

Spring Scientific Session ♦ Anaheim ♦ April 16-19

CDA



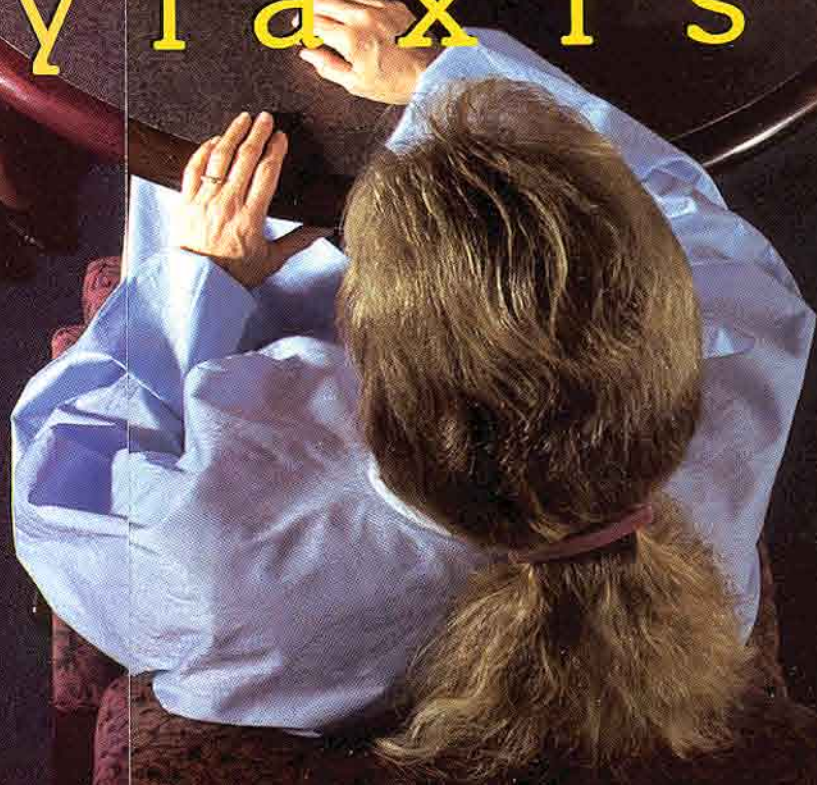
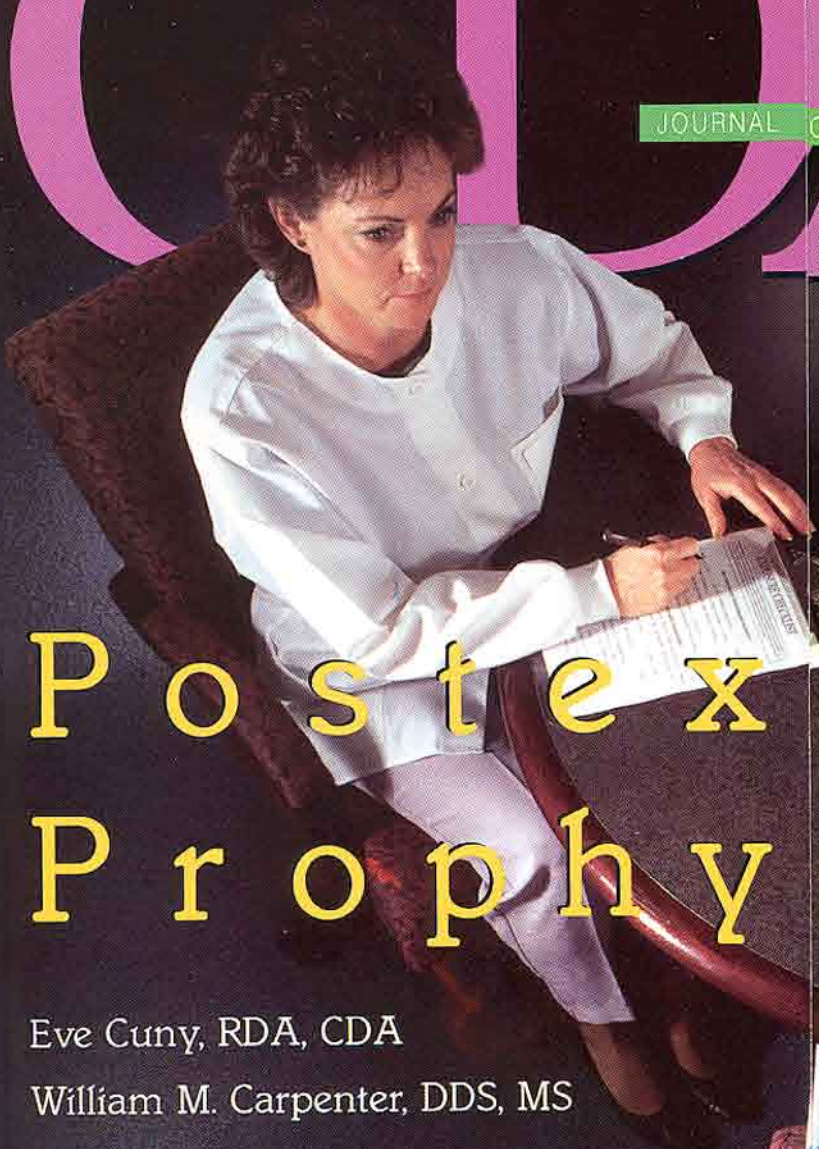
JOURNAL OF THE CALIFORNIA DENTAL ASSOCIATION VOL. 26 NO. 4

April 1998

Postexposure Prophylaxis

Eve Cuny, RDA, CDA

William M. Carpenter, DDS, MS





Journal

OF THE CALIFORNIA DENTAL ASSOCIATION

CDA Journal
Volume 26, Number 4
APRIL 1998

DEPARTMENTS

- 244** The Editor/*What Hazard is Next?*
248 Impressions /*Defending the Dental Office*
324 Dr. Bob /*In Search of ... a Connection*

FEATURES

261 OCCUPATIONAL EXPOSURE TO BLOOD AND BODY FLUIDS: NEW POSTEXPOSURE PROPHYLAXIS RECOMMENDATIONS

The risks associated with dental occupational exposures and new recommendations for postexposure care are explored.

By Eve Cuny, RDA, CDA, and William M. Carpenter, DDS, MS

273 ALLERGIC REACTIONS: INCREASING IMMUNOLOGICAL PROBLEMS FOR HEALTH CARE PROVIDERS AND PATIENTS

Clinicians should be familiar with the symptoms of allergies and understand the mechanisms involved.

By John A. Molinari, PhD

285 TRANSITION DECISION-MAKING AND STRATEGY

Practice transitions have become increasingly complicated with the addition of practice management companies and management service organizations.

By Randall K. Berning, JD, LLM

290 TRANSMISSION AND PERSISTENCE OF ACTINOBACILLUS ACTINOMYCETEMCOMITANS IN TWINS WITH ADVANCED PERIODONTITIS

A set of twins with severe loss of periodontal attachment and the same amplitype of A. actinomycetemcomitans is studied.

By Peter A. Russo, DDS; Hessam Nowzari, DDS; and Jorgen Slots, DDS, PhD

295 ECONOMICS OF DENTAL PRACTICE IMPROVE IN THE 1990S

A review of governmental and ADA reports confirms positive projections about the economics of dentistry.

By H. Barry Waldman, BA, DDS, MPH, PhD

What Hazard is Next?

JACK F. CONLEY, DDS

In the past dozen years, dentistry has experienced a continuous series of reviews of its various methods and materials that have been viewed by the public or regulatory bodies as hazardous to the health of patients or dental personnel. The rationale for initiating such review often seems to be based more on emotion than science. Happily, the profession has been able to achieve closure on many of these matters based upon science. Taking the positive view, it is also important to note that review of sterilization and disinfection protocols (to name just one of the areas that was under such scrutiny) eventually brought significant benefit to the public image of the dental profession.

It sometimes seems that dentistry is subject to more scrutiny than any other professional group or occupation within contemporary society. However that is unlikely. It just seems that way because of the considerable intraprofessional communication we receive on these issues on a routine basis! A partial explanation for the perceived frequency of reviews is that with advanced science and techniques both inside and outside the dental environment, new hazards to health, either real or perceived, continue to arise and must be addressed. For example, in the October 1997 New York State Dental Journal, Sara Babich, DDS, and Ronald Burakoff, DMD, reported that while lasers permit greater efficiency, their use increases the dentist's exposure to harmful microbial aerosols. In this instance, the risk (or hazard) should be easily manageable with respiratory protection.

Subject to scrutiny as potential hazards in recent years have been hazardous waste, dental amalgam,

biofilm in dental unit waterlines, and, recently, air quality standards and design requirements for dental offices (American Society of Heating, Refrigeration, and Air-Conditioning Engineers).

The latest "hazard" to command the attention of organized dentistry is the concern about hypersensitivity to latex gloves or latex products coated with talc or cornstarch. Three states have legislation pending that would ban or prohibit the use of latex products in dental treatment.

While 1 percent of the general population is estimated to suffer from latex hypersensitivity (the problem), solid, validated scientific information that would either justify such a prohibition or provide a scientifically acceptable alternative to latex gloves does not exist according to the American Dental Association Council on Scientific Affairs.

At present, three available alternatives (reduced-protein, powder-free, and vinyl gloves) all appear to possess deficiencies that preclude them from being an acceptable substitute. The Food and Drug Administration reported in fall 1997 that the manufacturing process for reduction of powder and protein in powderless latex gloves could compromise their barrier properties and shelf life -- potentially far more serious problems than the potential for latex hypersensitivity. Vinyl gloves continue to receive negative marks from practitioners because of lesser tactile sensitivity.

We are fortunate to have an ADA agency that can review scientific data and represent our best interests in preventing any prohibition of the use of latex products in dentistry until or unless scientific evidence provides clear indication that such a ban is appropriate.

In the interim, we must learn to have patience with scrutiny from the outside, as future advances in technology will without a doubt continue to bring forward questions about risks or hazards associated with new materials, devices, and techniques.

Loss of an Exceptional Leader

I would be remiss if I did not recognize the unexpected and untimely passing of one of dentistry's finest servants, William E. Allen, DDS. Bill, a pediatric dentist from Pasadena, was a past president of the California Dental Association and past executive director of ADA, among a multitude of outstanding contributions to the dental profession. Above all else, he was a marvelous professional person who always had a smile, a sense of humor, and something good to say.

Those of use who had the privilege of knowing Bill Allen will remember him as an extremely effective and dedicated leader, whose contributions were made at all levels within the profession. Bill Allen helped bring people together, and he will be particularly missed by those of us who knew him as a friend.

In Search of ... a Connection

BY DAVID G. JONES

Researchers are working to find something that has eluded medical science for generations -- a possible link between oral disease and systemic health problems in other parts of the human body.

If that link is discovered, implications could be enormous.

Scientists at the State University of New York, Buffalo, and at the University of North Carolina in Chapel Hill are searching for a connection between periodontal disease and serious medical conditions, including heart disease and stroke. The research is being funded by a \$1.2 million grant from the National Institutes of Health.

"The current studies are setting out to confirm if there's an association between periodontitis and heart disease, and if there is, to try to determine the mechanism of what might be causing the problem," says Dennis Mangan, director of infectious diseases program of the National Institute of Dental Research, a division of the U.S. Public Health Service in Bethesda, Md.

Mangan said that the research is based on different hypotheses of what may cause the problems.

"Both are controlled studies, comparing patients with periodontal disease with those who don't, with the goal of trying to find a correlation between periodontitis and myocardial infarction," Mangan says. "It will be fully another two years before the data are analyzed."

The new study involves 1,000 people who have survived a first heart attack, and 2,250 people who have never had a heart attack. Researchers will maintain contact with study participants to determine the incidence of heart attack among participants with periodontitis.

If a link can be discovered between

oral health and systemic medical problems, antibiotic intervention may be possible, but probably not soon, according to one expert.

"People have spent many millions of dollars looking for a causal organism for periodontal disease, and that's been elusive," says Steve Sonis, DMD, MS, chair of Harvard School of Dental Medicine's Department of Oral Medicine and Diagnostic Sciences. "In the '70s and '80s, there was a great hope, and there's still work being done, but the probability is low, at least in the near term, that an effective vaccine can be developed."

As the studies move forward, their momentum must be tempered with scientific deliberativeness, says a California-based expert.

"We have to take this one step at time, investigate thoroughly, do good science, and see what the relationship is, if any," says Thomas J. Pallasch, DDS, MS, professor of pharmacology and periodontics at the USC School of Dentistry. "After all, this could be a case of 'much ado about nothing.'"

Sonis, echoing Pallasch's concern, says, "The major issue (in the study) is whether there's a causal relationship, or is this a coincidental incidence?"

And that's the sort of question medical science has long faced.

Medical people have for centuries wondered if dental infections could cause problems in other parts of the body, or whether coincidence was a factor. In the 18th century, Dr. Benjamin Rush, a Pennsylvania doctor and signer of the Declaration of Independence, reported that some people suffering from arthritis found relief after infected teeth were extracted.

Since 1989, several studies have found that people with periodontal disease have an increased risk of heart disease and stroke. The evidence alone did not prove

cause and effect, but it did suggest that periodontal disease might increase the risk of cardiovascular disease.

And in February, the results of another study provided more tantalizing evidence. Research done in Minneapolis at the University of Minnesota, concentrated on *Streptococcus sanguis*, the predominant bacterium in dental plaque, considered harmless, a normal inhabitant in a healthy mouth. But the researchers found that when they mixed the bacteria with human blood in test tubes, clots formed, the pivotal event in most heart attacks and strokes. The findings were presented at a meeting of the American Association for the Advancement of Science in Philadelphia.

Periodontal disease is the No. 1 chronic infectious disease in the world, and the most common cause of tooth loss in adults. If an association between periodontal disease and other medical conditions can ever be found, it could provide a chance for both dentistry and patients to benefit directly.

"If a dentist tells patients that their periodontal disease could lead to more risk of stroke and heart attack, that would be a tremendous motivator for patients to minimize their risk of periodontal disease," Sonis says. "It would not only impact on their dental health, but on their longevity. That would be very good for dentistry and patients alike."

Even if no association is proven, the net effect of the research is already helping dentistry gain ground in the total health care industry.

"The barrier between oral health and systemic health is slowly blurring," Mangan says. "The oral dentist of yesterday is becoming an integral part of the overall health care of the individual, and the medical community is becoming more interested in what's going on in the mouth."

Asset Protection Can Be a Matter of Trust

BY MARIOS P. GREGORIOU

Estate planning and trusts are no longer exclusively for the very wealthy. Millions of Americans are planning their estates with trusts. Why? Because during the past two decades significant increases in income and the value of real estate and securities have helped boost the value of many individuals' estates. In this period of wealth preservation, trusts represent a popular and effective way to protect assets and transfer them to the next generation.

Trusts are cornerstones of an effective estate plan and offer distinct advantages to a broad range of individuals. A trust is a legal relationship whereby a person transfers property to a trustee for the benefit of one or more beneficiaries. The trust document, drafted by an attorney, sets forth the person's desires as to the type of trust, its duration, the powers and duties given to the trustee, the time and manner of the distribution of the trust assets and the rights of the beneficiaries. While the trustee is given legal ownership of the trust assets, he or she is legally bound to manage, invest and disburse those assets in the manner outlined in the trust document. That enables a person to maintain a great deal of control over assets put into the trust.

Trusts come in many types, and each is customized to meet family financial needs and goals. For example, a "testamentary" trust is usually created by a person's will and becomes effective upon his or her death. A "living" trust, as the name suggests, is created during the person's lifetime. It may be "revocable" (may be altered, amended or even terminated) or "irrevocable" (usually cannot be changed or terminated). In addition, a trust may be created for any number of beneficiaries, including charitable organizations. Trusts

also can provide for almost any method of distribution desired.

Transferring assets to a trust may provide the following benefits:

- It can be a holding vehicle for life insurance proceeds to be collected upon a person's death.
- It can provide for professional management of investments, such as stocks, bonds, mutual funds, separately managed accounts and real estate (if a professional trustee is appointed).
- It can offer a means of providing for a child's education or for the care of a handicapped dependent.
- It can supplement retirement or pension plans.
- It offers protection against mismanagement or non-management of assets for people who become ill or incapacitated.
- It can be a tax-savings vehicle, especially regarding estate taxes.*

A key component of any trust is the trustee. While individuals (including relatives, friends, financial advisers) can be named as trustee, it may be wise to use a corporate trustee to handle the numerous tax, legal, administrative and fiduciary requirements of the trust.

Mr. Gregoriou is an associate vice president for investments for Dean Witter. He can be reached at (800) 755-8041. This article does not constitute tax or legal advice. Consult a tax adviser and/or attorney for more information about personal trusts before making tax/legal-related investment decisions.

Mouth-Watering Treatment

A pharmaceutical product designed to treat dry mouth symptoms caused by Sjogren's syndrome has been approved for marketing by the U.S. Food and Drug Administration.

Developed and produced by MGI

Pharma Inc., the pills relieve the symptoms caused by Sjogren's, an autoimmune disease that damages the moisture-producing glands throughout the body, including the salivary glands in the mouth. They are available only by prescription.

Named Salagen Tablets, the pills feature as its active ingredient pilocarpine hydrochloride, a naturally occurring substance produced from the leaves of a plant grown in South America called the pilocarpus jaborandi.

Pilocarpine is a cholinergic agonist that stimulates the exocrine glands, including salivary glands, to produce more moisture. As prescribed, patients take Salagen Tablets daily. The effect of one 5 mg tablet lasts three to five hours.

Study results showed that Salagen in many patients can improve the overall feeling of dry mouth as well as improved specific symptoms of dry mouth, including: severity of dry mouth and mouth discomfort; the ability to speak, sleep and swallow food without drinking; and a decreased use of saliva substitutes.

The most common side effects related to the drug are sweating, increased urinary frequency, chills and flushing.

Salagen Tablets were introduced in 1994 to relieve dry mouth in head and neck cancer patients undergoing radiation therapy, which often damages salivary glands in addition to eradicating tumors.

An Atrocious Dental Pun

The following dental tale was sent to the Journal of the California Dental Association by longtime CDA member Dr. Marvin H. Leaf, so blame him.

A man went to his dentist because he felt something was wrong in his mouth. The dentist examined him and said, "That new upper plate I put in for you six months ago is eroding. What have you been eating?"

The man replied, "All I can think of is that about four months ago my wife made some asparagus and put some stuff on it that was delicious -- hollandaise sauce. I loved it so much that I now put it on everything -- meat, toast, fish, vegetables, everything."

"Well," said the dentist, "that's the problem. Hollandaise sauce is made with lots of lemon juice, which is highly corrosive. It has eaten away your upper plate. I'll make you a new plate, and this time, I'll use chrome."

"Why chrome?" asked the patient.

"It's simple," the dentist replied. "Everyone knows that there's no plate like chrome for the hollandaise."

After-Hours Club

Treating emergency patients after hours can be considered a fine service and an avenue toward making new, potentially long-lasting dentist-patient relationships, but that treatment requires thoughtful consideration.

Cindy L. Hutcheson, CDA, CDPMA, BS, writing in the September/October edition of *The Dental Assistant*, offers these guidelines:

- Make a decision. The dentist and team should decide whether they will treat patients after hours and if they will limit treatment to patients of record or accept new patients. Many loyal patients begin as emergency cases that no other dentist could or would see.
- Let others know. Specify whether emergency care is available to existing patients only or to the community in general.
- Is it an emergency? Providing 24-hour emergency care is not the same as being open for business 24 hours a day, Hutcheson writes. A true emergency is usually of sudden onset. A patient with a real emergency will appear at your

instruction and not attempt to dictate a convenient time.

- Who is the person? Emergency patients should be instructed to bring photo identification and to provide the license number of the vehicle they will drive to the appointment. Explain that the police patrol the parking lot and need to be aware of the vehicle's legal presence.
- Expect payment. Most dentists and physicians charge an extra fee for after-hours work. Estimate the charge, and accept only cash or credit card. If an estimate cannot be made, instruct the patient with no credit card to bring \$100 cash. If the charge is less, make change; if it is more, bill the balance.
- You have a life. Don't try to repair years of neglect at an after-hours visit. Get the patient out of pain and temporized, then schedule a new-patient visit. Explain that the emergency treatment is temporary, and stress the importance of keeping the appointment.
- Protect yourself. Never treat a patient alone. An auxiliary in the office -- preferable in the treatment area -- will safeguard against physical harm and the potential for litigation.
- Protect your patients. Arrive before the patient to make sure the parking area and door are well-lighted. After the appointment, walk the patient to the car. For safety, both doctor and staff should leave at the same time.

Getting Down to Basics

Simply put, students who decide to make a career in dentistry do so because it's a well-thought-of profession that pays well. Those aren't the only reasons, according to the results of a study published in the October 1997 issue of *Journal of Dental Education*, but they factor in significantly.

The study was done by Dan Zakik,

DMD, MPH; Revital Gilad, DMD; and Benjamin Peretz, DMD, and was undertaken to assess the reasons for choosing dentistry as a career and to evaluate the perception of applicants and preclinical students regarding some of the aspects that characterize the dental profession.

The study group comprised 168 people and was restricted to applicants and students in the first three preclinical years of study to avoid direct contact with the clinical teachers who may be long-time practitioners and may unintentionally communicate their views and biases to the students.

"Professional standing" and "financial security" were the two dominant reasons given by both applicants and students for choosing dentistry as a career. Few participants indicated "manual skill required" and "opportunity to help people" as major reasons for entering dentistry.

As far as participants' perception of the profession, highest scores were given to "contact with people," "caring profession," "professional status," "responsible job," "be your own boss" and "financial security."

"Financial security," which was important even with the applicants, was more frequently indicated by advanced students. The authors suggest that the ambience of the dental school may change the freshmen's perception of the profession to a more money-oriented view, as compared with the relative naivete of applicants.

Not only was "helping people" not a significant motivation for embracing dentistry as a career, it bore the lowest priority. This seems to contradict the image of dentistry as a "caring profession." The authors suggest that this aspect was only marginally important in the decision-making process, while categories such as "be your own boss" and "financial security" carried more weight.

According to the authors, a basic issue is whether applicants are really aware of the nature of the profession they wish to enter. The authors suggest that a bias may exist between the perceptions of the profession prior to admission and the reality young graduates face early in their careers.

The authors suggest recruitment programs that present a realistic picture of the profession might bring forth a more serious and in-depth search for suitable candidates to dental schools.

ADA Award Entries Sought

The ADA Council on Access, Prevention and Interprofessional Relations is seeking entries for the 1998 Geriatric Oral Health Care Award and Community Preventive Dentistry Award programs. Entries for both awards programs must be postmarked by May 15.

The Geriatric Oral Health Care Award program is for any individual or organization responsible for creating or implementing an oral health care program using unique equipment, settings or innovative modes of delivery that improve the oral health of older Americans.

The first-place award winner receives \$2,500, a wall plaque, and a trip to the ADA Annual Session in San Francisco. A meritorious award of \$500 also may be bestowed to another entrant.

The award is sponsored by ADA through the ADA Health Foundation with the support of the Warner-Lambert Company Consumer Health Products Group.

The Community Preventive Dentistry Award program, which recognizes significant preventive dentistry projects, is for any individual or organization responsible for creating or implementing a community program concerned with some aspect of preventive dentistry. Appropriate community activities may involve members of the dental team and include school

programs, programs for special populations and high-risk groups, media public information programs, and private practitioners' community education activities or treatment programs.

The award is sponsored by ADA through the ADA Health Foundation with the support of Johnson & Johnson Professional Division, a division of Johnson & Johnson Consumer Products Inc.

The first-place winner receives \$2,000, a wall plaque and a trip to the ADA Annual Session in San Francisco. Three runners up will receive \$300 each.

For more information on either program or to obtain entry forms, contact Jane McGinley, coordinator of Council on Access, Prevention and Interprofessional Relations programs, using the toll-free number. Ask for Ext. 2858. Or dial direct at (312) 440-2858.

Occupational Exposure to Blood and Body Fluids: New Postexposure Prophylaxis Recommendations

BY EVE CUNY, RDA, CDA, AND WILLIAM M. CARPENTER, DDS, MS

ABSTRACT Dental health care professionals continue to suffer exposure incidents from instruments contaminated with blood and/or body fluids from patients. Each of these cases requires that a rigid protocol be followed for their evaluation. New information regarding the risk factors for HIV-seroconversion following an exposure incident have been identified. Recent data has demonstrated a 79 percent reduction in disease transmission may be possible with a new combination drug therapy. The anti-retroviral drugs included in this new regimen are now standard in the management of occupational exposure to HIV. Several factors set dentistry apart from other health care occupations, and these differences appear to have an affect on the risks associated with occupational exposures. This article explores these risk factors and the new recommendations for postexposure care.

AUTHORS

Eve Cuny, RDA, CDA, is the director of Environmental Health and Safety at the University of the Pacific School of Dentistry in San Francisco.

William M. Carpenter, DDS, MS, is a professor and chairman of the Department of Diagnostic Sciences at the UOP School of Dentistry.

Acquired Immune Deficiency Syndrome has taken a devastating toll with more than 513,000¹ cases diagnosed as of December 1995 in the United States alone. Of these individuals, more than 319,000 have died. As large as this figure is, it does not give a true indication of the number of people who are HIV-positive. The United Nations estimates there are nearly 800,000 men, women, and children who are HIV-positive in North America and nearly 22 million worldwide. In light of these figures, and the known routes of transmission of the disease, occupational exposure to blood is of great concern to health care workers. Of particular

concern is accidental percutaneous or mucocutaneous exposures involving items contaminated with the blood or other body fluids of patients. These injuries have been reported to occur at a rate of about three a year per dentist.²

In 1991, the Occupational Safety and Health Administration responded to concerns among health care workers by issuing a set of rules intended to reduce and control exposure to bloodborne pathogens in the workplace.³ Included in these regulations was the requirement for employers whose employees had occupational exposure to blood and other body fluids to have a postexposure protocol as part of the required written exposure control plan. Earlier articles have

TABLE 1

Health care workers with documented and possible occupationally acquired AIDS/HIV infection, by occupation, through December 1995, United States.*

Occupation	Documented occupational transmission**	Possible occupational transmission***
Dental worker, including dentist	--	7
Embalmer/morgue technician	--	3
Emergency medical technician/paramedic	--	10
Health aide/attendant	--	12
Housekeeper/maintenance worker	1	7
Laboratory technician, clinical	16	16
Laboratory technician, non-clinical	3	--
Nurse	21	28
Physician, nonsurgical	--	11
Physician, surgical	--	6
Respiratory therapist	1	2
Technician, dialysis	1	2
Technician, surgical	2	1
Technician/therapist, other than those listed above	--	5
Other health care occupations	--	1
Total	52	111

* Health care workers are defined as those people, including students and trainees, who have worked in a health care, clinical or HIV laboratory setting at any time since 1978. See MMWR 41:923-5, 1992.

** Health care workers who had documented HIV seroconversions after occupational exposure or had other laboratory evidence of occupational infection: 42 had percutaneous exposure, five had mucocutaneous exposure, one had both percutaneous and mucocutaneous exposure, and one had an unknown route of exposure. Forty-four exposures were to blood from an HIV-infected person, one to visibly bloody fluid, one to an unspecified fluid and three to concentrated virus in a laboratory. Twenty-two of these health care workers developed AIDS.

*** These health care workers have been investigated and are without identifiable behavioral or transfusional risks; each reported percutaneous or mucocutaneous occupational exposures to blood or body fluids, or laboratory solutions containing HIV, but HIV seroconversion specifically resulting from an occupational exposure was not documented.

Source: CDC, HIV/AIDS Surveillance Report 8: Table 16, 1996.

addressed means of complying with the OSHA regulation.⁴ Detailed information must be gathered, including the circumstances surrounding the incident, the type of device in use, the patient's serostatus (if consent is obtained), and the susceptibility to Hepatitis B virus of the exposed health care worker (FIGURE 1). A referral to a qualified health care professional for evaluation of the exposure and determination of postexposure management must then be made. This management has always necessitated a referral to a physician or nurse with a knowledge of occupational health issues for follow-up due to the specific nature of medical management needed. Recent developments in the management of HIV exposures have dramatically illustrated the need to refer only to health care professionals with this specialized knowledge to make the critical determination of level of risk based on a number of factors. The determination of whether treatment should be recommended may then be made.

Findings of a Multiagency Study

Recent information regarding the benefits of several drugs has raised hopes that a prevention for HIV infection following exposure may be effective.⁵ In the Dec. 22, 1995, Morbidity and Mortality Weekly Report, a report appeared that described a case-control retrospective study to assess the effectiveness of zidovudine (ZDV, also known as AZT) in preventing HIV infection following occupational exposure to HIV-infected blood. While the report cautions that this type of study is not optimal for testing drug efficacy, it did indicate that the risk for HIV infection among health care workers who used ZDV was reduced by approximately 79 percent. The report also cautioned that the limitations of

Table 2

Type of Exposure	Source material*	Antiretroviral prophylaxis(H)	Antiretroviral regimen(1)
Percutaneous	Blood(&)		
	Highest risk	Recommend	ZDV+3TC plus IDV
	Increased risk	Recommend	ZDV+3TC+IDV**
	No increased risk	Offer	ZDV plus 3TC
	Fluid containing visible blood, other potentially infectious fluid(HH) or tissue	Offer	ZDV plus 3TC
Mucous membrane	Other body fluid (e.g., urine)	Not offer	
	Blood	Offer	ZDV plus 3TC
	Fluid containing visible blood, other potentially infectious fluid(HH) or tissue	Offer	ZDV+3TC
Skin, increased risk"	Other fluid (e.g., urine)	Not offer	
	Blood	Offer	ZDV plus 3TC, +IDV**
	Fluid containing visible blood, other potentially infectious fluid(HH) or tissue	Offer	ZDV+3TC
	Other fluid (e.g., urine)	Not offer	

*Any exposure to concentrated HIV (e.g., in a research laboratory or production facility) is treated as percutaneous exposure to blood with highest risk.

(H) Recommend: Postexposure prophylaxis (PEP) should be recommended to the exposed worker with counseling (see txt). Offer: PEP should be offered to the exposed worker counseling (see text). Not offer: PEP should not be offered because these are not occupational exposures to HIV (1).

(1) Regimens: zidovudine (ZDV), 200 mg three times a day; lamivudine (3TC), 150mg two times a day; indinavir (IDV), 800mg three times a day (if IDV is not available, saquinavir may be used, 600mg three times a day). Prophylaxis is given for four weeks. Full full prescribing information, see packet inserts.

(&) Highest risk: BOTH larger volume of blood (e.g., deep injury with large diameter hollow needle previously in source patient's vein or artery, especially involving an injection of source-patient's blood) AND blood containing a high titer of HIV (e.g., source with acute retroviral illness or end-stage AIDS; viral load measurements may be considered, but its use in relationship to PEP has not been evaluated). Increased risk: EITHER exposure to larger volume or blood OR blood with a higher titer of HIV. No increased risk: NEITHER exposure to larger volume of blood NOR higher titer of HIV (e.g., solid suture needle injury from source patient with asymptomatic HIV infection).

** Possible toxicity of additional drug may not be warranted. (See text).

V(HH) Includes semen; vaginal secretions; cerebrospinal, synovial, pleural, peritoneal, pericardial, and amniotic fluids.

" For skin, risk is increased for exposures involving a high titer of HIV, prolonged contact, an extensive area, or an area in which skin integrity is visibly compromised. For skin exposures without increased risk, the risk for drug toxicity, outweighs the benefit of PEP.

Sources: MMWR, June 7, 1996, Update: Provisional Public Health Service Recommendations For Chemoprophylaxis After Occupational Exposure to HIV (Table 1:)

TABLE 3

Postexposure Prophylaxis Drugs

Postexposure prophylaxis should be initiated only after assessment of risk factors as outlined in Table 1 of the June 1, 1996 Morbidity and Mortality Weekly Report. Depending upon the determined risk characteristics, the following drugs may be recommended either individually or in combination with one another.

1. Zidovudine (ZDV)

Regimen: 200 mg three times a day for four weeks, if tolerated.

Side effects: possible gastrointestinal symptoms, fatigue, and headache. In currently recommended doses, ZDV postexposure prophylaxis is usually tolerated well by health care workers. The information regarding potency and toxicity is derived from studies of HIV-infected patients, therefore specific information about effects in healthy individuals is unavailable.

2. Lamivudine (3TC)

Regimen: 150 mg two times a day for four weeks, if tolerated.

Side effects: possible gastrointestinal symptoms, pancreatitis (rare).

3. Indinavir (IDV)

Regimen: 800 mg three times a day for four weeks, if tolerated. If IDV is unavailable, saquinavir may be used at 600 mg three times a day for four weeks.

Sides effects: gastrointestinal symptoms, and usually after prolonged use, mild hyperbilirubinemia (10 percent) and kidney stones (4 percent); the latter may be limited by drinking at least 48 ounces of fluid per 24-hour period. During the first four weeks of IDV therapy, the reported incidence of kidney stones was 0.8 percent. As stated in the package insert, the concurrent use of IDV and certain other drugs, including some nonsedating antihistamines, is contraindicated.

The toxicity of these drugs among individuals not infected with HIV has not been well-characterized. Few data exist to assess the possible long-term (i.e., delayed) toxicity resulting from use of these drugs in persons not infected with HIV.

For definitive and complete information, consult the package insert that comes with the medication or is available from the pharmacy.

the study design should be considered when interpreting the results. Failure of postexposure prophylaxis with ZDV has also been reported.⁶ This study also attempted to identify risk factors that are significant in occupationally acquired HIV infection. The greatest risk for infection was present if the exposure was to a larger quantity of blood, if the exposure involved a deep injury, if the exposure involved a visibly contaminated device, if the exposure was during a procedure that involved a needle placed directly in a vein or artery, and if the source patient was terminally ill with AIDS. In reviewing nearly 200 exposure reports collected at the University of the Pacific School of Dentistry, the authors found that these high risk factors, with the exception of the patient's disease status, were not generally associated with the dental exposures. Most of the injuries reported at the dental school were limited to superficial

scratches or shallow punctures with little or no visible blood on the device. In the authors' experience, the exceptions to these conditions were root planing instruments and surgical instruments. However, it is still important to assess each incident individually and refer the exposed worker to the proper health care professional for further assessment. The relatively low risk of dental exposures is further illustrated by the fact that of the 49 documented occupational transmissions to date, none were among dental health care workers (TABLE 1).

There are, however, seven dental workers and 95 other health care workers without other reported risk factors who have been identified as HIV-positive.¹ The absence of a documented occupational exposure combined with the denial of other risk factors for HIV infection has prompted the Centers for Disease Control and Prevention to place these dental

workers in a category of possibly being infected occupationally.

Postexposure Prophylaxis Recommendations

An interagency working group comprising representatives of CDC, the Food and Drug Administration, the Health Resources and Services Administration, and the National Institutes of Health met to address these new findings and discuss the need for new postexposure prophylaxis recommendations. The CDC and the National Foundation for Infectious Disease cosponsored the workshop HIV Postexposure Management for Health Care Workers on March 4 and 5, 1996. The proceedings of the workshop will be published in the American Journal of Medicine.

Until this working group could help the health care profession with

TABLE 4

Exposure Incident Questionnaire and Report

Instructions: Complete this form indicating all available information. Request that the source patient agree to testing for HIV and Hepatitis B (if the exposed person has not been documented to have immunity due to vaccination and the source patient can be identified). Refer the exposed health care worker to an evaluating health care professional as soon as possible. Keep one copy of this form in the employee's confidential medical record. Maintain this form for length of employment plus 30 years.

1. Name _____ SS# _____
2. Date of reporting the accident / /
3. Date of exposure occurrence / /
4. Time of exposure _____ a.m/p.m.
5. How many hours had you been working when the injury occurred? _____
6. Professional category
 A. ___ Dentist B. ___ Assistant C. ___ Hygienist D. ___ Other (Specify) _____
7. Have you been exposed to blood or body fluids prior to this exposure? ___ Yes ___ No

Information About This Exposure

8. Did the exposure involve: ___ Blood ___ Saliva ___ Mucous ___ Other ___ No blood/body fluids ___ Unknown
9. Are you? ___ Right-handed or ___ Left-handed
10. Were you? ___ Self-exposed ___ Exposed by another
11. Part of the body that was exposed:
 A. ___ Finger/thumb B. ___ Hand C. ___ Face (part of face _____)
 D. ___ Arm E. ___ Other _____
12. Type of exposure
 A. ___ Needle injury
 1. ___ Syringe needle 2. ___ Suture needle
 B. ___ Puncture by other instruments
 1. ___ Burr/handpiece 2. ___ Scalpel blade 3. ___ Endodontic file
 4. ___ Rotary disk 5. ___ Wire (orthodontic or surgical) 6. ___ Other _____
 C. ___ Splash
 1. ___ To mucous membranes 2. ___ To intact (normal) skin
 3. ___ To existing wound 4. ___ Other _____
 D. ___ Bitten by patient
13. Description of procedure in progress when accident occurred:
 A. ___ Giving injection B. ___ Scaling C. ___ Extraction D. ___ Filing
 E. ___ Polishing F. ___ Manipulating dental wire G. ___ Suturing
 H. ___ Applying amalgam I. ___ Applying crown J. ___ Wiping instrument during procedure
 K. ___ Cleaning after procedure completed I. Other _____
14. Personal safety equipment being utilized (check all that apply)
 A. ___ Single gloves B. ___ Double gloves C. ___ Mask
 D. ___ Goggles/glasses E. ___ Face shield F. ___ Gown
 G. ___ Other _____
15. Circumstances contributing to this exposure (check all that apply)
 A. ___ New procedure B. ___ Concern about patient's infection/illness
 C. ___ Concern about procedure D. ___ Rushing procedure
 E. ___ Pressure from environment F. ___ Location of set-up
 G. ___ Being distracted H. ___ Other _____

TABLE 4 CONTINUED

16. Was the instrument involved in this injury reused in the patient after the accident without recleaning?
☐ Yes ☐ No ☐ Unknown
17. What might have prevented this injury?
 A. ☐ More instruction B. ☐ More assistance C. ☐ More time
 D. ☐ Less pressure E. ☐ Safer devices (specify if known _____)
 F. ☐ Having more experience G. ☐ Better personal safety equipment
 H. ☐ Better concentration I. Other: _____
18. Have you ever had the Hepatitis B vaccine (three or more doses)? ☐ Yes ☐ No
 If incomplete: ☐ 1 dose ☐ 2 doses ☐ No doses ☐ Already immune
19. Did you have postvaccination testing? ☐ Yes ☐ No
 Results _____
20. Have you had a tetanus booster in the past 10 years? ☐ Yes ☐ No ☐ Unknown

Source Patient Information

21. Is person known to be HBSAG+ or a carrier of HBV? ☐ Yes ☐ No ☐ Unknown
22. Is this person known to have HCV? ☐ Yes ☐ No ☐ Unknown
23. Has this person been diagnosed with AIDS? ☐ Yes ☐ No ☐ Unknown
24. Has this person tested HIV-positive? ☐ Yes ☐ No ☐ Unknown
25. Has this person had blood transfusions? ☐ Yes ☐ No ☐ Unknown
 If yes, when? _____
26. Is this person a child of a mother infected with HIV? ☐ Yes ☐ No ☐ Unknown
27. Is this person a child of a mother infected with HBV? ☐ Yes ☐ No ☐ Unknown
28. Has this person had unprotected sex with a partner at risk for HIV/AIDS? ☐ Yes ☐ No ☐ Unknown
29. Has this person had unprotected sex with a partner at risk for HBV? ☐ Yes ☐ No ☐ Unknown
30. Has this person shared use of injection drug needles/apparatus? ☐ Yes ☐ No ☐ Unknown
31. Is this person an immigrant from an area where HBV is endemic? ☐ Yes ☐ No ☐ Unknown
32. Does this patient receive hemodialysis? ☐ Yes ☐ No ☐ Unknown

Information From the Clinician Assessing This Injury/Exposure

33. Description of exposure
 A. ☐ Needlestick/puncture B. ☐ Laceration or other skin cuts
 C. ☐ Splash to mucous membranes D. ☐ Splash to intact (normal) skin
 E. ☐ Splash to existing wound F. ☐ Other _____
34. Location of exposure
 Hand ☐ L ☐ R Other _____
35. Depth of puncture or laceration
 A. ☐ Superficial, no blood appeared B. ☐ Superficial, blood appeared
 C. ☐ Deep puncture wound, with or without bleeding
36. Amount of blood/ body substance exposure
 A. ☐ None B. ☐ Some C. ☐ Actual injection D. ☐ Unknown
37. A. Treatment received? ☐ Yes ☐ No
 B. Was the exposure site decontaminated? ☐ Yes ☐ No
 C. If yes, time elapsed from exposure to decontamination? _____

TABLE 4 CONTINUED

D. If yes, agent utilized:

1. ☐ Iodophor solution 2. ☐ Bleach solution 3. ☐ Alcohol
 4. ☐ Soap and water 5. ☐ Saline 6. ☐ Water only

Treatment and Testing of Dental Health Care Worker

38. Treatment

- A. ☐ Dental health care worker referred to _____
 C. ☐ Other _____

39. Laboratory tests

40. Was source patient tested for HIV? ☐ Yes ☐ No

41. If no, why not?

- A. ☐ Refused testing for HIV B. ☐ Recently tested for HIV
 C. ☐ Wants testing elsewhere D. ☐ Known to be HIV+
 E. ☐ Wanted test but failed to return F. ☐ Left before test requested
 G. ☐ Source test pending H. ☐ Source could not be identified
 I. ☐ Other _____

42. Additional comments (from the clinician regarding this form, problems, etc.):

Clinician's Name_____
Clinician's Signature_____
Date

Instructions:

Send to evaluating health care professional with the exposure questionnaire. Retain completed report in employee's confidential medical record for length of employment plus thirty years.

Health Care Provider Bloodborne Exposure Incident Reporting Form

Name _____

Dear health care provider:

In accordance with the Cal-OSHA regulations for bloodborne pathogens, please return this form to the employer within 15 days indicating your management of this patient. This form must be completed in order to comply with current OSHA regulations in relation to work-related parenteral exposures.

	Yes	No
a) Is Hepatitis B vaccine indicated?	_____	_____
b) Has the exposed individual been informed of the results of your evaluation and testing, if completed?	_____	_____
c) Has the exposed individual been told of any additional medical conditions that may result from their exposure to blood or other potentially infectious materials, and has follow-up been arranged?	_____	_____
	informed	_____
	follow-up arranged	_____

(It is understood by all involved parties that any and all of the above information will be kept confidential, unless a signed consent is given by the exposed individual.)

Evaluation conducted by: _____ Date: _____

PLEASE RETURN TO:

guidelines for what to do with this new information, the use of ZDV (AZT) for postexposure prophylaxis remained a question of when and how much. The determination of whether to offer exposed health care workers ZDV following exposure to blood should rest with a qualified physician or nurse. As discussed earlier, a risk assessment should be conducted to evaluate the benefits of prescribing medications. Provisional recommendations made by the Public Health Service⁷ have assisted the evaluating health care professional in determining when postexposure prophylaxis may be appropriate. There are no easy answers. An occupational exposure to HIV-infected blood, no matter how slight, has the potential to cause great anxiety to the health care worker involved. Anti-retroviral therapy may now be the standard of care in the event of parenteral occupational exposure to HIV,⁸ however, the question of when to offer, encourage, or not offer postexposure prophylaxis to an exposed health care worker is not easily answered in spite of the published guidelines and may be especially true in dentistry where occupational exposures usually involve small amounts of body fluids and procedures, and are by instruments unfamiliar to the evaluating health care professional. Many physicians may choose to offer ZDV and another antiretroviral, lamivudine (3TC) medication, and perhaps a protease inhibitor, even when the exposure does not meet the criteria found in the provisional recommendations (TABLE 2). The possible consequences of not offering the therapy, even if the exposure is a minor one, may be enough to convince the physician to prescribe for all exposures that may involve the source patient's blood. The recommendations also state that postexposure prophylaxis

should be started promptly, preferably within one to two hours postexposure. This may often cause logistical problems, and prior arrangements with a qualified health care provider is essential to ensuring this therapy will be available in a timely manner if ever needed. This combination drug therapy (TABLE 3) has been found to produce anti-retroviral activity at a greater level than ZDV alone. The use of a protease inhibitor is a new addition to the treatment of individuals already infected with HIV and has produced dramatically promising results in treating AIDS patients. These results were widely reported at the 11th International Conference on AIDS in Vancouver, British Columbia, in July 1996.

These advances do not come without cost. With the high price of the drugs, the need for medical follow-up throughout the course of postexposure prophylaxis and medical consults, the cost can easily exceed \$1,500 for one exposure incident.

More Information Needed

With the lack of epidemiological evidence of dental health care worker seroconversion following occupational exposure to HIV, the relatively minor nature of most dental exposures, the emotional impact of such incidents, and the high cost of postexposure prophylaxis, the decision of whether to prescribe can be a very difficult one for the evaluating physician. Often in dentistry, the infectious status of the source patient is unknown, making it more difficult to interpret the guidelines that most strongly recommend postexposure prophylaxis if the source patient is known to be HIV-positive. As more information regarding exposure incidents is collected and reported, and more effective anti-retroviral therapies become available, the question of which route to take following

exposure will hopefully become more clear.

Prevention of exposure incidents remains the best strategy for management of exposures. The evaluation of all factors which may be associated with percutaneous and mucocutaneous exposures to blood should continue. Armed with this knowledge, the dental manufacturing industry can better respond by offering more effective and useful safety devices and personal protective equipment. The Public Health Service can use this information in developing guidelines for practitioners, and dental health care workers can understand what puts them at greatest risk and find ways of optimizing the safe provision of patient care.

References

1. CDC, HIV/AIDS Surveillance Report, 1996, p 45.
2. Siew C, Gruninger S et al, Percutaneous injuries in practicing dentists. *J Am Dent Assoc* 126:1227-34.
3. Federal Register, Code of Federal Regulations 1910.1030, Dec 6, 1991.
4. Jacobsen P, Carpenter W and Cuny E, Bloodborne exposure incidents: Complying with OSHA regulations. *J Cal Dent Assoc* 20(8):35-41, 1992.
5. CDC, Case-control study of HIV seroconversions in health care workers after percutaneous exposure to HIV-infected blood -- France, United Kingdom and United States, January 1988-August 1994. *MMWR* Dec 22, 1995.
6. Tokars JJ, Marcus R et al, Surveillance of HIV infection and zidovudine use among health care workers after occupational exposure to HIV-infected blood. *Ann Intern Med* 118:913-9, 1993.
7. CDC, Update: Provisional Public Health Service recommendations for chemoprophylaxis after occupational exposure to HIV. *MMWR* 45(22):468-72, June 7, 1996.
8. Katz MH and Gerberding JL, Postexposure treatment of people exposed to the human immunodeficiency virus through sexual contact or injection drug use. *New Eng J Med* 336:1097-100, 1997.

To request a printed copy of this article, please contact/Eve Cuny, RDA, CDA, UOP School of Dentistry, 2155 Webster St., San Francisco, CA 94115.

Allergic Reactions: Increasing Immunological Problems for Health Care Providers and Patients

BY JOHN A. MOLINARI, PhD

ABSTRACT An increasing percentage of the general population develops allergy symptoms each year. Many of these harmful immune response manifestations are being directed at a wide variety of drugs and chemicals that are routinely used in dental and medical care facilities. It is, therefore, important for clinicians to be familiar with the major allergic signs and symptoms, understand the mechanism involved in patient sensitization and challenge, and be able to provide appropriate care should an allergic emergency arise during patient care. It is also advisable for clinicians to prepare as much as possible by taking an accurate patient allergy history.

AUTHOR

John A. Molinari, PhD, is a professor and chairman of the Department of Biomedical Sciences at University of Detroit Mercy School of Dentistry.

When most health care professionals hear the phrase “immune response,” they probably think of a protective, beneficial reaction by the body’s defenses that is aimed at providing resistance against a vast array of microbial pathogens, toxins, and other potentially harmful substances. As examples, we can demonstrate immunological mechanisms that protect against a variety of stimuli, including bacteria, viruses, fungi, cancer cells, foreign blood types, and parasitic infestations.

Unfortunately, the immune system is a double-edged sword. One of the most common adverse presentations of the negative aspect is grouped under the designation allergy. An allergy is

an exaggerated or pathological immune reaction to a wide variety of substances or stimuli, which does not occur in all members of the same species. Also commonly termed hypersensitivity, these responses are the result of normally beneficial mechanisms acting inappropriately, sometimes stimulating tissue damage and inflammatory processes. Basically, the body mistakes certain antigenic substances, called allergens, for harmful, foreign invaders. The ensuing antibody (humoral) or lymphocytic (cell-mediated) response can induce clinically apparent, even life-threatening, symptoms. It has been estimated that 1-in-4 to 1-in-5 people living in the United States suffers from multiple allergies against seemingly innocuous substances, such as animal

TABLE 1

Classification of Hypersensitivity					
Type	Clinical Manifestations	Major Mediator	Major Effectors	Sensitization	Mechanisms of Injury
I (Anaphylactic)	Local anaphylaxis (atopic allergies); systemic anaphylaxis	IgE	Histamine; SRS-A	Inhalation (respiratory mucosa); ingestion (gastrointestinal mucosa); parenteral	IgE attached to mast cells causes releases of histamine and SRS-A on reacting with specific antigen
II (Cytotoxic)	Hemolytic disease of the newborn, drug-induced hemolytic hypersensitivity, transfusion reactions, graft rejection, autoimmune diseases	IgG	Complement; K cell	Parenteral, ingestion, transplantation	Activation of complement to give lysis and opsonization; K cell cytotoxicity for antibody-coated target cells
III (Immune Complex)	Local: arthus; systemic: serum sickness	IgG	Antigen-antibody complexes; complement; polymorphonuclear leukocytes	Parenteral (inoculation of antigen or antiserum), inhalation (rare)	Activation of complement by antigen-antibody complexes chemotactic for polymorphonuclear leukocytes, which leads to vasculitis
IV (CMI)	Delayed-type hypersensitivity, contact hypersensitivity, cytotoxicity (graft and tumor rejection), autoimmune disease	CMI: T cells	Lymphokines (DH type), cytotoxic T cells	Parenteral, contact, transplantation	Lymphokines: MIF, chemotactic factor, etc., lead to vascular necrotic injury; cell membrane injury by direct cytotoxicity of the cytotoxic cells leads to invasive-destructive injury

dander, foods, insect venoms, pollens, metals, ragweeds, antibiotics, and other medications. One of the most striking, classical hypersensitivity examples involves insect venoms. The injection of a small amount of bee or wasp venom from a sting into a person's skin does not normally constitute a serious problem. Yet, a person who is allergic to the venom's components can develop a localized or systemic, potentially life-threatening anaphylactic reaction within minutes after the incident.

Although there may be numerous reasons why allergic responses are of importance to dental professionals, there are three major ones, as follows.

- Many chemicals, drugs, latex-containing products, and dental materials can induce hypersensitivity in both care providers and their patients. These can include eugenol-containing products, preservatives in anesthetics, dentifrices, hand-washing antiseptics,

antibiotics, acrylic resin, and nickel in metal-based alloys.

- Certain hypersensitive reactions directly affect the oral cavity and maxillofacial areas.
- Patients may be using anti-allergy medications -- i.e., antihistamines, cromylin or steroids -- that may present problems during certain treatment procedures.

Two classification systems have been developed for hypersensitivity reactions (Tables 1 and 2). The present discussion will be limited to Types I and IV (TABLE 1) and representative anaphylactic immediate and delayed adverse responses (TABLE 2). These two groups of hypersensitivity reactions typically represent the most common types of allergic challenges facing the majority of dental and medical practitioners. In addition, because of health care challenges associated with increasing diagnosis and investigation of allergic reactions to latex products, portions of the discussion will

also consider clinical and immunological issues related to this occupational problem.

Type I Hypersensitivity

Immune responses categorized as Type I allergies are mediated by the immunoglobulin IgE. The ability of this antibody to specifically bind onto the surfaces of certain granulated cells (i.e., mast cells and basophils) allows IgE to trigger subsequent allergic sequelae described below. The major class of immediate hypersensitivity reactions also involve IgE. These are represented by either cutaneous (localized) or systemic anaphylactic symptomatology. Both can develop within minutes in allergic individuals. The manifestations of this type of allergy are variable, as reactions can develop at different sites and in target tissues, depending on the route of exposure (TABLE 3).

There appear to be two groups of antigens that tend to elicit Type I

TABLE 2

Comparison of Immediate (Immunoglobulin) and Delayed (T Cell) Hypersensitivities		
	Immediate	Delayed
Timing of response after shocking exposure	Appears within a few minutes; fades within a few hours	Develops and fades gradually, maximum at 24 to 72 hours
Special target tissue	Usually smooth muscle, but organ varies with species	Generalized tissue involvement
Tissue death	Quite common	Occurs but not typical of ordinary reaction
Humoral factor involvement	Yes, IgE and IgG	None yet identified
Cellular factor involvement	Only in that immunoglobulins are produced by B lymphocytes and plasma cells; mast cells	T lymphocytes, directly, not via immunoglobulin
Passive transfer	With immunoglobulins	With T lymphocytes
Type of tissue involved	Vascular	Vascular, but relatively avascular suitable also
Histology of skin reactions	Predominantly neutrophils early, with some mononuclears; edema obvious, with wheal and erythema	Tendency toward mononuclears, with some neutrophils; species variation; less edema and wheal; erythema and induration
Chemical mechanism	Histamine, serotonin, kinins; species variation	Lymphokines
Chemotherapy	Antihistamines and smooth muscle relaxants (adrenergic compounds)	Steroids (anti-inflammatory compounds)
Immunotherapy (desensitization)	Yes; relatively easy, temporary, via neutralizing antibodies or formation of blocking antibodies	Yes; with difficulty, temporary; usually not attempted

immediate allergic responses. The first consists of haptens, or incomplete antigens. As an example, an antibiotic such as penicillin or its metabolic products bind very efficiently to circulating host carrier proteins. This is a necessary prerequisite to making the hapten immunogenic and, therefore, capable of stimulating the immune system. The other broad group of immunogens includes various plant pollens, spores, insect venoms, medications, animal dander, and microbial products, which are unusually resistant to enzymatic degradation after entering the body. Antigens that stimulate IgE synthesis or trigger other hypersensitivity responses are called allergens. Usually only very low doses are required to stimulate IgE synthesis and set the stage for later allergic symptoms.

IgE is able to bind to specific receptors on the plasma membranes of mast cells and basophils. The high affinity of IgE

for these surface sites accounts for the long-term sensitivity of Type I allergic persons to inciting antigens. For mast cells and basophils to be activated during a hypersensitive incident, two conditions must be met:

- IgE initially must be bound to cell surface receptors. This requires that the person have had at least one previous exposure to the allergen to stimulate initial synthesis of IgE (i.e., sensitizing dose); and
- Allergen during a second or subsequent exposure (i.e., challenge dose) must react with antibody on the granulated cell surface to trigger degranulation.

During degranulation, preformed intracellular granules fuse with the cytoplasmic membrane, emptying their contents to the exterior. These include certain pharmacologically active mediators, such as histamine. In addition, other mediators, such as serotonin,

kinins, prostoglandins, leukotrienes, Slow Reacting Substance-Anaphylaxis, Eosinophil Chemotactic Factor-Anaphylaxis, and a number of cytokines, work with histamine to cause clinical manifestations characteristic for Type I, IgE-mediated, immediate hypersensitivity.

Signs and Symptoms of Type I Hypersensitivity

As outlined in **Table 3**, physical manifestations of Type I allergies resulting from stimulation of IgE synthesis can develop in multiple tissues and systems. These can present with a range of localized or systemic anaphylactic symptomatology. In individuals who are mildly sensitized, local skin exposure to the sensitizing allergen would typically produce pruritus and urticaria beginning within minutes post challenge. Affected individuals can experience itching at the site of allergen penetration, very quickly followed by a pale edematous raised zone

surrounded by a halo of erythema termed a wheal and flare (**FIGURE 1**).

The response may reach maximal intensity approximately 10 minutes post challenge, persist for another 10 to 20 minutes, and then gradually subside. This phenomenon is referred to as cutaneous anaphylaxis, with lesions described as wheal and erythema, wheal and flare, urticaria, or hives. Individuals with a cutaneous anaphylactic allergy to latex often find that their hands begin to burn and itch soon after donning latex gloves. After gloves are removed, they may also notice the rapid appearance of hives and localized edema in response to latex protein antigens (**FIGURES 2 AND 3**). Patients allergic to natural rubber latex can also experience similar symptoms during intraoral examination by care providers wearing latex gloves or after placement of a latex dam.

In generalized or systemic anaphylaxis, the effects can range from mild respiratory distress to life-threatening respiratory collapse. Massive edema can develop around the site of antigen injection along with difficulty in breathing and swallowing. These latter manifestations result from bronchial constriction and laryngeal edema. Shock can follow due to sudden peripheral capillary permeability, vasodilation, and rapid decline in the person's blood pressure. Anaphylactic death in extremely sensitized individuals can occur very rapidly despite emergency resuscitation procedures. Fortunately, most people survive episodes of anaphylaxis, with recovery usually complete within an hour.

Systemic manifestations of Type I hypersensitivity can also develop in some individuals who are challenged with airborne allergens such as ragweed pollens and natural rubber latex proteins. In the latter case, latex immunogens can



FIGURE 1. Cutaneous Type I hypersensitivity reaction to animal dander. Localized itching, vasodilation and urticaria developed within 10 minutes after epithelial challenge with allergen.



FIGURE 2. Type I hypersensitivity to natural rubber latex protein exhibited by a dental student. The reaction formed within minutes after the student donned powdered latex gloves and was most intense for erythema and urticaria in those areas of the hands in constant contact with the gloves.



FIGURE 3. Type I allergy in a dental care provider against latex in the elastic band on a face mask.



FIGURE 4. Type IV hypersensitivity reaction manifested as contact dermatitis against nickel in a metal watch band. Note the tissue necrosis evident 72 hours after epithelial challenge.

adhere to cornstarch powder particles during product manufacturing processes. As gloves are removed from boxes, aerosolized proteins bound to powder may remain suspended for prolonged periods. The presence of excessive powder on latex gloves, along with frequent removal of gloves from boxes during the day, can cause substantial particle aerosolization in the immediate vicinity. As a result, respiratory and conjunctival exposure of sensitized persons to the offending proteins can stimulate onset of Type I symptoms. Coughing, wheezing, shortness of breath and/or respiratory distress may occur, with the severity being dependent on the extent of the person's sensitization. Severity can range from mild itching, irritation and



FIGURE 5. Type IV allergic reaction to a latex dam. The patient reported burning and itching of the lips approximately 24 hours after placement of a latex dam during dental treatment.

allergic conjunctivitis to a brief period of difficulty in breathing, all the way to life-threatening anaphylaxis.^{1,2}

Treatment of Type I allergic reactions depends on prompt recognition by the practitioner and ultimate intervention with

pharmacological agents. Since histamine is the most active pharmacological mediator during anaphylactic reactions in humans, administration of antihistamines can prevent further progression of many localized allergic episodes. In the case of severe anaphylaxis, injection with epinephrine, monitoring vital signs, and cardiovascular resuscitation are utilized to provide life-saving assistance.

Atopy

There appears to be a heritable predisposition for some individuals to easily become hypersensitive to a wide range of allergens. Hypersensitivity can develop rapidly when these allergens are inhaled, ingested, or contacted via epithelial/mucosal exposure. Airborne plant pollens, particularly ragweed pollen, represent the most common and well-studied allergens. In addition, tree and grass pollens, microbial spores, house dust (composed of epidermal products of man and animals, bacteria, molds, and insect parts/feces), bovine milk constituents, and egg albumin all can act as potent allergens. The two most common physical manifestations of inhalation allergy are hay fever, more properly termed allergic rhinitis, and asthma. Allergic rhinitis is characterized by sneezing, nasal congestion, and watery discharge, as well as increased lacrimation, periorbital edema and conjunctival itching.

Type IV Hypersensitivity

A host sensitized to the urushiol oil on the surface of the poison ivy leaf; certain metals; microbial antigens; or accelerators, antioxidants, and other chemicals used in the manufacture of latex gloves, will develop a more chronic skin lesion following subsequent exposure of the same allergens. Usually no reaction is seen for at least 10 hours after challenge.

TABLE 3

Clinical Manifestations of Type I (IgE-Mediated) Hypersensitivity

Organ System	Symptom	Sign
Skin	Pruritus, facial swelling, Nasal congestion	Urticaria,* angioedema
Respiratory tract	Itching, sneezing, dyspnea, cough, substernal tightness, abdominal pain	Rhinitis, laryngeal stridor, wheezing, tachycardia
Gastrointestinal	Nausea, vomiting, diarrhea	
Eye	Tearing, itching	Conjunctivitis
* Hallmark of the syndrome		
Adapted from Lucre WC and Thomas Jr H, J Emer Med 1:83-95, 1983.		

Then erythema, swelling, and induration gradually appear with maximal size and intensity being reached at 24 to 72 hours. The lesion resolves over the next several days. In a highly sensitive person, this type of delayed response can cause local necrosis, ulceration, and even scarring (FIGURE 4).

Histologically, Type IV reactions are readily distinguished from immediate-type hypersensitivities. In a mild to moderate delayed-type hypersensitivity reaction, the earliest cellular infiltrate consists of small- to medium-sized lymphocytes, neutrophils, monocytes, and macrophages that accumulate around postcapillary venules. At the time of maximal tissue response, the entire dermis is involved; and mononuclear cells may be found in the epidermis. Necrosis of blood vessels, muscle, connective tissue, and epidermis may occur to varying degrees, depending on the sensitivity of the individual.

A common form of Type IV hypersensitivity encountered by health care providers and their patients is contact dermatitis (FIGURE 5). The inciting agents are typically a variety of small molecular weight chemicals (< 1,000 daltons) capable of inducing an allergic skin reaction. The catechols of the poison ivy plant, soaps, detergents, drugs, many dental materials, and active chemicals used in the manufacture of latex and other rubber products, all can

cause allergic contact dermatitis. The initial exposure to a potential sensitizing substance does not elicit any visible skin response. In some individuals, however, if re-exposure to the same substance occurs anywhere on the skin surface just four to five days after initial exposure, a localized Type IV hypersensitivity response is elicited. In other individuals, several exposures to the substance may be required before any visible manifestation is observed. Occasionally, challenge exposures can lead to intense allergic reactions that can produce necrosis. Sensitization and response to challenge exposures involve sensitized T-lymphocytes, their lymphokine products, and other inflammatory cells attracted to the affected area. Lesions form slowly with a several-hour delay in the onset of symptoms, reaching maximal appearance 24 to 48 hours after challenge. The chronic inflammatory reaction is well-demarcated on the skin and is surrounded by localized edema. Onset of symptoms is prolonged to allow sufficient numbers of antigen-specific lymphocytes to arrive at challenge sites, with the resultant secretion of lymphokines attracting other inflammatory cells, such as macrophages and neutrophils. Contact dermatitis can take a minimum of four days to heal with necrosis, scabbing, and sloughing of affected epithelium.

Historically, Type IV latex

hypersensitivity has been found to be the most common natural rubber latex allergy. In contrast to Type I allergies directed against latex protein components, the etiologies of delayed, lymphocyte-mediated reactions are chemicals added to crude milky latex during the manufacture of latex products. Numerous scientific reports have documented the presence of more than 200 chemical additives, although the chief allergens responsible for Type IV hypersensitivity appear to be accelerators and antioxidants.³⁻⁵

Treatment for the skin reactions observed with contact dermatitis utilizes antihistamine to minimize itching and topical corticosteroid therapy to reduce the inflammatory response signaled by the sensitized T-lymphocytes.

Summary

Clinicians can expect to treat an increasing number of allergic patients in health care facilities. Although many allergies may be directed at allergens outside of the treatment setting, sensitization and subsequent challenge can also occur against a variety of active chemicals and drugs used in patient care. These include topical medicaments, antibiotics, toothpastes, dental materials and nickel in restoration materials routinely used in dental care.

Dental care providers should be knowledgeable in recognizing early signs and symptoms of allergic reactions during patient care and also be prepared to provide appropriate care when needed.

References

1. Hamann B, Hamann C and Taylor JS, Managing latex allergies in the dental office. *J Cal Dent Assoc* 23(1):45-50, 1995.
2. American College of Allergy, Asthma and Immunology, Latex allergy -- An emerging health care problem. *Ann Allergy, Asthma Immunol* 75(1):19-21, 1995.
3. Heese A, van Hintzenstern J et al. Allergic and irritant reactions to rubber gloves in medical health services. Spectrum, diagnostic approach and therapy. *J Am Acad Dermatol* 25:831-9, 1991.
4. Hamann C, Natural rubber latex protein sensitivity in review. *Amer J Contact Derm* 4(1):4-21, 1993.
5. Hamann C and Sullivan K, Latex sensitivity in dentistry. *Oper Infect Cont Update* 2(2):1-8, 1994.

To request a printed copy of this article, please contact/John A. Molinari, PhD, UDM School of Dentistry, 8200 W. Outer Drive, Detroit, MI 48219-0900.

Transition Decision-Making and Strategy

BY RANDALL K. BERNING, JD, LL.M

ABSTRACT With the advent of practice management companies and management service organizations, the already complicated area of practice transitions has become even more complex. This article discusses some of the key information a dentist will want to have in hand before making a decision on any transition, whether new or traditional. The key to all successful transitions is to enter into them with as much information as possible, rather than relying merely on feelings.

AUTHOR

Randall K. Berning is a health care attorney, educator and consultant. He is adjunct faculty at three dental schools: the University of California at San Francisco, the University of Illinois and the University of Maryland.

“Daddy, is playing outside right now ‘an important opportunity not to be missed’?”

My 5-year-old son Matthew asked me that question during a visit to my office while on a holiday break from kindergarten. I knew I must have been emphatic in making my point to the client I had been talking to on the telephone and that Matthew had overheard me before he asked his question. In a humorous way, Matthew had captured the essence of practice futures today: asking before leaping, “Is this an opportunity I have to grab now?”

This article will discuss the dynamic area of practice transitions by contrasting classic options with new forms of practice opportunity and focusing on decision-

making. In an increasingly complex career path, dentists should be ever alert to choices of practice that may affect their future. Most dentists do see the broad horizon relating to their practice but fail to particularize key steps that let them act decisively. This article should be a help in moving the reader into a proactive mode of decision-making.

Opportunity

Powerful currents of change are affecting dentistry and causing increasing numbers of dentists to ask the question “What do I do?” When I wrote for California dentists “Practice Transitions in the 1990s,”¹ the discussion focused on what I now call “classic transitions,” i.e., associateships, buy-ins, buy-outs and a variety of solo-group options. They are

still valid transition strategies, particularly for younger professionals. Some of these strategies are discussed in two chapters I prepared for the excellent new publication *A Guide for New Dental Practitioners*, developed by CDA's Committee for the New Dental Professional.² Yet, here we are in 1998 faced with transition formats that pose significantly different choices, some not even mentioned a few years ago.³ Most recently, practice management companies and management service organizations are the latest entrants into a growing field of opportunities that present themselves to younger professionals entering practices, midterm practitioners deciding on how to secure their futures, and end-term practitioners evaluating their exits from practice strategy.

All health care practitioners who value being prepared are looking ahead and actively weighing their choices. A health lawyer from a national law firm recently observed that of all the group medical practices he deals with, about a third seek business advice rather than just legal counsel. I find at least the same is true in dentistry, but not just for group practices. Although I deal with a lot of groups, groups in formation and specialty practices, my work still reflects dentistry's demographics, which is largely solo practice. What is so fascinating is that what I call "advanced solos" are in step with groups in trying to evaluate choices and seeking to plot a strategy that allows them to control to the maximum degree possible and allowable the drawing area of the practice. Such a strategy involves actively evaluating the demographics of their patient base, competitors, practice growth rate and the potential for maximizing return with the addition of associates, partners and additional office locations.

Three Keys

This article will highlight a core of material relating to opportunity consideration. Most people would agree that opportunities are only that, unless and until they are evaluated, sorted and prioritized. Action must be taken by the decision-maker, in this case the dentist, to take advantage of or to decline a given practice development opportunity. The action should not be capricious, but instead should follow a standardized decision-making format and be driven by getting all the pertinent information possible to make a good decision. This is no different from a doctor performing a well-conceived radiologic examination. Consider this statement by Dr. Olaf E. Langland, "The dentist must have a dental radiograph that will provide the maximum possible information concerning a particular anatomical region."⁴ Dr. Langland goes on to discuss each aspect of what maximum possible information represents, including, density, contrast and geometric characteristics. A dentist should use this same meticulous approach in evaluating practice transition opportunities.

The process of evaluation of the type of transition opportunities mentioned here has three distinct keys or parts. I use these three parts daily, with additional factors not discussed here as I deal with the futures of practices and practitioners. It is this structure that is helpful in answering the "What do I do?" question and provides the basis to guide a decision-maker to a well-considered decision, given the unique facts of his or her life and practice.

- Key 1: What is the time frame for decision-making?
- Key 2: What are the perceived benefits vs. potential negatives?
- Key 3: How thorough has the investigation process been?

Key 1: What Is the Time Frame for Decision-Making?

We can't have a meaningful discussion relating to the future of a practice or a dentist's career unless a time frame is set. The time frame allows us to give a structure to the planning for both the practice and dentist(s). However, we have to define terms that are meaningful in that practices' and dentist's view. For example is "short term" a year or less? Is "long term" five years or 10? I could find dentists who would chose less and those who would chose more. The key is to decide what is meaningful for that practice and dentist. Many doctors view three to five years as short term and 10 years as long term.

Why do I mention both the practice's and dentist's time frames? Because they both have time lines; sometimes they are the same, and sometimes they are different. Dentists, as noted above, are either starting out, midterm or end-term. Their life/career is relatively predictable. Dentists in groups will still have individual time lines; but, with proper age blending, the group can come closer to matching the underlying practice time line, which can be much longer.

Let's explore a practice time line for a well-established practice in a mature community. I've worked with practices like these in nearly every part of the country, but one area I've worked with for 18 years is particularly rich with them: the San Francisco peninsula. More often than not, such a practice on the peninsula offers a solid fee-for-service history. The expectations of the patient base is for a higher level of dentist competence and personal attention to care. The time line for the future of those practices, absent radical changes, would be either a comfortable plateau of performance

or a continuing climb depending on the leadership, marketing and capacity of the dentist(s).

But take one of those practices, add a new practitioner or a new style of operation under perhaps a management service organization, and watch what happens to the life (time line) of the practice. If good planning and execution of the plan occur, the practice may be reborn with a new time line and different set of expectations being offered to the patients. Or, the practice may find the change does not meet with local demographic market expectations, and the practice could face the prospect of imploding.

Key 2: What Are the Perceived Benefits vs. Potential Negatives?

Many of the newer opportunities being presented to practitioners today sound good. Some offer to set up a practice or purchase an existing practice, offering improved management, reduced overhead, marketing, the ability to attract managed care contracts, and even access to capital. This panacea, of course, is no different from some of the classic transitions in which a seller makes what seems to be a too-good-to-be-true offer dependent on a glowing picture of all the new patients available if the new dentist implements a marketing plan.

But, whether the offer is for the newer opportunities or the classic transition, dentists must weigh the perceived benefits against those they may give up. In the case of the newer opportunities, there may be a loss of autonomy or practice management control and even the prospect of decreased income if the projected growth of the practice does not occur. And in the case of the classic transition, there is the often substantial debt that buying or buying into a practice represents, which can be driven higher if

real estate is part of the purchase.

Key 3: How Thorough Has the Investigation Process Been?

Before any decision is made on a future relating to a practice or dentist transition, one must do his or her homework and seek the facts behind any proposed opportunity.

In December, I participated in a debate-style exchange sponsored by the Northeastern Society of Orthodontists that pitted the CEOs of all the orthodontic management companies -- Orthodontic Centers of America, Apple Orthodontix, Omega Orthodontics and OrthoAlliance -- against three responders: an orthodontic consultant; a concerned orthodontist who had been approached and had evaluated an offer to sell his practice; and me, a health care attorney and practice consultant. The room filled with 700 orthodontists bristled with tension as various viewpoints were aired. Time and again the observation was made by the management companies that the doctors were responding to various offers to transition their practices based on feelings, not facts. But I find that in dentistry feelings are facts. This is because a high percentage of general care and specialty practitioners are not accustomed to taking the time and energy to dig for facts, relying instead on their instincts. The problem is that although a dentist may use his or her feelings to make a final decision, feelings can never replace facts. At the least, the following must be investigated and, if possible, secured to make a sound decision.

Private Classic Transitions

Where the intention is to use a buy-in, buy-out or sale:

- Gather all financial information, see the list of 10 items to secure at **FIGURE 1**, Page

14, of the Valuing a Practice, ADA.⁵ The list includes the following: a balance sheet reflecting current assets and liabilities, the most recent income statements, a copy of practice income tax return for at least three previous years, a year-to-date income statement for present year with breakdown of all revenue and expenses, estimates of the fair market value of equipment, the cost of leasehold improvements and date for each, year-to-date total and the three previous full years' monthly production and collections by dentist and hygienist, average accounts receivable and any accounts written off over the foregoing period, and a schedule of all practice expenses.

- Investigate the owner's past, present and proposed future strategic plan for advancing the practice.
- Investigate the owner's past, present and proposed future business and marketing plans and proposals to increase patient flow.
- Meet with all staff to evaluate the team

Practice Management Companies

- Investigate, where publicly traded, annual report key information.
- Investigate management philosophy.
- Investigate business strategy.
- Investigate growth projections and check them with advisers.
- Investigate and talk with other practitioners who are part of entity and take into account any biases or financial self-interest that may color their comments.

There has never been a time of so many choices relating to practice and dentist transition. This unprecedented range of opportunities for the futures of both translates into an increasingly heavy burden for any dentist decision-maker. Decisions need to be investigated

and weighed. Outside advisers can offer valuable assistance in the areas of financial affairs, tax, health care law and consulting expertise.⁶ The difference between a dicey future and rock-solid future seems to be good planning using well-developed planning models to secure the success desired, a consistently applied marketing strategy that is responsive to the drawing area of the practice, and a well-conceived practice transition plan. Well-advised groups and advanced solos are tackling each task and reaping the rewards of making good decisions.

References

1. Berning RK, Practice Transitions in the 1990s. *J Cal Dent Assoc* 18(6):21-3, 1990.
2. Berning RK, Evaluating Employment Agreements and The Challenges of Becoming an Owner of a Dental Practice. A Guide for New Dental Practitioners, The Committee on The New Dental Professional, California Dental Association, 1997.
3. For a discussion of an unusual new group form of practice, see Berning RK, Coming Soon: The Virtual Group. *J Cal Dent Assoc* 25 (10):715-9, 1997.
4. Langland OE, Radiologic Examination. *Clark's Clinical Dentistry*, Vol 1 Chap 4, 1996.
5. Valuing a Practice: A Guide for Dentists, Council on Dental Practice, American Dental Association, 1996.
6. Berning RK, A Brief Guide to Using a Lawyer's Mind in Healthcare Business Situations. *J Am College Dent* 64(2):9-12, summer 1997.

Transmission and Persistence of *Actinobacillus Actinomycetemcomitans* in Twins with Advanced Periodontitis

BY PETER A. RUSSO, DDS; HESSAM NOWZARI, DDS; AND JORGEN SLOTS, DDS, PhD

ABSTRACT The arbitrarily primed polymerase chain reaction technique (AP-PCR) was used to fingerprint *Actinobacillus actinomycetemcomitans* and *Porphyromonas gingivalis* isolates in 44-year-old African American male and female twins who had not lived in the same household for 26 years. Both twins exhibited severe loss of periodontal attachment on several maxillary and mandibular teeth. All isolates of *A. actinomycetemcomitans* yielded the same AP-PCR banding pattern, whereas the *P. gingivalis* isolates from each twin showed different AP-PCR profiles. The finding of the same amplotype of *A. actinomycetemcomitans* in both twins suggests a single source of the organism and possibly a persistence of the organism in each twin for at least 26 years.

AUTHORS

Peter A. Russo, DDS, is a clinical assistant professor at the University of Southern California School of Dentistry.

Hessam Nowzari, DDS, is director of advanced periodontics at the USC School of Dentistry. **Jorgen Slots, DDS, PhD**, is chairperson of periodontology and associate dean for research at the USC School of Dentistry.

Actinobacillus actinomycetemcomitans is a gram-negative, capnophilic coccobacillus that resides in supra- and subgingival plaque, tongue dorsum, buccal mucosa and saliva.^{1,2} *A. actinomycetemcomitans* can be isolated from both periodontally healthy and diseased sites and has been implicated as a major pathogen in prepubertal,³ localized juvenile^{4,5} and advanced adult periodontitis.^{6,7}

Recent studies show that intrafamilial transmission of *A. actinomycetemcomitans* occurs with high frequency in families with localized juvenile periodontitis patients.⁸⁻¹⁰ Preus and colleagues¹¹ demonstrated that parents with *A. actinomycetemcomitans*-associated adult periodontitis transmitted the bacterium to one of their children

30 percent of the time. Also, all infected children revealed the same genetic type of *A. actinomycetemcomitans* strain as did one of their parents,^{9,10} suggesting that the parents were the source of the infection. An intriguing means of preventing *A. actinomycetemcomitans*-associated periodontitis may derive from intervening in the organism's transmission from person to person.^{9,12,13}

Using genetic fingerprinting, the present study showed that identical isolates of *A. actinomycetemcomitans* were recovered from a pair of dizygotic twins who had not lived together for 26 years and who both demonstrated advanced periodontitis. The findings suggest that *A. actinomycetemcomitans* can survive for a considerable time in subgingival plaque.

Patient Descriptions

A pair of 44-year-old African American male and female twins were referred for treatment of periodontitis to the Advanced Periodontics Clinic at the University of Southern California. Neither patient had received treatment for periodontitis. The male patient's medical history was noncontributory. The female had a history of hypertension controlled by medication and diet. Both patients were of low socioeconomic status. They had lived in the same household for the first 18 years of their lives, but had lived separately since 1968 when the male patient was drafted for military service in Vietnam, where he remained until 1972. Upon his return, he resided in various parts of the Southern United States until about 10 years ago when he returned to Los Angeles. The female remained in Southern California and had no personal contact with her brother until his return. Since then, personal visits had taken place on only rare occasions.

Information on the dental history of the family is limited. Both parents were edentulous when they died. They had had their remaining teeth extracted when they were in their 40s, for reasons their dentists called "pyorrhea." No other family members were available for clinical or microbiological examinations.

In the anterior maxillary and mandibular teeth, both patients demonstrated loss of periodontal attachment with particularly severe damage in teeth Nos. 6, 8 and 10. In the female, suppuration was present around teeth Nos. 6 and 8; and class II mobility (Miller Classification) was noted on teeth Nos. 7, 8 and 13. In the male, class I mobility was present on tooth No. 6. In the molar areas, both patients showed several deep periodontal pockets. The female revealed severe periodontitis

around teeth Nos. 2, 3, 15, 18 and 30. The male presented with severe periodontitis around teeth Nos. 2, 15, 18 and 31.

Microbiological Procedures

Pockets with the deepest probing depth measurements in each quadrant were selected for microbiologic investigations. The sites tested for the female patient were teeth No. 2 distobuccal (probing depth = 7 mm), No. 15 mesiobuccal (PD = 9 mm), No. 18 mesiobuccal (PD = 9 mm), and No. 30 distobuccal (PD = 9 mm). The sites tested for the male patient were teeth No. 2 distobuccal (PD = 7 mm), No. 15 mesiobuccal (PD = 7 mm), No. 18 mesiobuccal (PD = 7 mm), and No. 31 distobuccal (PD = 8 mm).

After supragingival plaque was removed and each site thoroughly dried with cotton gauze, three sterile paper points were used to obtain subgingival plaque from each study site. The paper points were inserted to the bottom of the pocket, retained for 10 seconds, and then transferred to a 2 ml vial containing VMGA III anaerobic transport medium (Moller 1966).

The microbiological samples were processed within 60 minutes of collection. Microorganisms were mechanically dispersed with a Vortex mixer at the maximal setting for 45 seconds, and the microbial suspension was tenfold serially diluted in Moller's VMG I anaerobic dispersion solution.¹⁴ With a sterile bent glass rod, 0.1 ml aliquots from appropriate dilutions were plated onto nonselective 4.3 percent brucella agar (BBL Microbiology Systems, Cockeysville, Md.) supplemented with 0.3 percent Bactoagar, 5 percent defibrinated sheep blood, 0.2 percent hemolyzed sheep red blood cells, 0.0005 percent hemin, and 0.0005 percent menadione, and onto TSBV (Trypticase soy agar-Serum-



FIGURE 1. A radiographic representation of the bone loss in the mandibular left posterior sextant in the female patient. Severe vertical radiographic bone loss is demonstrated.



FIGURE 2. A radiographic representation of the bone loss in the maxillary left posterior sextant in the male patient. Moderately severe radiographic bone loss with molar furcation involvement is demonstrated.

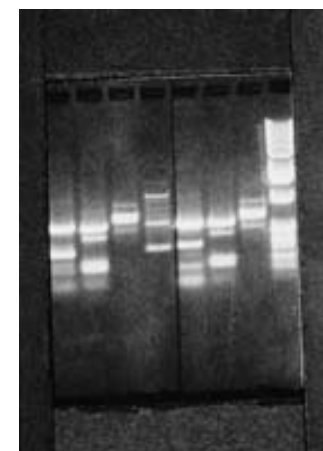


FIGURE 3. AP-PCR profile of *A. actinomycetemcomitans* for both patients. Lanes 1 and 5: *A. actinomycetemcomitans* primers. Lane 2: profile of male isolates using OPA 3 primer. Lane 3: profile of male isolates using OPA 4 primer. Lanes 4 and 8 are molecular size markers. Lane 6: profile of female isolates using OPA 3 primer. Lane 7: profile of female isolates using OPA 4 primer.

Bacitracin-Vancomycin) selective medium for *A. actinomycetemcomitans*, enteric gram-negative rods, pseudomonads, and yeasts.¹⁵ The nonselective blood agar was incubated at 35 degrees Celsius in a Coy anaerobic chamber (Coy Laboratory Products, Ann Arbor, Mich.) containing 85 percent N₂, 10 percent H₂, and 5 percent CO₂ for 10 days. TSBV medium was incubated in 10 percent CO₂ in air at 35 degrees Celsius for four days. Presumptive identification was performed according to methods described by Slots¹⁶ and by use of commercial micromethod systems.

Microorganisms examined included *A. actinomycetemcomitans*, *Prevotella intermedia*, *Porphyromonas gingivalis*, *Bacteroides forsythus*, *Campylobacter rectus*, *Fusobacterium* species, *Peptostreptococcus micros*, *Capnocytophaga* species, beta-hemolytic *Streptococcus* species, *Staphylococcus* species, *Enterobacteriaceae* species and *Candida* species.

Following identification of bacterial species, *A. actinomycetemcomitans* and *P. gingivalis* isolates from each patient were analyzed using the arbitrarily primed polymerase chain reaction (AP-PCR) fingerprinting technique. PCR is a cyclical, enzymatic reaction in which DNA strands are copied and used as templates for subsequent cycles, resulting in an exponential increase of the desired target(s). The resulting amplicons can be visualized in agarose gel electrophoresis. The AP-PCR study was carried out as described previously.^{17,18} The primers used for both the *A. actinomycetemcomitans* and the *P. gingivalis* isolates were 5'AGTCAGCCAC 3' (primer OPA-3) and 5'AATCGGGCTG 3' (primer OPA-4).

Results

FIGURES 1 AND 2 demonstrate the severity of the radiographic bone loss in

TABLE 1

Subgingival microorganisms in four deep pockets in each of two dizygotic twins with advanced periodontitis

Species	Percent of cultivable microorganisms	
	Female patient	Male patient
<i>A. actinomycetemcomitans</i>	18.2	0.004
<i>P. gingivalis</i>	36.4	22.2
<i>B. forsythus</i>	1.7	0.6
<i>Capnocytophaga</i> spp.	1.0	0.6
<i>Fusobacterium</i> spp.	18.2	6.9
<i>P. micros</i>	9.1	4.1
<i>P. intermedia</i>	0.0	11.1

the female and male patients, respectively.

TABLE 1 shows the cultivable subgingival microbiota of the two study patients. Both individuals harbored subgingival *A. actinomycetemcomitans*, *P. gingivalis*, *B. forsythus*, *Fusobacterium* species, *P. micros*, and *Capnocytophaga* species.

FIGURE 3 demonstrates the AP-PCR analysis of *A. actinomycetemcomitans* isolates from both study subjects. The banding patterns in lanes 2 and 3 for the male patient were identical to the banding patterns in lanes 6 and 7 for the female patient, using the two PCR primers. The AP-PCR analysis for *P. gingivalis* showed different nucleotide banding patterns for strains obtained from the twins.

Discussion

The present AP-PCR analysis showed that two fraternal twins harbored identical isolates of *A. actinomycetemcomitans*. Both individuals had probably received the *A. actinomycetemcomitans* strain from the same source, most likely one of the parents, and had probably been infected by this bacterium for more than 26 years.

This may be the first report to lend support to the notion of decades of longevity of an oral *A. actinomycetemcomitans* colonization. Asikainen and colleagues⁹ presented microbiological evidence of at least

two years' *A. actinomycetemcomitans* survival in teenagers. Previously, Preus and colleagues⁹ suggested that one predominant genotype of *A. actinomycetemcomitans* could persist for 13 years in the subgingival plaque of a patient with established periodontal disease. The inability of mechanical therapy to completely eliminate *A. actinomycetemcomitans* from the periodontal pocket, and the organism's colonization of buccal mucosa and tongue dorsum contribute to a prolonged period of colonization.^{6,13,15} Although this report cannot indisputably determine the origin of the *A. actinomycetemcomitans*, reports by Preus and colleagues⁹ and Asikainen and colleagues¹⁰ suggest a vertical intrafamilial transmission of the organism, most likely occurring from the mother during childhood. It is also of interest that *A. actinomycetemcomitans* seems to have undergone a multitude of generations over many years within the periodontal pocket of each individual without changing the AP-PCR profile.

The possibility of a transmission of *A. actinomycetemcomitans* during recent adult life of our study patients was not supported by these twins' social history. Since 1968, when the male twin was drafted for military service, these individuals had rarely had contact with

each other until recently. Clinical and radiographic evidence of each patient's periodontal disease status indicates a history of periodontal breakdown beginning earlier in life, perhaps in adolescence. The pattern of vertical and horizontal periodontal destruction is consistent with the diagnosis of post-juvenile periodontitis and an involvement of *A. actinomycetemcomitans*, and possibly of *P. gingivalis* in adolescence and early childhood. Also, Preus and colleagues⁹ provided evidence for the improbability of a transmission of *A. actinomycetemcomitans* between adults who already have an established periodontal *A. actinomycetemcomitans* infection. These data, therefore, support the notion of a prolonged *A. actinomycetemcomitans* colonization in some individuals. If so, it seems that the dentist cannot rely upon the host defense to clear the organism but may have to perform active intervention directed against the species. In periodontitis patients for whom antimicrobial therapy directed against *A. actinomycetemcomitans* is indicated, a systemic antibiotic therapy of amoxicillin-metronidazole (250 mg/TID/eight days of each drug) combined with thorough subgingival scaling and root planing constitutes an effective regime.²⁰

Conclusion

This paper reports a case of fraternal twins who have been infected with an identical strain of *A. actinomycetemcomitans* and who may have harbored the bacterium in subgingival plaque for more than 26 years. A prolonged subgingival colonization of *A. actinomycetemcomitans* may contribute to severe periodontitis, as implied in several previous studies. The combination of subgingival *A. actinomycetemcomitans*

and *P. gingivalis* may have been significant in the periodontal destruction observed in the twins studied.

References

1. Kilian M and Fredrikson W, Ecology of *Haemophilus*, *Pasteurella* and *Actinobacillus*. In: Kilian M, Fredrikson W and Biberstein EL, eds, *Haemophilus*, *Pasteurella* and *Actinobacillus*. Academic Press, London, 1981, pp 11-38.
2. Asikainen S, Alauusua S and Saxen L, Recovery of *A. actinomycetemcomitans* from teeth, tongue and saliva. *J Periodontol* 62:203-6, 1991.
3. Preus HR, Olsen I and Namork E, Association between bacteriophage-infected *Actinobacillus actinomycetemcomitans* and rapid periodontal destruction. *J Clin Periodontol* 14:245-7, 1987.
4. Slots J, Subgingival microflora in periodontal disease. *J Clin Periodontol* 6:351-82, 1979.
5. Slots J and Genco RJ, Microbial pathogenicity. Black-pigmented *Bacteroides* species, *Capnocytophaga* species, and *Actinobacillus actinomycetemcomitans* in human periodontal disease: Virulence factors in colonization, survival and tissue destruction. *J Dent Res* 63:412-21, 1984.
6. Zambon JJ, *Actinobacillus actinomycetemcomitans* in human periodontal disease. *J Clin Periodontol* 12:1-20, 1985.
7. Slots J and Listgarten MA. *Bacteroides gingivalis*, *Bacteroides intermedius* and *Actinobacillus actinomycetemcomitans* in human periodontal diseases. *J Clin Periodontol* 15:85-93, 1988.
8. Zambon JJ, Christersson LA and Slots J, *Actinobacillus actinomycetemcomitans* in human periodontal disease. Prevalence in patient groups and distribution of biotypes and serotypes within families. *J Periodontol* 54:707-11, 1983.
9. Preus HR, Zambon JJ et al, The distribution and transmission of *Actinobacillus actinomycetemcomitans* in families with established adult periodontitis. *J Periodontol* 65:2-7, 1994.
10. Asikainen S, Chen C and Slots J, Likelihood of transmitting *Actinobacillus actinomycetemcomitans* and *Porphyromonas gingivalis* in families with periodontitis. *Oral Microbiol Immunol* 11:387-94, 1996.
11. Preus HR, Haraszthy VI et al, Differentiation of the strains of *Actinobacillus actinomycetemcomitans* by the arbitrarily primed polymerase chain reaction. *J Clin Microbiol* 31:2773-6, 1993.
12. Kornman K, Age, supragingival plaque, and steroid hormones as ecological determinants of the subgingival microflora. In: Genco RJ and Mergenhagen S, eds, *Host-Parasite Interactions in Periodontal Diseases*. American Society of Microbiology, Washington DC, 1982, pp 132-8.
13. Asikainen S, Alauusua S et al, Subgingival microflora and periodontal conditions in healthy teenagers. *J Periodontol* 57:505-9, 1986.
14. Moller AJR, Microbiological examination of root canals and periapical tissues of human teeth. *Odontol Tidskr* 74:1-380, 1966.
15. Slots J, Reynolds HS and Genco RJ, *Actinobacillus actinomycetemcomitans* in human periodontal disease: A cross sectional microbiological investigation. *Infect Immun* 29:1013-20, 1980.
16. Slots J, Rapid identification of important periodontal microorganisms by cultivation. *Oral Microbiol Immunol* 1:49-55, 1986.
17. Slots J, Liu YB et al, Evaluating two methods for fingerprinting genomes of *Actinobacillus actinomycetemcomitans*. *Oral Microbiol Immunol* 8:337-43, 1993.
18. Chen C and Slots J, Clonal analysis of *Porphyromonas gingivalis* by the arbitrarily primed polymerase chain reaction. *Oral Microbiol Immunol* 9:99-103, 1994.
19. Asikainen S, Alauusua S and Kleemola-Kujala E, A two-year follow up on the clinical and microbiological conditions of the periodontium in teenagers. *J Clin Periodontol* 18:16-9, 1991.
20. van Winkelhoff AJ, Rams T and Slots J, Systemic antibiotic therapy in periodontics. *Periodontol* 2000 10:45-78, 1996.

Economics of Dental Practice Improve in the 1990s

BY H. BARRY WALDMAN, BA, DDS, MPH, PhD

ABSTRACT A review of Internal Revenue Service, Health Care Financing Administration, Bureau of the Census, and ADA reports for the mid 1990s confirms earlier projections that the economic trend in the practice of dentistry would be favorable.

AUTHOR

H. Barry Waldman, BA, DDS, MPH, PhD, is a professor of Dental Health Services at the State University of New York School of Dental Medicine.

From an overall perspective through the year 2000, the economic future of the (dental) profession appears to be far more positive than many might believe.¹

This was the conclusion of a presentation written in the early 1990s, based upon an analysis of development during the late 1980s affecting the dental profession, including a “slimming down” in the number of graduates from dental schools, the increasing size of the general population, and per capita expenditures for dental services at rates “well in excess of the amounts spent in (the) 1970(s).”¹

Information is now available from a series of federal agencies (including the Internal Revenue Service, the Bureau of the Census, and the Health Care Financing Administration) and

the American Dental Association that confirms these favorable projections through the mid 1990s. While the emphasis in the following review will be on the improving economics of dentistry, the significance of the general “leveling down” in the 1990s of the number of dental school graduates and graduates per population that began in the early 1980s should not be overlooked. For example, in 1980, there were 5,250 dental school graduates (23.1 graduates per million population), compared to 3,908 graduates (or 14.3 graduates per million population) in 1995 (**TABLE 1**).²⁻⁶

Overall National Health Expenditures

By the mid 1990s, almost \$1 trillion (\$988.5 billion) was expended for national health costs (\$957.8 billion for health

services and \$30.4 billion for research and construction). While health expenditures have continued to increase during the 1990s -- because of increases in the population, effects of inflation, and the use of expensive care modalities -- the rate of increase as measured by its share of the gross domestic produce (GDP) has slowed. In 1980, health expenditures represented 8.9 percent of the GDP, 12.1 percent in 1990, and between 13.4 and 13.6 percent in each year from 1992 to 1995. Managed care, in its many forms, has played a role in slowing the expenditure rates for health care services.³

National Dental Expenditures

Although dental service expenditures increased from \$31.6 billion in 1990 to \$45.8 billion in 1995, dental service spending represented a somewhat smaller share of national health expenditures in the 1990s than in the 1980s (approximately 4.5 percent in the 1990s, vs. approximately 5.6 percent in the 1980s) -- reflecting both limited changes in the extent of dental insurance coverage and increased spending

TABLE 1

Dental school graduates and graduates per million population in 1980, 1983, 1985, 1990, 1991, 1992, 1993, 1994, and 1995.²⁻⁶

Year	Number of Graduates	Graduates per million population
1980	5,256	23.1
1983	5,756*	24.5
1985	5,353	21.6
1990	4,233	17.0
1991	3,995	15.2
1992	3,918	15.4
1993	3,778	14.1
1994	3,875	14.3
1995	3,908	14.3

* Greatest number of graduates.

for other services. Increases in the proportionate share of health expenditures were reported for nursing home care, home health services, and services by other than physician and dentist health personnel. However, the annual rate of change in dental service expenditures increased in 1992, 1994, and 1995 at rates faster than expenditures for the overall category for personal health care costs, hospital care costs, physician costs, and health personnel costs other than those for physician and dentist health personnel.^{3,7}

Per Capita Dental Expenditures

From 1990 to 1995, per capita dental expenditures increased progressively from \$121.53 to \$167.77. However, in terms of constant dollars (i.e., removing the effects of inflation), there was a decrease in per capita expenditures (between the early 1980s and the immediate years after the 1990 recession) followed by a rebound during the mid 1990s -- but as yet not reaching per capita constant dollar levels reported for most of the 1980s (TABLE 2).^{3,7-11} Thus, compared to the 1980s, the

TABLE 2

Expenditures for dental services in 1970, 1982, 1987, 1990, 1991, 1993, and 1995.^{3,7-11}

	1970	1982	1987	1990	1991	1993	1995
National expenditures for dentistry (in billions)	\$4.7	\$19.5	\$27.1	\$31.6	\$33.3	\$39.2	\$45.8
Population (in millions)*	215.1	240.2	251.8	260.0	262.8	267.9	273.0
Current dollars per capita dental expenditures	\$21.85	\$81.18	\$107.63	\$121.53	\$126.77	\$146.32	\$167.77
Consumer Price Index for dental services** (1982 - 1984 = 100)	39.2	93.1	128.8	155.8	167.4	188.1	206.8
Constant dollar national dental expenditures (in billions)	\$11.9	\$20.9	\$21.0	\$20.3	\$19.8	\$20.8	\$22.1
Constant dollar per capita dental expenditures	\$55.74	\$87.99	\$83.56	\$78.00	\$75.75	\$77.79	\$81.12

* July 1 Social Security area population estimates.

** The dental component of the Consumer Price Index increased at a faster rate than the general CPI.

Between 1990 and 1995, the dental component approximately doubled the increasing rate of the general CPI.

TABLE 3

ADA Reports: Independent general and specialist primary practice mean net income in 1981, 1985, 1990, 1991, 1992, 1993, and 1994.^{12,13}

Year	Current Dollars		CPI 1982-84 = 100)	Constant Dollars	
	General Dentist	Specialist Dentist		General Dentist	Specialist Dentist
1981	\$53.0	\$77.5	90.9	\$58.3	\$85.2
1985	64.1	103.4	107.6	59.6	96.1
1990	88.5	142.9	130.7	67.7	109.3
1991	92.0	143.2	136.2	67.6	105.1
1992	98.1	153.4	140.3	69.9	109.3
1993	107.8	159.7	144.5	74.6	110.5
1994	117.6	177.6	148.2	79.4	119.8

Note: Dollars are in thousands

improving economics of dentistry during the 1990s (detailed below) reflects a combination of a continued slimming down in the growth of the numbers of practitioners, an increasing population size, and, to some extent, a rebounding of per capita expenditures for dental services.

Practitioner Income Reports

American Dental Association

The American Dental Association's annual Survey of Dental Practice provides a detailed picture of the evolving conditions of dental practice, including the economic situations of the many practice arrangements. For example, the results from the latest survey were reported in the ADA News, indicating that, "Average net income among U.S. independent dentists in 1994 topped \$127,000 – up 10.5 percent over the previous year."¹¹ Independent practitioners include sole proprietors or partners in incorporated or unincorporated practices.

Throughout the 1990s, ADA has reported annual increases in generalist and specialist practitioner incomes reaching \$117,600 in both areas in 1994. In terms of constant dollars, except for 1991 (the period immediately following the last recession), practitioner income has increased annually, far exceeding the

practitioner income during the 1980s (TABLE 3).^{12,13}

The increases in practitioner income occurred despite a slightly lower average number of people per private practicing dentist during the 1990s, as compared to the 1980s (TABLE 4).^{3,7,8,14} (Note: National survey data for the 1990s are not available for the proportion of the population with a dental visit in a year and the number of visits per year – critical information that would be needed to develop a comprehensive analysis of the evolving economics of practice.)

Internal Revenue Service

A somewhat underused approach to considering developments in practitioner income is the use of Internal Revenue Service annual reports on income tax collections. Realistically, creative accounting techniques may be used to limit income tax payments, but probably

no more frequently than individual practitioners tend to enhance their incomes at cocktail party discussions. However, reviewing IRS data over time, to some extent, may limit the effects of creative accounting in any particular year and provide an overview of the general changes in practitioner income.

With these limitations in mind, the following picture of improving dental economics was developed from IRS national income tax reports during the past 15 years.

- A continuing increase (from 1980 to 1994) in practice average gross business receipts reached almost \$226,000 for sole proprietors and \$229,000 per partner (TABLE 5).¹⁵⁻¹⁷ The ADA survey reported almost \$363,000 in gross receipts for independent practitioners in 1994.¹²
- During the 15-year period, sole proprietors reported that average net

TABLE 4

Population per private practicing dentist in 1982, 1987, 1991, and 1995.^{3,7,8,14}

	1982	1987	1991	1995
Population (in millions)	236.2	251.8	262.8	273.0
Private practitioners	116,208	126,357	138,094	141,396
Population per private practitioner	2,032	1,993	1,903	1,931

TABLE 5

IRS reports: current dollar dental practice tax return business receipts in 1980, 1985, 1990, and 1994.^{15-17*}

Year	Sole Proprietor		Partnerships		
	Number	Business receipts per tax return	Number	Number partners	Business receipts per partner
1980	82,265	\$85,768	3,609	8,722	87,657
1985	83,657	115,755	8,298	20,090	99,938
1990	100,526	155,811	5,898	14,963	121,297
1994	96,415	225,775	3,915	8,568	228,731

* Personal communication: IRS Statistics of Income (SOI) data gathering department, March 1997. Note: Since 1989, SOI published partnership tables do not list dental practices as a separate category.

TABLE 6

IRS Reports: current and constant dollar dental practice net income in 1980, 1985, 1990, and 1994.¹⁴⁻¹⁶

	Current dollar		CPI Index	Constant dollar	
1980	\$35,827	\$28,352	53.8	\$43,479	\$34,407
1985	39,549	37,095	82.4	36,755	34,474
1990	57,782	42,991	107.6	44,209	39,954
1994	84,238	63,709	148.2	56,840	42,988

balance the budget could result in placing “caps” or limits on tax-free deductions for fringe benefits. Such an effort could have a profound impact on dental insurance coverage (which currently accounts for approximately one-half of dental expenditures³).

The traditional primary emphasis on hospital and physician insurance coverage could overshadow concerns for dental insurance as employers and unions negotiate for reduced funds for fringe benefits in an era of taxes on formally tax-free benefits. We must keep these realities in mind as the budget debate heats up in the Congress.

But as of the mid 1990s, the changes that were made in restricting the production of dentists for a growing general population (together with a rebounding in per capita expenditures for dental services) have continued the favorable predicted trend in the economics of dental practice.

References

1. Waldman HB, What about dental economics for the 1990s? J Cal Dent Assoc 21(5):20-3, 1993.
2. Levit KR, Lazenby HC et al, National health expenditures, 1990. Health Care Financing Review 13:29-54, fall 1991.
3. Levit KR, Lazenby HC et al, National health expenditures, 1995. Health Care Financing Review 18:175-214, fall 1996.
4. Council on Dental Education, Trend Analysis: 1985/86; 1991/92 Annual Report on Dental Education. American Dental Association, Chicago, 1986; 1992.
5. Survey Center, Trend Analysis: 1994/95 Survey of Predoctoral Dental Education Institutions. American Dental Association, Chicago, 1995.
6. Survey Center, Academic Programs, Enrollment, and Graduates: 1995/96 Survey of Predoctoral Dental Education Institutions. American Dental Association, Chicago, 1996.
7. Gibson RM, Waldo DR et al, National health expenditures, 1982. Health Care Financing Review 5:1-31, fall 1983.
8. Waldo DR, Levit KR et al, National health expenditures, 1985. Health Care Financing Review 8:1-21, fall 1986.
9. Office of National Cost Estimate. National health expenditures, 1988. Health Care Financing Review 11:1-41, summer 1990.
10. Bureau of Economic and Behavioral Research. The Consumer Price Index and Dental Practice. American Dental Association, Chicago, 1992.

income (before taxes) increased from approximately \$36,000 to \$84,000. Per partner net income increased from approximately \$28,000 to \$64,000. (As noted above, the ADA reported a net income of more than \$127,000 for 1994.)

- In terms of constant dollars, sole proprietor and per partner net income increased at a rate faster than the rate of inflation (TABLE 6).¹⁴⁻¹⁶

The annual report by the Health Care Financing Administration (HCFA) provides a broad view of the evolving economic picture of the health care system. The combination of HCFA economic data and ADA reports on the number of private practicing dentists and professionally active dentists (which includes any dentist in a dental related occupation, e.g. research, administration, education) provides a confirming picture of improving economics of dental practice. By the mid 1990s, current and

constant dollar net income for private practice increased to levels above those for the 1980s (TABLE 7).^{2,3,7-12,14}

Overview

No dental practice is average, and gross receipt and net income data vary from location to location, with some practitioners experiencing difficulties as the economies of their communities do not keep pace with the national economy. Nevertheless, despite the wide range of income levels reported by different federal agencies (including the Internal Revenue Service) and the American Dental Association, the trend in each of the reports indicates that the projections at the end of the 1980s have been borne out -- the economics of the practice of dentistry have continued to improve in the mid 1990s.

But these figures should not inspire over confidence. Efforts in Washington to

TABLE 7

Dentist income based on national expenditures: 1982, 1987, 1991, 1995 ^{3,7-12,14}				
	1982	1987	1991	1995
Number of Dentists				
Private practitioners	116,208	126,3357	138,094	141,396
Professionally active dentists*	126,985	137,817	150,762	153,346
Nation expenditures for dentistry (in billions)	\$19.5	\$27.1	\$33.3	\$45.8
Expenditures per				
Private practitioner	\$167.8	\$214.5	\$241.1	\$323.9
Professionally active dentist	\$153.6	\$196.6	\$220.9	\$298.7
Net income as a percent of gross receipts**	40.9%	35.3%	33.2%	35.1%
Current dollar net income				
Private practitioners	\$68.6	\$75.7	\$80.1	\$113.6
Professionally active dentists	\$62.8	\$69.4	\$73.3	\$104.8
Consumer price index (1982-84=00)	96.5	113.6	136.2	152.4
Constant dollar net income				
Private practitioners	\$71.1	\$66.6	\$58.8	\$74.6
Professionally active dentists	\$65.1	\$61.1	\$53.8	\$68.8

Note: Expenditures per dentist and net income are in thousands.

* To a varying extent, some dentists employed in administrative positions, research and education provide dental services to patients. While expenditures and income calculations per private practitioners would be decreased by including these part-time practicing dentists (whose major income may be derived from nonpractice services), it does reinforce the general finding of a favorable trend in the income of dentists.

** Percentages are for all independent dentists.(13)

11. Department of Labor, Bureau of Labor Statistics. CPI Detailed Report Jan 1993-1996.

12. Dental income survey shows upswing. ADS News 27:23-4, March 18, 1996.

13. Bureau of Economic and Behavioral Research, The 1982; 1986; 1993 Survey of Dental Practice. American Dental Association, Chicago, 1983; 1986; 1994.

14. Distribution of dentists. ADS News 28:4, March 17, 1997.

15. Internal Revenue Service. Statistics of Income Source Book: Sole Proprietorship Returns, 1957-1984. Government Printing Office, Washington, DC, 1986.

16. Internal Revenue Service. Statistics of Income Source Book: Partnership Returns, 1957-1984. Government Printing Office, Washington, DC, 1985.

17. Sole proprietorship and partnership return information tables. SOI Bulletin, 6-16; summer, fall 1984-1996.

To request a printed copy of this article, please contact/H. Barry Waldman, BA, DDS, MPH, PhD, Department of General Dentistry, School of Dental Medicine, SUNY Stony Brook, NY 11794-8706.

Defending the Dental Office

Robert E.
Horseman, DDS

In an effort to stem the tide of violence so prevalent in our society today, there appears to be a movement to appeal to the bad guys directly instead of through their lawyers. I notice in my travels about town posted notices on some establishments stating "Bookkeeping materials only within," "The operator has only \$4.50 in change," "The manager does not have the combination to the safe. It is on a time lock that will not open until after the turn of the century."

Any perpetrator reading these discouraging messages will mutter "Dang!" then do his perpetrating elsewhere. At least that's the theory. A disappointed crook may well realize that crime is just too frustrating unless you're already rich and seek some other vocation such as CEO of a savings and loan association or a position in the government. On the other hand, those with short fuses may lay waste to the whole shebang; it's too difficult to call.

In planning for the future, which I understand lies ahead, it seems to me that dental offices need to do something more to beef up their security than to sterilize everything in sight. A notice posted on the reception room door advising would-be hit men that all we've got is 500 patient records with outstanding balances and if you want to take a crack at collect-

ing these accounts, good luck! is probably not going to suffice. If a belligerent person shows up at the window demanding something, standard procedure is to offer him an appointment next Thursday at 2:30 p.m. This gives him an opportunity to cool down; but experience has shown that your average crook is not going to take kindly to this ploy, nor will your offer to call 911 to see if he can be taken care of sooner elsewhere placate him. If there is a large caliber gun involved in this discussion, chances are the person confronting you is not a patient. He is either a perpetrator or a salesman.

It is a well-known fact in criminal circles that dental offices have more gold stashed within than can be found at Fort Knox. The explanation that although we have a lot of polyvinyl impression material and a ton of green die stone, we're fresh out of gold bullion, isn't going to be entirely acceptable. Offering him some nice zinc-free amalgam isn't going to wash either.

We used to collect a small amount of gold from patients who were undergoing extractions or replacement of old gold restorations. Economically hip patients nowadays demand even the dust generated from cutting out an old MOD inlay in a bicuspid. "Paid \$50 for that back in 1934," they state. "It's mine and I want it!" Right!

Now what am I going to do when an AK-47 is pointed at my bald spot and I haven't the baksheesh to buy him off? "Why don't you try my lab man?" seems kind of self-serving, but I haven't ruled it out.

I have rehearsed my reaction to this calamity many times, and the best plan I have come up with is to grab my handpiece and snarl in my best Clint Eastwood imitation, "I've got an SS White 557 and I know how to use it, punk!" In my fantasy, the crook is always convulsed with laughter; and although I am relieved to find he has a sense of humor, he doesn't seem to consider a sample of Fixodent and a new toothbrush as adequate compensation for his trouble. Little does he know that if I could just get him to stand still for three or four hours, I could irradiate him to a cinder with the deadly beams from my powerful dental X-ray.

I have thought that perhaps in addition to enrolling my staff in CPR classes, we should all take up karate or one of those other ritualistic Oriental martial arts disciplines where, after years and years of training, we will be able to bust cement blocks with our foreheads and render our hands useless for anything but preventing our watches from sliding off. This could come in handy if a crook ever breaks into our office and hides behind a cement wall or a pile of lumber.

An even better plan might be to get a really vicious dog to protect our interests. We briefly entertained a menu of Rottweilers, Dobermans and pit bulls but abandoned this option after a consideration of the inadequacies of our toilet facilities.

The really vicious animal I have in mind is the one about the size of a mature hamster, one that always rides on the lap of an elderly lady, both of them driving the big Lincoln. This dog has been groomed by somebody with a perverse sense of humor, wears a diamond-studded collar, has a pink bow between its ears and, as a result, has a massive inferiority complex. It hates everybody. That's the kind of dog that would give footpads and other unscrupulous persons second thoughts about walking off with our unexposed film and glove supplies.

Possibly the best protection of all could be afforded by hiring an unemployed teenager who has spent the past 10 years hanging around mall video arcades during which he has single-handedly annihilated tens of thousands of bad guys, many of whom were from galaxies you've never heard of. Maybe if we promised to keep him supplied with batteries for his Walkman, he could even be trained to take out the trash. Or answer the phone, even if it wasn't for him.