CDA

Association Guide
New Officers
2001 Budget

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DEPARTMENTS

FEATURES

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A New Year — A New Day for CDA

JACK F. CONLEY, DDS

Twelve months ago, the talk was all about the new millennium. Yes, there was some talk even then that the real change to a new millennium would come as we entered the year 2001. Well that time has now arrived, and there should be no question that we are now fully engaged in the world of the 21st century.

Based upon work done in the year 2000, the 21st century world of the California Dental Association will also commence this year. Year 2000 President Kent Farnsworth, in close collaboration with President-Elect Jack Broussard and with the cooperation and assistance of other leadership and staff, worked tirelessly during the past year to establish a foundation for a more vital future for organized dentistry in California. Both leaders should be congratulated by every dentist practicing in California, both member and nonmember, for the many efforts they made toward the betterment of the dental profession.

At the November CDA House of Delegates, the Applied Strategic Plan, which was central to their activity, was approved. While that might be viewed as a landmark, it is only the foundation for the work that yet needs to be accomplished if the goals and objectives of the plan that will carry the association forth in this new era are to be successfully developed and implemented.

In his presidential address to the delegates, which can be found elsewhere in this issue, Dr. Broussard outlined his vision of the work and opportunities that lie ahead. It speaks to colleagues in the profession who have either not been a part of organized dentistry or have been merely a dues-paying member in the past. For the profession to be successful in achieving its mission of service to the public, these individuals must not only be members, they MUST be included as active and supportive participants. More importantly, they must FEEL included.

A lesson learned from the "diverse, non-CDA leader" members who participated in the strategic planning process was that while they did not wear the label of "leader," they had been included in planning the future of their professional organization. Interviews with these individuals showed that their participation also renewed their excitement about the challenges facing them as practicing dentists. The experience also demonstrated that interaction with peers is an extremely important facet of membership in organized dentistry. Without active participation, we believe that a professional is unable to objectively assess the value of membership.

Another theme for the new millennium that was addressed during the 2000 House of Delegates was the matter of support to CalDPAC. CalDPAC must be classified as voluntary, but for professionals who believe in and fully support their profession, it shouldn't be. It should be mandatory. How can members say they are fully supportive of

their organization's efforts to fight for or against regulations or other actions from outside the profession that will dictate how dentistry is delivered if they do not support CalDPAC? It needs to be said yet again that far less than half of CDA members has been supporting CalDPAC.

Too often we have heard the argument that the amount of dues and PAC support are a deterrent to CDA membership. Those who have participated as volunteers have been exposed to data showing that dues and contributions expected of other professional groups and unions often exceed the levels requested of CDA members. Given the earning potential within the dental profession, except among the most recent graduates, the level of dues or contributions should not be an issue for the informed participant. And, from our perspective, that is one of the unresolved issues before the organized profession at the beginning of the new millennium.

Drs. Farnsworth and Broussard typify the attitude of current leadership. They want to see more participation by existing members and the inclusion of nonmembers in order to build an organization that can withstand all crises that it may encounter in the rapidly changing world of the 21st century. Members who participate will quickly learn the value of their membership. They will realize how vital their support to their profession is. Whether that support is in the form of service, contribution to government relations activity, or both, it creates a sense of value and a sense of belonging.

Despite the many achievements in the last two decades of the 20th century for the California Dental Association, and there were many, it is now a new year and a new day for CDA. The new day is just beginning. There will be opportunities for those who have not been active participants to become active and to feel included in the support of their profession. Those who review the Strategic Plan will see new entities such as resource, message, and learning centers evolve that will provide new benefits to all members.

The new day brings forth an organization that encourages participation and engenders support. To borrow from Dr. Broussard's vision, it cannot afford to do less if it is to be "the best it can be" in the 21st century.

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A Celebration of Opportunities

JACK S. BROUSSARD, JR., DDS

This past year with Kent Farnsworth's leadership we have laid the "Foundation for Success." By approving the Strategic Plan, the House of Delegates has reconfirmed our shared vision, supported our common goals, and re-emphasized our core values. Now we must step through the door of opportunity to fulfill our vision.

But before we take our next steps, we must remember and honor our past. Indeed CDA has a glorious past. It is a past abundant in visionaries and strong, courageous leadership. It took vision, leadership, and courage to combine northern and southern California into one cohesive organization.

It took vision, leadership, and courage to create the California Dental Service.

It took vision, leadership, and courage to move our headquarters from a small office near Los Angeles International Airport to Sacramento, the hub of state government.

It took vision, leadership, and courage to create The Dentists Insurance Company and 1201 Financial & Insurance Services, Inc., and to build our office building at 1201 K St.

Yes, it took vision, leadership, and courage to build the California Dental Association into the successful and admired organization that it is today.

Through much of our growth and success, many countless outstanding volunteer leaders forged our progress. But two men made exceptional contributions to the success CDA enjoys today -- Dr. Dale Redig and Dr. David Gaynor. I would like to thank them and all of our past leaders for their vision, leadership, and courage.

We now embark on a new era for CDA. For the first time in our history, we have opened the doors wide so members, nonmembers, and allied groups can truly help in the labor of creating our future. Through the applied strategic planning process, we have listened to our membership's wants, needs, expectations, and hopes. We have gone outside of membership into today's ever changing and increasingly complex world to explore the challenges, threats, and opportunities that await us.

I have chosen "A Celebration of Opportunities" as the theme for 2001. I believe this theme will be a rallying point for CDA's work. The next phase of

our journey toward the future will not be easy, for it will require great effort and dedication. We must set specific objectives that will help us attain our goals to achieve our vision. We must be open and courageous to take advantage of the opportunities before us. We must be bold and firm in our resolve to overcome the challenges presented to us. We must be true to our vision, diligent in the execution of our mission, and grounded in our core values to turn threats into opportunities. We must celebrate our successes. We must learn from our mistakes. We must instill our enthusiasm for organized dentistry in everyone we meet. By telling and living the success story of CDA, we create our vision, not just with words, but also with the integrity of our lives.

I have a vision of the California Dental Association. As you may have heard me say at the applied strategic planning meetings across the state, I believe in CDA with a big "C" -- an association of dentists, allied groups, specialty organizations, diverse organizations, components, and the ADA, all sharing a common vision of the best possible future -- as our vision statement says -- in "synergistic cooperation." We must have an association that is open to new relationships and alliances with education, government and industry. Relationships that can help us increase access to care for all.

I would like to extend a special invitation to all who may feel that CDA has not represented them in the past. To those who may feel they are not an intimate part of CDA. To our younger members, students, our increasingly diverse members and non-members, and allied groups who believe they have had no voice at CDA. I invite you to become involved in this great effort to create the organization that can represent you and your future.

My vision may not be your vision; however, our collective vision is broad enough to embrace the input from all to start the dialogue toward the future. Together we will continue to strive to be "the best CDA can be!"

We must not make the mistakes of some other professional organizations: turning into a fragmented corpse; truly representing no one; and allowing ourselves to be devoured by government and third-party interests. We must be more aggressive in defending the doctor-patient relationship. We must work diligently to challenge laws that prevent us from securing our best future. We must hold third-party interests accountable for their intrusion into our practices. The applied strategic planning process will help us secure that future. The Applied Strategic Plan is a living, breathing dynamic document. It will change with time. If we do our work well, next year will uncover pathways yet to be discovered and opportunities not yet imagined.

I have been asked what I want to accomplish during my year as CDA president. Our plan for next year is truly a team effort. When Tim Comstock, Kent Farnsworth, and I first presented our vision of the strategic planning process to the Executive Committee, we knew it would be a multiyear project. Kent would lay the foundation by forming the committee and presenting the plan to the House of Delegates. I would begin the implementation process by forming the task forces and workgroups that will formulate the objectives and plans for change and thereby securing a systematic, achievable and prioritized format for change. Steve Chan will focus our efforts on the short-term goals and objectives, such as the new foundation, the message center, the resource center and the learning center. Dennis Kalebjian, Debra Finney, and Russ Webb will work with components, allied groups, and membership to formulate a process to achieve our long-term goals. Our executive management team -- Tim Comstock, Fritz Knauss, Bob Witt, and Rich Krolak -- together with their excellent staffs will provide us with the best corporate and association brain trust in the nation.

At next year's House of Delegates, we will present the initial governance reorganization plans for approval. Additionally, the models for the message center, learning center, resource center, and foundation will be presented for review. We will provide the House with the initial prioritization of our long-term goals.

I ask all of CDA now to join me in our journey to fulfill our vision. I call on the Executive Committee; trustees; subsidiary, council, and committee chairs; representatives from our allied groups; delegates; component executive directors; the membership at large; and CDA and subsidiary staffs to join the journey.

We are the California Dental Association. We have a glorious past and an unfettered future. Listen to our story. Embrace our vision. Help us become the best we can be. Join our Celebration of Opportunities!

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Conceiving the Future

KENT FARNSWORTH, DDS

CDA has accomplished much during the past year. It has been the result not of any one person's individual effort, but by the cooperative effort of volunteers and staff. It has been said before, but our CDA and component staffs represent the highest standard of talent, motivation, and dedication. I'd like to thank them for all they do on our behalf.

I would also like to thank another part of our family. We have two of the most successful subsidiaries in all of organized dentistry. Their success means that we can do more for our members than dues alone would allow. Another, more subtle, asset is that our financial strength translates into political clout. I would like to thank the CEOs of TDIC and 1201, Fritz Knauss and Bob Witt, and their volunteer chairmen, Don Schinnerer and Sandy Bocks, for their contributions to CDA and congratulate TDIC on its 20 years of serving dentistry.

As I leave the office of president, I'd like to leave CDA with some personal observations about a few issues I feel will be of major concern to this association in the coming years. First of all, the future of this profession must be determined by organized dentistry. Not by politicians, not by regulators, and not by third parties. Some years back, we had a marketing campaign that told the public, "We are the dentists who set the standards." And long before Congressman Norwood took up the fight, CDA started the Patients Bill of Rights concept. However, getting our message out to the public and legislators costs money.

We must be willing to support programs to inform and educate the public. Last year's Board of Trustees approved the hiring of a marketing director to coordinate CDA and subsidiary efforts in public relations and marketing. I will strongly urge that person to develop an aggressive marketing and public awareness program to be presented to the Board of Trustees. The House of Delegates would then be asked to approve an assessment to pay for that marketing plan at its 2001 meeting.

We must also address the issue of CalDPAC participation. We can no longer depend on the contributions of 40 percent of our members to support the legislative efforts for all of us. If it were

possible, I would make PAC participation mandatory. Advocacy is the only way we can influence our own future. Director Liz Snow and the Government Relations Office have done a fantastic job with the resources available, but the political reality is that money is power. Unless we gain access to political discussions, no one hears our side. Numbers count, both in money and membership. We reduced the amount of the PAC contribution this year in hopes of increasing participation.

The other sacred cow I hope to barbecue is continuing competency. By virtue of our license, the state has granted us a monopoly to do dentistry. We have a responsibility that goes along with that monopoly. It is a responsibility to remain competent. The public has a right to expect that we are competent not only at the time we take our initial clinical exam and not only because we attest that we have taken 50 hours of continuing education every two years. I'm not suggesting that we support re-examination. CDA has developed an alternative consisting of self-examination and lifelong learning. In the past, this concept has been rejected. However, the guidance for assessing competency must come from organized dentistry. If we do not act on this, others certainly will. I want it to be the California Dental Association members who set the standards.

While I'm very proud of all that CDA has accomplished this past year, I must also discuss the future. The Bible tells us that Methuselah lived to be 969 years old. I predict we dentists will see more change in the next 20 years than Methuselah saw in his whole lifetime.

California has a reputation of being a place where new ideas, good and bad, originate. One of this association's greatest strengths is its willingness to change and adapt to cultural and demographic trends.

An old Sufi proverb says, "The first barrier to doing something is the knowledge that it can be done. Once you know something is possible, you can never return to the state of not knowing. This is why the first barrier is also the last."

Well, the California Dental Association has broken that barrier this year. Thanks to the concepts brought forth during our Strategic Planning Committee meetings and Executive Committee and senior staff retreats, the association has a blueprint for a new approach to our association structure. Like any building project, changes may have to be made to the original plan as conditions dictate, so the proposals of the Applied Strategic Plan are not set in stone, but they are the direction in which we'd like we want to move this association. As in real life, conception is the fun part. Dr. Jack Broussard and the rest of leadership have the tough job of giving birth to this new CDA.

In conclusion, I think the following story is appropriate. Two lions escaped from the Sacramento Zoo and took off in opposite directions. Months later they ran into each other in the middle of the night.

"I'm having a terrible time finding food," the first lion said. "How have you been getting along?"

"Just fine," the second lion replied. "I found a good hiding place in the 1201 K St. building. I look for the CDA immediate past president to eat. It will be years before they notice anyone is missing."

I want to thank you for the year you've given me. I can think of no greater honor than serving as the president of this wonderful organization. My wife, Jain, and I thank you very much.

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Teens Health Crisis Has Dental Implications

By Debra Belt

The future isn't looking so bright for the many California teens who are giving into bad eating habits and sedentary lifestyles and setting themselves up for serious health problems down the road.

Poor nutrition, inactivity and obesity are threatening the health of the next generation of adults and could lead to record rates of heart disease, diabetes, stroke, and cancer, according to the recent CalTEENS study conducted by the Berkeley-based Public Health Institute.

While the study casts a potential shadow on the future, it also sheds light on the increasingly integral role of dentists in alerting patients to the influence of these factors on oral and overall health. California dentists are among the health care professionals expressing concern about the study findings, which include:

- The percentage of young people who are overweight has nearly doubled in the past 20 years, and one-third of the state's youth are obese or on the verge of becoming overweight. At particular risk are Latino and African-American teens.
- Of the 1,200 teens surveyed, more than 60 percent reported eating candy or drinking soda daily.
- Just 2 percent of adolescents met all five dietary recommendations in the California Daily Food Guide (see box).
- Almost half of all teens surveyed reported eating no vegetables on the survey day; 30 percent ate the minimum recommended serving of fruits and vegetables.
- Teens spend twice as much time watching television or playing video games as being physically active.

"I don't think any observant person was surprised by the results from the study," said Carmen Nevarez, MD, MPH, vice president of external relations for the institute. "However, what was shocking and unexpected is the degree of the decline in diet and exercise. The study revealed how little exercise teens actually get and how many meals they eat out of the home."

"As dentists, we should be concerned about these findings," said Kerry K. Carney, DDS, chair of CDA's Council on Community Health. "With the release of the surgeon general's report and the focus on the integral approach to oral health and overall health, we need to be more aware of factors such as poor nutrition and obesity."

The institute also reports that poor eating and physical inactivity have created a new phenomenon in which type 2 diabetes is appearing in adolescents for the first time. Type 2 diabetes is directly linked to the rising rates of obesity and has been referred to as a new epidemic among minority youth.

"Type 2 diabetes used to be called adult-onset diabetes, but that term doesn't apply any more," Nevarez said. "In findings over the last 10 years, we have gotten enough information to know that this is not a fluke, it's a trend."

"Diabetes is of special concern because of the relationship to how well the body, including the oral cavity, heals," Carney said. "People with diabetes are also at a higher-than-average risk for developing periodontal disease."

Nevarez notes that many of the interrelated factors that contribute to diabetes are preventable. "With active intervention and support to encourage physical activity, smart food choices, and weight management, diabetes is preventable in many people."

The institute is using the study to renew support in creating a society where young people are encouraged and empowered to make healthy choices. "Dentists are in a prime position to encourage sound nutritional practices," Nevarez said. "They are often in the unique position of being the first to notice signs of a poor diet, especially one high in sugary sweets. Oral health professionals are high on the list of people who can play a tremendous role in talking to parents and young people about eating well."

Carney notes that in her practice, nutrition information is incorporated with information about plaque control. "We emphasize foods to avoid, especially sticky sweets and soda."

"It's our responsibility to help structure an environment to live a healthy life," Nevarez said. She noted that another institute project has been involved in working with Oakland and Sacramento school districts in defeating contracts with a major soda company that was seeking to install vending machines in schools.

The American Dental Association reports that in exchange for money to the school, "pouring rights" contracts give soft drink companies the right to place their vending machines on school property and that some contracts allow vendors to take other measures to increase the exposure of soft drinks to children. The ADA House of Delegates this year approved a resolution that, in part, opposes contracts that promote increased access to soft drinks in schools.

The study also reports that teens who have taken nutrition and health classes were more likely to report healthy eating practices. "This is a very important point," Nevarez noted. "It shows that if you give young people the knowledge they need to make smart choices, they will do so."

The entire CalTEENS study is available online at www.phi.org.

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The California Daily Food Guide: Dietary Guidelines for Californians

These guidelines include special recommendations for adolescents, namely:

- Five servings or more of fruits and vegetables every day for adolescent girls and seven serving or more a day for boys;
- Four servings or more of whole grain breads, cereals, and grains per day (plus additional servings of other grains to total at least seven servings a day);
- Three servings of fat-free or 1 percent milk products every day;
- Two small servings of lean animal protein (totaling five ounces for adolescent girls and seven ounces for adolescent boys) or a vegetarian alternative;
- One serving of beans every other day; and
- One hour or more of active play or vigorous physical activity every day.
- Courtesy of the Public Health Institute, 2001 Addison St., Berkeley, CA 94704, (510) 644-8200, www.phi.org.

Where Kids Get Their Fill

Outside the home, schools and fast-food restaurants are the most common places that adolescents obtains meals and snacks. Typically these food have more calories per nutrient that foods consumed at home.

- The number of teaspoons of sugar contained on one 32 oz. soda: 17
- Percent of all vegetables consumed by U.S. teens that were french fries: 25
- The amount of fat (grams) in an order of "supersized" fries: 28
- Percent of total calories eaten by adolescents that come from meals eaten outside the home: 33
- The average number of calories that soda adds to a teen's diet: 300 to 500
- The number of calories an average cinnamon roll at the mall adds to a teen's diet: 670

Smoke Gets in Your Eyes, Heart and Ovaries

Smoking can cause serious health problems for anyone, regardless of age or gender, but some of tobacco's harmful effects are reserved for women only.

"Women who smoke are four times more likely to develop cervical cancer than women who don't use tobacco," said Sandra Brooks, MD, director of gynecologic oncology at the University of Maryland Medical Center. But Dr. Brooks said a surprising number of women are unaware of the increased risk.

"Health care professionals need to make their female patients aware of the short- and long-term effects of smoking," Brooks said. "Smoking affects many cells in the human body. The longer a woman smokes, the more damage is done."

Smoking also increases the risk of infertility. "Studies have shown that tobacco use can decrease the supply of eggs within the ovaries, even in young women," said Howard D. McClamrock, MD, director of the medical center's in-vitro fertilization program. "Doctors should urge women to stop smoking if they plan to become pregnant in the future."

Women smokers who do conceive should quit. Research links maternal smoking to underweight babies, sudden infant death syndrome, and learning and behavior problems. Despite extensive publicity about such dangers, about one-quarter of pregnant women continue to smoke cigarettes.

"Our prevention efforts need to be focused on young teenage girls because they make up the fastest growing group of new smokers," says Mary Corretti, MD, a cardiologist at the University of Maryland Medical Center. "In addition to the threat of cancer and reproductive problems, women smokers increase their risk of developing cardiovascular disease, which is the No. 1 cause of death among women."

Examples of high calorie, mass-merchandised fast food popular with teens:

- BK Double Whopper (w/cheese): 1010 calories
- 7-11 Double Gulp: 800-900 calories
- Taco Bell taco salad (w/salsa): 850 calories
- Pizza Hut Supreme Personal Pan Pizza: 808 calories
- Jack in the Box fish and chips: 780 calories
- Jack in the Box Oreo cookie shake: 740 calories
- Jack in the Box chicken teriyaki bowl: 670 calories
- McDonald's super size french fries: 610 calories
- Burger King chocolate shake: 570 calories
- McDonalds' apple danish: 340 calories

Courtesy of the Public Health Institute

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Apnea Treatment May Alter Occlusion

Removable appliances, usually made by orthodontists, for treatment of sleep apnea may cause unexpected complications, according to a recent orthodontics journal article. Sleep apnea is a relatively recently discovered disorder that has attracted growing interest among researchers in the field of oral and maxillofacial surgery and orthodontics

The purpose of removable appliances is mostly to advance the mandible and keep it in a protruded occlusal relationship during sleep, wrote authors Kari Panula, DDS, and Katri Keski-Nisula, DDS, of Vaasa Central Hospital in Finland. More airway space is thought to be created retrolingually in the hypopharynx to reduce the obstruction that causes snoring and apnea, they explained.

These appliances are generally used in adults and therefore are not supposed to have the capacity to irreversibly change occlusion, as is the case when children are treated with activator-type appliances, the authors said. Patients can use these devices on a temporary basis to determine whether orthognathic surgery could be effective in correcting apnea problems.

A mandibular advancement appliance can be a good solution for these patients, Panula and Keski-Nisula said. However, complications can also occur. Their article reported on an adult woman who was treated with a mandibular advancement appliance and later found to develop a permanent alteration in her occlusion.

This case confirms the growing impression among researchers that mandibular advancement appliance treatment may carry the risk of remodeling changes in the glenoid fossa, even in adults. The authors ruled out alternative explanations for the occlusal change in their patient, based on clinical, radiographic and magnetic resonance imaging examinations.

For the authors' patient, the appliance was made very thick to conveniently position the TMJs and improve retention of the appliance. Consequently, they propose that appliances be fabricated as thin as possible to promote more horizontal protrusion and prevent counterclockwise rotation.

The article appeared in the *International Journal of Adult Orthodontics & Orthognathic Surgery,* Volume 15, No. 3, 2000.

Reduced Bite Force a Problem for Elderly

As patients age, their bite force and salivary flow rates decrease, according to an article in the August 2000 Journal of Dental Research. The article also highlights the importance of maintaining healthy dentition, capable of masticating a variety of food textures, as a solid defense against oral disease.

The authors of the study state that this is the first direct investigation of the association between bite force and salivary flow rates and note that bite force is directly correlated with salivary flow, regardless of a patient's age or gender. The 399 study subjects were residents of San Antonio, Texas, who were participating in the Oral Health: San Antonio Longitudinal Study of Aging.

Bite force is involved in the mastication of food, and the forces required to chew food are related to the firmness of the diet, according to the article. Age-related decreases in bite force and salivary flow rates may relate to an overall decrease in masticatory function associated with a reduced caloric intake, loss of teeth and the wearing of dentures, oral pain, or periodontal disease, the authors noted.

The size of the masseter muscle is a factor in muscle strength and therefore the magnitude of force that can be applied during a clenching cycle, the authors said. Previous studies have shown that masseter muscle size decreases with increasing age, and this decrease in muscle size may be related to a reduction in masticatory force as individuals age.

Educating Parents Key to Reducing Fluorosis

Young children brushing their teeth with parental assistance were found to ingest a significantly higher amount of dentifrice than those brushing by themselves, according to a study in the September/October 2000 issue of Pediatric Dentistry.

The study was performed to assess the actual amount of dentifrice used and ingested among 28 U.S. preschoolers.

The prevalence of permanent tooth dental fluorosis has increased in fluoridated and nonfluoridated communities in North America, according to the article. Even though most of the increase has been in milder forms and may not be considered a public health problem, the authors commented, it can be considered an esthetic problem, especially in anterior teeth.

Early use of fluoride dentifrice has been documented in a number of studies as a risk factor for dental fluorosis, the authors state. Almost all dentifrices sold in North America are fluoridated.

Most children start brushing by the age of 18 to 24 months. Although earlier reports have agreed with this study's finding that the amount of dentifrice used is the strongest determinant of the amount ingested, few recent studies have been conducted on the amount of dentifrice actually used by preschoolers. And no U.S. study has been published that assessed other factors associated with dentifrice use and ingestion among preschoolers, they add.

These authors found that their study participants ingested a mean of 62 percent of the dentifrice used per brushing, and the amount of fluoride ingested was significantly associated with the amount of dentifrice used. The amount of fluoride ingested did not differ according to the age or gender of the child, mother's age or education, family income, dentifrice flavoring, total brushing time, number of times the child expectorated, or number of rinsings.

According to the article, the fact that children who had parental assistance while brushing ingested more fluoride than those who brushed by themselves may have been due to longer brushing, along with parents' desires to achieve excellent oral hygiene and caries prevention for their child, coupled with a lack of knowledge regarding fluorosis and fluoride ingestion.

The authors recommend that dental professionals educate parents about using small amounts of fluoride dentifrice and ways to avoid having children ingest it.

Researchers Increasingly Involved in Financial Relationships

A growing number of faculty researchers report financial relationships with industry sponsors beyond grants for an individual research project, according to an article in the Nov. 1 issue of the Journal of the American Medical Association.

Elizabeth A. Boyd, PhD, and Lisa A. Bero, PhD, of the University of California at San Francisco School of Medicine, conducted a case study using data from disclosure forms and official documents maintained by the administrator of conflict of interest policies in the UCSF Office of Research Administration. The university is a major research institution with more than 12,000 faculty and staff, and it ranks among the top five in National Institutes of Health funding. The authors assessed the extent to which faculty researchers have personal financial relationships with the sponsors of their research, the nature of those financial relationships, and efforts made at the institutional level to address disclosed financial relationships and perceived conflicts of interest.

According to background information cited in the study, academic institutions receive about $1.5 billion from industry each year. While a growing number of academic researchers receive industry funding for clinical and basic research, little is known about the personal financial relationships of researchers with their industry sponsors.

The authors examined UCSF disclosure forms and other documents dating from December 1980 through October 1999. "By 1999, almost 7.6 percent of faculty investigators reported personal financial ties with sponsors of their research," they wrote. "Throughout the study period, 34 percent of disclosed relationships involved paid speaking engagements (from $250 to $20,000 per year), 33 percent involved consulting agreements between researcher and sponsor (from less than $1,000 to $120,000 per year), and 32 percent involved the investigator holding a position on a scientific advisory board or board of directors." Fourteen percent of cases involved investigators reporting equity in the sponsoring company, and 12 percent involved multiple relationships.

The UCSF Chancellor's Advisory Panel on Relations With Industry made decisions regarding the presence or absence of conflicts of interest and recommended management strategies to mitigate or eliminate conflicts. "The advisory panel recommended managing perceived conflicts of interest in 26 percent of the cases, including recommending the sale of stock, refusing additional payment for talks, resigning from a management position, or naming a new principal investigator for a project," the authors reported.

The authors asserted that specific guidelines regulating faculty relationships are lacking, even as these types of financial relationships and their accompanying risks to research integrity are likely to increase. "Thus, our findings raise questions for university, state, and federal policymakers who are concerned about enforcing consistent standards of behavior among faculty researchers," they wrote.

"Guidelines for what constitutes a conflict and how the conflict should be managed are needed if researchers are to have consistent standards of behavior among institutions," they conclude.

The study was funded by grants from the Industry-University Corporate Research Program; the University of California Office of the President; and the Office of the Vice Chancellor for Academic Affairs, University of California, San Francisco.

Web Watch

California Dental Association

CDA maintains a comprehensive database for its members as a member benefit. A log-in name and password are required for access. Instruction on obtaining those can be accessed by going to the CDA homepage, www.cda.org and clicking on the "Members Only" button.

The following are the main buttons at the CDA member homepage, www.cda.org, and highlights of the information available from those pages.

Publications

Online versions of the *Journal of the California Dental Association* and *CDA Update*.

Professional Development

Information on Sessions; risk management classes; continuing education, including online courses; licensure; and staff training.

Legislation & Regulations

Information on CDA Legislative Day, CalDPAC, legislators, and election results.

CDA Marketplace

Journal classified ads, the ADA and CDA product catalogs, and CDA subsidiary services.

Membership Benefits

Information on peer review, including the manual; direct reimbursement, the relief fund, chemical dependency, dues, ethics, and the Regulatory Compliance Manual.

Honors

Robert L. Merin, DDS, MS, has been named Dental Alumnus of the Year 2000 by the University of California at Los Angeles School of **Dentistry.**

Myron J. Bromberg, DDS, has been recognized with the Academy of General Dentistry's Distinguished Service Award.

Richard D. Udin, DDS, received an honorable mention from the American Society of Association Executives Gold Circle Awards for his article "Newer Approaches to Preventing Dental Caries in Children," which appeared in the November 1999 issue of the Journal of the California Dental Association.

Paul Glassman, DDS, has been appointed assistant dean for information and educational technology at the University of the Pacific School of Dentistry. **Richard Fredekind, DDS,** has been named acting assistant dean for clinical services at UOP. **Jeffrey S. Kirk, DDS**, has been named group practice administrator of UOP's third-year clinic. **Larry Loos, DDS,** and **Marc Geissberger, DDS**, have been named co-chairs of the newly formed Department of Restorative Dentistry at UOP.

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Dental Implications of the Human Genome Project

Janyce Hamilton

Dr. Marks stared at the new patient sitting in the dental chair. Did she just ask if she could have a genetic test for periodontal disease like one she read about on the Internet?

"Repeat the question please" he asked, carefully adjusting his stool, stalling to think up an intelligent response.

The Human Genome Project, now in its second decade of mapping discoveries, has brought dentistry gifts and curses. With researchers identifying about 300 known dental genes thus far and about 1,000 diseases and disorders with major orodental complications, comes the gift of knowledge. The curses soon follow, however, as dentists realize there is no treatment yet for almost all of the problematic genes. To match the sometimes ominous results of sophisticated genetic screening tests, all dentists have are standard therapies: a scaler, a chip soaked with medicine, a graft.

It is a humbling realization.

Meanwhile, a news story on a study released by the Pew Internet and American Life Project at the end of 2000 found that "more Americans surfing the Internet look for medical information than for sports scores, stock quotes, or online shopping bargains."

In fact, 55 percent of 12,000 people surveyed went online for health information once per month. Dentists, often so bogged down in paperwork they have no time to search the Internet, may be shocked to find that their patients are sometimes better informed on the latest dental discoveries than they are.

The global scientific and health care community's wonderment continues as genetic discoveries affecting health make the news headlines each week. What the new cloning capabilities mean to medicine and dentistry is that the Human Genome Project is advancing science so rapidly that the production of new biochemical substances, tissues, and entire organs will be taken to new heights.

Xenograft tissue from animals? No problem.

Exograft tissue from a patient's own body, grown in a dish and reimplanted? No problem.

Disease prevention and delay, diagnosis, and treatment are advancing daily with mapping sequences being

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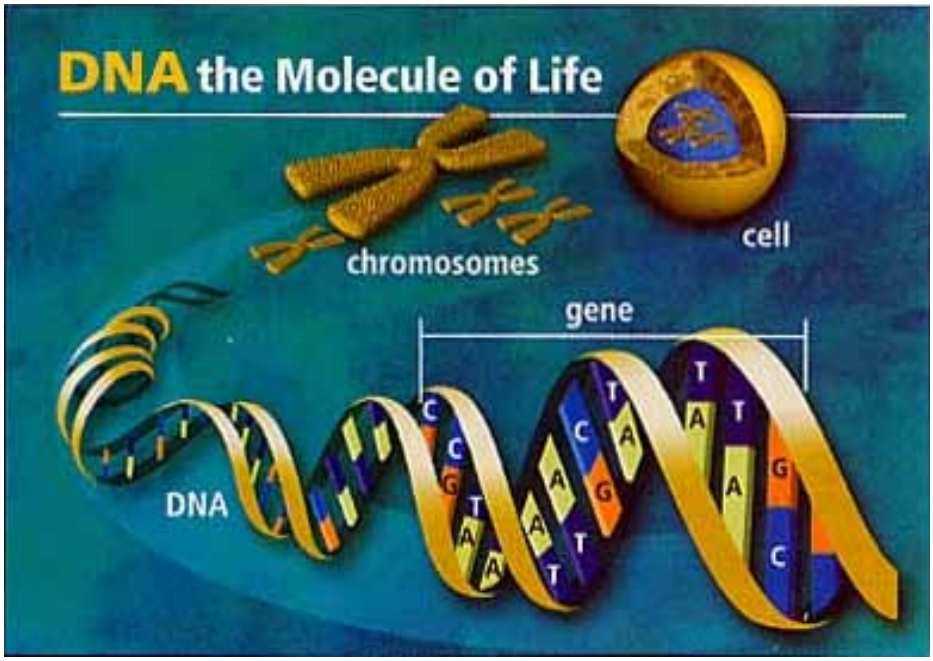
added to one of several public gene banks 24 hours a day by genome project international researchers. Investigators continuously tap the gene banks to hunt for genes that will advance their research or lead to a worthy patent.

As genetic discoveries affecting dentistry continue to emerge in the next few years, they will no doubt radically alter some of the basic concepts of disease and its management as taught in dental schools.

This article contains interviews with top government, academic, and industry experts on dental genetics to profile what is known about the science, legal, ethical, insurance, and clinical aspects of genetics in dentistry. Dental school and continuing education, privacy, and future therapeutic issues are addressed with an emphasis on how patients' genetics are just now beginning to affect the dental practice.



DNA Diagram. Courtesy of the Human Genome Program, http://www.ornl.gov/hgmis

The Human Genome Project Facts

- A genome is the complete set of genetic instructions carried within a single cell of an organism. In each cell is DNA, which is composed of chemical bases represented by four letters. Determining the order of those bases is "sequencing." That sequencing results in a person's genome, which will tell health professionals the instructions for everything a patient's cell does.
- The Human Genome Project was begun in 1990; by June of 2000, the project's Public Consortium and Celera Genomics announced a working draft of the sequence of the human genome -- 95 percent of the genetic blueprint for a human being is complete. It is 99.9 percent accurate.
- 20 different human genomes have been used for the basic work, and about 1,000 others have been used for annotations and further detail analyses. The largest difference discovered between two people has been 0.1 percent
- Anyone with Internet access can go to three public databases funded by U.S. National Institutes of Health, U.S. Department of Energy, Wellcome Trust in England, and others, to see each deciphered piece of DNA code. 75,000 people from academia, industry and corporations across the globe search this information daily at no charge.
- More than 1,000 scientists from six countries, including the United States, are sequencing the human genome.
- The sequencing effort is tightly coordinated to minimize duplication of effort.
- Data is deposited by scientists into public databases every day, 24 hours a day.
- To sit down and read the amount of information generated by the Human Genome would take 26 years of round-the-clock reading time.
- $3 billion has been funded for 1990-2005; the tab to produce the working draft is $300 million.
- Preliminary benefits of the working draft sequence: thousands of genes and about a million polymorphisms (mutations). For example, the breast cancer susceptibility gene, as well as genes for several other disorders, most fatal; also a leukemia drug that in preliminary trials, appears positive, and gene therapy for Parkinson's that appears promising in monkeys.

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The DNA Panel

If one could peer into a crystal ball, the future dental practice would look quite the same. But some of the tests administered by dentists, and eventually the treatments given, would be markedly different.

Arthur Curley, JD, a San Francisco attorney and an assistant professor at the University of the Pacific School of Dentistry, specializing in medical, health, and dental law, believes that dentists will soon offer blood tests to assess if a disease status is under control. "Instant blood tests for blood sugar levels in diabetics, dilantin levels in epileptics, etc., will become the standard of care; and failure to at least recommend such tests will be malpractice." Then, as DNA testing becomes cheap and easy, Curley said, dentists may start to offer them to take potential-disease inventories. Key among the new tests will be an assay panel that uses cheek swabs, saliva, or crevicular fluid to screen patients for all known genetic dental disease susceptibilities.

Dentists may eventually offer tests for all known medical disease susceptibilities.

Affymetrix, in Santa Clara, Calif., is one of the better-known biotech companies that develops and commercializes systems that enable researchers to create, acquire, analyze, and manage complex genetic information. Affymetrix' DNA array technology identifies thousands of genes simultaneously using a DNA chip. Its technology is designed to capture the unique gene expression patterns and polymorphic variants of a person's genome (gene map).

The chip is a DNA affinity test. In simple terms, DNA sequences are combined with a computer chip. The subject's DNA sample is bathed over the chip. The subject's complementary DNA binds to the chip, indicating how similar the subject's DNA is to the chip's representative mutated and standard DNA sequences. The DNA that binds is identified by software, and the result indicates the subject's variations from and affinity with standard and mutated DNA. More than 12,000 genes fit on one chip. This information may correlate with specific diseases and therapeutic responses that could be critical knowledge for managing a disease and prescribing the right drugs -- "pharmacogenomics."

With pharmaceutical companies profiting significantly by advertising directly to consumers, they are driving the explosive development of pharmacogenomics. In dental practices, which prescribe mostly antibiotics and pain medications, the benefits will likely come in the package of genetically tailored pain medicines. This is because patients' genes alter their response to pain. In contrast, resistance to antibiotics is more a function of bacterial genetics, not human genetics. Lawrence Tabak, DDS, PhD, director of the National Institute of Dental and Craniofacial Research, said "Genetic tests will also increasingly be used to identify individual predictors of drug response so that effective therapies can be prescribed sooner, potentially toxic side effects avoided, and diseases more effectively and economically managed."

Affymetrix offers a scanner for electronically recording which gene sequences were found on the DNA chip, along with the software to analyze and manage that information. Mutations, alone and when combined with varied drug regimens, can be analyzed by computer to one day ascertain certain predictable health outcomes -- information physicians, dentists, insurers, employers, and potential spouses may want to know.

But does the individual want to know?

Will Patients Want To Know?

The general public, including dental patients, are divided as to whether they want to know their genetic predisposition for diseases and disorders.

When it comes to a genetic basis for periodontal disease, Interleukin Genetics did some market research and reported more than 90 percent of patients surveyed would want to know the information "if their dentist said it would be useful."

Other sources report that a greater percentage of people are fearful of knowing what invisible diseases silently lurk beneath their skin.

Harold Slavkin, DDS, PhD, former director of the NIDCR and current dean of the University of Southern California School of Dentistry, said that "denial" is an important human mechanism for coping with life, nonetheless "each of us can use denial or choose to live through information and knowledge."

A recent American Medical Association survey and other researchers have found that about half of patients want to know their genetic risk factors. Genes for diseases that cannot yet be cured, such as cancer and Alzheimer's, may be information in the "I don't want to know" category.

Tests for genes linked with more cosmetic and controllable diseases may be more amenable to patients' psyches, and therefore may experience more demand.

Gene-Linked Diseases With Oral Component

On NIDCR's site at nidr.nih.gov/cranio/index.html, many of the diseases/disorders with dental, oral, and craniofacial genetic component are listed. Categories include craniofacial birth defects, severe orthognathic disorder, abnormal tooth size and shape, absence of teeth, periodontal diseases, head and neck cancers, salivary gland disorders, TMJ diseases and disorders, osteoarthritis, osteoporosis, and chronic facial pain.

Fact: Every hour in the United State, a baby is born with a genetic craniofacial defect (1 in 700 live births).

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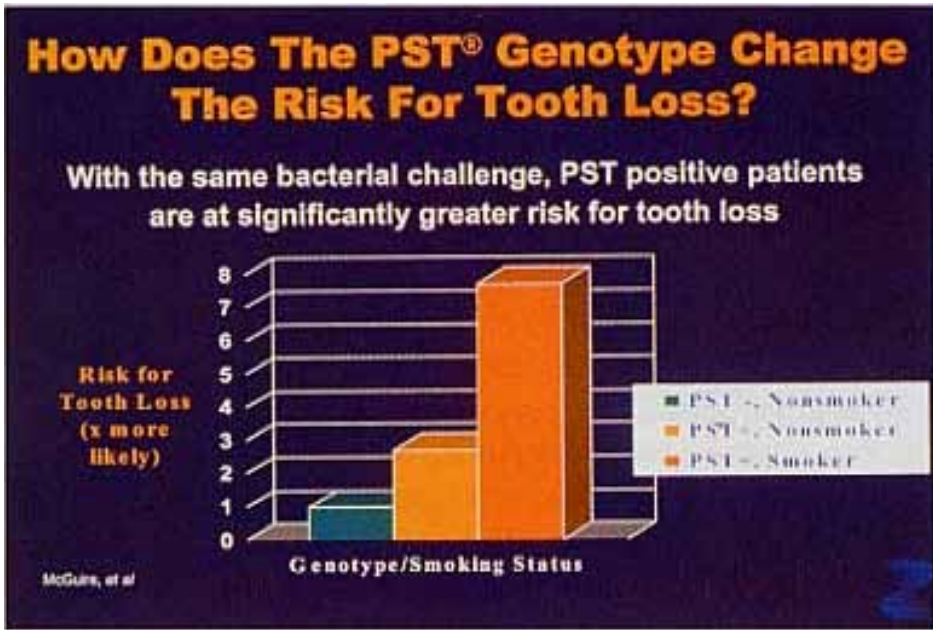
Dentistry's Only Genetic Test

When it comes to dentistry, the only genetic test available is the PST Genetic Susceptibility Test for Periodontal Disease. The company holding the polymorphism's patent -- and those for several other systemic diseases -- Interleukin Genetics in Waltham, Mass., made the PST test available for dental research and clinical use in 1997, the same year Dolly the sheep was cloned. More than 7,000 PST tests have been processed.

Ken Kornman, DDS, PhD, of Newton, Mass., is one of the early investigators studying the specific interleukin-1 (IL-1) genetic marker associated with periodontal disease for which the test checks. According to Kornman, the chief scientific officer and co-founder of Interleukin Genetics and a professor of microbiology at the University of Texas Health Science Center, the test doesn't determine whether a patient has periodontal disease but whether he or she has a gene mutation that increases the risk for advanced periodontal disease and the chance of losing teeth. The PST screens for two polymorphisms in the genes for IL-alpha and IL-beta that regulate the activity of the cytokine IL-1. IL-1 is involved in the control of inflammation and immune response in various spots in the body. For PST's purposes, the focus is on periodontal disease.

The benefits and limitations of finding one's PST status are subject to debate.

Michael McGuire, DDS, of Houston, is the president of the American Academy of Periodontology. He has performed research for Interleukin Genetics by using the PST test in his periodontal practice. McGuire said the test's usefulness lies in its capability to identify patients who have a polymorphism that causes their body to over produce IL-1. IL-1, which the body normally produces to help destroy microbes in response to a bacterial challenge, is fine in normal amounts. Overproducers of IL-1, however, have excessive inflammation that appears to result in destruction of bone and connective tissues in the periodontium.



The genetic marker for periodontal disease can influence tooth loss.

Those with IL-1 are almost three times more likely to lose teeth than someone who is IL-1 negative, according to McGuire. Although initially offered as a finger-prick blood test, testing now involves taking a cheek swab and mailing it to a lab. One week later, the results arrive and the patient is given the news: positive or negative status.

"If I have the gene for periodontal disease, I want to know because I'm forewarned and forearmed. Perio is preventable so you can take charge," McGuire said.

The "preventable" part indicates that even positive status isn't a death sentence for patients' teeth and periodontal health. It just means extra oral care is needed. Tabak is concerned, however, about positive tests leading to exaggerated concern by the patient and being used to support unnecessary interventions by dentists. Likewise, "Inconclusive tests can result in a false sense of security in some patients. Negative results may be interpreted as a reason to bypass needed procedures," Tabak said.

The limits of the PST test lie in its scope: Only 30 percent of diseased patients are PST positive. But the remainder can still get severe periodontal disease, just as those who are positive can remain disease-free for their lifetime.

Another percentage cited comes from a November 2000 study in the Journal of Periodontology by John Gunsolley, DDS, MS, and colleagues on periodontal health and genetic risk in identical and fraternal twins. The investigators found that approximately half of the variance in periodontal disease can be attributed to genetic differences.

Not only is periodontal disease multifactorial, but researchers admit that a number of genes may affect susceptibility -- and all these factors may differ among races and ethnicities.

"Periodontal disease is a lot like heart disease: It depends on risk factors. For heart disease, it's cholesterol, weight, smoking, exercise, family history. It's similar in periodontal disease, where bacteria is the cause and two major risk factors are genetics and smoking. Secondary risk factors -- amplifiers -- are stress, systemic diseases, hygiene and care, and medications," McGuire explained.

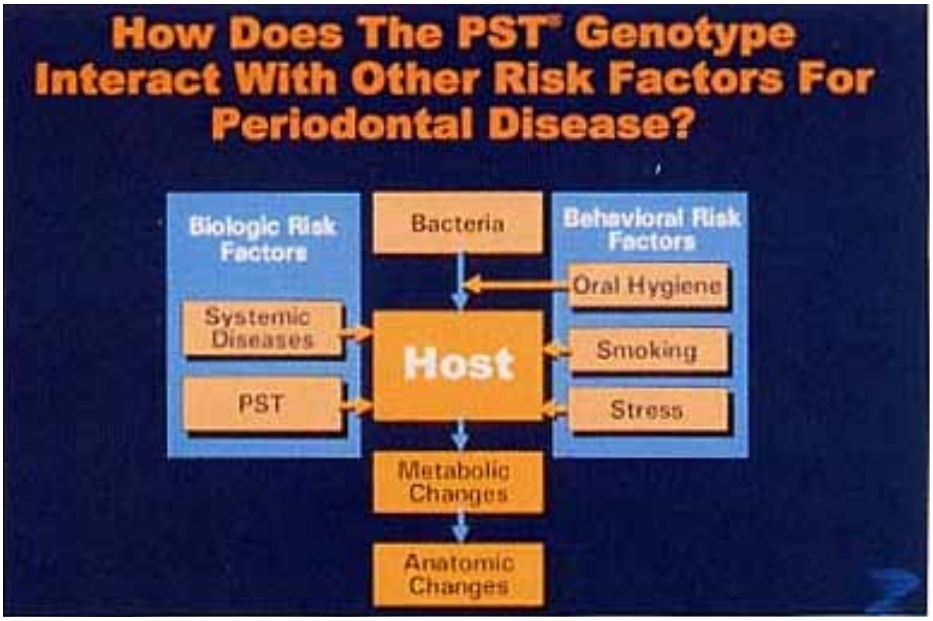
Researchers of dental disease and

genetics have been known to recite: "Like no bug is an island, not every polymorphism is an island." Ken Kornman commented on the saying by connecting bacterial tests for P. Gingivalis and the genetic test for perio: "Many dentists use the PST test (prognostic) together with microbiological testing (diagnostic) to get a more complete picture of the current status and future risk for disease progression."

Meanwhile, there is less genetic research being performed to pursue a "caries gene" than periodontal genes. Caries is often seen in people with certain gene-based disorder's such as Sjogren's syndrome. Researchers are debating the role of the host's gene-related systemic immune response in caries. One rat study showed a 50 percent genetic link to caries. Yet, most scientists believe caries -- more preventable than periodontal disease -- is related more to virulent bacteria than genetic variation in the pathogens and their hosts. Because it is a controllable oral disease perceived by most to have little systemic consequence, the commercialization potential needed to fund the exploration for a genetic link is not as strong as it is for other diseases.

Slavkin has often stated that every disease and condition except trauma or physical accidents has a major genetic component -- although not necessarily a causative component. Everyone interviewed for this article agrees that diseases are multifactorial, and the genetic component is far from being the sole predictive card in the deck.

In McGuire's opinion, the PST test's advantage lies in its capability to help clinicians make treatment decisions about whether to maintain or extract a questionable tooth. For general practitioners, the result may tip the scales as to whether to refer a case to a periodontist. In addition, McGuire claims positive PST status can be likened to the "proof" an intraoral camera produces. Not only is it good for case acceptance, it can work as a motivational tool for some patients who reportedly practice extra vigilant hygiene once they learn the "bad news" of their predisposition to gum disease. Yet, some studies find compliance with doctor-prescribed pharmaceuticals for even serious diseases hovers at 50 percent. So, when no one quite understands why an elderly patient won't consistently take his high blood pressure pills, how can a dentist be sure the PST-positive periodontitis patient will floss?



The genetic marker for perio works in concert with other risk factors.

Skeptics say a patient's PST status is a moot point, even "information overload," as it doesn't change the treatment plan, which is often aggressive for all patients with advanced perio disease. To that line of thinking, the test's proponents counter that they prefer a conservative approach using individualized treatment.

"I'm against overtreatment," McGuire commented.

Michael Lynch, DMD, PhD, from the Council on Scientific Affairs at the American Dental Association, wants dentists to temper their zeal for dentistry's first genetic test. "It has limited value in that it tells us when a nonsmoker has slightly more risk," Lynch cautioned, adding that dentists should not think of it as a stand-alone tool for predicting periodontal disease.

"A lot of health problems are not the result of one deficiency, but a complex of genes," Lynch said. "There's a lot of overlap that builds in compensation. Except for the extreme cases of single-gene diseases, one genetic deficiency isn't going to be enough to create a problem."

NIDCR's Tabak said he has some concern about premature integration of genetic testing in the dental practice. Before validity and utility are strongly established and providers have adequate knowledge of genetics, there are risks of genetic testing for dental, oral, and craniofacial susceptibilities, just as there are for breast and colon cancer, diabetes, and heart disease. "This can lead to exaggerations about the prognostic and therapeutic implications of testing," Tabak explained.

For a fairly innocuous genetic periodontal disease test, the insurance industry is certainly sitting up and taking notice.

Impact on Insurance and Benefits

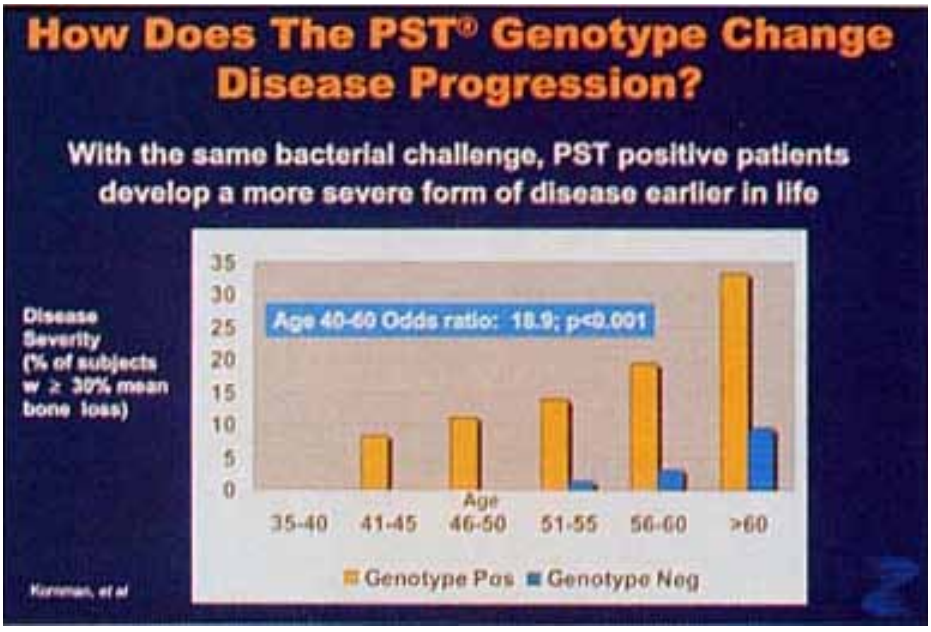
A positive genetic test result for

significant systemic disease, even in those who are presymptomatic, has the potential to interfere with the ability to obtain or keep health insurance or a job. Tabak agreed: "There are federal laws and laws in some states that provide some protection against genetic discrimination, but no law covers every individual in every situation."

The screening test for the hereditary Huntington's gene was approved for use in 2000 for assessing risk and setting premiums by British life and health insurers. Standard diagnostic tests for seven diseases -- including Alzheimer's and breast cancer -- are already used. The Huntington's ruling, however, paves the way for using genetic tests for insurance consideration -- something Americans fear will eventually be adopted in the states. Especially worrisome is the idea than genetic liabilities may overshadow one's current health, no matter how robust. U.S. governmental health agencies and insurers are watching the situation overseas closely. Individuals will not be asked to have a genetic test before obtaining insurance, but if they have already been tested, the data that cannot be hidden from insurance companies asking for a health history. There is speculation as to whether this will discourage people from getting tested to learn their genetic susceptibilities, which in turn will prevent them from seeking treatment or changing health habits.

In the United States, the Medical Information Bureau provides information to its members that was provided to them from insurance companies to whom people have availed their medical liabilities. A spokesperson for the bureau said they do not have codes for genetic susceptibilities. They would not, however, indicate if they would refuse receipt of genetic test results or gene-based disease data if acquired indirectly.

The bureau does not collect dental information. In fact, because dental disease isn't as costly for insurers as, say, diabetes, there may never be a national



Carriers of the perio genetic marker can face more serious disease progression.

database of oral health status from which dental patients would need to hide their positive PST test results. No doubt dental insurers are keeping their own files on their members' claims so it is uncertain what could evolve in the future.

Howard Bailit, DMD, PhD, professor and director of the Health Policy and Primary Care Research Center, School of Medicine, University of Connecticut Health Center, has a lot of experience in this area. He's also a research associate at the Sloan Managed Care Industry Center at Harvard and a former Aetna Health Plans vice president for medical policies and programs.

Almost all employer-based dental insurance is sold as a group policy without underwriting at the individual member level, according to Bailit. So actuaries wouldn't access the genetic susceptibility of individuals unless the group being underwritten is small, such as in dental offices where there may be 10 or fewer employees. In that case, as with individual dental insurance policies, "Data on genetic susceptibility could be used to influence rates charged, unless state law prevents the use of this information by insurers," Bailit said.

Because PST positive status does not "strongly link" the patient to periodontal disease susceptibility just yet, according to Bailit, it will not influence rate setting.

Of course, insurance companies always leave open their options for why and when and how much they can raise premiums.

Dental insurers so far are not interested in picking up the $120 tab for the PST test, because employers aren't interested in higher premiums. A state law mandating coverage of genetic tests would be the only thing to get them interested.

Most people in the dental insurance industry agree than a strong argument can be made for managing (approving/denying) treatments on the basis of a patient's risk for disease. So far, when it comes to caries, insurers are intrigued by the idea of controls or limits on procedures based on degree of risk. Bailit thinks genetic risk would be even more difficult, "That type of benefit program would be very difficult to market and impossible to administer."

In fact, the dental insurance industry doesn't know what to make of the new

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PST test. The test's manufacturer says PST positive status is correlated with increased risk of future tooth loss, but the insurance industry says this doesn't mean the PST has "positive predictive value." One insurance group agreed to join the PST's manufacturer to sponsor a study to gather more data on the PST test.

Michael del Aguila, MS, PhD, is an epidemiologist and director of outcomes assessment for Washington Dental Service, a member of the Delta Dental Plans Association. He is sponsoring the research being performed at the University of Washington School of Dentistry to quantify the relationship between PST genotype status and utilization of dental services by patients in a dental plan. Insurers such as the Washington Dental Service want to target resources appropriately. If the evidence demonstrates that those who are PST positive are more likely to use periodontal dental services, they can receive earlier coverage for services that may slow the progression of the disease. This in turn could minimize more costly complications due to advanced disease (bridges, partials, dentures, implants) and contribute to improved oral quality of life for patients.

"We want to know the total cost and treatment over time of those with PST positive vs. negative status. If it has value in letting dentists know which patients will need care in the future, why not authorize and provide treatment now?" del Aguila asked.

The study began a year ago and has faced challenges recruiting patients. del Aguila didn't speculate as to the reason behind the reluctance of subjects who declined participation. It may have been inadequate compensation for their level of effort. Or perhaps they did not trust how a dental insurance company would use the information.

The study has currently been reconfigured to take advantages of changes in collection of the PST (cheek swabs vs. fingerprick) that allow patients to perform it in their own homes.

Privacy and Ethical Issues

Seven out of 10 Americans are concerned about their employers or insurance companies accessing their genetic information and using it against them, according to a 1998 American Medical News article.

The National Human Genome Research Institute reports that 90 percent of people it surveyed think employers should be prohibited from obtaining employees' genetic data, and 60 percent said they won't take a genetic test if they think employers and insurers can access the results.

Federal employees in 2000 were protected by an Executive Order signed by President Clinton; however, a Patients' Bill of Rights Act with protection against genetic discrimination is needed. State legislation is pending across the country and has passed in 23 states to enhance patients' rights and protections. But Americans have a responsibility to keep informed as to how to protect their privacy and voice their concerns about the vulnerability of their medical data to their legislative representatives.

The Human Genome Project itself does not pose ethical dilemmas, but use of its findings will.

Slavkin favors the following analogy: "Like the Periodic Table of Elements from the 19th century, the Human Genome Project is without values per se, but raises profound ethical issues regarding the uses of this knowledge base."

Online Health Histories

In fact, companies are mining the Genome Project's draft map of a human being for genes and their polymorphic errors or variations as you read this. From it they develop tests using organisms like yeast and lab animals, and sometimes plan to put them through clinical trials on humans.

Dentists one day may offer or even recommend patients take tests that go well beyond dental diseases. Patients may come into the office already having taken such a test at another medical or dental office and know the full spectrum of their health-related susceptibilities.

In 2010, a "Dr. Marks" may see a new 15-year-old dental patient, Sophia, who made her appointment via the Internet. Sophia tells Dr. Marks she has the gene for juvenile onset periodontal disease, not to mention alcoholism, "which means I have to stop at two drinks, or else" she opines, sighing with adolescent drama. Dr. Marks asks if she brought

Genetic Web Sites

- The National Human Genome Research Institute: www.nhgri.nih.gov/ (source for how many genes are mapped thus far)
- NICDR: nidr.nih.gov
- GenBank: www.ncbi.nlm.nih.gov/Genbank/GenbankOverview.html
- Links of some useful resources for human genome data searches, Human Genome Central: www.ensembl.org/genome/central
- Interleukin Genetics: ilgenetics.com
- Human Genome news: www.ornl.gov/hgmis
- Ethical, legal, and social implications of genome research on privacy/confidentiality: http://www.ornl.gov/hgmis/elsi/elsi.html
- American Society of Human Genetics: www.faseb.org/genetics
- National Coalition for Health Professional Education in Genetics: www.nchpeg.org

her history on a card or does he need to retrieve it. Sophia, like all Americans, has her certified DNA map stored on an electronically secure site, with portions she can make accessible to her health care providers or potential insurers via a changeable password. However, after reading about full-site hackings using passwords, she decided to bring Dr. Marks her medical and dental history and genetic data on a portable health card with a computer chip. In any case, neither source will allow copying or a printout for security and legal purposes, though reports of bypassing technology surface.

Although a recent survey by the Pew Internet and American Life Project confirmed that in the year 2000, 63 percent of Americans were opposed to keeping their medical records online even with a password-protected site for fear others would see it, expediency will trump public opinion. History is our teacher -- remember when one's social security number was forbidden to be used as personal identification for any reason except for its express purpose? Today, Americans' formerly secret social security numbers are used for credit cards, bank account passwords, and appear on most drivers' licenses, even on personal checks handed to the pizza delivery guy.

Stanley Surabian, DDS, JD, is chief of Dental Services for Community Medical Centers, and Program Director of the General Practice Residency in Dentistry program at University Medical Center in Fresno, Calif. Surabian said he has noticed a trend in a loosening of privacy safeguarding, "Our nation became diverted from the limitation for widespread generalized use of the social security number. Who knows what could happen with genetic data?"

Slavkin has some idea, "The military are advanced in using genotype for identification on microchips," he said.

Attorney Curley has this vision of the future: "A patient will issue their medical record authorization code and the doctor's computer will access the entire medical history of the patient stored on the Internet. The dentist's office will have a 'smart program' that will filter the information with dental issue priorities and alert the doctor to any significant issues to review, or order up prior test results and digital images -- also stored on the net."

In years to come, dentists will not only request a patient's full health history, complete with molecular data, but that of the patient's family members (at least as it applies to oral health). Genetic susceptibilities for conditions such as oral cancer and periodontitis may be information shared among family members. If a sibling knows his brother has the oral cancer gene, he'll have the opportunity to get tested, quit chewing smokeless tobacco, and pursue individualized gene therapy treatment, which will increasingly be made available for such conditions.

The National Coalition for Health Professional Education in Genetics is developing a tool for eliciting a comprehensive, multigenerational family history. Once it is finished, NIDCR -- a member of the coalition -- may help adapt it and disseminate it to dentists.

A patient's own and familial oral and general health histories will be integrated information for "disease management" -- a term popping up lately almost as often as "evidence-based dentistry." Disease management involves the coordinated prevention or delay of a particular disease, early and more accurate diagnosis, treatment planning, and outcome prediction to reduce costs and improve outcomes.

More and more, health care providers will be making judgments about genetic test results. Computer programs may even be created that assign weights to risk factors (including genes and home hygiene pattern), disease, treatment, therapy administered, and genetic reception to that therapy. The software will crunch the numbers and output a percentage of the patient's teeth predicted to be retained at different ages. It should not be surprising if the insurance industry pursues this technology.

Dental Geneticists

Gene therapy is in its infancy -- mostly in animal research -- and is not an established mainline clinical modality.

Lynch of the ADA envisions that gene therapy will be used only when significant morbidity and mortality is involved. "Periodontal disease is not on the radar for that," he theorized. Likewise, he doubts that a dental genetic specialty organization would be able to obtain recognized dental specialty status.

Other dental scientists and researchers disagree.

Tabak admitted that current research on genetic therapy in dentistry is limited to animals. In fact, he said he cannot speculate about when and where the pioneering research of gene therapy for dental disease will occur on humans. He does, however, believe it is just a matter of time.

"The Human Genome Project will identify the players in the complex cascade of gene activation and deactivation involved in tissue repair and that encode proteins that endow cells with key functions," Tabak predicted. He named candidates for periodontal disease thus far as polymorphisms in the IL-1, IL-10, TNF-alpha and cathepsin C gene; and in the cell receptors for IgG and vitamin D and the HLA marker. Genes responsible for defective tooth enamel formation, decreased salivary gland function, and immune dysfunction and others are associated with caries.

After all the players are determined in the next few years, researchers can study how to modulate the cascade to enhance healing in reconstructive surgery, change function, and more.

Tabak, for one, is comfortable using the term "dental geneticists" to describe dental researchers who have received advanced training in genetics and pursue genetic research for dental applications.

Likewise, he thinks there may also be geneticists with special knowledge of oral health. "They will conduct basic and epidemiological research on the genetic underpinnings of dental, oral, and craniofacial conditions. In the clinic, they will consult on the dental and oral manifestations of craniofacial conditions or rare systemic diseases that require more specialized genetics expertise than that required of a general dentist."

Tabak noted that although there are craniofacial genetics courses, he is not aware of a set course of study for dental students who wish to become dental geneticists. However, NIDCR has an interest in furthering genetics education in dentistry, so it, as well as other NIH institutions, recently announced their involvement in the Ethical Legal and Social Implications of Human Genetics and Genomic Research Education Grant Program. Applications will be accepted by NIDCR from for-profit and non-profit public or private organizations and agencies. Activities eligible for funding include developing courses, conferences, and curriculum and many other means for improving professional and lay understanding about genetics, related technology, and its ethical, legal and social implications. Schools and organizations interested in applying for a grant can contact the NIDCR's Office of Training and Career Development, Division of Extramural Research (Dr. James Lipton, assistant director of the office, can be reached at [301] 594-2618 or James_Lipton@nih.gov).

Dental researchers are working at a breakneck pace to study not only genetic susceptibilities, but also pharmacogenetics and tissue engineering/biomimetics in vitro and in vivo. They'll also study cell cloning, which will one day become commonplace to generate and replace defective or aging organs and tissues. This technology is much like that of physicians in the news recently who soon plan to try repairing weakly pumping hearts in patients who have had congestive heart failure using new muscle and blood vessel fashioned from the patient's own cells.

Bruce Baum, DMD, PhD, chief of the NIDCR's Gene Therapy and Therapeutics Branch, said the dentist as gene therapist is not only possible, but will be reality for today's dental students by the time they reach their "midpractice lifetime." His research in gene transfer technology and the regulation of salivary gland secretion is widely published. It was only natural when he questioned the need for therapeutically injecting genetically engineered proteins (current method) when the same therapy could be less costly and more easily performed using one of the body's built-in, slow-release pumps: the salivary gland. In his research on laboratory animals, he has proved his theory and already transferred therapeutic genes to salivary glands with good results. He has used this approach to repair irradiation-damaged salivary glands, as well as kill an azole-resistant Candida species using a therapeutic course of gene expression (10 to 14 days). He's also used this transfer route to deliver genes for therapeutic proteins for endocrine secretion. The glands then can produce and secrete "transgene-encoded proteins" systemically so that they circulate in the bloodstream to treat certain single-protein deficiency diseases such as human growth hormone deficiency or hemophilia. Baum hopes to begin to use his findings in human trials within two years.

If salivary gland gene transfer proves highly efficient and effective, not only for oral disease but also as a modality for therapeutic gene transfer for systemic disease in humans, the possibility of dentists administering gene therapy for health purposes beyond the oral cavity is real.

Slavkin used Baum's work as an example to explain the mechanics for one method of delivering gene-mediated therapy for local or systemic benefit. Besides injection into the salivary glands, genes can be injected into the mucosa, gingivae, tongue and musculature. They can also be inhaled through oral and nasal mucosa.

Explained Slavkin: "The 'gene' is delivered as 'naked' DNA or encased in a viral vector (carrier) that has the facility to bind cell surfaces and become engulfed or absorbed or phagocytosized by normal cellular processes. The gene delivery has often been developed to mimic the ways that viruses invade cells; adenoviruses are superb at entering oral and nasal cells."

Safety of Gene Therapy

Genetic researchers have found adenoviruses are the best vectors for testing therapeutic genes, although they pose problems for long-term use. In his work with salivary glands, Baum considers safety concerns the priority.

In 1999, Jesse Gelsinger, an 18-year-old student at the University of Pennsylvania died from a toxic reaction four days after starting experimental gene therapy treatment. His liver had been injected with virus-bearing genes to correct his genetic liver disorder. Ever since gene therapy's first casualty, safety questions have dogged researchers. The university reported to the Food and Drug Administration that procedural errors were made, but the event could not have been anticipated. Still, the program was temporarily halted, and federal and Congressional scrutiny has begun in the fledgling field. The fact that during adenoviral manufacture contamination with HIV and hepatitis C viruses is a possibility -- albeit rare -- in itself draws attention.

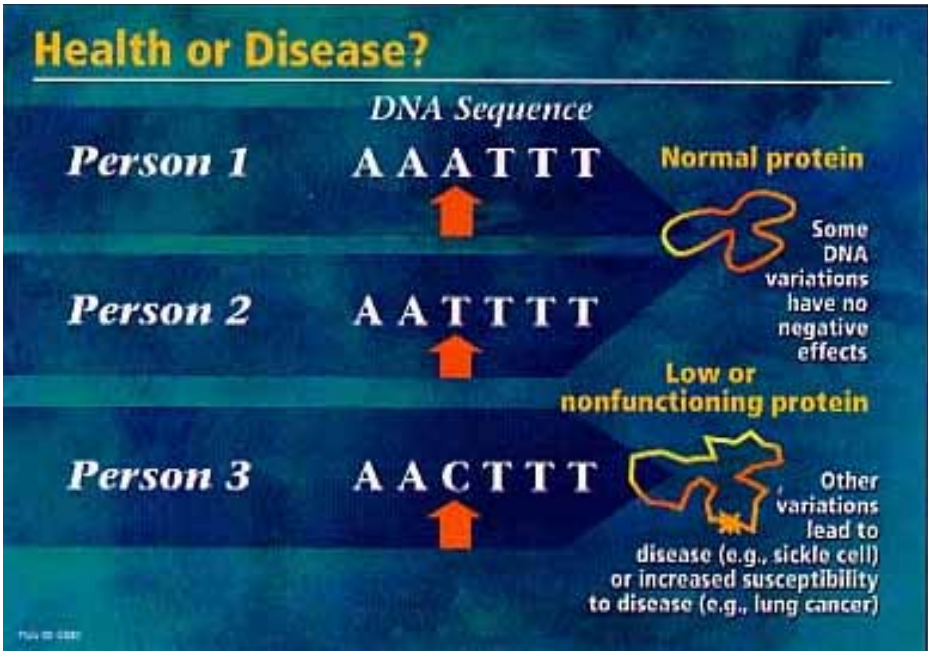
Slavkin sees the accident this way: "In important clinical research, people can die and do die. In the case of the teenager in Pennsylvania, all accounts indicate poor handling of the clinical protocol and the health of the teenager as well as failure to provide informed consent to the parents. This tragedy could have been avoided in the specifics. Meanwhile, adverse effects do appear in clinical trials. and the public needs to understand that clinical trials for life-threatening diseases do have risks."

For now, whatever tinkering is done to

therapeutically alter human genes cannot be passed on to our offspring.

Slavkin explained that humans consist of somatic cells and germ cells. "Germ cells are only found in gonads (ovaries and testicles). Everything else is made of somatic cells, and each somatic cell contains the same human genome encased in 23 pairs of chromosomes. Gene-mediated therapy can be performed in germ as well as somatic cells. Modifications to somatic cells are not inherited. The gene-mediation may last for days or weeks, or could last for a lifetime if inserted in to stem cells. Federal guidelines today limit therapy to somatic cells," Slavkin said.

There is comfort in knowing if therapy for a potential problem linked to a polymorphism is botched or if unwanted side effects emerge, the gene therapist should be able to switch off the gene or perform therapy with the opposite effect to reverse course -- even if it was to be a "permanent change" to stem-type somatic cells. But even if it is a permanent change that for some reason cannot fully be undone, at least it will not be passed onto children. Restrictions to prohibit germ cell genetic research exist in every country.



DNA variations vary in their effect on the human body. Courtesy of the Human Genome Program, http://www.ornl.gov/hgmis.

Integrating With Medicine

In the era of biodentistry, the future model of the dental practice is being debated. Parts of dentistry will probably overlap with medicine, as they do now.

For example, a patient calling his doctor's office to describe a classic blocked salivary gland beneath the tongue is scheduled to see the physician, who then refers to an ear, nose, and throat specialist. Why isn't the nurse taking the patient's call instructed to direct the patient to a doctor of dental medicine, who would have more appropriate judgment and could refer to an oral surgeon if need be? These apparent "turf wars" and separate territories will continue if something doesn't change.

Many think that dental practices that offer genetic testing for a host of systemic diseases beyond oral diseases will be "networked" with genetic counseling and treatment. Perhaps general dentists will still be solo or group practitioners who refer to specialists. Or maybe dentists will become part of a broader group health model -- the multidisciplinary health clinic owned by one health care system that offers a full range of services: medical, nursing, dental, podiatric, ophthalmic, obstetric/embryology, pediatric, audiology, oncology, etc. At such a site, genetic tests for every aspect of human health will be offered with genetic and psychological counseling as well. The idea is to provide a full-spectrum of health care providers within close proximity to more easily treat the patient along a seamless continuum of care.

Dentists are not currently trained to do any genetic counseling, let alone handle counseling patients given test results that they believe lessen their quality of life or shorten their lifespans. In fact, in a 1998 study on providing genetic test results reported in a Journal of the American Medical Association article, only 1 in 5 patients received the appropriate genetic counseling to accompany test results positive for genetic risk of cancer.

If dentistry doesn't begin carving out a niche in genetics, medicine will claim it.

"The oral health professions, government, and industry need to work together to make this a reality or it will flower in a medical specialty area such at ENT or pediatrics," Slavkin said.

Genetics Curriculum

In a New England Journal of Medicine report a few years ago, physicians had misinterpreted one-third of predictive test results for colon cancer. Physicians need more genetic training and so do dentists.

The first basic genetic course anyone can recall being offered in a dental school was back in the early '90s. It is a decade later, and not every dental school offers a genetics course. In fact, it is barely mentioned in many dental schools and not at all in most large dental meetings where continuing

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education courses are held.

Rachel Morrissey, manager of education and institutional surveys at the American Dental Association Survey Center, reported that she collects information from all dental schools on how many clock hours they spend on basic science and clinical science.

"We have a graph with different disciplines within basic science. Twelve categories are represented, and except for 'other,' genetics is the least taught of all disciplines, and physiology is the most," Morrissey said.

In the 1997-98 academic year, 42 of 55 dental schools surveyed covered "some genetics." During four years of dental school, the high was 110 clock hours by Harvard School of Dental Medicine, the low was one clock hour by the University of Texas Health Science Center at San Antonio Dental School. The mean average number of clock hours of genetics taught during dental school for all schools is 13.4 hours.

The Survey Center recently surveyed dental schools again. When the results are released later this year, it will be interesting to see if genetics is taught in more schools and covered more thoroughly.

In an encouraging estimate, Slavkin speculated that NIH and industry grant support indicates to him that about one-quarter of dental schools have been involved in some molecular genetic research.

Dental organizations have been publishing genetics research articles but have yet to produce any consensus statements or patient education materials on genetic testing.

Both dental schools and professional societies must play a central role in educating the nation's dental and oral hygiene professionals on their role in how best to utilize the applications of advancing genetic research and in providing related services, according to Tabak.

"Every attempt needs to be made to train faculty and to reform current curricula and licensure examinations" for the next generation of dental health care professionals. At the same time, current dental professionals need education and updates on "the emerging importance, benefits, and risks for their patients of genetic information and gene-based therapies," Tabak said.

The National Coalition for Health Professional Education in Genetics, formed by the AMA in 1996, will soon issue a set of core competencies in genetics that will outline the minimum knowledge, skills, and attitudes necessary for health professionals, including dentists, to provide high-quality care to patients in this era of genetics. A draft landed in the hands of some dental society board members and leaders charged with modifying educational curriculum. Under way are discussions in some schools as to how they could begin assessing their existing genetic offerings and their faculty's expertise for teaching genetics. These discussions will help determine needs in formulating just how these competencies could be integrated into their curricula.

Baum from NIDCR has stressed for some time the need to introduce the concept of gene therapy -- not just basic genetics -- into the dental curriculum. Baum believes that practitioners could be using the salivary glands for gene transfer as early as 2010.

Molecular Dentistry in the Average Practice

Leaps in science and technology knowledge mean the finished map of the human genome will be completed ahead of schedule. Originally set for 2005, researchers are now saying 2003 is a real possibility. The compounding understanding from each small discovery is flattening out the learning curve for the Human Genome Project's researchers. What researchers can sequence in one minute today, took 20 minutes three years ago, and a year or more 20 years ago.

Ten years from now, when general dentists encounter cancer patients with damaged salivary glands from irradiation therapy, they may refer the patients to a dental geneticist, or perhaps an oral surgeon or periodontist with special gene transfer education to restore the glands' function in moving water. Or, they may just do it themselves if they received the proper continuing education.

By 2010, all dentists will know how to interpret genetic test results and their implications that affect oral health, or refer to someone who does in "complicated cases." "Dentists and dental hygienists will need to make informed decisions about the application of new gene-based drugs and therapies, and to understand the psychological, ethical, legal, and social implications related to the use of genetic information and technologies," Tabak said.

Conclusion

This article discussed the changes and challenges in how oral health will soon be managed in the emerging era of genetic dentistry. We are living in a time when cloning -- not long ago dismissed as "science fiction" -- has become a reality. The principle of genetic manipulation to counter cellular aging is yet another vista for research. Our genome -- a genetic thumbprint -- will provide health professionals with the instructions for everything our cell does, from the time we began dividing into a zygote to the day we die. Nothing akin to this has ever graced science in the history of the world. Indeed the most momentous impact of the Human Genome Project upon humankind will probably unfold in ways we can't begin to imagine.

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Hear My Words, O Heathen Patient

Robert E. Horseman, DDS

Sermon on Appointments

The appointment is the basic unit of my practice. You may procure one by the telephone; you may procure one by the personal appearance; you may procure one by the proxy. Once made, understand this: No contract is more sacred; not that of the marriage, not that of the court summons. I say to you, do not break it, but leave it as it is. Unless declared legally dead, dishonor not the appointment, nor tarry more than four minutes beyond the time of obligation. Do as I have told you, because I do not allow it, that is why.

Laws Pertaining to the Reception Room

The reception room is for the waiting. This is what it is for. If that were not true, it would be a hall. During the period of the waiting, I have provided for you the magazines. Of the magazines, of the People and of the Sports Illustrated, of the National Geographic and the Inlay Workers Gazette, of all the periodicals that are bright of color and precise of arrangement, you may touch, but not render them in disarray. Observe them just as I have told you. Tear not pieces from the pages in which to enfold your gum. Heed me, for I have other things to do. Realignment of the magazines is not one of them.

Know that children below the age of reason (25) are permitted in the reception room provided: (1) They are in the company of two or more blood relatives authorized to dispense corporal punishment; (2) They have been fed prior to the arrival and suffer not from the bulimia nor of the diarrhea; (3) They have not in their possession confections of the Popsicle, nor of the Gummi Bear, nor of the cotton candy. Of the M&M's, of the Snickers and of the Kit Kats, they may eat, but not in the reception room. Of all the frozen and unfrozen junk foods of unknown provenance, they may eat, but absolutely not in the room of reception. When they reach that place where the reception room carpet begins, there must the crayons, the Silly Putty and the Play-Doh be surrendered. Nor will they with the Bic draw upon the walls or upon the furniture, because we do not do that, that is why.

Operatory Laws, Statutes and Ordinances

For patients: Neither drink of the rinse that is of the alcohol content of 26 percent, nor swallow of the spray water, for it contains loathsome things. Hear me, O my patient, heed the assistant for it is she who stands between you and the drowning. Operatory law requires you to be flat upon your back. This law is immutable. Physical law states you cannot rinse in this position. To try will result in embarrassment and severe sanctions,

even unto the inguinal hernia. I say to you, obstruct not the continuity of the procedures by insisting on the sitting up to do that which you cannot do lying down. Indeed, you will drive me to madness and I shall not forget.

Cast your countenance up into the light, ratcheting your mouth open to its maximum aperture, for the darkness and the wetness therein overwhelm me even to distraction. And hold yourself still; hold still, I say, that I may give each tooth an examination thereof. What I do is as it must be; and you shall not go hence until I have done. Your account of your flossing ritual each day shall be duly noted in your chart. Judging will be based on originality, imaginative variations and polygraph results. The decision of the Tooth Fairy shall be final.

For assistants: Let not your absence be noted lest you be cast permanently into quiet time elsewhere. Greater than you suspect from the semi-monthly stipend lavished upon you is my need for you.

Hear me, O my assistant, for the overhead it kills me. Direct not the suction hose with which you are entrusted in such a manner that when placed against the soft tissue, a noise not unlike that of a strangled chicken emits. Neither shall your suction tip engage the fingers of my latex gloves, for that is an abomination to me. When I tell you what you must do and even if your inclination is to make a fist in your pocket and silently intone, "Cement Head," know that you are appreciated. Were I 60 years less of age and singly afloat, we could decamp to Bora Bora in tandem. Alas, this is not to be. Do not forget what I have said about the vacuum.