Saliva Test for Oral Health

There are three critical phases of periodontal disease with biomarkers released first into gingival crevicular fluid and then into saliva. The three biological phases are inflammation, connective tissue degradation and alveolar bone turnover. Six protein biomarkers can be measured in saliva: interleukin 1 beta (IL-1β), interleukin-8 (IL-8), macrophage inflammatory protein (MIP), matrix metalloproteinase-8, (MMP-8), osteoprotegerin (OPG) and tumor necrosis factor alpha (TNF-α).

Researchers at the University of Kentucky in Lexington monitored these six biomarkers in a group of 68 subjects with chronic periodontitis. Half the group received oral hygiene instruction (OHI) alone and the other half received oral hygiene instructions and scaling and root planing (SRP). Saliva samples and clinical exams were done at baseline, 16 weeks and 28 weeks.

Both groups showed improved periodontal health, with greater clinical healing in the SRP group. Both groups showed reductions in OPG and TNF-α. IL-1β and MMP-8 levels were significantly reduced only in the SRP group. IL-1β was reduced at both time points for the SRP group and only at 28 weeks in the control group.

Those who responded well to OHI (27 percent) or SRP (63 percent) were evaluated separately, showing significant reductions in OPG, MMP-8 and MIP-1α at both 16 and 28 weeks. Based on these findings, salivary biomarker levels could provide valuable information for the assessment of periodontal health both in dental and non-dental settings.

Clinical Implications: In the not-too-distant future, consumers will buy over-the-counter saliva tests to measure and monitor their periodontal health.


Salivary Occult Blood Test for Perio

Perioscreen is a new salivary occult blood test developed by Sunstar International in Japan. The paper strips detect human hemoglobin in saliva using a colloidal gold-labeled antibody. After swishing with three milliliters of distilled water for 10 seconds, the mixture is spit into a cup and the Perioscreen test strip is dipped into the saliva sample. The colloidal gold-labeled antibody dissolves in the saliva sample and if blood is present, an immune complex is formed and moves up the test strip by capillary action, resulting in a magenta line.

Researchers in Japan compared findings of the Perioscreen test to clinical examination in a group of 2,861 residents of the town of Hisayama in southern Japan. The clinical exam consisted of probing and bleeding scores on mesial-facial and mid-facial surfaces of all teeth. This screening method is known for underestimating periodontal disease, but is used for speed and convenience. Subjects also completed a questionnaire about dental history, medications and general health.

In 52 percent of subjects, no probing depths of 4mm or deeper were found and in 60 percent of subjects, bleeding upon probing was less than 15 percent of sites.

Based on bleeding and probing depths, subjects were divided into two groups – poor periodontal health and healthy. A total of 1,197 were diagnosed with poor periodontal health, while only 861 had a positive Perioscreen test and 336 had false negative scores. Of the 801 periodontally healthy subjects, 384 had positive Perioscreen tests and 417 had negative tests.

Clinical Implications: The Perioscreen test from Sunstar might be a screening option in the U.S. in the near future.

**Gingivitis Causes Endotoxemia**

Gingivitis is a reversible inflammation of the gingival tissues, triggered by endotoxin. Endotoxin is part of gram-negative bacterial cell walls. Endotoxins pass through altered sulcular epithelium, triggering an inflammatory response from the body that includes activation and recruitment of white blood cells, specifically neutrophils. Endotoxins also find their way into the bloodstream and move to other parts of the body.

Researchers at Indiana University School of Dentistry monitored endotoxin levels in the blood of 50 healthy black and white men and women who participated in an experimental gingivitis study.

For three weeks, study subjects refrained from all oral hygiene to induce experimental gingivitis. At the three-week point, subjects received a prophylaxis and resumed daily oral hygiene with two more weeks of monitoring. Blood samples were taken at baseline, following three weeks without oral hygiene and again two weeks after resuming daily oral hygiene.

Endotoxemia was evident in 56 percent of serum samples after three weeks of experimental gingivitis. Two weeks later, endotoxemia levels were back to baseline levels. Neutrophil activity was also measured in the blood, with levels elevated at three weeks and returning to baseline levels after two weeks of oral hygiene. In identifying endotoxin positive and negative subjects, it was evident that of the endotoxin negative subjects, more neutrophil activity was seen in black subjects. In endotoxin positive subjects, more neutrophil activity was seen in women. Persistent neutrophil activity over time plays a role in tissue destruction. Periodontitis is more destructive, but gingivitis presents an early problem that needs to be addressed.

Clinical Implications: Gingivitis triggers systemic changes that might have significant implications on general health.


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**Mothers Share Caries Risk with Their Children**

The relationship between parents' oral health and the oral health of their children was reported in 1946 among 3,000 offspring in 1,150 families. Caries levels in 15-19 year olds was twice as high when parents had high caries rates compared to children of parents with low caries rates. Several studies show that both parents influence the caries rates of children, but the influence of the mother's oral health is greater.

Researchers at the University of California, San Francisco evaluated agricultural workers in Mendota, California, 160 miles southeast of San Francisco. A total of 179 mothers and their 387 children were evaluated clinically. Most mothers (80 percent) reported their oral health to be fair or poor and only 33 percent had ever received professional dental hygiene care. Six percent of mothers and 19 percent of children had never had a dental visit. One-third of the mothers and 85 percent of the children had Medicaid dental insurance.

Untreated caries were found in 46 percent of mothers with a mean decayed-filled-surfaces score (DFS) of 13.5, affecting half their teeth. Untreated caries were found in 27 percent of children (average age of the children was nine years, ranging from one to 17 years). The DFS rate for permanent teeth was 4.3 and the rate for deciduous teeth was 13.5.

The adjusted odds ratio for this group was similar to that reported in 1946. The children of mothers with untreated caries were twice as likely to have untreated caries themselves.

Clinical Implications: Caries prevention for children begins with the mothers. Mothers should be encouraged to get their oral health in order before their children's teeth erupt to reduce the child's caries risk.

No Brain Benefit from Chewing Gum

Chewing gum is considered beneficial for oral hygiene, to help cope with airsickness and as an alternative to smoking. Researchers have suggested, anecdotally, that chewing gum enhances brain function.

Researchers at the University of Vienna in Austria wondered whether chewing gum would improve spatial task performance by healthy young adults. The Endless Loop Test (ELT) was used to measure spatial task performance. Individually, in a quiet room, seated before a computer, subjects were instructed to look at two images of an endless loop. The second image was rotated and the subject was asked to identify the direction of the rotation. A total of 23 image pairs were evaluated, with some used only for warm-up that were not included in the final analysis.

In the first experiment, three groups were tested: 117 subjects chewed sugared gum, 115 chewed sugar-less gum and 117 did not chew gum during the test. The test took approximately 10 minutes.

The second experiment involved the same ELT with different images. A group of 50 subjects were given sugar-free gum and instructed to chew during the test. The control group of 50 did not chew gum during the test.

Chewing gum did not enhance spatial task performance in either test. Those chewing gum did slightly worse than controls, but the difference was not statistically significant. The addition of sugar for the group chewing sugared gum did not provide any benefit over sugar-free gum or not chewing gum at all.

Clinical Implications: Neither chewing gum nor the presence of sugar in chewing gums enhanced the performance of spatial tasks.


Adolescent Smoking and Toothbrushing

Smoking is a significant risk factor for periodontal disease as well as other systemic diseases. Another risk factor is poor oral hygiene. These two risk behaviors, when started early, might become life-long habits.

Researchers at the University of Tampere in Finland used a 12-page survey with 85 questions to gather data from teens about smoking and daily toothbrushing. Demographic questions were also included. These teens were all part of a larger ongoing health study in Finland.

The survey was sent to 9,853 teens ages 14, 16 and 18, with 5,643 surveys returned for an overall response rate of 65 percent. The response rate for girls was 73 percent compared to 57 percent for boys.

Daily smoking was reported by nearly 10 percent of 14 year olds, 25 percent of 16 year olds and 33 percent of 18 year olds. A higher percentage of girls smoked at age 14 and 16 compared to boys. At age 18, daily smoking was similar for both boys and girls.

A higher percentage of girls in all age groups reported toothbrushing more than once per day compared to boys. Daily smoking and brushing less than twice a day were reported by seven percent of 14 year olds, 18 percent of 16 year olds and 22 percent of 18 year olds. This combination of two unhealthy habits suggests an increased risk of periodontal disease for these teens in Finland.

Clinical Implications: Tobacco cessation advice as well as oral hygiene coaching during routine dental visits for teens is advised. Research suggests that teens are more likely to listen to dental professionals about smoking risks than their parents.