

## Current Adhesive Dentistry as an Alternative to Amalgam: Case History



By Tim Adams, DDS

There is no question that the era of cosmetic dentistry has been accelerated with the development and advancement of dental resins and adhesives. Today their applications can be appropriate in both the anterior and posterior regions of the mouth. No two materials have given us the ability to conservatively restore teeth close to, if not equal to, their original form, function, and appearance.<sup>1-10</sup> However, adhesive resin restorations are by their nature more demanding and time-consuming than silver mercury restorations. Successful application of the latest advancements in adhesive dentistry requires strict adherence to a few crucial steps (ie, use of a rubber dam).<sup>11-15</sup> The following case report introduces and examines the characteristics and protocol for using a new direct resin and one-step adhesive bonding system.

There is no question that the era of cosmetic dentistry has been accelerated with the development and advancement of dental resins and adhesives.

### BACKGROUND

Dentists have been using silver mercury fillings for more than 150 years.<sup>16</sup> The main advantages of these types of fillings are: their quick and easy manipulation; the fact that they are very "forgiving"; and they are relatively inexpensive. The primary disadvantage is the increasing demand for tooth-colored materials that don't just "fill" teeth but restore teeth to their original form and function. Other drawbacks with silver mercury fillings include: the structural degradation that occurs over time with corrosion; the potential for fracture due to a wedging effect; the large amount of healthy tooth structure that must be amputated from the tooth to allow for adequate retention; and the lack of adhesion to tooth structure. These are truly "fillings," not "restorations."<sup>17-21</sup>

### MATERIALS

Many new and continually improving adhesive restorative materials are now available.



Figure 1. Patient presents with silver mercury fillings in teeth Nos. 14 and 15.

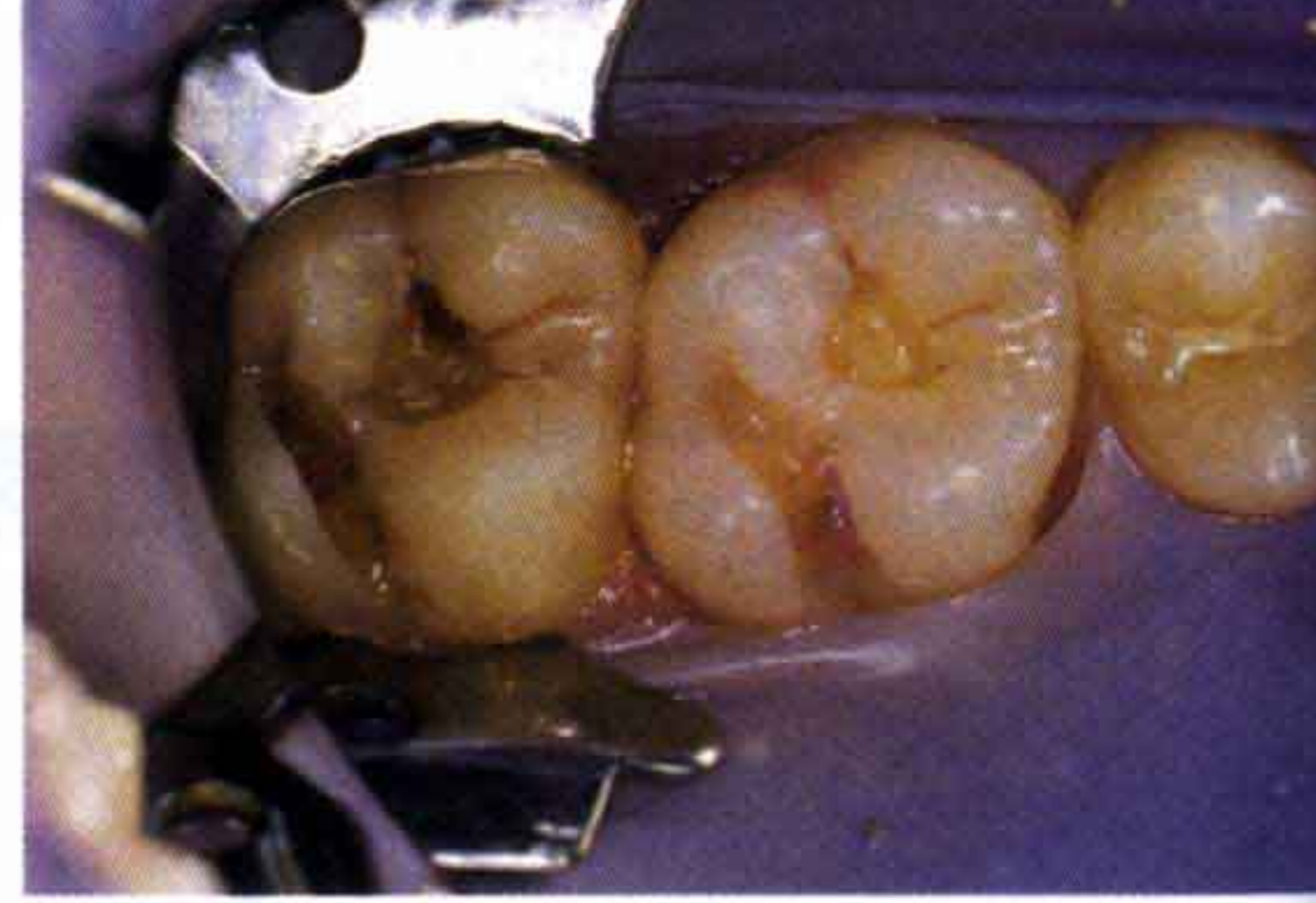


Figure 2. Caries detection dye confirms presence of decay.



Figure 3. Air abrasion is used to clean the cavity preparation and anatomical grooves.



Figure 4. Preparations are lightly air dried.



Figure 5. After lightly air thinning the primer to remove the alcohol carrier, a glistening, shiny surface should be evident.



Figure 6. The final restorations exhibit exceptional contour, marginal integrity, anatomy, color, and strength.

In this case, Point 4 Optimized Composite System and OptiBond Solo Plus Universal Adhesive (Kerr) were used. According to the manufacturer, Point 4 is an ultra-small par-

ticle size (0.4) composite that is aesthetic, polishable, and strong. One of the advantages of a 0.4 particle is its dimensional similarity to the wavelength of light. It is the manufacturer's belief that lining up the average particle size

in the composite with the wavelength of light results in a more efficient scattering of light and transfer of color to the adjacent dentition. This phenomenon allows the restoration to deliver more of a chameleon effect. Point 4 has strength comparable with today's hybrid composites. This is due in part to its filler loading (76% by weight, 57.2% by volume). This material can be polished to a very high luster like a microfill, yet provides the strength comparable with that of the latest generation of microhybrids.

OptiBond Solo Plus is an ethanol-based filled adhesive that is available in either a traditional bottle or a single-dose (rocket) delivery system. This sixth-generation adhesive is filled 15% with a new 0.4 filler and, like OptiBond Solo, releases fluoride. With this small particle size and a resulting film thickness of only 10 μm, OptiBond Solo Plus can be used for both direct and indirect restorations, eliminating the need for two separate primers.

### CASE REPORT

A 37-year-old male presented with a desire to remove his silver mercury fillings. His interest was driven by his own investigation into dental materials and appreciation of the benefits associated with adhesive dentistry. Teeth Nos. 14 and 15 both had occlusal and occlusal-lingual silver mercury fillings (Figure 1). The teeth were properly anesthetized and a rubber dam was placed. A 330-carbide bur was used to very conservatively remove all of the silver mercury filling with copious water spray and high-speed suction. Caries detection stain (Seek, Ultradent) was used to observe and confirm the presence of decay (Figure 2). A KCP 1000 was then used to clean up the cavity preparation and the associated anatomical grooves, which also showed signs of decay (Figure 3). Note that the conservative outlines of the preparations were kept very close to their original outline form, which would have been difficult to achieve placing another silver mercury filling.

The preparations were then scrubbed with Con-

sepsis (Ultradent), rinsed, and lightly air dried with an A-Dec air dryer (Figure 4). A 36% phosphoric acid solution was then applied to the enamel and dentin surfaces for 15 seconds, rinsed, and lightly air dried. Tubulicid

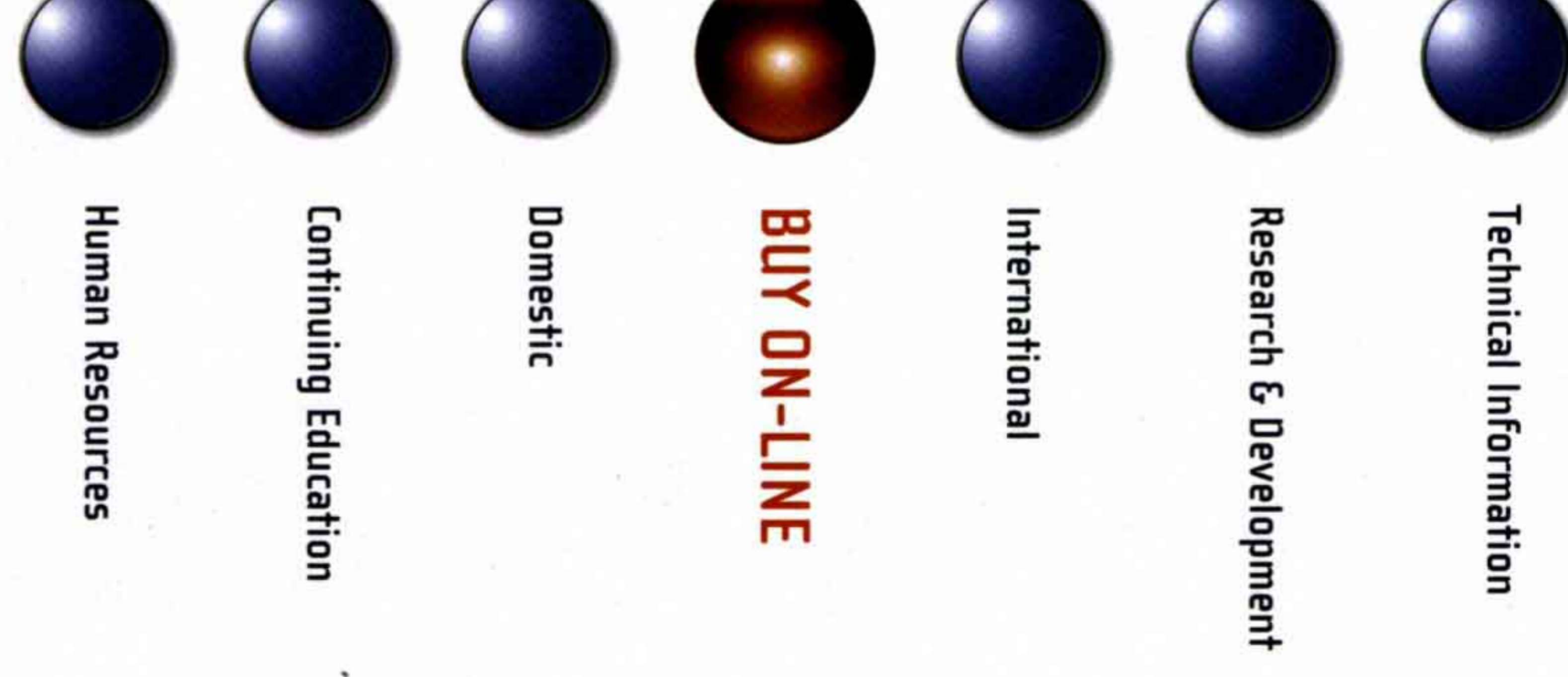
Red (Global) was applied with a multibrush as a combination wetting agent and antimicrobial. Excess moisture was blotted dry with a new multibrush to prevent oversaturation of the dentin. The dentin should be moist

with a glistening surface. OptiBond Solo Plus was then applied for 15 seconds with a multibrush using a light brushing motion. The primer was then lightly air thinned with an A-Dec air dryer for approximately 3 seconds to

remove the alcohol carrier. A shiny glistening surface should be evident at this point (Figure 5). The preparation was then light cured for 20 seconds.

continued on page 84

www.bisco.com



Click here to buy quality products on-line.  
Our entire catalog is available at www.bisco.com.

BRINGING SCIENCE TO THE ART OF DENTISTRY™



Bisco Dental Products

1-800-BIS-DENT

FREE FACTS. circle 46 on card

## RESTORATIVE

### Current Adhesive Dentistry as an Alternative to Amalgam

continued from page 83

An increment of Point 4 composite was then placed with a composite instrument and condensed and manipu-

lated into the preparation. This increment was light cured using the three-sided method of curing. The restoration was then carved with a composite instrument and a cone burnisher. A layer of DeOx (Ultradent) was pla-

ced to prevent an oxygen inhibition layer from forming. The final cure was performed and the restoration was finished with Kerr finishing diamonds and carbides. The rubber dam was removed and the occlusion

was checked. The restoration was finished with a series of Kerr finishing cups, points, and polishing paste. A final layer of unfilled resin (Optiguard, Kerr) was placed following acid etching of the tooth restoration interface

for 15 seconds. The final check revealed a very natural-looking restoration with exceptional contour, marginal integrity, anatomy, color, and strength (Figure 6).

### CONCLUSION

The legendary dental materials researcher, Dr. Ralph W. Philips, stated in the spring of 1970, "There is a need for a truly adhesive dental material and its advent will have a profound effect upon the practice of dentistry. If microleakage could be prevented, then the rationale behind the selection and use of varnishes and bases would be considerably different than that which is now in vogue. An adhesive material would supplant many of the present materials used in restorative dentistry."<sup>22</sup>

Dr. Philips' vision was so "on the money" that he knew it was just a matter of time before his prognostications came true. The case presented utilized a combination of OptiBond Solo Plus, which allows the clinician to use one primer in either a direct or indirect restoration, and Point 4 composite, which provides the polishability of a microfill and the strength of a microhybrid. Long-term longitudinal research will be the true test of these new materials, but early studies show much promise.

Perhaps it is time for the profession as a whole to look at the benefits and disadvantages of 150-year-old technology and ask how many more crowns we can ingeniously produce, or better yet, how many crowns we can proactively prevent by using the current and best materials available. The time may very well be right to educate ourselves and our patients so that together we can decide to supplant what is cheap and easy with a stronger, more conservative restoration. The first step in the process is your own training. A command of adhesive dentistry will help prepare you for a bright and healthy future for yourself and your patients. ♦

### Acknowledgment

The author wishes to thank the Las Vegas Institute for Advanced Dental Studies for teaching him the technique

Introducing an exceptional clean everyone can smile about

now available for kids

Colgate Actibrush—the toothbrush that combines the clinically proven cleaning effectiveness of an oscillating head action and the convenience of battery power for true portability—all at an exceptionally affordable price—\$19.99\*

Colgate ACTIBRUSH

- Over 8,000 oscillating movements per minute
- Small round head for individual tooth cleaning
- Long slim neck for effective access to posterior regions
- No plugs or recharging—can be stored anywhere
- Long battery-life (approximately 250 uses)



Now four great designs for kids make brushing fun

Clinically proven to give a significantly better clean than an ordinary manual toothbrush

www.colgate.com

\*Suggested retail price

© 30-day studies of plaque and gingivitis reduction. Data on file (Colgate-Palmolive Co.)

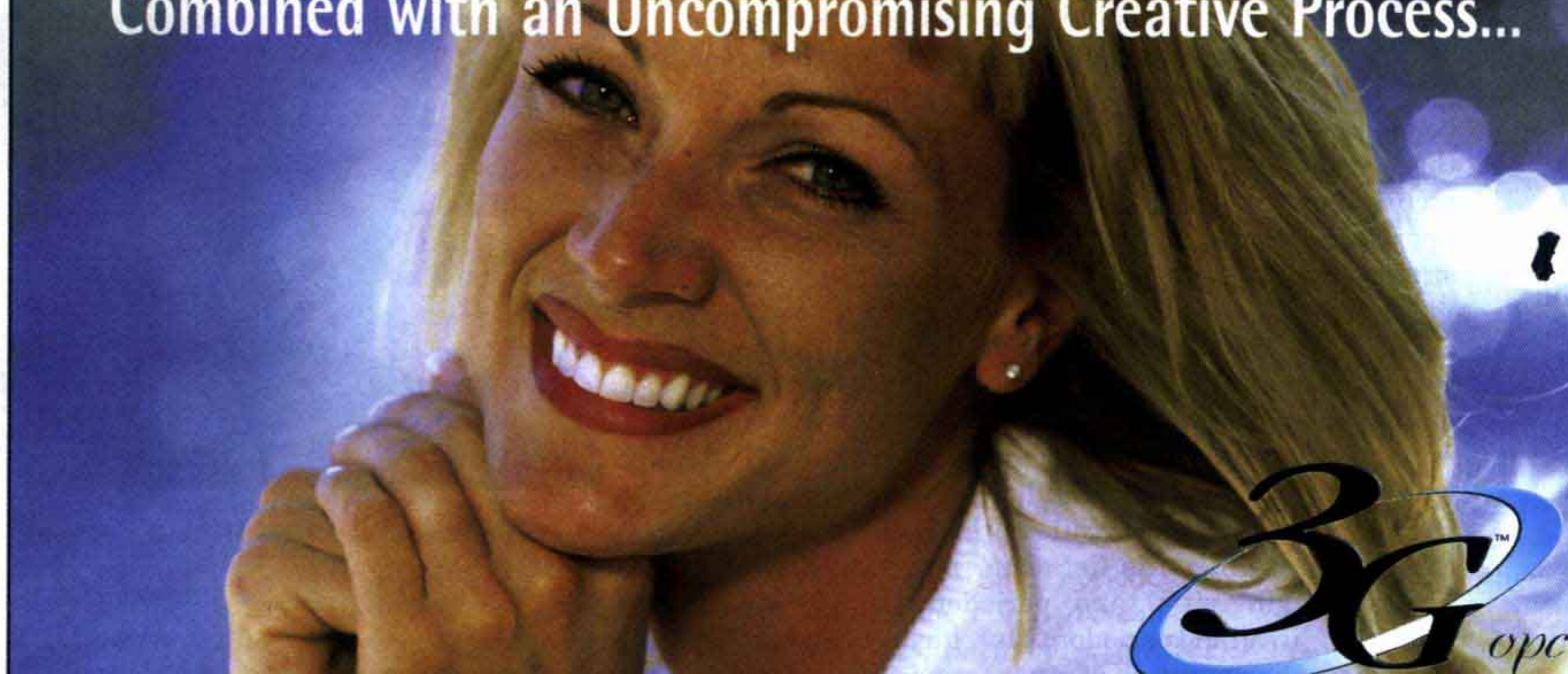
## RESTORATIVE

protocol described in this article.

### References

1. Fassore B, Nicholas J, Youdelis R. Load fatigue of teeth restored by a dentin bonding agent and a posterior composite resin. *J Prosthet Dent.* 1991; 65(1):80-85.
2. McCulloch A, Smith B. In vitro studies of cuspal reinforcement with adhesive restorative material. *Dent J.* 1986; 161(12):450-452.
3. Swift EJ, Pardigae J, Heyman HB. Bonding to enamel and dentin: a brief history and state of the art. *Quintessence Int.* 1995;26:95-110.
4. Morin D, Delong R, Douglas W. Cusp reinforcement by the acid etch technique. *J Dent Res.* 1984;63(8):1075-1078.
5. Triold PT Jr, Swift EJ Jr, Barkmeier WW. Shear bond strengths of composite to dentin using six dental adhesive systems. *Oper Dent.* 1995;20:46-50.
6. Lopes L, Leitao J, Douglas W. Effect of a new resin inlay/onlay restorative material on cuspal reinforcement. *Quintessence Int.* 1991;22(8):641-645.
7. Chappell RP, Spencer P, Eick JD. The effects of current dental adhesives on the dentinal surface. *Am Dent Assoc.* 1994;125:851-859.
8. Leinfelder KF. Posterior composite resins: the materials and their clinical performance. *J Am Dent Assoc.* 1995;126:663-676.
9. Hudson JD, Goldstein GR, Georgescu M. Enamel wear caused by three different restorative materials. *J Prosthet Dent.* 1995;74:647-654.
10. Susuki S, Leinfelder KF, Kawal K, et al. Effect of particle variation on wear rates of posterior composites. *Am J Dent.* 1995;8:173-178.
11. Lutz F. State of the art of tooth colored restoratives. *Oper Dent.* 1996;21:237-248.
12. Christensen GJ. Restorative dentistry: an update for practitioners, educators, examining boards. *J Am Dent Assoc.* 1995;126:1165-1168.
13. Vargas MA, Deneshy GE, Silberman JJ. Bond strength to etched enamel and dentin contaminated with saliva. *Am J Dent.* 1994;7(6): PAGES??
14. Brannstrom M, Nyborg H. Cavity treatment with a microbiodic fluoride solution: growth of bacteria and effect on the pulp. *J Prosthet Dent.* 1973;30(3):303-310.
15. Lutz F, Krejci I, Oldenburg TR. Elimination of polymerization stresses at the margins of posterior composite resin restorations: a new restorative technique. *Quintessence Int.* 1986; 17:777-784.
16. Mandel I. Living with amalgam: an environmental perspective. *Quintessence Int.* 1991;22:337-339.
17. Davis MW. Cuspal fracture with conventional class II amalgam. *Dent Today.* 1998;17(12):42-49.
18. Davis MW, Nesbitt WE. The wedge effect. *AAOJ J.* 1997;Fall:52-58.
19. Mahler DB, Bryant RW. Microleakage of amalgam alloys: an update. *J Am Dent Assoc.* 1996;127:1351-1356.
20. Ship II, Shapiro IM. Mercury poisoning in dental practice. *Comp Dent Educ Dent.* 1983;4(2):107-110.
21. Duke ES. What is the future of amalgam. *Quintessence Int.* 1996; 27(2):139-140.
22. Philips RW. An evaluation of anterior restorative materials. *Alumni Bulletin I.U.S.D.* Spring 1970;38:42.

The Next Generation of All-Ceramic Bridges... Combined with an Uncompromising Creative Process...



3rd Generation

Achieves the Premium in Esthetic All-Ceramic Bridges.