Gender Differences in Oral Health

It is only in the last decade that gender differences in medical science and human physiology have begun to be explored in a systematic way. Traditional medicine presumed that male and female physiology was essentially the same except, of course, for the reproductive system. So called, "women's health" consisted of issues related to reproductive health while all other health concerns were calculated based on 70 kilogram Caucasian male standards and converted to fit a smaller female body type.¹

Advances in science and experimental techniques have given those in the field pause, and a reassessment of these erroneous concepts is now taking place. Up until recently, medical researchers were careful to balance study populations in terms of risk factors, socioeconomic status, race, amounts of disease, age, smoking, and gender as well as other parameters. However, the results were invariably presented as a mean result evaluating the study population as a whole.

Based on recent discoveries by those who are taking a more careful look at gender differences in response to treatments and medications, it now appears that essentially every system in human physiology demonstrates differences in function between men and women. These differences become clear only when the results are analyzed separately according to age and gender (Figure 1).

Any discussion of gender differences in oral disease must begin with the known sexual dimorphism in the immune response to bacterial and viral antigens. Essentially, all oral conditions that we as dentists treat are caused by viruses and bacteria with the exception of autoimmune disorders.

It has long been known that females have lower mortality rates than males from birth. This can be explained partially by the fact that females mount a greater antibody response to bacterial infections than males.² It has been documented that women produce more IgG, IgM, and IgA than their male counterparts.³ The gene for IgM has been located on the x-chromosome so that 2x-chromosomes substantially increase the amount of IgM.⁴ In general it appears that physiologic levels of estrogen stimulate both the humoral immune response and the cell-mediated immune response. In general, male hormones have the opposite effect.⁵ In light of this, although the exact mechanisms have yet to be elucidated, it is understandable why females have a more exuberant response to infections.

Puberty marks a stage of significant physiologic changes triggered by increased production of specific sex-steroid hormones. Although children in this age group are not known for their stellar oral hygiene practices,⁶ the incidence of frank gingivitis is low. Many early observant clinicians recognized a change in the gingival

Figure 1. Gender life cycles.

Figure 2. Pregnancy gingivitis with typical swelling and redness of interproximal papillae.

continued on page 74
Gender Differences in Oral Health

continued from page 72

response to plaque accumulations during this life stage that had not been previously seen.6-8 It appears that gingivitis is most severe during the onset of puberty when there is an exaggerated response to the hormonal content in the gingival crevicular fluid,6,10 as well as a change in the microbial composition of the plaque at this time.11,12 These changes, noted by several investigators, demonstrate increases in pathogens known to be important in the progression of periodontal disease including Actinobacillus, Capnocytophaga, and Prevotella species.11,12 These changes in the microbial composition of the plaque appears to be related to a shift in the microenvironment of the sulcus and the bioavailability of different micronutrients (ie, hormones).13

More dramatic and probably more interesting is the condition known as "pregnancy gingivitis." To truly understand this condition we must first have a working knowledge of the immune status of the pregnant patient. Due to the fact that during 9 months of pregnancy a woman must be able to tolerate the circulation of fetal antigens which are derived from maternal as well as paternal genetic material, she must be in an altered immune state, so as not to reject her fetus. This implies some degree of immunosuppression. There is a significant depression in the cell-mediated immune response, specifically a decreased peripheral blood lymphocyte responsiveness to antigens. When investigators looked at the immune response to specific oral bacteria, here too a depressed immune response was evident by the second trimester and resolved after the birth of the baby.14

Patients with an underlying gingivitis or periodontitis at the time they become pregnant have an approximately 50% chance of developing an exacerbation of their disease (estimates range from 20% to 100%) during their 2nd and 3rd trimesters.15 These changes are attributed to the high levels of estrogen and progesterone in the circulation which have numerous effects on the vascular and immune systems and locally affect the composition of the gingival plaque. High levels of progesterone increase vascular permeability, which in turn increases swelling and edema in the gingival tissues16,17 (Figure 2), and could possibly increase tooth mobility.18 Investigators have identified an overgrowth of specific oral bacteria during pregnancy, notably Fusobacterium and Prevotella species. It appears that certain bacteria can use the high levels of estrogen present in the gingival crevicular fluid as a substitute for their normal growth nutrient (vitamin K).19,20

There is mounting evidence that good oral hygiene and frequent professional oral prophylaxis during a patient's pregnancy have enormous benefit for both the patient and the fetus.

The result is that some of your pregnant patients will complain of bleeding, sore gums, and loose teeth. For the most part this will resolve at parturition unless the patient is breast-feeding, which maintains the high hormone levels. The symptoms will not subside until the patient is no longer nursing.

There is some anecdotal evidence that the pregnant patient with established moderate to severe periodontal disease may suffer more serious consequences due to these changes including attachment loss and tooth loss. However, well-controlled studies have not yet been done. There is mounting evidence that good oral hygiene and frequent professional oral prophylaxis during a patient's pregnancy have enormous benefit for both the patient and the fetus.21

Another life stage where women experience alterations in their oral health that differ from men of the same age is around the time of menopause. The average age of menopause for women in the United States is 51 years. It is defined by having no menstrual cycle for at least 6 months. This is caused by the cessation of the production of estrogen, the major estrogen produced by the ovaries. During this time women will complain of a variety of oral symptoms, the most common of which is a dryness or burning sensation of the oral tissues.22 Other causes besides loss of estrogen have been suggested including nutritional deficiencies23 and fungal infection,24 which may account for some of the cases. However, the overwhelming majority of the cases occurring in women are coincidental with the onset of menopause. There is, in fact, some evidence that treatment of these patients with hormone replacement therapy (HRT) systemically will relieve the oral symptoms in some

continued on page 76
Gender Differences in Oral Health continued from page 74

Postmenopausal women in this age group are also at high risk for the metabolic condition known as osteoporosis. Type 1 osteoporosis affects a significant number of women in this country in a ratio of 20:1 when compared with men in the same age group. Osteoporosis is the result of low bone mass and such patients have an increased risk of bone fracture. The peak bone mass occurs in our early 20s. Normal bone remodelling occurs constantly throughout our adult years (bone resorption followed by bone formation), with a slight net loss as a person ages. At menopause if women choose not to take HRT they are at an increased risk for rapid systemic bone loss during the first 5 to 7 years after menopause. The interesting question is how this impacts on oral bone loss. If a patient has moderate to advanced periodontal disease with the ultimate result being alveolar bone loss and tooth loss, and this patient also develops osteoporosis, will this cause an exacerbation of the periodontal disease? Will there be an increase in alveolar bone loss and tooth loss? Information related to this very complex subject is beginning to be elucidated. Several investigators have looked at the relationship of skeletal osteopenia and alveolar height and density and have found a positive correlation.56-38 (See Figures 3 and 4.) Osteoporotic patients lose more teeth, have less alveolar bone height, and have less mandibular bone mass than nonosteoporotic patients. Curiously, the relationship between periodontal attachment loss (clinical attachment loss) and osteoporosis has not been clearly demonstrated.27 Probing depth and attachment loss measurements are not dramatically different in the osteoporotic versus the nonosteoporotic patient. However, when you adjust for other risk factors such as smoking, age of menopause, estrogen supplements, and amount of plaque present, the relationship between clinical attachment loss and alveolar bone loss and osteoporosis becomes stronger.29

Gender differences have also been noted in a variety of other oral conditions. For instance, several epidemiological studies have shown that women have a higher incidence of oral ulcers than men. It has even been suggested that the occurrence of these ulcers follows a pattern related to the menstrual cycle.80 Along with a woman’s generally exaggerated response to infectious antigens is an exaggerated response to autoantigens. This makes women more susceptible to autoimmune diseases than men. It is estimated that 80% to 90% of autoimmune diseases occur in women. Notable examples are lupus erythematosus, rheumatoid arthritis, multiple sclerosis, and Graves disease.81 Oral manifestations of autoimmune diseases that dentists will most likely observe at some time in their careers are primarily desquamative in nature. Lichen planus, which has the classic

**IMPORTANT ANNOUNCEMENT**

**CREST® EARN ANOTHER REASON TO SMILE**

**CREST® MULTI-CARE WHITENING RECEIVES THE AMERICAN DENTAL ASSOCIATION SEAL OF ACCEPTANCE**

Crest has proven worthy of ADA acceptance again—earning the Seal of Acceptance for the second time in just 6 months. First, Crest® Extra Whitening became the only whitening dentifrice ever to earn the ADA Seal of Acceptance. Now, Crest MultiCare Whitening, our all-in-one whitening dentifrice, has proven equally worthy of recognition.

This after months of laboratory and clinical testing, and then, evaluation by the Council on Scientific Affairs. Let us show you why Crest MultiCare Whitening is the all-in-one that’s worthy of your recommendation and how it’s continuing a tradition of excellence for Crest.

**Brighter smiles in just 4 weeks**

A recent survey indicated that people with whiter teeth are perceived as healthier and more attractive.5

With a patented, enamel-safe polishing agent, Crest MultiCare Whitening is proven to remove extrinsic stains and give patients brighter smiles in just 4 weeks. It helps you give patients added confidence as it fights supragingival tartar buildup while offering trusted cavity protection.

Patented soft-silica technology

Crest MultiCare Whitening is designed with breakthrough technology that allows for 50% more silica content.2 It provides better surface stain removal than Crest Cavity Protection,1 without increasing abrasivity,3 delivered in a patient-tested Fresh Mint formula.

Over 80% less stain buildup

The unique soft-silica technology of Crest MultiCare Whitening gently removes surface stains and allows for over 80% less stain buildup on the teeth.1 It helps give your patients brighter smiles by revealing the natural whiteness of their teeth. Now, when selecting an all-in-one dentifrice, recommend the only one that combines the whitening technology of Crest Extra Whitening, the freshness of Crest MultiCare, and the ADA Seal of Acceptance.

Recommend Crest MultiCare Whitening

They feel their best with you and Crest

**Data on file, Procter & Gamble.** Based on consumer perception and clinical studies. **1vs Crest Cavity Protection.** Based on laboratory tests. **2vs Crest Tartar Protection.**
Continuing Education Exercise No. 13.3

DENTISTRY TODAY

To submit Continuing Education answers, use the answer sheet on page 145. On the answer sheet, identify the article (this one is Test 13.3), place an X in the box corresponding to the answer you believe is correct, detach the answer sheet from the magazine and mail to Dentistry Today Department of Continuing Education.

The following eight questions were derived from the article Gender Differences in Oral Health By Susan Karabin, DDS, on pages 72 through 77.

Learning Objectives

After reading this article, the individual will be familiar with:
1) major physiological differences between women and men.
2) specific oral conditions that primarily affect women.

1. It now appears that differences in function between men and women are limited to the following system(s):
   a. reproductive system.
   b. reproductive and immune systems.
   c. reproductive and musculoskeletal systems.
   d. essentially every system in the body.

2. Production of IgM is:
   a. the same for males and females.
   b. greater in females.
   c. less in females.
   d. regulated by genes on the y chromosome.

3. Females with underlying gingivitis or periodontitis at the time they become pregnant have an approximately 50% chance of developing an exacerbation of their disease:
   a. within 1 month of becoming pregnant.
   b. during the 1st trimester.
   c. during the 2nd and 3rd trimesters.
   d. after delivery.

4. Certain oral bacteria can use high levels of estrogen present in gingival crevicular fluid as a substrate for their normal growth nutrient, which is:
   a. glucose.
   b. vitamin E.
   c. vitamin K.
   d. vitamin C.

5. Menopause, which can lead to a variety of oral symptoms, is caused by cessation of production of:
   a. progestagens.
   b. progesterone.
   c. IgM.
   d. estradiol.

6. In the United States the ratio of Type 1 osteoporosis in women compared with men is:
   a. 5:1.
   b. 10:1.
   c. 20:1.
   d. 40:1.

7. It is estimated that _____ of autoimmune diseases occur in women.
   a. 30% to 40%.
   b. 50% to 60%.
   c. 70% to 80%.
   d. 80% to 90%.

8. Dry mouth and dry eyes are typical clinical symptoms of the following autoimmune disease:
   a. pemphigoid.
   b. rheumatoid arthritis.
   c. Sjogren's syndrome.
   d. lupus erythematosus.

Dr. Karabin practices in New York City and is an associate clinical professor in the Department of Periodontics at Columbia University School of Dental and Oral Surgery. She is presently the Dental Scholar for the Partnership for Women's Health at Columbia University and is on the board of trustees of the New York Academy of Dentistry, the Northeastern Society of Periodontics, as well as the American Academy of Periodontology.