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The

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of the **AMERICAN COLLEGE of DENTISTS**





## **OBJECTIVES of the AMERICAN COLLEGE of DENTISTS**

The American College of Dentists in order to promote the highest ideals in health care, advance the standards and efficiency of dentistry, develop good human relations and understanding, and extend the benefits of dental health to the greatest number, declares and adopts the following principles and ideals as ways and means for the attainment of these goals.

(a) To urge the extension and improvement of measures for the control and prevention of oral disorders;

(b) To encourage qualified persons to consider a career in dentistry so that dental health services will be available to all and to urge broad preparation for such a career at all educational levels;

(c) To encourage graduate studies and continuing educational efforts by dentists and auxiliaries;

(d) To encourage, stimulate and promote research;

(e) To improve the public understanding and appreciation of oral health service and its importance to the optimum health of the patient;

(f) To encourage the free exchange of ideas and experiences in the interest of better service to the patient;

(g) To cooperate with other groups for the advancement of interprofessional relationships in the interest of the public;

(h) To make visible to professional persons the extent of their responsibilities to the community as well as to the field of health service and to urge the acceptance of them;

(i) To encourage individuals to further these objectives, and to recognize meritorious achievements and the potentials for contributions to dental science, art, education, literature, human relations or other areas which contribute to human welfare—by conferring Fellowship in the College on those persons properly selected for such honor.



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## William John Gies

The name of William John Gies is seen frequently in matters related to the profession of dentistry and particularly to the American College of Dentists. Why has this man received such unusual recognition and high honors from dentistry, especially since he was not a dentist.

Dr. Gies was one of dentistry's greatest benefactors and, because of that, he became an adopted member of the profession. Largely due to his early efforts, dentistry attained parity in education with medicine. As a scientist, educator, author, editor, lecturer and leader of professional societies, he advocated the highest professional ideals. He contributed tremendously to the advancement of dentistry and to the elevation of the profession in the public esteem.

He worked his way through college by tutoring others and chose teaching as his vocation, graduating from Yale in 1897 with a Ph.D. degree in Physiology. He was appointed to the medical teaching staff at Columbia University where he continued to serve for nearly forty years. As a researcher and author, he published volumes on biological chemistry and dental research subjects.

In 1916, Dr. Gies recommended the establishing of a dental school at Columbia University and was instrumental in its organization. In 1919, he founded the Journal of Dental Research and, the next year, founded the International Association of Dental Research (IADR). In 1923, he initiated and led the negotiations which combined four separate groups of dental educators into a new organization that has continued to function as the American



Keith P. Blair

Association of Dental Schools (AADS).

He became the Director for the Study of Dental Education sponsored by the Carnegie Foundation and, in 1930, produced the famous Carnegie Report on the survey of dental education that had been requested by the AADS. This work eventually led to much better standards in dental education and helped to place the control of dental literature in the hands of the profession.

He was the first editor for the Journal of Dental Research and continued in that position for nearly twenty years, frequently making up deficits from his own pocket until that Journal eventually became self supporting. At the same time, he also served for many years as the Secretary for the IADR, guiding it through its early years.

Mainly through his efforts, the American College of Dentists established the American Association of

## FROM THE EDITOR'S DESK

Dental Editors in 1931. In 1934, when the JOURNAL of the American College of Dentists introduced its first issue, Dr. Gies was the founding editor and continued to serve in that position for a five-year term.

To honor him, the Gies Foundation for the Advancement of Dentistry was organized in 1950. It continues to support ongoing projects in dental education, dental research and dental journalism. The American College of Dentists has established the Gies Award to recognize Fellows of the College whose truly outstanding contributions have warranted exceptional recognition.

From his earliest days, Dr. Gies preached that dentistry could reach its goals only on the broad front of education, research and journalism and that these three were interdependent on each other. Then he proceeded to work with dentistry for most of his life to accomplish these goals. It was his tremendous personal effort that helped dentistry develop into the status of a real profession during the 1920's and 1930's. His initiative, drive and unwavering commitment to principles has benefited the dental profession immensely and simply cannot be fully appreciated. What is mentioned here are only the brief highlights of his illustrious career.

He was a man who had a *CALLING*. Because he did, the world of dentists and their patients has been made far better. William John Gies richly deserves to be remembered and honored by dentistry. Δ

Keith P. Blair

# DENTAL INSURANCE:

## Its Variations And Relationship To The Use Of Dental Services

H. Barry Waldman\*

"In recent decades, dental insurance plans have been one of the fastest-growing items on the employee benefits scene."  
(1)

Between 1967 and 1985, the number of persons in the United States with dental coverage grew from 4.6 million to almost 100 million, largely because of the adoption of worksite-based group plans.<sup>2</sup> In 1986, 71 percent of all full-time employees in medium and large firms participated in dental plans financed wholly or partially by their employers—an increase of 25 percent from the proportion covered in 1980.<sup>1</sup> These plans provided a variety of services (with emphasis on preventive care), provider payment procedures and employee contribution mechanisms, all of which contributed significantly to patient dental visit patterns and the extent and type of provided services.

The following presentation will review the changing picture of dental insurance with emphasis on the 1980s and the anticipated developments during the next decade.

### Some background

Third party coverage of personal dental expenditures was initiated as a fringe benefit for employees of the Denver and Rio Grand Railways Company before the twentieth century. A summary of developments during this century have been divided into three periods:

1. between 1910 and 1945 as a period of isolated prepayment ideas;
2. 1946–1965 as a period of experimentation with various benefit plans; and
3. 1965 to 1976 as the major growth period of plans.

The slow growth of dental insurance plans until the second half of this century was due in part, "to the need to afford the average citizen some protection from hospital medical costs before focusing on dental care cost."<sup>3</sup>

### Expenditures for dental services

Between 1980 and 1987, current dollar expenditures for dental services in the United States more than doubled from \$15.4 billion to \$32.8 billion. In terms of constant dollars (i.e. removing the effects of inflation) there was an increase of 31 percent (from \$11.9 billion to \$15.5 billion). It is projected that constant dollar national dental ex-

pensures will increase by approximately one third by the year 2000 (Table I).

Dental expenditures per person increased from \$68.42 in 1980 to \$134.75 in 1987 (from \$52.71 to \$64.29 in constant dollars).<sup>5,6</sup> Based upon population projections through the end of the century, dental expenditures per person are projected to increase to \$334.38 (\$77.15 constant dollars) (Table I).<sup>\*\*</sup>

In 1987, direct out-of-pocket expenses for hospital and physician services represented respectively, 10.6 percent and 27.8 percent of the total annual expenditures.<sup>4</sup> By contrast, 60.9 percent of dental expenses were paid directly by patients. However, the share of payments for dental services paid directly by patients had decreased from 91.5 percent in 1970 and 72.7 percent in 1980 (Table II).

While the private insurance's share of dental expenditures increased from 23.4 percent to 37.1 percent during the 1980s, government program share of dental expenditures decreased from less than four percent to less than two percent. Based on projections through the year 2000, there will be minimal changes in government and private insurance share of dental expenditures (Table II).

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<sup>3</sup>Douglass and Day provide an extensive retrospective review and current status of costs and payments for dental services through the mid 1970s.<sup>3</sup>

<sup>\*\*</sup>For an extended discussion of dental economic predictions through the year 2000, see an earlier presentation by this writer in the Journal of the American College of Dentists.<sup>9</sup>



**Table I. Current and constant dollar national expenditures for dental services by source of payment and expenditures per person: selected years 1970-2000<sup>(4-8)</sup>**

Year	Total National Expenditures							Expenditures Per Person	
	Private		Public		Current Dollar Total	Dental Component CPI (1977=100)	Constant Dollar Total	Current Dollars	Constant Dollars
	Private Insurance	Direct Payment	Federal Gov't	State & Local					
(All total national dollar figures are in billions)									
1970	\$2	\$4.3	\$.1	\$.1	\$4.7	64.5	\$7.3		
1980	3.6	11.2	.3	.3	15.4	129.8	11.9	\$68.42	\$52.71
1986	9.9	19.1	.3	.3	29.6	198.5	14.9		
1987	12.2	20.0	.3	.3	32.8	209.6	15.6	134.75	64.29
Projected									
1990	14.2	26.8	.4	.4	41.8	248.5	16.8	167.42	67.37
1995	21.5	39.8	.5	.4	62.2	na	—		
2000	31.4	57.1	.6	.5	89.6	433.4	20.7	334.38	77.15

### Who has dental insurance coverage?

Between the late 1960s and 1984, there was a continuing annual increase in the number of people covered by dental insurance.\* Since 1984, there has been a slow down and decrease in dental insurance coverage (Table III). This decline resulted from a number of factors, including:

1. Employment declines in some industries, such as basic steel, which provided dental benefits.
2. Efforts to control health care costs caused some companies to reconsider expanding their benefit programs to include dental care.
3. Flexible benefit programs which enabled employees to switch insurance plans in favor of other benefits.<sup>1</sup>

By 1986, almost 40 percent of the civilian noninstitutionalized

population of the United States had some form of dental insurance. Forty-three percent of children between five and seventeen years of age had dental insurance. Almost one third of young adults (between 18 and 24 years) had insurance; and between 41 percent and 49 percent of the population between 25 and 54 years had insurance. There was a progressive decrease in dental insurance coverage through the various age cohorts after 54 years of age (Table IV).

There were differences by the various demographic characteristics in the extent of coverage. Males were more likely to have coverage than were females, particularly those age 45 and over. A larger proportion of whites than blacks had coverage, and non-Hispanics were more likely to be insured than Hispanics. A greater proportion of those living in the suburbs than those residing in the central city, or outside of Metropolitan Statistical Areas (MSA), had dental insurance

**Table II. Percent distribution of national expenditures for dental services by source of payment: selected years 1970-2000<sup>(4-7)</sup>**

Year	Private		Public		Total
	Private Insurance	Direct Payment	Federal Gov't	State & Local	
1970	4.3%	91.5%	2.1%	2.1%	100.0%
1980	23.4	72.7	1.9	1.9	99.9
1986	33.4	64.5	1.0	1.0	99.9
1987	37.1	60.9	0.9	0.9	99.8
Projected‡					
1990	33.9	64.1	1.0	1.0	100.2
1995	34.6	63.9	0.8	0.6	99.9
2000	35.0	63.7	0.7	0.6	100.0

‡ Projections for 1990 and beyond were developed prior to the availability of 1987 data. The original projects for 1987 were that 33.6 percent of expenditures would be paid by private insurance and 64.2 by direct payments. (4)

\*Any insurance plan specifically designed to pay all or part of the dental expenses of the insured individual, except oral surgery. This insurance can be either a group or an individual policy, with the premiums paid by the individual, the employer, a third party or a combination of these. Benefits can be received under the plan in the form of payment to the individual or to the dentist.<sup>10</sup>

**Table III. Number of persons with private dental insurance: selected years, 1967-1986<sup>(11)</sup>**

Year	Number (In millions)
1967	4.6
1970	11.9
1975	30.3
1980	79.4
1981	83.2
1982	93.1
1983	100.8
1984	102.1
1985	99.8
1986	94.9

coverage. The population living in the West had the highest rate of coverage and those living in the South had the lowest. Finally, there were greater rates of coverage with increased levels of education and increased family income (Table V).

### Use of dental services

As compared to the population without dental insurance, individuals with insurance coverage had 1) more visits per person, 2) a greater percent with a single dental visit and multiple dental visits in the past year, and 3) a greater percent with last visit for a check-up (Table VI). In addition, the dentate population had more than double the rate of insurance coverage as did the edentulous population (Table VII).

### Dental insurance for employees of medium and large firms

Data from the Bureau of Labor Statistics' 1980-86 surveys of full-time employees in medium and large firms provide specific information on developments in dental insurance coverage for a significant segment of the workforce and general population.<sup>1</sup> The 1986 survey studied a sample of 1,500 establishments which represented approximately 46,000 establishments employing 24 million workers. In

addition, 98 percent of the participants were in dental plans with provisions that covered all family members. The survey studied approximately 1,900 plans providing dental benefits. Five-eighths of the participants had dental coverage that was separate from their main health insurance plan. A majority of the participants in dental insurance plans in 1986 received coverage paid entirely by their employers.

Reflecting the changes in national dental insurance coverage, between 1980 and 1984, there were increases in the proportion of all workers with dental insurance coverage in medium and large firms. Similarly, there were decreases between 1984 and 1986. Throughout the 1980s, a greater proportion of professional administrative staff, had insurance coverage than did technical and clerical staff. In 1986, production employees had the smallest proportion of coverage (Table VIII).

Throughout the 1980s, nearly all dental plans covered a wide range of services, including examinations, restorative procedures and periodontal care. There was little change in the incidence of coverage of services except for an increase of orthodontic services (Table IX).

The dental plans paid for covered services in a variety of arrangements:

1. Full or partial payment of usual, customary and reasonable charges (UCR)—This is a rate that is not more than the dentist's usual charge; within the customary range of fees in the locality; and is reasonable, considering the circumstances.
2. Payment according to a schedule (list) of allowances. Unlike the UCR method, scheduled allowances do not change automatically as a re-

**Table IV. Percent distribution of persons 2 years of age and over by private dental insurance status: 1986<sup>(10)</sup>**

Age	Have private dental Insurance	Do not have private dental Insurance	Unknown
2-4 yrs.	37.8%	56.7%	5.5%
5-11 yrs.	42.9	53.0	4.1
12-17 yrs.	43.1	52.7	4.2
18-24 yrs.	32.3	59.0	8.7
25-34 yrs.	41.2	53.9	4.9
35-44 yrs.	49.0	46.5	4.5
45-54 yrs.	44.8	50.0	5.2
55-64 yrs.	35.3	59.0	5.7
65-74 yrs.	14.6	78.4	7.0
75+ yrs.	7.3	84.4	8.3
Total	37.8%	56.7%	5.5%



**Table V. Percent distribution of persons 2 years of age and over by various demographic characteristics and private dental insurance status: 1986<sup>(10)</sup>**

	Have private dental Insurance	Do not have private dental Insurance	Unknown
Sex			
Male	39.2%	55.2%	5.8%
Female	36.5	58.2	5.3
Race			
White	39.0	55.8	5.2
Black	29.1	64.0	6.9
Hispanic Origin			
Non-Hispanic	38.3	56.2	5.5
Hispanic	31.3	63.0	5.7
Mexican American	31.3	64.1	4.6
Other Hispanic	31.3	61.7	7.0
Place of residence			
MSA*	40.6	54.0	5.4
Central City	35.3	58.5	6.2
Not Central City	44.0	51.0	5.0
Non-MSA	28.7	65.8	5.5
Geographic Region			
Northeast	38.6	56.4	5.0
Midwest	41.7	52.7	5.6
South	30.8	62.7	6.5
West	44.3	51.8	3.9
Education Level			
Less than 9 yrs.	12.7	81.1	6.2
9-11 yrs.	24.7	69.4	5.9
12 yrs.	38.3	56.4	5.3
13 yrs. +	47.0	48.3	4.7
Family Income			
Less than \$10,000	9.4	85.6	5.0
\$10,000-\$19,999	24.9	70.0	5.1
\$20,000-\$34,999	46.3	49.6	4.1
\$35,000 +	59.3	37.2	3.5

\* Metropolitan Statistical Area

flection developments in community dental prices. On average, plan sponsors did revise schedules of allowances to reflect increases in the price of dental care.

3. Incentive payment—To encourage participants to seek preventive care, under this method of reimbursement, the percent of dental expenses paid by the plan increases each year if the participant is examined regularly by the dentist. Preventive procedures were more likely to be subject to incentive schedules than complex restorative and orthodontic procedures.
4. Copayment methods—The participant is responsible, generally for a set percent of costs. Incentive programs are a variation of copayment methods.
5. Deductibles—Participants are required to pay a specified amount of dental expenses before the plan pays any benefits.

UCR and schedule of allowance programs constitute the vast majority of all the dental insurance plans. A major share of examination and orthodontic services are covered under UCR programs (80 percent and 77 percent, respectively). Somewhat less of a share of fillings and crowns are covered under UCR programs (69 percent and 70 percent, respectively) (Table X).

There have been some major changes since 1980 in the financial arrangement for dental insurance coverage. There has been a marked shift from providing benefits through commercial insurance carriers to self-funded arrangements (by the employers). Commercial carriers provided benefits to half the participants in 1986; down from three quarters in 1980. Self funded plans more than doubled

**Table VI. Dental insurance status by dental visit pattern: 1986<sup>(10)</sup>**

	Insurance	No Insurance
Number of visits per person per year	2.6	1.7
Percent with 1 or more visits past year	70.1%	49.9%
Percent with 2 or more visits in past year	44.5%	27.8%
Last dental visit was for a check-up	48.0%	29.7%

**Table VII. Percent distribution of persons 34 years of age and over by dentition status and the availability of private dental insurance: 1986<sup>(10)</sup>**

Dentition Status	Have private dental Insurance	Do not have private dental Insurance	Unknown
Dentate	39.4%	55.9%	4.7%
Edentulous	18.5	74.3	7.2

**Table VIII. Percent of full-time health insurance participants with dental benefits in MEDIUM AND LARGE FIRMS: selected years 1980-1986<sup>(1)</sup>**

Year	All Participant	Professional and Administrative	Technical and Clerical	Production
1980	56%	60%	55%	56%
1982	68	76	68	64
1984	77	79	75	76
1986	71	75	72	68

**Table IX. Percent of plan participants in MEDIUM AND LARGE FIRMS by dental procedure: 1980, 1983, 1986<sup>(1)</sup>**

Procedure	Percent of plan participants		
	1980	1983	1986
Examinations	100%	99%	100%
Fillings	100	100	100
Crowns	97	99	98
Orthodontics	62	73	75

their share of participants during the same period (from one fifth to two fifth). Other arrangements, (Health Maintenance Organiza-

tion, Preferred Provider Organization and dental societies) increased their minor share of participants (Table XI).

Finally, there was a wide range of payments (for examinations, fillings and crowns) under schedule of allowance plans. As a result, in many instances, copayment expenditures are required by plan participants (Table XII).

### Overview

Despite the rapid expansion of dental insurance coverage during the last two decades, the reality is that by the late 1980s, dental care recipients continue to be responsible directly for 60 percent or more of dental costs—and minimal changes are anticipated in the decade of the 1990s. For many groups in the nation, dental care costs are "felt" far more than physician services. Nevertheless, per capita expenditures for dental services have continued to rise. And it is anticipated that this trend will continue through the next decade.

But in addition, there are the overall realities that:

1. unions and employees are attempting to increase health benefits,
2. employers are seeking methods to control the ever increasing costs of health care, and
3. the federal government is considering the balance between political expediencies and the need for added revenues from taxing fringe benefits.

As dentists attempt to deal with a seemingly never ending array of evolving dental insurance claim forms and third party oversight, (at times, uncertain whether dental insurance is a blessing or a curse) they must remain current with the evolving patterns of insurance. Only then can they take the

**Table X. Method of dental insurance reimbursement IN MEDIUM AND LARGE FIRMS by dental procedure: 1986 <sup>(1)</sup>**

Procedure	Percent of plan participants covered for procedure				
	Total	UCR	Schedule of cash Allowances	Incentive Schedule	Copayment Method
Examinations	100%	80%	17%	3%	< 0.5%
Fillings	100	69	27	3	1
Crowns	100	70	27	1	2
Orthodontics	100	77	20	—	3

**Table XI. Percent distribution of funding arrangements IN MEDIUM AND LARGE FIRMS for dental insurance: 1980, 1983, 1986 <sup>(1)</sup>**

Funding arrangement	Percent of plan participants		
	1980	1983	1986
Blue Cross-Blue Shield	5	5	6
Commercial Carrier	77	66	48
Self-funder	18	23	39
HMO and other	2	5	8
Total	100%	100%	100%

necessary steps to ensure the continuance of "dentist oriented" dental insurance. The profession must never lose sight of the reality that any reduction in employer contributions and/or taxation of fringe benefits could affect adversely the extent and range of dental insurance.  $\Delta$

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**Table XII. Percent of full-time participants in MEDIUM AND LARGE FIRM dental plans with schedule of allowances by maximum payable amounts for selected dental procedures: 1986 <sup>1</sup>**

	Percent
Examinations	
\$10 and under	2%
\$11-\$20	19
\$21-\$30	30
\$31-\$40	24
\$41-\$50	22
\$50+	1
Fillings	
\$10 and under	14%
\$11-\$15	36
\$16-20	42
\$21+	8
Crowns	
\$100 and under	6%
\$101-\$150	22
\$151-\$200	31
\$201+	40



# ADHESIVE BONDING OF COMPOSITES

R. L. Bowen\*  
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Since the introduction of composite restorative materials approximately 25 years ago, the conservation of tooth structure historically removed for retention form, resistance form, and extension for prevention, has been an incentive for much research to develop durable adhesive bonding.

The strength and durability of bonds to enamel have been adequate for numerous clinical procedures for many years. Even before the invention of dental composites, Dr. Michael Buonocore pioneered techniques for filling and sealing developmental pits and fissures with synthetic resins available at that time.<sup>1</sup> Regenos and other dental clinicians instituted the etching of enamel in and around cavity preparations and discovered that fractured incisors could be repaired and restored promptly and esthetically without preparing dentin for retention form.<sup>2,3</sup> Methods were also developed to use acid etching and resins to bond orthodontic brackets directly to teeth, a procedure with several advantages

Although the strength and durability of adhesive bonds to enamel have been adequate for numerous clinical procedures for many years, commercial products which demonstrate a range of effectiveness for adhesion to dentin are relatively new.

This paper discusses several of the more popular commercial dentin and enamel bonding systems, noting differences in their chemical components and instructions for use. Since simple technique errors can lead to failure, it is important that practitioners understand not just the sequence of protocol steps, but the function of each system component.

Dentists are encouraged to try dentin and enamel adhesives supported by research literature in refereed journals to determine which works best for them, and to provide feedback to dental manufacturers and researchers so that these materials and clinical techniques can be further improved.

by the National Institute of Dental Research, the National Institute of Standards and Technology, the universities, the American Dental Association, and other organizations.

A result of these contributions is, in a word, information. It is on this foundation of information that new and successful products and techniques are built. For example, the bonding of dental resins to etched enamel has changed from a simple micromechanical interpenetration of the resin with the roughened enamel surface, analogous to microscopic riveting, to adhesive bonding that combines mechanical interpenetration with specific chemical interactions, perhaps analogous to riveting plus welding. With the latter, bond strengths are nearly doubled.<sup>5</sup>

The more challenging and therefore more exciting problem of adhesive bonding of composite resins to dentin is being met. Products are now commercially available which demonstrate a range of effectiveness for adhesion to dentin. Some are effective with both dentin and enamel simultaneously; this makes the procedure much more convenient for the dentists as compared to the more difficult method of treating dentin and enamel as isolated surfaces when, in fact, they are intimately associated in most lesions.

Eventually there may be one "best" formulation, but currently there is no consensus on what that might be. The technology is evolving so rapidly that we can expect further improvements in the short

over the cementing of bands.<sup>4</sup> And the list goes on. It would be a very protracted review to cite all of the contributions of dedicated research scientists to adhesive bonding technology. Vast support for these endeavors has been provided

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term. One consequence of this rapid development is that longitudinal clinical studies of the various adhesion systems have not been completed. In most cases, they have barely begun. Most dentists do not wish to be the first by which the new is tried nor the last to lay the old aside. However, the practitioner must continually use professional judgment to draw the line between "experimenting" with new products, with concern that some may have had less than ideal research done before marketing, and failing to keep up with valuable advances in dental therapeutics.

Some products have directions for use that are inadequate in detail or contain terms that are sometimes subject to misinterpretation. For example, the word "rinse" to some dentists means for the patient to use a cup of water, and to other dentists indicates the use of a water syringe and a high volume aspirator. Using the latter technique in an adhesive bonding procedure, provided there is absolutely no contamination, can lead to successful results. The rinse with a cup of water would allow the organic solutes in saliva (that normally develop the salivary pellicle) or other impurities to adsorb onto the surface barring the effective attachment of adhesion-promoting ingredients.

Adhesive bonding materials are extremely sensitive to variations in technique. Success of restorations placed with these adhesives would seem to be as dependent on operator technique as on the compositions of the products. Therefore, both the clinical and market success of these products will depend upon the completeness of instructions and on how accurately these are followed by dental practitioners.

Probably no other area in dentistry requires continuing education more than that of adhesive bonding techniques for use with

composite resins. The larger dental meetings usually have at least one clinician or researcher lecturing on materials and methods for adhesive bonding of composites. Another source of information is the American Dental Association's Council on Dental Materials, Instruments, and Equipment; this source is available on the ADA toll-free WATS line, (800) 621-8099. Because of the continually growing interest in the subject, there is also an abundance of valuable information in refereed dental journals.

The following description of a few dentin and/or enamel bonding products is not intended to convey implications of relative merit, but rather to provide some understanding of the materials and methods. What might be most noteworthy is the fact that each of the systems described uses distinctly different formulations of chemical components to achieve the same purpose of bonding dental resins with physicochemical interactions to the hard tooth tissues.

One recent product is Scotchbond 2™ (3M Co., St. Paul, MN), a two-component dentin/enamel bonding system consisting of a dentin primer and a light-curing adhesive resin.\* The Dentin Primer is an aqueous solution of maleic acid and a hydrophilic methacrylate monomer (hydroxyethyl methacrylate, HEMA).

The clinical technique involves cavity preparation followed by etching of enamel (if present in the preparation), followed by water rinsing and air drying.

The entire preparation surface is

then bathed with the Dentin Primer for 60 seconds followed by air drying *without* rinsing. The acid component of the Dentin Primer functions to remove the dentin smear layer in a controlled manner. The manufacturer claims that the surface smear layer is removed while the smear plugs are left in the tubule openings, thus limiting penetration of acid or resins. The HEMA component of the Dentin Primer functions as a surface conditioner, one end of the molecule interacting with the hydrophilic tooth surface while the other end reacts with hydrophobic monomers.

The Light Cure Dentin Adhesive consists of HEMA, hydrophobic monomer BIS-GMA, a photoinitiator, and a viscosity modifier. A uniform coat of 75 to 100 microns thickness of Light Cure Dental Adhesive is placed with a brush and light cured for 20 seconds. Composite resin is then placed directly on the adhesive surface and cured. The Light Cure Dental Adhesive contains HEMA and BIS-GMA which copolymerize with the HEMA laid down by the Dentin Primer. This resin is light cured in a relatively thick (75–100 micron) layer *prior* to placement of the restorative material. Oxygen inhibited monomer on the adhesive surface copolymerizes with monomer in the restorative resin to complete the coupling of tooth surface to the restorative composite.

The original Scotchbond™ provided for strong adhesion of resin to etched enamel with relatively weak bonds to dentin. However, Light Cured Scotchbond™ was effective in retaining 97% of the incrementally-placed Silux™ restorations in Class V "dish-shaped" cavities for one year.<sup>6</sup> Scotchbond 2™ is claimed by the manufacturer to be a further improvement in the evolution of this product.

The GLUMA™ bonding system, developed by Drs. C. E. Munksgaard and Eric Asmussen, has been

\*Although certain commercial materials are identified in this paper, in no instance does such identification imply recommendation or endorsement by the National Institute of Standards and Technology or the American Dental Association Health Foundation or that the materials identified are necessarily the best available for the purpose discussed.



on the European market for several years and was recently introduced into the U.S. market by Columbus Dental (St. Louis, MO). The GLUMA™ 1 Etchant consists of a gel of phosphoric acid which is used to etch enamel for 20–30 seconds; the enamel is then washed and dried prior to treatment of dentin.

The GLUMA™ 2 Cleanser consists of a dilute solution of EDTA (a sodium salt of ethylenediaminetetra-acetic acid) which, according to the manufacturer's claims, removes the smear layer leaving smear plugs in the tubule openings to prevent penetration. It is applied for 30 seconds and then the surface is washed and dried.

GLUMA™ 3 Primer solution, containing 5% glutaraldehyde and 35% HEMA in water, is applied for 30 seconds and then blown dry to a thin layer *without* rinsing. The manufacturer claims glutaraldehyde interacts directly with the amine groups of dentin collagen forming groups that then bond chemically with the HEMA and adhesive resin.

GLUMA™ 4 Sealer is a bonding agent composed of a methacrylate monomer system which copolymerizes with the surface HEMA. The monomers in the restorative composite overlay this resin and all are polymerized simultaneously by light activation.

Tenure™ (Den-Mat Corp., Santa Maria, CA) utilizes an oxalate system similar to one developed in the ADA's Paffenbarger Research Center at the National Institute of Standards and Technology.† A second

generation product was introduced to simplify the original treatment protocol. The Tenure™ Dentin Conditioner uses a dentin-enamel etchant consisting of a dilute nitric acid solution with a small amount of aluminum oxalate. It is claimed that the acid removes the smear layer on dentin while leaving a precipitate of reaction products in the dentinal tubules. Enamel is etched simultaneously by the nitric acid in a pattern similar to etching with phosphoric acid.

The second generation Tenure™ bonding agent consists of two powders, A and B, which are mixed with a solvent, Tenure™ Liquid, prior to application. It is claimed that Powder A contains the acidic form of NTG-GMA plus a sodium salt of this surface active comonomer, which is capable of initiating the polymerization of the subsequently applied monomer. Powder B is PMDM, a monomer capable of interacting with the altered tooth surface while copolymerizing with other PMDM molecules and restorative resin monomers. The Tenure™ Liquid is an acetone-water solvent used to solubilize the powdered components for application.

According to the "two-minute" clinical protocol, after cavity preparation, Tenure™ Dentin Conditioner is applied to the enamel and dentin for 30 seconds, the surface washed with clean water for 30 seconds and completely dried with an air syringe. Powders A and B are dispensed into a small dish and mixed with three drops of Tenure™ Liquid. The dissolved mixture is then applied to the surface with a brush, the application repeated, and the surface allowed to dry by evaporation of the solvent. Composite or other resins can then be

applied directly to the surface and will copolymerize with the surface-bound PMDM.

A third generation product, Tenure Solution™, has now become available which appears to be similar, except that components A and B are now premixed solutions which are combined and applied as before.

Another new product based on Paffenbarger Research Center research is Mirage Bond™ dentin-enamel adhesive (Myron International, Inc., Kansas City, KS).‡ This material is being initially marketed as an adhesive applied to both dentin and enamel to bond ceramic restorations.

Part 1 of the adhesive is a solution of 2.5% nitric acid with 4% NPG (N-phenylglycine). The nitric acid serves to remove smear layer and simultaneously etch enamel while the NPG is a surface active dentin conditioner capable of initiating the polymerization of the subsequently applied monomer. This solution is applied to dentin and enamel for 60 seconds, the excess blown away, and the surface dried without rinsing.

Part 2 of the adhesive is a premixed 5% solution of PMDM, a hydrophilic monomer, dissolved in an acetone solvent. This solution is applied to the previously conditioned surface and the solvent allowed to evaporate prior to application of resin, composite, or resin based luting agent.

Although these various adhesive systems contain few common ingredients, some of the principles

†A nonexclusive domestic license of the applicable patents is currently in force between Den-Mat Corporation and the American Dental Association Health Foundation.

‡A nonexclusive domestic license of the applicable patents is currently in force between Myron International, Inc. and the American Dental Association Health Foundation.



utilized are the same. All contain an agent capable of removing a very thin surface layer from dentin and/or enamel. Adhesion to the "smear layer" can never give bond strengths that exceed the low cohesive strength or weak attachment of the smeared layer to the underlying dentin or enamel. Removal of weak surface layers is necessary to achieve the presently experienced higher values. All these adhesive systems contain functional compounds which can, at least theoretically, form chemical bonds to components of the tooth. And also, all of these systems contain monomers that are capable of copolymerizing with restorative resins.

Product component and procedural variations make it imperative, however, that the operator understand not just the treatment sequence but the function of each of the agents to achieve effective results. Rinsing after the application of Scotchbond 2™ Dentin Primer would remove the HEMA and eliminate adhesive interaction with subsequent resins. The same is true if water were applied after the application of GLUMA™ 3 Primer. Air thinning of the Scotchbond 2™ Light Cure Dental Adhesive to a thickness of less than 75 microns would cause excessive oxygen inhibition and prevent surface polymerization and subsequent adhesion. These are only a few examples of simple common technique errors which can lead to failure. Again, it should be clear in the operator's mind not just what to do in each step of the procedure but why each is performed.

In addition to the adhesion systems described above, there are several other dentin adhesion products which remain popular, including Prisma Universal Bond™

(Caulk, Milford, DE), Bondlite™ (Kerr, Romulus, MI), and Dentin Adhesit™ (Vivadent, Tonawanda, NY). These are unfilled resins with chemical additives that promote bonding to dentin and/or etched enamel. These adhesives are now primarily advocated for the protection of dentin during enamel etching.<sup>7</sup>

The protocols described for these materials demonstrate only the differences in application of the adhesive materials. Isolation, preparation, and pulpal protection must still follow the basics of good operative technique. Near perfect isolation is a necessity with these materials since any fluid contamination during application will severely compromise the results. If contamination should occur, each protocol should be repeated from the beginning without skipping over any of the steps. Until clinical effectiveness of these adhesives can be proven, preparation design should still contain basic resistance and retention form with adequate pulpal protection of very deep areas with the appropriate calcium hydroxide liners. The necessity of lining all dentin surfaces with calcium hydroxide or glass ionomer, however, should no longer pertain.

Ultimately, both the clinical and market success of adhesive products will depend on clinical results experienced by dental practitioners. To determine which performs best for them, dentists must be willing to use dentin and enamel adhesives for which there is supportive research literature in refereed journals. Then, feedback from dentists to dental manufacturers and researchers is critical for further improvement of the materials and clinical techniques.

The advancement of adhesive

bonding technology holds great promise for both preventive and restorative dentistry. Restorations placed without retention form could result in less drilling per filling, thus preserving more vital tooth tissue and lessening the need for anesthetics. Reduced treatment time is less fatiguing for dentists and more comfortable for patients. Broader applications of this technology are already being developed for tooth desensitization, bonded ceramic restorations and protective root coatings. Δ

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# THE PLACEBO EFFECT

## The Placebo Effect in the Management of Chronic Myofascial Pain: A Review

John W. Stockstill\*

The term "placebo" has been defined and used since 1811<sup>1</sup> to mean a medicine given more to please the patient than to benefit him. It has been frequently referred to as a pharmacologically inert substance that was administered to the patient to relieve his or her stress when the physician did not wish to use "actual" medication.<sup>2</sup> However, an "exact" placebo is one that mimics all the physical characteristics of the experimental substance or treatment, and may be considered to be active (noninert) or inactive (inert).<sup>3</sup> In terms of experimental analysis and observation, a placebo is "a tool to distinguish pharmacological effects of suggestion and to obtain an unbiased assessment of the results of the experiment."<sup>4</sup> By formal definition, the placebo can be classified as "an inactive substance or preparation, formally given to please or gratify the patient, now also used in controlled studies to determine the efficacy of a medical substance."<sup>5</sup>

Distinction should be made between the "placebo effect" and the "placebo response." The placebo effect refers to "that portion of the behavioral change which can be attributed to the symbolic transaction of being given medication, as contrasted with the behavioral

The placebo effect has, until recent times, been inauspiciously misinterpreted or neglected as a key variable in basic human clinical investigations. Its role in the healing response has been questioned and debated for centuries, but only within the last thirty years has it become a more clearly defined therapeutic phenomenon.

Of special interest to dentistry is the application of the placebo in clinical studies, especially those studies investigating the treatment of chronic myofascial pain. Specifically, the placebo effect has been incorporated as a standard in the design of many splint, pain management, and subjective pain response studies.

The intent of this literature review is to shed some light upon the placebo effect and its role in the investigation, immediate treatment, and extended management of chronic myofascial pain.

change due to mere passage of time, repeated testing, or other 'spontaneous' influences occurring while on placebo." Both terms are used interchangeably.<sup>3</sup>

Historically, before the onset of "modern" pharmaceutical involvement in medicine, many "medications" were, in fact, placebos in the

literal sense that the actual pharmacological and medicinal mechanism(s) of the drugs were largely unknown or misunderstood.<sup>3</sup> But the patient was "given" the substance (usually by a learned person such as a physician) and often got better as suggested, with the patient's expectations (following the suggestion) becoming their reality. Therefore, the history of medications in healing prior to modern experimental pharmacological and psychological techniques can be attributed in part to the placebo effect.

In a speech before The Royal Society of Medicine in 1953, J.H. Gaddum redefined the terms "dummy medication" (that which is intended to have no effect) and "placebo."<sup>4</sup> While the dummy tablet was given simply to "have no effect" and be neutral in its function, the placebo was recognized as being able to possibly cause psychological or physical changes through therapeutic suggestion and the strength of symbolism. What is interesting is that the two terms, "dummy" and "placebo," were used independently and while one was taken to mean "have no effect-dummy," the other was thought to be capable of producing at least some type of change, albeit a change of unpredictable nature. Eventually, the two terms were consolidated into the more commonly used "placebo." However, a question still remained as to the mechanism or interrelationship of the mental suggestion and the observable physical change.

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Another commonly accepted observation was the concept of placebo and physiologic effects. Prior to 1955, it seemed that most members of the medical community had some understanding of the role of the placebo in both clinical treatment and research. The placebo was expected to have no physiological effect as, for example, in pain relief. It was simply used to screen out those reacting to it in order to more clearly interpret laboratory or clinical results. The consolidation of the terms "dummy" and "placebo" into simply "placebo" by Beecher in 1955 actually ushered in the dual concepts of the psychological as well as physical changes that could be elicited in a patient. Also, the implication of psychological suggestion and its impact on physical changes were now being made and became a part of the new and growing "psychophysiological" school of thought.

A basic understanding of possible mechanisms of action of both pain systems and the placebo must be in hand before logical arguments and conclusions can be drawn concerning their interrelationship.

## PAIN

By definition, pain is "a more or less localized sensation of discomfort, distress, or agony, resulting from the stimulation of specialized nerve endings."<sup>5</sup> In addition, pain is a subjective experience involving sensory and emotional influences associated with actual or potential tissue damage. Perception of pain (nociception) is dependent upon definite physicochemical and neurologic modes of transmission as well as the psychological makeup of the individual. These psychological elements play a much greater part in chronic pain than in acute pain, which is predominantly viewed as being heavily influenced by the initial response to nociceptive stimuli.<sup>4,7</sup> Psychological factors such as conditioning, learned

pain behavior, past experiences, anxiety, and depression all play important roles in the perception and management of pain, especially chronic pain, where these determinants seem more critically involved.<sup>6-8</sup>

The mechanism of action of the placebo in the pain response may be explained as being a combination of neurophysiological and psychological factors. Explanations for its role(s) in nociceptive responses have included neurochemical reactions involving the release of endogenous opiates<sup>9</sup> as well as fluctuations in catecholamines<sup>10</sup> and steroid levels.<sup>11</sup>

Psychological involvement in the placebo effect has been examined in the doctor-patient relationship<sup>12,13</sup> and can be extremely dependent upon the psychological make-up of the individual<sup>14-16</sup> as well as the expectations of the patient.<sup>2,4,7,17</sup> Therefore, it seems quite appropriate to label the placebo effect in pain perception and response as being a combination of neurochemical and psychological factors, neither being independent of the other.

## STUDIES

The focus of much attention in dental research over the past twenty years has been on the psychophysiological factors involved in temporomandibular joint disorders (dysfunction) and chronic myofascial pain. Reports on TM disorder treatment have included the use of medications, surgery, or combinations of both,<sup>18-20</sup> as well as "no treatment" intervention such as mock equilibration.<sup>21</sup> Psychological management of chronic myofascial pain has been heavily documented and involves the techniques of counseling, hypnosis, biofeedback, and behavior modification.<sup>7,22,23</sup>

A factor common to all of these intervening techniques has been the introduction of the placebo as a form of comparison and as means

of ruling out nonintervention responses. Since chronic pain can be related to anxious or depressive states and since these states appear to be susceptible to placebo therapy,<sup>24,25</sup> it seems logical to experimentally test the effects of treatment modalities (both "real" and placebo) in terms of their independent effects as well as their interactions with each other. The following studies attempted to exercise this logic in terms of the chronic facial pain associated with TM disorders such as Myofascial Pain Dysfunction.

## I. MEPROBAMATE STUDY

Medication studies abound in the literature on pain control, and several seem particularly pertinent in the treatment of chronic myofascial pain. In 1971, Greene and Laskin studied the effects of Meprobamate, a combination tranquilizer/muscle relaxant, on MPD syndrome.<sup>26</sup> Ninety patients with MPD syndrome were randomly selected and were assigned to an initial "Meprobamate only" group or "placebo only" group. A four day supply of medication was dispensed in a double-blind manner. Patients were instructed to return on the fifth day at which time they either received the same medication or were "switched over" to the second group for another five day period. During the course of the study, the patients were asked to assess the intensity of eight subjective symptoms (such as masticatory muscle pain and joint pain) as well as three objective symptoms (clicking, crepitation, etc.) on a treatment evaluation form. To summarize results, 58% showed improvement using Meprobamate and 31% showed improvement taking the placebo. Subjective symptoms improved most frequently and objective symptoms seemed less affected by either drug. The possibility of the lingering effects of one drug on another were taken into account by the authors. No



attempt was made to classify patients as being acute or chronic myofascial pain patients.

## II. SPLINT STUDY

In addition to the use of medication, other treatment techniques have been investigated relative to myofascial pain and the placebo response. Greene and Laskin (1972) examined the efficacy of three different types of splints in the treatment of myofascial pain in a mixed group of acute and chronic pain patients.<sup>27</sup> The splint designs included full arch coverage, anterior coverage only (cuspid to cuspid), and a placebo splint covering only the palate with no extension over dental arches. Seventy-one patients with MPD symptoms (masticatory muscle pain, limitation, deviation on opening) were chosen for participation. Each patient was given the non-occluding splint to wear for 1–2 weeks. If the patients received relief with the placebo (non-occluding) splint, they were allowed to continue in the study or discontinue treatment (NOTE: 11 chose to discontinue). Those who reported no improvement moved on to the anterior platform splint. The full coverage splint was worn by those patients receiving little or no symptom relief with the first two splints.

Results indicate that 28 of 71 patients (40%) received some improvement of symptoms with the non-occluding placebo splint. Thirty of 60 patients (50%) improved with the anterior platform splint, and 35 of 44 patients (80%) showed improvement after wearing the full coverage splint. The design of this experiment resembles to some degree a triple-blind procedure where a preliminary

study with placebos is carried out, after which the placebo reactors are excluded for the remainder of the study. Even though the aim of this design attempts to exclude or reduce placebo effects, it is interesting to note that in most experimental settings, a placebo is effective between 30–66% of time, regardless of preventive measures taken.<sup>3,6</sup>

The authors' findings indicate that certain splint designs may be superior to others in terms of symptom relief. They also point out the potential psychological effects of a placebo in that 40% of the participants reported some improvement with a non-occluding splint. In other published studies, there seems to be a strong tendency for many MPD patients to respond positively to placebo therapies; that is, an improvement in subjective symptoms but little or no improvement in signs of the disorder.<sup>21,28</sup>

Several experimental issues seem open to question. No time period is given for "duration of symptoms" prior to testing. In fact, the test groups could be assumed to be mixtures of both acute and chronic myofascial pain patients. Sternbach (1978) and Turk (1983) have postulated that responses to acute and chronic pain are, in fact, quite different.<sup>7,8</sup> This difference in response to nociceptive stimuli could possibly be manifested in totally different responses to treatment, causing questions to be raised concerning "improvement" data. Regarding splint design, an argument could be made in defense of the non-occluding placebo splint. In an excellent review of intraoral appliance design and theory, Clark (1984) raised the issue of "cognitive awareness" with respect to any type of corrective device being worn by

the patient. The presence of any intraoral appliance may *constantly* remind the patient to alter usual or parafunctional behavior. This modification may decrease harmful or abnormal masticatory muscle activity exhibited at anytime of day or night, resulting in eventual pain reduction. Hypothetically, "learning to alter, reduce, or change a harmful behavior is a general theory that applies to most successful therapeutic interventions."<sup>29</sup>

## III. REVIEW OF STUDIES

A very thorough assessment of several studies over a period of 11 years involving standard reversible techniques and placebos in the treatment of MPD was reported by Greene and Laskin (1983). The main objective was to correlate the patients' long-term status to their initial treatment response. Treatment techniques included splints, biofeedback therapy, medication, mock equilibration, and placebos. All treatments were considered reversible and all treatments required some cooperation and active participation from the patients. Analyses of results indicated that at the end of treatment, 74% of 175 patients were greatly improved or symptom free, 25% showed little or no improvement, and 1% were actually worse. On the follow-up interview, 53% were symptom free and 37% reported occasional or minor symptoms. Furthermore, 8% said their condition was the same as before treatment, and 2% reported feeling worse. (NOTE: The authors combined "symptom free" and "minor symptoms" into one group having a 90% improvement.)<sup>30</sup>

No indication is given of how many patients reporting were in

the actual placebo groups. In order to draw logical conclusions on placebo effectiveness, it would be interesting to see what percentage of the total number responding were given placebo treatment, and might this placebo group make up the usual 33–66% of patients responding positively to a placebo.

An additional question to address in similar studies would be what percentage of patients "get better" or improve over time independent of treatment selected. The interaction of time coupled with psychological support (doctor-patient relationship) has been investigated to some degree but further investigation into "time" and the cyclic remission of pain should be undertaken.<sup>12</sup>

## PROBLEMS AND PITFALLS

The placebo, by definition, is inert chemically and its makeup renders it "unreactive." Beecher added that the strength of the placebo did not come from how much was given or how long it was taken, but came from the patients' mental expectations as well as the undetectable nature of the placebo by the observer or subject.<sup>4</sup> Frank attributes the strength of the placebo to this same "hope of relief" held by the patient and states that "symptom relief and improved function are intimately related to increased satisfaction and diminished frustration" brought on by intervention.<sup>2</sup> However, the problem arises when full disclosure of double-blind design is made to a participant. In other words, when a patient becomes aware of the nature of a double-blind study (medication vs. placebo, for example), he or she is in fact informed to some degree that "some of the patients

will get the real medication and others will get the control." This idea of "openness" or being honest does in fact suggest that the patient may or may not receive a control or placebo. To follow Beecher's line of reasoning, the unique ability of a placebo to be used to study the reaction or processing component of suffering seems to be a bit tainted in that the slightest suggestion of its possible use on a patient could modify that particular patient's eventual response and treatment outcome. Thus, in being candid and as straightforward as one can be with patients in an experimental setting, the strength of the placebo can be reduced or completely lost, dependent on the degree of information given and the mental acuity of the patient in "perceiving" change in a condition such as chronic myofascial pain.

In addition, significant differences in personality structure of the individual may be suggestive of their statistically falling within either placebo reactor or non-reactor groups. Aberrations in personality (depressive, anxious, or neurotic conditions) have been found to be strongly suggestive of how patients can be expected to react to placebos. For example, in the absence of verbal suggestion by the attending clinician, placebo responders tended to be those asymptomatic individuals previously diagnosed as being depressed and hypochondriacal. However, following strong verbal suggestion, the placebo responders tended to be those subjects previously classified as being more neurotic and hysterical.<sup>14</sup>

Social and emotional characteristics of patients may also play a role in response to placebos. For example, self-reliant, independent individuals were found to respond

more favorably to placebo intervention. Those subjects classified as leading lifestyles of reduced self-reliance and responsibility reacted unfavorably (nonresponder) to the prescribed placebo.<sup>15</sup>

## SIDE EFFECTS

Just as all drugs have "beneficial" aspects, placebos are no different in exhibiting side effects. These include nausea, itching, headache, and drowsiness. Several investigators, including Wolf, have recorded these side effects in similar studies and describe these "placebo reactions" as being "objective changes at the end organ which may exceed those attributable to potent pharmacological action."<sup>3</sup> Also, an interesting point is made by J.D. Frank in his text *Persuasion and Healing* (1961) concerning placebo side effects. He hypothesizes that, since some patients fear drugs and mistrust doctors, this pain and mistrust could be strong enough to cause severe physiological changes such as nausea, itching, and diarrhea.<sup>2</sup>

Although the pertinent psychological factors of fear and distrust must be included in explaining negative side effects, one area lacking in suggestive information is that of patient tolerance to the placebo itself. Since lactose seems to be the placebo of choice for human medication studies, there would seem to be a valid question regarding its use in lactose intolerant patients. These patients exhibit bloating, nausea, and diarrhea when exposed to moderate amounts of lactose.<sup>32</sup> Unfortunately, there seems to be little if any published information concerning the use of a lactose versus non-lactose placebo to account for possible lactose intolerance problems.



## CONCLUSION AND SUMMARY

The clinical effectiveness of placebo has been demonstrated in many experimental situations. The placebo may function in a physiological manner by stimulating or enhancing the release of endogenous opiates of the midbrain. Its psychological role in healing may be due to one or more of the following: the patient's expectations, cognitive awareness, doctor-patient relationship, or the suggestive nature of prescribed medication. The placebo seems to be most effective when the painful or stressful condition is most severe, and its potency seems to be greater when the pain complaints are acute rather than chronic.

To conclude, in terms of the placebo effect in pain patients, particularly chronic pain patients, "non-specific or placebo effects appear to be one of the most potent, but largely underrated therapeutic modalities available to every clinical situation."<sup>33</sup> △

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# Motivations for Treatment and Outcomes of Care

## The Relationship between Motivation for Seeking Dental Treatment and the Evaluation of Outcomes of Care

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Although considerable research has been conducted on factors influencing the use of dental services, the motivations of patients entering treatment remain poorly understood. Numerous studies have shown the importance of perceptions, demographic, economic, and access factors in predicting who will visit the dentist in a given year.<sup>1</sup> However, once people enter care, the importance of these factors diminishes and relatively little is known about those who complete care or how perceived need relates to satisfaction with treatment. Health care is an on-going process, and future utilization is likely to be dependent on satisfaction with past treatment. Therefore, there is a need to learn more about how dental conditions affect people in their everyday lives, the motivations people have for entering care, and how people evaluate the care they receive. Although many factors affecting dental utilization have been studied, few studies have examined the relationship between patients' motivations for seeking care and whether they evaluate the outcomes of treatment in terms of their previous expectations. A better understanding of this relationship could provide insights into improving dental treatment.

Several indicators of dental satisfaction have been developed as an outcome measure in patient evaluation of health care.<sup>2</sup> A large literature on patient satisfaction with

both medical and dental treatment suggests that satisfaction with care is a multidimensional concept.<sup>3,4,5</sup> Dimensions of dental satisfaction include technical quality of care, access, cost, pain and atmosphere. Studies of dental patient satisfaction show that both patient and general populations are satisfied with dental care and that age, education and income are significant factors in explaining satisfaction with care.<sup>3</sup> Although sociodemographic characteristics are important variables to consider, it may be more critical to dental care delivery to determine why people enter care and whether patients have realistic treatment goals.

Kiyak's study of orthognathic surgery is one of the few to examine motivations of patients entering care and to assess satisfaction with treatment longitudinally.<sup>6,7</sup> She found that patients' perceived problems with oral functioning were the primary motivation for seeking treatment, although perceived functional problems were not related to patient satisfaction 24 months after surgery. Satisfaction with surgery seemed to be related only to esthetics, in that patients who perceived improvements in esthetics generally rated satisfaction high, regardless of other functional problems. The results of this series of studies suggest that oral surgery patients use different criteria in evaluating the need for care as compared to the criteria in evaluating the outcomes of dental treatment.

This paper analyzes patients' motivations for entering more common dental treatment programs. We expect that patients' motivations for treatment and subsequent

evaluation of care will be sensitive to dental conditions and will differ from those of oral surgery patients. The main aims of the paper are to describe patient motivations and evaluations of care and to analyze the relationships among motives for treatment, patient satisfaction, evaluation of treatment outcomes and whether patients' treatment expectations were met. Because number of visits as an indicator of time spent in treatment could influence patient satisfaction, this variable is included as a control variable.

### Methods

#### Subjects

Patients were recruited from nine private dental practices in the Hartford, CT area and were invited to participate in a longitudinal study to assess how common but serious dental problems affect people in their everyday lives. Patients with temporomandibular joint dysfunction (TMJ), recurrent periodontitis and patients needing dentures were referred by their dentists and had to meet the selection criteria as follows. Patients had to be over the age of 18, English speaking, and have no other major systemic illness. For the TMJ category, patients had to have at least 20 teeth, pain on opening, clicking or popping on opening or tenderness of the masseter muscles. For the periodontal category, patients had to have at least 20 teeth and an average pocket depth of 5 millimeters. For the denture category, patients had to have loose or ill-fitting dentures or broken dentures in need of replacement. A group of dental patients being seen on recall was selected as well, as a compari-

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son group. For this group, the recall group, patients had to be returning for a 6 month check-up and prophylaxis visit and have no active dental disease.

### Sample Size

The sample was one of convenience in that the main objective of the study was to assess the feasibility of using quality of life indicators in a sample of dental patients with serious dental problems. As such, it is not a representative sample and the results should be viewed as suggestive rather than definitive. Since patients were referred from private dental practices, there is likely to be some bias from staff referral into the study as well as self-selection bias. Of the 242 patients referred into the study, 63% (152) of those asked to participate completed questionnaires at the time of their initial evaluation at the dental practice. At 6 months the sample consisted of 103 patients: 30 TMJ, 16 periodontal, 15 denture and 42 patients on recall. The attrition rate for the sample from initial evaluation to 6 months into treatment was 32.3%.

### Procedure

Patients completed mailed questionnaires prior to their initial visit to the dentist, at one month into treatment and at six months. The questionnaires collected data on sociodemographics, reasons for seeking treatment, total number of visits, improvement in functioning as a result of treatment, patient satisfaction, and whether or not expectations for treatment were met.

### Measures

**Motivations for Seeking Treatment:** This instrument was adapted from Kiyak's problems with oral functioning scale<sup>4</sup> which was used in her study of orthognathic surgery patients to assess why patients were seeking this treatment. It is composed of 16 items comprising 4 subscales related to function, esthetics, health and social reasons

for entering treatment. Patients rated the relative importance of seeking treatment for these reasons on a four-point scale from 1, not very important to 4, very important. Scores on the subscale items were summed and divided by the total number of items to obtain a subscale score which ranges from 1 to 4. The alpha reliability on this scale was .92.

**Patient Satisfaction:** The Davies-Ware Dental Satisfaction Questionnaire (DSQ)<sup>2</sup> was modified and used to assess general patient satisfaction on 5 dimensions: cost, access, pain, quality of care, and total access which consisted of cost, access and convenience. The questionnaire consists of 17 statements and participants rated their agreement with each statement on a five point scale, from 1 strongly agree to 5, strongly disagree. Scores on each of the items are summed to provide an overall score which ranges from 17 to 85. Alpha reliability on this scale was .86.

**Improvement as a Result of Treatment:** This scale was adapted from Kiyak's problems with oral functioning scale. This scale consisted of the same 16 items as the reasons for treatment scale and patients were asked to rate how much improvement they experienced in their condition from, 1 much better to 5, much worse. A score of 3 indicated no change in their condition. Scores on the subscale items were summed and divided by the total number of items to obtain a subscale score which ranges from 1 to 5. Alpha reliability on this scale was .98.

**Evaluation of Expectations of Treatment Being Met:** Assessment of whether patients' treatment expectations were met was based on one item on which patients were asked to rate on a scale of 1 to 10 how well their expectations about treatment were met, with 10 being met very well and 1 being not met at all.

**Dental Appointments:** Information on total number of appointments was gathered from patient self-reports on the questionnaires

mailed at one month and six months after the initial visit to the dentist.

### Data Analysis

Frequencies and mean scores were used to describe the sample. Analysis of variance (ANOVA) was conducted to determine the effect of dental condition and the covariates age, income and education on the outcome measures. Repeated measures analysis (MANOVA) was used to assess whether patterns of response about reasons and expectations differed by dental condition. Pearson product moment correlation analyzed the relationship between reasons for treatment and treatment outcomes.

## Results

### Descriptive Characteristics of the Sample

Table 1 presents a description of the sociodemographic characteristics and utilization rates of the participants at 6 months. The variables age, education and income appear to have a strong effect on condition. TMJ patients are mostly young, highly educated women who tend to be unmarried. Denture patients tend to be older, less well-educated men, considerably less affluent than the other groups. The periodontal group consists of an equal proportion of men and women who are more likely to be married and generally middle-aged. The recall group are the most affluent, are also well educated and over 75% are women. Most of the participants remaining in treatment 6 months after their initial evaluation at the dentist had dental insurance. Denture patients are the exception with only 21.4% having insurance. The final sample (n = 103) did not differ significantly on these variables from the sample at baseline (n = 152).

Patients in the study have a relatively high number of dental appointments compared to national statistics. The average number of dental visits per person in the



**Table 1. Descriptive characteristics of the sample by treatment group (n=103)**

Variables	TMJ (n=30)	Periodontal (n=16)	Denture (n=15)	Recall (n=42)
Mean Age	34.0	52.2	62.8	43.9
(s.d)	(13.4)	(9.3)	(10.7)	(14.6)
Family Income	\$24,500	\$27,000	\$14,500	\$30,500
(s.d)	(\$7,000)	(\$5,500)	(\$7,000)	(\$4,500)
% Employed	86.2%	87.5%	20%	76.2%
% Women	86.2%	50%	40%	78.6%
% Married	37.9%	87.5%	53.3%	66.7%
% Dental Insurance	69%	73.3%	21.4%	68.3%
Mean Years Education	14.8	13.8	11.4	14.3
(s.d)	(2.5)	(2.2)	(1.9)	(2.8)
Total Number of Appointments	6.2	6.0	5.9	2.6
(s.d)	(4.0)	(3.3)	(4.1)	(3.0)

United States in 1983 was 1.9 overall and for those having at least one dental appointment the average number was 3.4 visits.<sup>5</sup> The higher number of visits per patient in the study may indicate the greater treatment needs of our participants.

Patients in the treatment conditions do not differ significantly from each other on average number of visits. Recall patients have significantly fewer dental appointments than the treatment groups, but they still have a higher number than the national average.

Fig. 1 presents the mean scores of patients on reasons for entering treatment before entering treatment. It illustrates a profile approach used to analyze different response patterns on patients' reasons for entering treatment at baseline by condition.<sup>6</sup> The sample consists of those patients who remained in the study at 6 months. Again, the final and original samples do not differ in any systematic way on this variable or any subsequent variables under study.

For all groups general health concerns and fear of losing teeth are important considerations in seeking dental treatment. Esthetic and social reasons are somewhat to moderately important for all pa-

tients, as well. There is, however, a significant difference among the treatment groups in their rating of the importance of function as a reason for treatment. The denture and the TMJ patients score significantly higher than the recall group on the importance of functional problems as a reason for treatment (Scheffe test;  $F = 6.31$ ; 3df;  $p < .05$ ).

Figure 1 also demonstrates that the pattern of patient's reasons for seeking treatment vary by condition. Multivariate analysis of variance finds a significant condition by scale interaction ( $F = 4.00$ ; 9 df;  $p < .001$ ), indicating that patients' reasons for entering treatment vary according to dental condition. Periodontal and recall patients are characterized by remarkably similar profiles, although periodontal patients have somewhat higher scores. General health concerns are most important followed by esthetics, social concerns and function. This finding is surprising since the clinical oral health status of these patients are so different, and may be an indication that periodontal patients may not be aware of the clinical status of their dentition.

TMJ patients rate function as being most important which is most likely related to the relative severity of their functional symptoms, followed by general health concerns, esthetics and social considerations. Denture patients, again, rate function as most important but esthetics are also important to denture patients, as expected.

Figure 2 presents the mean scores on patients' perceived im-

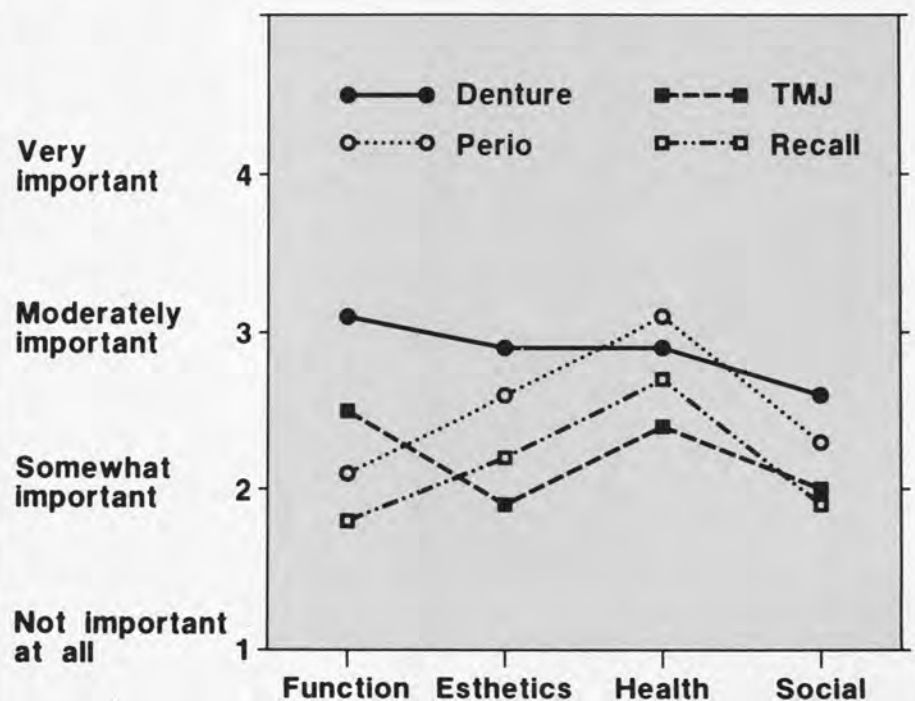


Figure 1. Mean scores on patients' reasons for treatment by condition.



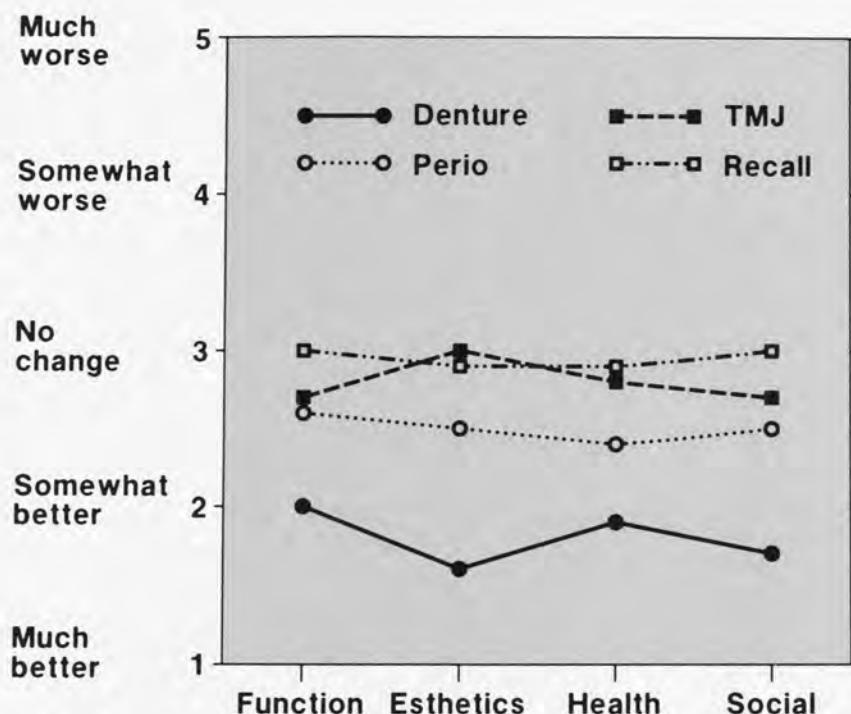


Figure 2. Mean scores on patients' perceived improvement in dental condition after 6 months of dental treatment.

provement in their condition at 6 months. The graph illustrates in a profile approach the differences in patients' perceived improvement in their conditions as a result of treatment. Denture patients perceive significantly more improvement in oral functioning on all dimensions as a result of treatment. They perceive the greatest improvement in esthetics, which was an important reason for entering treatment. Recall patients saw very little change in their conditions, as did TMJ patients and periodontal patients.

Multivariate analysis of variance found that, as with importance of reasons for treatment, patterns of perceived improvement in oral functioning as a result of treatment differed by condition ( $F = 2.57$ ; 9 df;  $p < .01$ ). Because of the differing nature of the symptoms and treatments associated with each condition, differences by condition would be expected. Recall patients exhibit a relatively flat curve. Since these patients have few or no symptoms, little change would be expected. The most dramatic change is seen in the denture group, with esthetics receiving the highest rat-

ing. Periodontal patients see the greatest improvement in general health concerns, which corresponds to their sense of importance of this dimension for entering treatment. Improvements in function, esthetics and social dimensions of scale are about the same. TMJ patients see very little change in their condition as a result of

treatment, despite the high number of visits these patients have made to their dentist.

Table 2 describes patients' satisfaction with care and whether their treatment expectations have been met. Similar to the findings of Davies and Ware, patients' mean scores on patient satisfaction are higher than the midpoint of the possible range of scores (midpoint = 51), suggesting that most respondents are satisfied with their care. This relatively high level of patient satisfaction is somewhat surprising given that most of the patients see relatively little improvement in their oral functioning as a result of treatment. Patient satisfaction appears to measure much more than clinical status as a result of treatment and may be more sensitive to the more subtle aspects of the process of care, such as doctor-patient interactions, appearance of the office, fees, etc. It also is evident that patients are generally satisfied with these other dimensions of care.

However, there are differences by condition in patients' satisfaction. TMJ patients are significantly less satisfied than the other patients with the dental treatment, as indicated by this scale.

TMJ patients also differ significantly from other patients on whether their treatment expecta-

**Table 2. Mean scores on patient satisfaction and whether treatment expectations were met after 6 months of dental treatment by treatment group**

	TMJ (n=30)	Periodontal (n=16)	Denture (n=15)	Recall (n=42)
Patient Satisfaction (s.d.)	55.4 <sup>1</sup> (6.4)	59.8 (6.0)	61.2 (10.3)	62.6 (7.5)
Expectations Met (1=not met/10=completely met) (s.d.)	4.9 <sup>2</sup> (3.0)	7.6 (2.3)	6.6 (3.4)	8.8 (7.5)

<sup>1</sup>significantly different from recall patients using one way analysis of variance, Scheffe test,  $p < .05$

<sup>2</sup>significantly different from periodontal and recall patients using one way analysis of variance, Scheffe test,  $p < .05$

tions were met. TMJ patients fell below the midpoint (on a scale of 1 to 10), showing that their expectations for treatment have not been met very well. This is a striking result in comparison to the scores of the other patients who score relatively high on having their treatment expectations met. Although not significantly different, recall patients score the highest on having their expectations met, as expected. Interestingly, although denture patients report the most improvement with their condition as a result of treatment, they score lower than the periodontal patients on having treatment expectations met.

Table 3 reports on the relationships among patient satisfaction, expectations met, patients' motivations for entering treatment and their evaluation of treatment outcomes. Four major points can be made about these outcome variables from the correlations. First, patient satisfaction is unrelated in any systematic way to either motivations for treatment or perceived improvement in clinical status. The only significant relationship between satisfaction and motivations for treatment is between satisfaction and the social subscale. Those who rate social functioning as more important as a reason for entering treatment tend to be less satisfied with dental care. This

finding further supports the notion that patient satisfaction goes beyond clinical health concerns and is more sensitive to the way in which care is provided. This aspect of care should receive more attention from dentists.

As expected, patient satisfaction is positively correlated with having treatment expectations met. That is, those whose expectations are met, are more satisfied with care. Patient satisfaction is also negatively related to number of appointments, indicating that those with fewer appointments are more satisfied. This result indicates patients' dissatisfaction with having treatment spread out over many visits.

Second, as with satisfaction, having treatment expectations met is not systematically related to either motivations or perceived improvement. Having expectations met is only significantly associated with the function subscale on motivations for treatment and improvement in condition. These significant negative correlations denote the importance of oral functioning in patients' treatment expectations. The lower patients rate function in importance for treatment, and the more improvement they see in this area, the more likely they are to have had their expectations about treatment met. These results are difficult to interpret, but suggest that when expectations are rela-

tively low it is more likely that expectations will be met. Further, because of the dentists' skills in treating the functional aspect or oral health status, expectations about function can be more easily met.

Third, the correlations among reasons for treatment and perceived improvement in treatment are significant. The consistent negative direction of the relationships indicates that the higher patients rate the importance of each dimension for seeking treatment, the more improvement they perceive on that dimension. However, the correlations are fairly modest suggesting that motivations for treatment are only of minor importance in the evaluation of treatment outcomes.

Finally, number of appointments is negatively associated with perceived improvement in condition. Patients with more visits perceive the most improvement in their condition. Therefore, although patients are less satisfied with having to visit the dentist more frequently, having more visits appears to be effective in improving the patients' perceived oral health status.

### Effects of Covariates

Sociodemographic variables such as age, income and education are differentially distributed among treatment groups and were

**Table 3. Pearson correlations among patients satisfaction, treatment expectations, importance of reasons for treatments and improvement in condition**

	2	3	4	5	6	7	8	9	10	11
1. Patient Satis.	.29	NS	NS	NS	-.19	NS	NS	NS	NS	-.28
2. Expections Met		-.23	NS	NS	NS	-.19	NS	NS	NS	NS
Importance of Reasons for Treatment										
3. Function			.58	.48	.62	-.25	-.22	-.18	-.28	NS
4. Esthetics				.73	.60	-.24	-.25	-.23	-.28	NS
5. Health					.68	-.27	-.22	-.29	-.27	NS
6. Social						-.30	-.26	-.28	-.34	NS
Improvement in Condition										
7. Function							.72	.79	.82	-.24
8. Esthetics								.85	.87	-.25
9. Health									.87	-.22
10. Social										-.24
11. Total Appointments										



not expected to independently affect motivations or the variables measuring outcomes of treatment. Analysis of variance was conducted to test this hypothesis by entering condition first and then determining whether sociodemographic factors had a significant effect on the dependent measure. Age does not have a significant effect on any of the measures independent of condition. When condition is entered first in the analysis of variance and education and income are entered as covariates, education has a significant independent effect on dental satisfaction, expectations, and health and social reasons for treatment. Those with higher education are more satisfied with care, are more likely to have their treatment expectations met and rate social and general health reasons as more important motivations for treatment.

Income does not have a significant independent effect on patient satisfaction, expectations or results of treatment independent of condition. However, income has a significant independent effect on health reasons for treatment. Those with higher incomes rate health reasons for seeking treatment more important than those with less income.

### Discussion

The aim of this paper was to explore the relationship between patients' motivation for entering dental treatment and patients' evaluation and satisfaction with treatment outcomes. The most significant finding of the study suggests that reasons for treatment and evaluation of results are sensitive to dental condition. Analysis of the data show that in this sample patterns of responses on patients' reasons for treatment, results of treatment, expectations and patient satisfaction vary by condition and that selected sociodemographic factors remain as an important independent influences on these outcomes.

### Reasons for treatment

For all patients, health concerns were an important motivation for

seeking dental treatment. The results of the study further show that many patients may not make distinctions between oral health and general health issues. In contrast to Kiyak's findings, problems with function were not the primary motivation for all patients seeking treatment. For the periodontal and recall groups, health reasons were the most important and function was the least important reason for seeking care. However, for the denture and TMJ groups, problems with oral functioning were the primary reason for seeking care, with health reasons following very closely. TMJ dysfunction and denture replacement and their treatment may more closely parallel the treatment needs of the oral surgery patients studied by Kiyak.

Given that reasons for entering care differed by group, it may be important for dentists to consider these differences when treating patients. It is especially interesting to note that periodontal and recall patients have similar response patterns to questions about their care seeking motivations. Perhaps dentists should stress the importance of health and esthetics when treating periodontal patients, especially the role of oral health in relation to general health.

### Improvement in conditions

As expected, there was a significant correspondence between patients' motives for treatment and their evaluation of the results of treatment. In general, patients who sought treatment for problems with oral functioning tended to see improvement in that area. Similarly patients who sought treatment for reasons of esthetics or health perceived improvement in those areas. The largest correlation between reasons and results was in the social interaction subscale indicating that dental diseases have a strong social component. However, despite their level of statistical significance, the magnitude of the correlations was fairly modest.

Similar to the findings of Kiyak, patient motivations for entering

treatment may not correspond to their evaluation of outcomes. Denture patients, for example, score high on function as a reason for treatment yet saw the greatest improvement in esthetics. TMJ patients, on the other hand, exhibit a pattern of responses characteristic of a chronic pain population, reporting little improvement in problems and being most disappointed in the results of treatment.

### Patient satisfaction

As expected, most patients are relatively satisfied with dental care and satisfaction is correlated with expectations being met and fewer dental appointments. This finding would suggest that dentists can improve satisfaction with care by scheduling the fewest possible appointments for treating a patient. Most noteworthy is the lack of a clear relationship between motivations, evaluations and satisfaction, indicating that satisfaction encompasses a much broader concept than the four dimensions of the scales studied.

### Conclusions

The results of the study should be viewed cautiously since the findings are suggestive and limited to a select sample of dental patients with serious dental problems. Although patient motivations for entering treatment were found to vary by condition, a common finding was that all patients in the sample were motivated by general health concerns. This has practical implications for dentists in stressing to their patients the importance of maintaining oral health. Future research should be aimed at learning more about patients' motives and expectations for treatment in relation to patient satisfaction and evaluation of the results of dental care.  $\Delta$

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# WHY NOT YOU IN THE FDI?

**Robert W. Elliott, Jr.\***

There is only one international dental organization that encompasses the total spectrum of our profession. That is the Federation Dentaire Internationale.

When we consider that there are over 150,000 dentists in the USA and about 500,000 worldwide you would think that there would be a great number of us who would be "Supporting members" of the FDI, especially when individual dues are only \$30.00 per year.

Surprisingly, there are less than 1,100 dentists in the USA who are members.

Well, you ask, why should I belong? That is a relevant question and one that deserves an answer—let me give you my thoughts.

This international body needs and merits our participation to show the world that we care about others than ourselves and more practically to assist the group financially as we benefit from its efforts.

As you know, the American College of Dentists accomplishes its goals through Commissions which supervise working groups. The FDI achieves its objectives in the identical fashion. It has four Commissions, each of which has four to eight working groups. These Commissions are: Dental Education and Practice, Research and Epidemiology, Dental Products, and Federal Den-

tal Services. The working groups consider an area of need or a special project and develop guidance for general use or for an individual nation, as requested. These reports are reviewed by the sponsor Commission and published as position papers. In countries with few resources, or not as advanced dentally as the United States of America, these reports are much in demand.

The FDI also participates with the World Health Organization (WHO) in joint working groups. This contributes to the recognition of dentistry in international health circles.

Specifically, FDI President Carlton Williams states, "The FDI/WHO joint working group's effort that is so consuming at the moment is the AIDS program headed by Dr. Jens Penboj of Copenhagen. This project will continue for at least one more year as a large number of countries are finding the material very helpful."

Dr. Jan Erik Ahlberg, Executive Director of the FDI states in a recent issue of the FDI NEWS, "Much of the work done by the FDI for the benefit of the individual dentist is assimilated in 'end products' which bear no mark of the FDI contributions. A good example is standardization of dental materials. Probably only a very small proportion of practicing dentists know that behind the ISO standard for every material they use, the FDI has been heavily involved in its preparation." We must remember, too, that the fantastic revolution in Oral and Maxillofacial surgery

## ACD Reception At FDI MEETING

The European Section of the American College of Dentists is holding a "No Host" reception during the FDI Meeting in Amsterdam on Wednesday, September 6, 1989 at Mid-day in the Garden Hotel. ACD Fellows and their spouses are cordially invited. Those wishing to attend should forward \$15.00 per person, by check, made out to Derrick-ACD Account as soon as possible. Send to the Section Secretary, Dr. Donald Derrick, 140 Park Lane, Suite 21, London W1, England.

was fathered in Switzerland and England, and Branemark of Sweden has shown us the way in implants while the early interest in periodontics came from European exiles such as Gottlieb, Orban and Wienman.

Additionally, the FDI NEWS, published six times a year, will keep you posted on what is happening in our profession worldwide.

So you see, the FDI provides an indispensable, international forum for our profession. The FDI needs your support—for \$30.00, tax deductible, you can become a Supporting Member—why not send your check today to FDI, USA Section, 211 East Chicago Avenue, Chicago, IL 60611?

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\*Robert W. Elliott, Jr., ACD Immediate Past President.

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# NEWS OF FELLOWS

**Wesley J. Dunn**, the founding Dean of the Faculty of Dentistry of the University of Western Ontario, was recently elected the 50th President of the Royal College of Dental Surgeons of Ontario which is the 121 year old governing body of dentistry in Ontario. Dr. Dunn practiced in Toronto until 1955, when he was appointed Registrar of the Faculty of Dentistry at the University of Toronto, a position he held until his appointment as Dean of Dentistry at the University of Western Ontario in 1965. Dr. Dunn has served as the Editor of the *Journal of the Canadian Dental Association* and as Chairman of the Council on Education of the Canadian Dental Association. He has also served as President of the American Association of Dental Editors, President of the Association of Canadian Faculty's of Dentistry and Organizing Secretary of the Canadian Society of Dentistry for Children.



Wesley J. Dunn

**Robert F. Streelman** of Wyoming, Michigan, recently received the 1989 Distinguished Service Award of the West Michigan District Dental Society. Active in his community and church, Dr. Streelman has served as President of the West Michigan Dental Society and is currently the President of the West Michigan Dental Foundation.



Robert F. Streelman

**Gordon H. Rovelstad**, the Executive Director of the American College of Dentists, was the recipient of the American Society of Dentistry for Children's 1988 Award of Excellence for his significant contributions to the advancement of the dental health of children. Dr. Rovelstad received his D.D.S., M.S.D. and Ph.D. degrees from Northwestern University and practiced pedodontics in Elgin and in Chicago from 1948-1953 and in Jackson, Mississippi from 1974-1981. Dr. Rovelstad served with distinction in the United States Navy Dental Corps and received the Meritorious Service Medal in 1969 and the Legion of Merit Award in 1972. His extensive research in salivary gland physiology, dental caries etiology and epidemiology and in oral biology, resulted in a substantial number of

scientific articles and presentations.

Dr. Rovelstad has also held many academic appointments at various universities. He served as the Chairman of the Department of Pediatric Dentistry from 1975-1976 and as Assistant Dean, Educational Programs from 1976-1981 at the University of Mississippi. Dr. Rovelstad is a Diplomate of the American Board of Pedodontics and has served as a member of the Examining Board and as the President of the American Board of Pedodontics. He has also served as the President of the American Academy of Pedodontics, as well as the President of the International Association for Dental Research and the American College of Dentists. Dr. Rovelstad has served as Executive Director of the American College of Dentists since 1981.



ACD Executive Director, Gordon H. Rovelstad, center, received the American Society of Dentistry for Children's Award of Excellence during the Spring Meeting of the ACD Board of Regents. The Award was presented by ACD Regent Prem S. Sharma, right, who is also the Immediate Past President of the American Society of Dentistry for Children. ACD President James A. Harrell, Sr., is pictured at left.

**Harald Løe**, Director of the National Institute of Dental Research, was recently the recipient of the Surgeon General's Exemplary Service Award which is given to civil service employees of the Public Health Service who have "exemplified the highest leadership and commitment to meeting the initiatives of the office of the Surgeon General and to the mission of the PHS." Dr. Løe was also recently honored by the Swedish Dental Society with the presentation of its international prize of 100,000 Swedish kronor. Dr. Løe received the award during ceremonies in Stockholm in connection with the 25th anniversary of the Swedish National Dental Research meeting. The award has been established to highlight the importance of dental research, its international scope and its continuing development.

A native of Norway, Dr. Løe received his Doctor of Dental Surgery and Doctor of Odontology degrees from the University of Oslo. Prior



Dr. Løe, on the left, seen receiving his award from Surgeon General C. Everett Koop.

to his appointment as NIDR Director, he served as Dean of the University of Connecticut School of Dental Medicine. Dr. Løe has received a total of 9 honorary degrees from universities in 5 countries. In addition, he has received numerous awards, including the Alpha

Omega Achievement Medal Award, the Alfred C. Fons medal of Outstanding Achievement in the interest of humanity from the Connecticut State Dental Association and the International Association for Dental Research award for basic research in periodontology.

**Erbert W. D'Anton**, Professor and Chairman of the Department of Oral Biomaterials at the University of Texas, Dental Branch, at Houston, will retire shortly from his academic position. Dr. D'Anton received his D.D.S. degree from St. Louis University Dental School in 1946 and joined the faculty of the University of Texas, Dental Branch, at Houston in 1948. He was appointed Chairman of the Department of Oral Biomaterials in 1956. Dr. D'Anton is a member of several professional organizations and has served as the Vice President of the Supreme Chapter of Omicron Kappa Upsilon. He has also served on the Editorial Staff of the Houston District Dental Society and was a Test Construction Committee member of the National Board of Dental Examiners.



Allen M. Ito

**Allen M. Ito** of Honolulu was recently honored by the Hawaii Dental Association by being presented the Association's Distinguished Service Award. Dr. Ito was recognized for his extensive service to the dental profession and for being a role model as an outstanding member of the profession. Dr. Ito has served for many years as the Chairman of the Library Committee and co-Chairman of the Table Clinic Committee of the Hawaii Dental Association. His untiring efforts in promoting continuing education programs have been of immense value to his fellow practitioners in Hawaii. Dr. Ito also founded "Operation Book Shelf" as a project of the Hawaii Section and has been responsible for collecting dental books and literature from members of the profession and shipping them to dental schools in the Pacific Basin countries.



Erbert W. D'Anton



**Lloyd E. Church** of Bethesda, Maryland, was presented an embroidered judo uniform at the annual meeting of the American Academy of the History of Dentistry during the American Dental Association's annual session in Washington, D.C. The judo uniform, a gift from Dr. Norinaga Moriyama, of Tokyo, Japan, was in appreciation of the extensive help provided by Dr. Church to the Tokyo Dental College and also to replace the judo uniform that Dr. Church lost during his trip from Tokyo to Washington, D.C. in 1948.

Dr. Church received his D.D.S. degree in 1944 from the University of Maryland. A man of many talents, he helped pay for his dental education by playing cornet in a local jazz band, by being a member of a survey crew for the West Virginia State Road Commission and by serving as a member of the Pinkerton Detective Agency. In 1946, he enlisted in the U.S. Army Dental Corps and was assigned to the 361st Station Hospital in Tokyo, Japan. He served as a dental member of the special security medical team at Sugamo Prison during the war trials and provided dental services for the prisoners and military personnel at the prison. While serving in Japan, he heard that the Tokyo Dental College had lost all of its dental equipment and supplies and proceeded to assist them in refurbishing their clinics. A nearby judo school heard about Dr. Church's help to the Den-

tal College and offered to give judo lessons to him. The offer was accepted and before leaving Japan, Dr. Church earned the prestigious black belt in judo.

Following an honorable discharge from the military in 1948, Dr. Church was on his way back to Washington, D.C. when he lost his prized judo uniform. Dr. Moriyama, a graduate of the Tokyo Dental College, brought and presented the new judo uniform to Dr. Church in appreciation of the help that Dr. Church had given to his college and to replace the one that was lost 40 years earlier.

Following his return to Washington, D.C., Dr. Church went into private practice and received an M.S. degree in 1951 and the Ph.D. degree in 1959 from the University of West Virginia. He served on the faculty of the dental and medical school of the Medical College of Virginia and of the George Washington University School of Medicine. In addition, he was affiliated with the Armed Forces Institute of Pathology and served as a senior research scientist at the National Biomedical Research Foundation, as well as a member of the University of Maryland School of Medicine. He conducted extensive research in a variety of areas and was also very active in several professional and community organizations. Dr. Church currently serves as the Book Review Editor of the *Bulletin of the History of Dentistry*.



Norinaga Moriyama of Tokyo on the right, seen presenting an embroidered judo uniform to Dr. Church at the annual meeting of the American Academy of the History of Dentistry in Washington, D.C.

**Anthony M. Schiano** was honored by the Palisades General Hospital in North Bergen, New Jersey for his many years of outstanding and dedicated service to the dental staff. Dr. Schiano is a former Chief of the Oral and Maxillofacial Surgery Section, Department of Surgery, and former Chairman of the Board of the Palisades General Hospital Association. He is a Diplomate of the American Board of Oral and Maxillofacial Surgery and has served as a president of the Hudson County Dental Society.



Anthony M. Schiano on the left, was presented an engraved plaque by another Fellow of the College, Harvey Salb.

**Ralph S. Kaslick** was recently appointed Director of the Department of Dentistry at the Goldwater Memorial Hospital on Roosevelt Island, New York. Dr. Kaslick will also serve as Clinical Professor of Periodontics at NYU College of Dentistry. He served as Assistant Dean, Academic Affairs at Fairleigh Dickinson University, College of Dental Medicine and then as Dean from 1976-1987. Dr. Kaslick also served as the Acting Provost from 1983 to 1985.



Ralph S. Kaslick

Ray Victor Smith was presented with a medallion and citation at the Colorado Section's annual meeting in recognition of 50 years as a Fellow of the American College of Dentists. James H. McLeran, Dean of the University of Iowa College of Dentistry, and associate Iowa Dean John C. Montgomery were also at the meeting to recognize Dr. Smith's 53 years of full-time teaching. Dr. Smith graduated from the College of Dentistry, University of Iowa, in 1914 and following two years of general practice, joined the faculty of dentistry at Iowa. Starting as a demonstrator in Crown and Bridge, over a period of 7 years, he rose to the rank of Professor and Head of the Department of Crown and Bridge. He retired from this position in 1959, but continued to teach part-time at the University of Iowa in the Oral Hygiene Department until 1969.

Dr. Smith served as the Chairman of the Dental Aptitude Testing Committee of the American Association of Dental Schools from 1932 until his retirement in 1959 and was a consultant to the Council on Dental Education of the American Dental Association and the Veterans Administration.

Raymond J. Fonseca, Professor and Chairman of Oral Medicine, Pathology and Surgery at the University of Michigan School of Dentistry, has been appointed Dean of the University of Pennsylvania School of Dental Medicine, effective July 1. Dr. Fonseca received his D.M.D. degree from the University of Connecticut School of Dental Medicine and completed his oral surgery residency at Parkland Memorial Hospital in Dallas, Texas. He is the Vice President of the Society of Editors in Oral and Maxillofacial Surgery and an examiner for the American Board of Oral and Maxillofacial Surgery. He is also a Section Editor for the Journal of Adult Orthodontic and Orthognatic Surgery, as well as a Section Editor of the Journal of Oral and Maxillofacial Surgery.



Ray Victor Smith, center, was honored for 50 years of Fellowship in the College at the Colorado Section Meeting. Also pictured is ACD Regent Thomas W. Slack, left, who presented the ACD Citation, and Colorado Section Chairman David H. Werking.



Edgar C. Hatcher, Jr.

Edgar C. Hatcher, Jr. of Bristol, Tennessee, recently received an honorary degree of Doctor of Science from Nan Nam University, Taejon, Republic of Korea. Dr. Hatcher was recognized for his contribution to dentistry and higher education both in the United States and in other parts of the world.

Dr. Hatcher is the Editor Emeritus of the Journal of the Tennessee Dental Association and received the William J. Gies Editorial Award in 1985 for excellence in dental journalism. He was also the recipient of the 1986 Golden Pen Award, presented by the International College of Dentists. Dr. Hatcher addressed the commencement ceremonies of the Han Nam University in Korea before receiving his honorary degree.



Raymond J. Fonseca



## SECTION ACTIVITIES

### Carolinas

The Carolinas Section held its annual meeting at the Omni Hotel in Charleston, South Carolina, February 3-5. The meeting, attended by 43 Fellows and their guests, consisted of a scientific program, business meeting and social activities. The Section voted to make a pledge of \$1,000 to the "Campaign for the 90's" to be paid over a five-year period. Dr. Fitzhugh N. Hamrick was recognized at the meeting and presented with a certificate of appreciation for his outstanding service to the dental profession. New officers were elected as follows: Chairman, John B. Sowter; Vice Chairman, William R. Chapman and Secretary/Treasurer, Dudley C. Chandler, Jr.



Photographed at the Carolinas Section meeting are, from the left: Howard W. Higgins; William R. Chapman, John B. Sowter, Dudley C. Chandler, Jr., James H. Gaines; James A. Harrell, Sr., President of ACD and Chris C. Scures, Regent, Regency 3.



Howard W. Higgins, on the left, seen presenting a certificate of appreciation for outstanding service to the dental profession to Fitzhugh N. Hamrick.

### Maryland

Seventy Fellows attended the annual business meeting of the Maryland Section recently at the Maryland University Club to conduct the Section's official business. The meeting was presided over by John F. Hasler, Section Chairman and, following reports by several committees, the following officers were installed: Chairman, J. Richard Crouse; Vice Chairman, Don N. Brotman; Secretary, W. Michael Kenney; Treasurer, Frank Romeo and Editor, Harry W. Dressel, Jr.



Photographed at the Maryland Section's annual business meeting are, from the left: Past Regent, Joseph P. Cappuccio; Ruth S. Friedman, Regent, Regency 2; J. Richard Crouse; W. Michael Kenney and John F. Hasler.



## Hawaii

Fellows of the Hawaiian Section are actively participating in making arrangements for the 1989 Annual Meeting of the College which will be held at the Ilikai Hotel in Waikiki, on November 3. James A. Harrell, Sr., President of the College, and Mae Hom of the national office staff attended the Hawaii Section's meeting recently to finalize plans for the annual meeting and convocation. All Fellows attending the Honolulu meeting are in for a very special treat, as a superb, informative and entertaining program has been arranged which will also emphasize the uniqueness of Hawaii. The current officers of the Hawaii Section are: Chairman, Kanemi Kanazawa; Vice Chairman, John M. Fujioka; and Secretary/Treasurer, Harry H. Morikawa.



Victor J. Niiranen, left, retired Navy Captain, is pictured with ACD President James A. Harrell, Sr. during the Hawaii Section Meeting. Dr. Niiranen has been very active in the Hawaii Section, was instrumental with the shipment of books and periodicals to dental libraries in the Far East and is also an accomplished artist. He is currently the President of the National Society of Arts and Letters.

## St. Louis

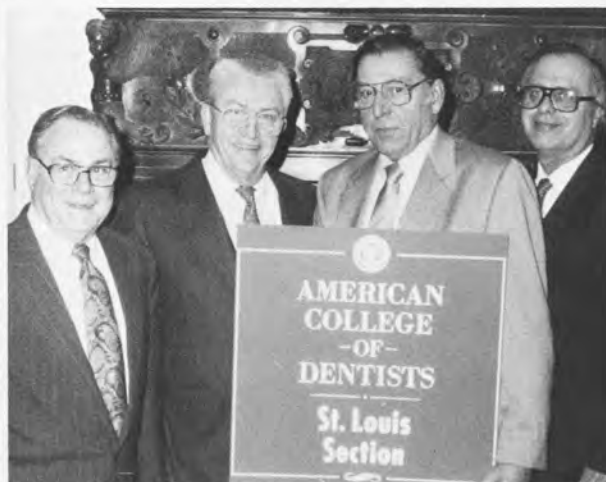
The St. Louis Section held its annual meeting recently in Brentwood, Missouri and elected the following officers: Eugene J. McCabe, Chairman; Richard W. Brand, Chairman-Elect; and Joseph M. Grana, Secretary/Treasurer.



Photographed at the meeting of the Hawaii Section are from the left: Lewis S. Earle, ADA 5th District Trustee; James A. Harrell, Sr., President, ACD; Arthur A. Dugoni, President, ADA; and Kanemi Kanazawa, Chairman, Hawaii Section.



At the Hawaii Section Meeting are, from the left, Section Secretary-Treasurer Harry H. Morikawa, Section Chairman Kanemi Kanazawa, ACD Comptroller Mae Hom, Section Vice Chairman John M. Fujioka and ACD President James A. Harrell, Sr.



Photographed at the St. Louis Section meeting are, from the left: Chairman Eugene J. McCabe, Past Chairman Warren H. Speiser, Secretary-Treasurer Joseph M. Grana and Chairman Elect Richard W. Brand.

## STATEMENT OF OWNERSHIP AND CIRCULATION

THE JOURNAL OF THE AMERICAN COLLEGE OF DENTISTS is published quarterly by the American College of Dentists, Suite 352N, 7315 Wisconsin Avenue, Bethesda, Maryland 20814. Editor: Keith P. Blair, D.D.S., Managing Editor: Gordon H. Rovelstad, D.D.S.

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The Journal of the American College of Dentists is published quarterly in order to promote the highest ideals in health care, advance the standards and efficiency of dentistry, develop good human relations and understanding, and extend the benefits of dental health to the greatest number. It is the official publication of the American College of Dentists which invites submission of essays, editorials, reports of original research, new ideas, advances and statements of opinion pertinent to dentistry. Papers do not necessarily represent the view of the Editors, Editorial Staff or the American College of Dentists.

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2. White, E.M., Sometimes an A is Really an F. *The Chronical of Higher Education*, 9:24, February 3, 1975.

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