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# DENTISTRY TODAY™

VOLUME 27 NO. 2

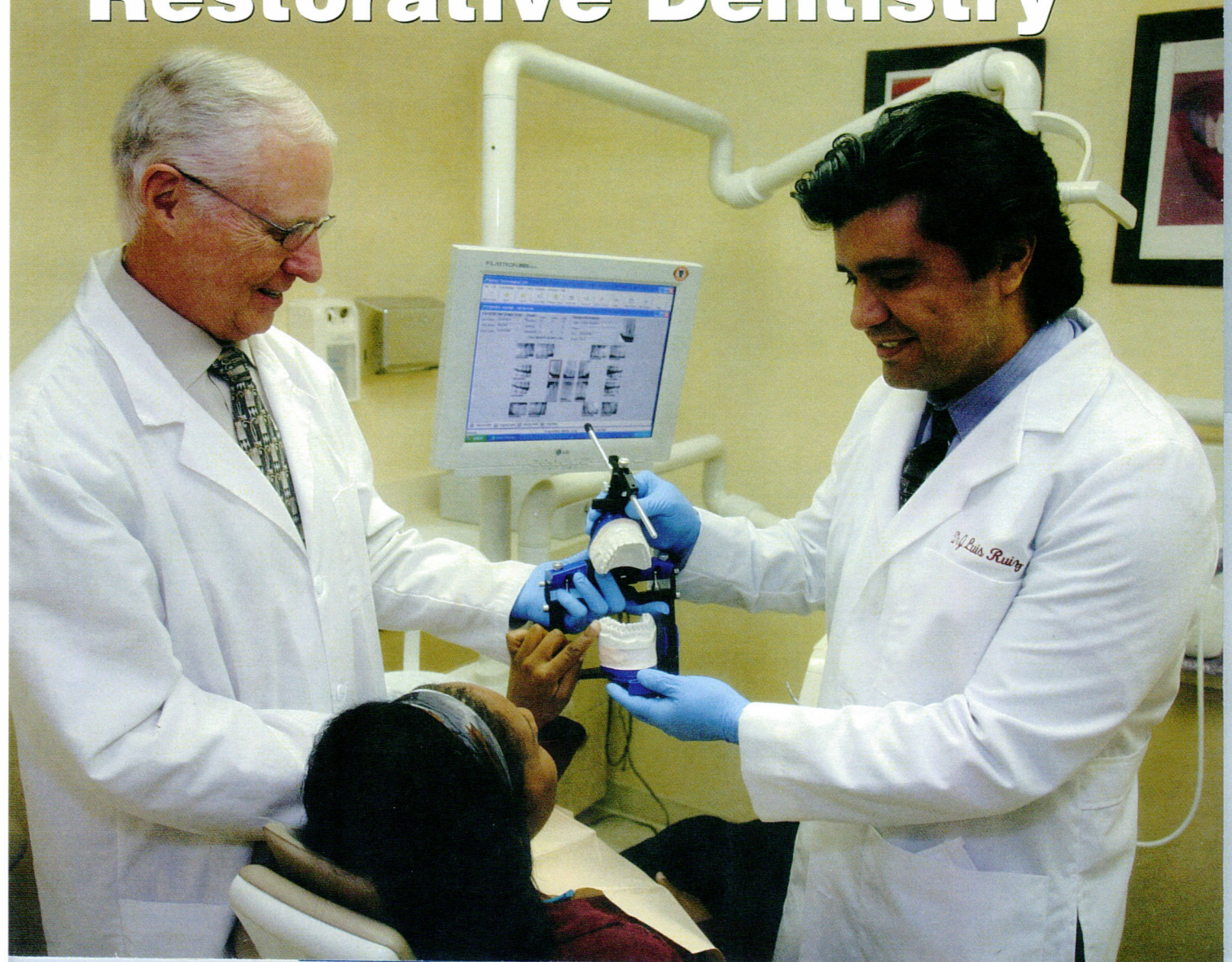
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FEBRUARY 2008

Drs. Christensen and Ruiz on...

## New Directions in Restorative Dentistry

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# Restorative Dentistry

## Current Developments and a Look to the Future

**R**estorative dentistry is traditionally one of the most fundamental aspects of dental treatment. Developments in materials, equipment, and techniques have transformed both the art and science of restorative dentistry, and future advancements will undoubtedly continue the evolution of this discipline. February has traditionally been a month when we take a look at "new directions" the dental profession is likely to take in the coming new year and beyond, and this month is no exception.

*Dentistry Today* is pleased to present an exclusive interview with 2 leading clinicians and educators, Drs. Gordon J. Christensen and Jose-Luis Ruiz, who share their views about the current state of restorative dentistry and their vision of what the future holds. Dr. Christensen is Dean of the Scottsdale Center for Dentistry, and Director of Practical Clinical Courses. Dr. Ruiz is course director of the USC Advanced Esthetic Dentistry Continuum and clinical instructor at the University of Southern California, and is associate instructor and mentor at Practical Clinical Courses where he teaches with Dr. Christensen.

*DT: What direction would you like restorative dentistry to go in the future?*

**Dr. Christensen:** I see many areas in which change in restorative dentistry would be desirable. Among them are:

The restorative excellence observable years ago is difficult to find today. There has been a significant trend to restore patients with tooth-colored restorations with the full intent of having to replace the restorations in a few years. The emphasis on long-term service of restorations seems to have vanished. Aesthetic dentistry appears to be the major emphasis, and some of the more aesthetically pleasing materials have limited longevity potential. The result of this trend in resin-based composites is restorations that are not finished well, open or rough contact areas on class II composites, occlusion left too high on composites, postoperative tooth sensitivity after composite placement, and mismatched color on composites. I see veneers that are too bulky and that have open margins and overhanging resin cement. Many times veneers have been placed on teeth that could have been treated conservatively with bleaching, incisal recontouring, orthodontics, or a combination of conservative treatments.

In the fixed prosthodontic area, I see crowns with over-contour and inadequate color matching, crowns with mutilated occlusal surfaces related to them coming back from laboratories too high, crowns on teeth that could have been restored with more conservative restorations, and fixed prostheses that appear too large and bulky in relation to the remaining natural teeth. There are far too many crowns being done in the United States on teeth that could have been restored with more conservative restorations. However, I am optimistic that quality, long-term restorative dentistry is still being practiced by many dentists.

**Dr. Ruiz:** I agree with Gordon...there are far too many full-coverage crowns being done today, especially PFMs.

Although they have served the profession well over many decades, they have many negative consequences including they require excessive tooth reduction and they often cause chronic gingival inflammation because subgingival placement is required. I would like the profession in

general to become more aware of the long-term benefits of tooth preserving techniques and the importance of protecting the gingival health, by utilizing restorations which require less tooth removal and the supra-gingival placement of margins, such as partial coverage nonmetal onlays and inlays/onlays. This in the long-term will lead to better longevity of the natural dentition.

*DT: Do you believe that the average United States dentist should be considering the use of nonmetal onlays before considering full-coverage crowns?*

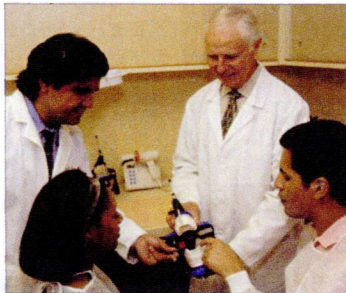
**Dr. Ruiz:** I absolutely believe that every American dentist should make porcelain- or resin-based composite onlays or inlay/onlay restorations a very important part of their practice, and these should be the first choice when a direct restoration is not possible or desirable. Once the learning curve has been passed, they are equally as simple as a full crown; as a matter of fact, I think they are simpler. The clinician will have to go through the same learning period that he/she went through when posterior composites were first learned, but because clinicians are now more proficient at adhesive dentistry procedures, the curve will be shorter. Seeking education from respected educators in this field is of the utmost importance, because the techniques and principles for these procedures are far different than the ones needed for mechanically retained full crowns or gold onlays, and understanding the difference will make or break the success of the restorations.

Just as with direct posterior composites, there are many naysayers who predict doom. It is mostly because of their personal lack of experience; there is plenty of published evidence to demonstrate the excellent performance of these restorations. I have personally done thousands of them in my private practice over the past 9 years with incredible success, and I am pleased to see that finally American dental schools are starting to teach these techniques to dental students. We are behind many parts of Europe, where they have been doing so for many years.

**Dr. Christensen:** The quantity of crowns placed in the U.S. annually has been estimated to be between 40 and 50 million. This means that a typical general dentist is placing about 30 units of crowns or fixed prostheses per month. I estimate that many of those teeth could have been restored with metal or nonmetal extracoronary restorations-onlays. Most patients do not want to display metal in their mouths, so tooth-colored restorations become the treatment of choice. Tooth-colored onlays have been proven to be highly acceptable restorations and to serve adequately if they are placed carefully. These restorations leave the facial and often the lingual surfaces of the affected teeth intact, thereby preserving the original tooth contour and color. When the gingival tissues recede, the tooth color still matches the adjacent teeth, and there is not a whitish or grey appearance at the gingival margin, as is manifested in many teeth restored with porcelain-fused-to-metal (PFM) crowns.

When more than one third of the cusp tip to cusp tip tooth structure has been destroyed as a result of dental caries or removal of previous restorations, and the facial and lingual surfaces of the tooth are

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*Dr. Ruiz (left), Dr. Christensen (center) with course participants.*

## Restorative Dentistry...

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intact, an onlay should certainly be considered as an alternative to crowns. Why are these restorations not placed to a greater extent in the U.S.? I have several potential reasons. Onlay tooth preparations are somewhat more difficult to accomplish than full crown preparations. Dentists are very familiar with making tooth preparations for full crowns, but onlay tooth preparations are more formidable and time consuming. I contend that with experience they do not have to be more difficult. Some dentists would state that onlays are more difficult to seat than full crowns. Again I disagree. If the laboratory technician has made a well fitting tooth-colored onlay restoration, either from ceramic or polymer, seating the restoration is relatively simple. The only difference between seating a full crown and an onlay is the usual desirability to use abrasive disks to finish the facial and lingual margins, as well as potentially a finishing strip to smooth the proximal and gingival margins. The result is a well-finished and beautiful tooth-colored restoration.



**Figure 1.** Observe how although the gingival margin of the PFM is clearly visible it is not unsightly as a PFM would be.



**Figure 2.** Observe the catastrophic failure of a full gold crown after 20 years. The patient was completely unaware there was any problem, because it looked fine in the mouth.



**Figure 3.** Observe the effects of 2 PFM crowns which severely interfere with lateral movements and have caused cervical abfractions to all 4 teeth involved. The contralateral side was impeccable.

Another potential impediment to increased use of tooth-colored onlays is the reticence of some third party payment organizations to pay for these restorations. There is an obvious lack of payment for onlays from these organizations when compared to payment for crowns. Organized dentistry must inform and convince the third party organizations that onlays are viable and responsible restorations for teeth that are moderately broken down, and that they are preferable to placing full crowns. On the other hand, dentists need to seek further continuing education to become proficient in treatment plan-

ning for, and treatment with, tooth-colored onlays. The lack of use of tooth-colored onlays is one of the most frustrating situations I see in current restorative dentistry.

*DT: When a full-crown is indicated, what type of crown would you like to see the profession advocate?*

**Dr. Christensen:** The cast gold alloy crown is passing into oblivion. Leaders of the major labs tell me that less than 10% of their crowns are now cast gold alloy. I treat many dentists, and these patients are the ones most interested in full

gold alloy crowns, especially on lower molars, upper second molars, and on the occlusal of upper first molars. As is well-known, typical nondentist patients want tooth-colored restorations.

What type of tooth colored full crown is most indicated today? The PFM crown has been proven for more than 50 years. The percentage of failure is very low and is often estimated or surveyed to be 1% or 2% over many years. That has certainly been my experience. However, the long-term aesthetic acceptability of PFM crowns is less than perfect.

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## Restorative Dentistry...

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*The all-ceramic crown and fixed prosthesis market is increasing rapidly, with the zirconium oxide substructure restorations being the most popular.*

After 5 years, the gingival tissues often recede, exposing tooth structure that is discolored or at least a different color than the crown. Additionally, as the gingiva recedes, the color of the crown toward the gingival margin is often a disagreeable gray or whitish color, presenting a

contrast with the exposed tooth structure. The functional longevity of PFM crowns is many more years, but they are often disagreeable from an aesthetic acceptability. It has been estimated that PFM crowns constitute about 60% of the US laboratory market. I suggest that the PFM crown should continue to be the most commonly used tooth-colored crown as the profession watches the service record of the zirconia-based crowns and fixed prostheses currently being popularized on the US market.

The all-ceramic crown and fixed prosthesis market is increasing rapidly, with the zirconium oxide substructure restorations being the most popular. The current most popular brands are: Lava from 3M ESPE, Cercon from DENTSPLY, IPS e.Max from Ivoclar Vivadent, and Everest

from KaVo. Many others will soon flood the market, further confusing both dentists and laboratory technicians. One of the advantages of the zirconia-based crowns is that when the gingiva recedes, the color of the crown more closely matches the color of the tooth than when gingiva recedes around a PFM crown. I suggest that dentists should use these zirconia-based crowns and fixed prostheses with caution as they prove themselves over years of service to patients. At this point they are serving well, with several studies ranging up to 7 years showing continuing success.

**Dr. Ruiz:** It depends if it is in the front or in the back of the mouth. In the anterior area of the mouth I prefer to use bonded feldspathic or pressed porcelain, when possible. If it

is in the posterior area porcelain-fused-to-zirconia (PFZ) full-crowns have some advantages over PFM crowns. The most important advantage is that if they are done properly, they have enough translucency to allow for a more coronal placement of the margin, and still have an aesthetic result (Figure 1). I cannot over-emphasize the benefit of this! I like to call this "supragingival dentistry"; I routinely leave the margin of posterior PFZs one-half-mm supragingival (if I use them in the anterior, I leave the margin at gingival level). Impressions are so much easier and predictable, and the gingival health is also predictably good. We must be aware that the longevity of PFZs has not been established, and we must be cautious. The coping design is key to success, and laboratories also go through a learning process. Nevertheless, I have placed close to 2,000 Lava crowns over the past 5 or 6 years with equal success to PFM crowns, but again, this is short-term success. I will keep you posted.

*the same longevity as cast gold alloy restorations. What are your views relative to longevity of the various metal-free restorations?*

**Dr. Christensen:** Cast gold alloy restorations are well known to serve for several decades if they have been accomplished well. On the other hand, dentistry has had a significant number of tooth-colored crowns that have come on the market with a great flurry of optimism, only to fail after a few years. The new generation of zirconia-based crowns and fixed prostheses appear to have the potential to serve successfully on a long-term basis, but time is needed to substantiate their usefulness as long-term restorations. Their limitations as we now see them are difficulty of removal or making endodontic access, and the inability to place precision or semi-precision attachments in them. However, these are limitations that occur only infrequently.

**Dr. Ruiz:** When you ask about longevity, are you asking about the longevity of restoration only, or the longevity of the restoration and the tooth? If we consider the longevity of the restoration only, a super strong material like gold or at least a PFM crown is the correct answer. The interesting issue is that often, when I remove an old gold crown or old PFM I find that the tooth didn't fare as well as the restoration. Because of the metal, it is very difficult to know if there is leakage or new caries under the crowns, and often a tooth is decaying right under our nose. Maybe there is leakage from day one; when we finally remove the crown years later, the tooth is gone (Figure 2).

This brings me to the question: What is more important, the longevity of the restoration or the longevity of the tooth? The newer metal-free tooth-colored restorations have the advantage that they show quite readily if there is leakage or new caries. This may make some clinicians unhappy, because the restoration has to be replaced sooner than expected, but this is the best for the long-term conservation of the natural dentition.

Many clinicians complain because porcelain- or resin-based composite fractures more easily than gold. The question is what do we want? An indestructible material, which, if improperly adjusted, will cause permanent periodontal and pulpal trauma and/or muscle and joint dysfunction? Something is going to pay the price of improperly adjusted occlusion! (Figure 3). Or is it better to adjust the occlusion appropriately so we can use more aesthetic materials and also insure

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DT: On the subject of longevity, ceramic restorations have not had

**Restorative Dentistry...**

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that the most ideal type of load is placed on the restoration to maintain the health of the entire masticatory system?

This leads me to occlusal disease and the incorrect management and diagnosis of it, which is mostly to blame for premature restoration failure. I believe it is indispensable to include an evaluation of the signs and symptoms of

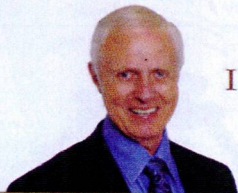
occlusal disease in all our complete examinations, thus allowing us to better manage occlusal disease and its consequences, which in turn will allow for a longer, healthier life of the dentition and our restorations.

*DT: Both of you have had a major interest in occlusion and the lack of emphasis on occlusion in most practices. How can interest in occlusion be stimulated?*

**Dr. Christensen:** I have taught practical concepts in occlusion for many years. To make interest in occlusion attractive to dentists, courses must be simple and pragmatic, and the treatments promoted must be financially acceptable to practitioners. Currently, many occlusion courses are so far into nonpractical procedures or promoting expensive and questionable devices that dentists do not want to become involved. I feel that the treatment of the commonly occurring occlusal conditions is not only relatively simple but they are financially acceptable, making their implementation into practice a win/win situation for patients and dentists.

**Dr. Ruiz:** We must make it more simple and practical! As Gordon says, most courses and dental school education make it too complicated, dry, and even scary, which makes people want to just avoid it all together. One of the things I don't like is the premise of most occlusion courses today, which want to mix occlusion and Joint Disease (JD) together and imply that everyone who is interested in occlusion has to be an expert on both. In my courses I separate them. Every dentist should be an expert in occlusion if he/she wants to serve his/her patients well. But being an expert in occlusion is not that difficult if we separate it from JD. Most restorative dentists should avoid treating JD patients; the good news is that JD patients are few and easy to spot, plus most dentists don't want to treat them! The key is a good and uncomplicated initial differential diagnosis system; readers can obtain a free copy of the diagnosis form by contacting me (e-mail: ruiz@druiz.com). Once a diagnosis is made, the dentist can appropriately treat the patient, or, if the patient has TMJ instability, he/she should be shipped out to the "TMJ expert." Over the years, and learning from some of the top experts, I have developed a methodic yet practical

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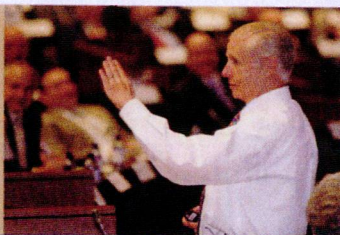
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**Restorative Dentistry...**

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approach to do this differential diagnosis and then to treat occlusal disease. I believe every dentist can and should be an expert in occlusion and

treat occlusal disease. Helping these patients is a win/win situation. Occlusal disease is so rampant the potential production increase is enormous.

*DT: Would you say that the various occlusal pathologic conditions or*

*"diseases" are receiving adequate treatment in the U.S.?*

**Dr. Ruiz:** Not even close! "Occlusal disease," in its many forms, continues to ravage our patients' teeth right under our noses. Every day the

dentist treats the consequences of occlusal disease, yet we rarely recognized them as such. Occlusal disease may be one of the most costly diseases we treat in dentistry, and we barely even notice it. Severe cervical hypersensitivity and cervical erosions of the teeth (abfractions) are attributable to "occlusal disease." In a clinical study, Coleman and others pointed to the fact that occlusal trauma (one form of occlusal disease) is often the "primary" cause of cervical dentinal hypersensitivity, and yet the profession treats it mostly with topical desensitizers. Class V restorations are performed to treat cervical erosions (abfractions) without properly diagnosing or treating the main cause of this problem...occlusal disease (not the only cause). Some of the other conditions that are partially attributable to occlusal disease in its many forms are tooth fractures, restoration fractures, localized periodontal destruction, mobility which could lead to early tooth loss, muscle pain, and JD, and others which often go unrecognized and untreated. It is a costly disease and the profession would do well by calling it by its well-earned name "occlusal disease."

**Dr. Christensen:** The potentially pathogenic occlusal conditions that I can identify are: primary occlusal trauma, secondary occlusal trauma, bruxism, clenching, temporomandibular dysfunction, and abfractions. I estimate that these conditions are treated only infrequently in the United States, that dental patients are very accepting of treatment for them when they are educated about the conditions, and that the backlog of needed treatment is enormous. I encourage dental school faculty and especially postgraduate continuing educators to become involved with and teach practical occlusal concepts and techniques. In my position as Dean of the Scottsdale Center for Dentistry, and under the excellent leadership of occlusion authority Dr. Terry Tanaka, we are providing pragmatic, easily implemented occlusion courses. ♦

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