osteopenia and alveolar bone loss, postmenopausal women should be concerned when considering removable prosthodontics (dentures) and dental implants. When postmenopausal patients exhibit continuing bone resorption under a well-fitted dental prosthesis, osteoporotic bone loss may need to be considered. Postmenopausal osteoporotic women were found to require new dentures three times more often after age 50 than nonosteoporotic women. In fact, this bone loss may become so severe that the construction of functional dentures may become impossible, leading to serious nutritional deficiencies.

Dental implants may be of significant benefit to an osteoporotic patient. However, most dental implants depend on sufficient bone volume and density for success. Therefore, a thorough assessment of the surgical site in osteoporotic women should be performed prior to surgery. Heersche et al¹⁹ have even theorized that the success or failure of implant therapy may be based on the number and types of osteoprogenitor cells present, both estrogen and progesterone.

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Conclusion

It is evident from existing research that there is a direct link between a woman's changing hormonal status and her changing oral health throughout her life. In the premenopausal state, this relationship should be noted, especially during pregnancy. However, when a woman has passed into menopause and is no longer producing hormones, this relationship and the decision to use HRT are an even greater consideration. Since one third of her remaining life could occur after her last menses, protecting and maintaining her oral health should be a major consideration.

References

1. [No author listed.] *Women's Oral Health Issues*. American Dental Association. Oral Health Care Series. December 1995.
2. Bimstein E, Matsson L. Growth and development considerations in the diagnosis of gingivitis and periodontitis in children. *Pediatr Dent* 1999;21:186-191.
3. Tiainen L, Asikainen S, Saxen L. Puberty-associated gingivitis. *Community Dent Oral Epidemiol* 1992;20:87-89.
4. Morishita M, Aoyama H, Tokumoto K et al. The concentration of salivary steroid hormones and the prevalence of gingivitis at puberty. *Adv Dent Res* 1988;2:397-400.
5. Amar S, Chung KM. Influence of hormonal variation on the periodontium in women. *Periodontol* 2000 1994;6:79-87.
6. Nakagawa S, Fuji H, Machida Y et al. A longitudinal study from prepuberty to puberty of gingivitis. Correlation between the occurrence of Preve-talla intermedia and sex hormones. *J Clin Periodontol* 1994;21:658-669.
7. Lindhe J, Attsfrom R. Gingival exudation during the menstrual cycle. *J Periodon Res* 1967;2:194-198.
8. Jensen J, Liljemark W, Bloomquist C. The effect of female sex hormones on subgingival plaque. *J Periodontol* 1981;52:599-602.
9. Kornman KS, Loesche WJ. The subgingival microflora during pregnancy. *J Periodontol Res* 1980;15:111-122.
10. Vittek J, Hernandez MR, Wenk EJ et al. Progesterone "receptors" in human gingival. *IRCS J Med Sci* 1982;10:381.
11. Nyman S. Studies on the influence of estradiol and progesterone on granulation tissue. *J Periodontol Res* 1971;7:1-24.
12. Thomson ME, Pack AR. Effects of extended systemic and topical folate supplementation on gingivitis in pregnancy. *J Clin Periodontol* 1982;9:275-280.
13. Zachariassen RD. Oral manifestations of menopause. *Compendium* 1993;14:1584-1591.
14. Grushka M. Clinical features of burning mouth syndrome. *Oral Surg Oral Med Oral Pathol* 1987;63:30-36.
15. Vittek J, Hernandez MR, Wenk EJ et al. Specific estrogen receptors in human gingiva. *J Clin Endocrinol Metab* 1982;54:608-612.
16. [No author listed.] *Stand Up to Osteoporosis*. Washington DC: National Osteoporosis Foundation; 1994.
17. Birkenfeld L, Yemini M, Kase NG et al. Menopause-related oral alveolar bone resorption: A review of relatively unexplored consequences of estrogen deficiency. *Menopause* 1999;6:129-133.
18. Jeffcoat MK, Lewis CE, Reddy MS et al. Post-menopausal bone loss and its relationship to oral bone loss. *Periodontol* 2000 2000;23:94-102.
19. Heersche JN, Bellows CG, Ishida Y. The decrease in bone mass associated with aging and menopause. *J Prosthet Dent* 1998;79:14-16.

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