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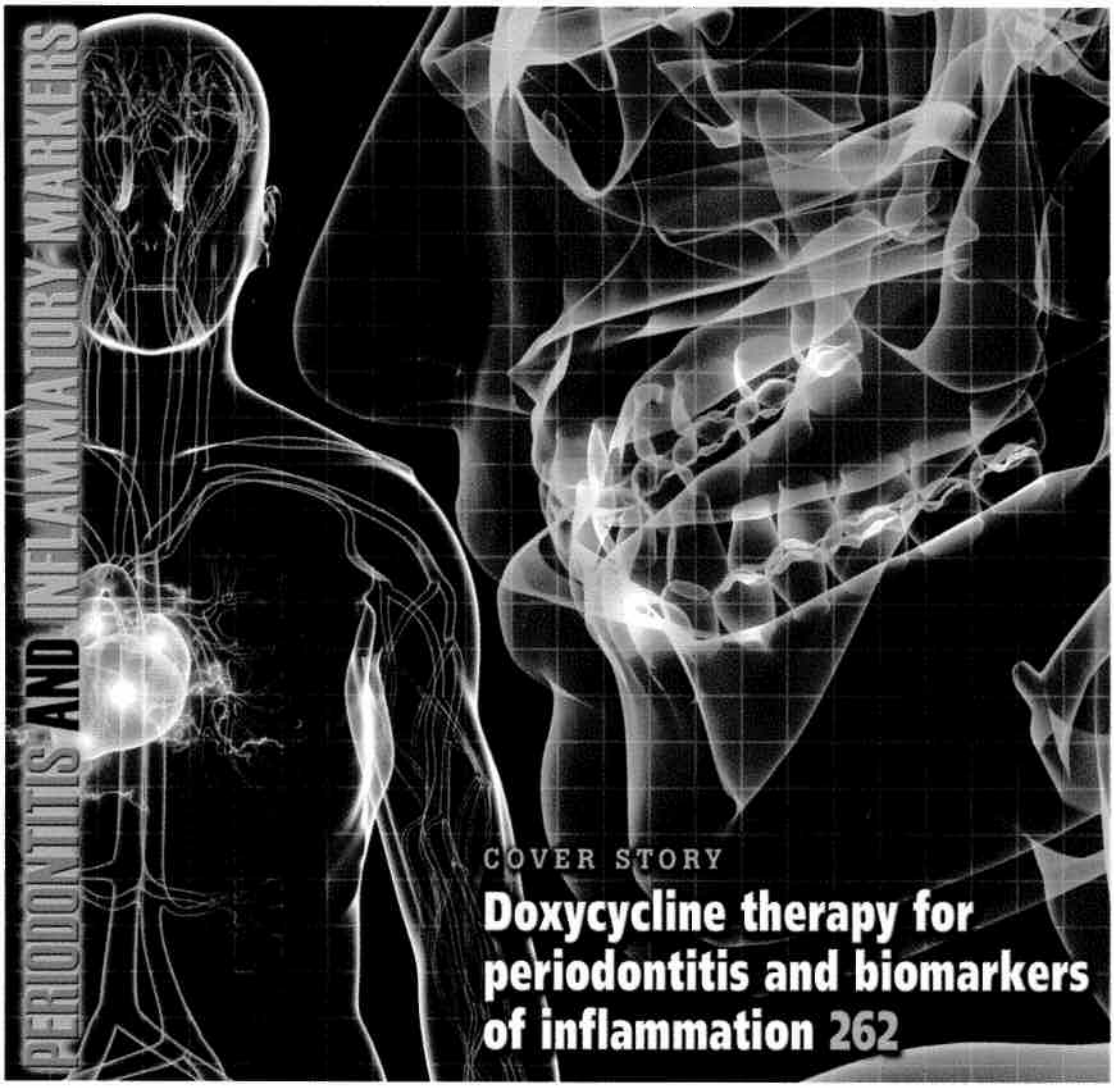

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wish to contact those authors for clarification. However, it has no bearing on utilization of imaging in orthodontics in North America. It would be erroneous to insinuate that the situation is similar.

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ONTOLOGY AND RESEARCH

We would like to comment on Dr. Barry Smith and colleagues' October JADA editorial, "Ontology and the Future of Dental Research Informatics" (Smith B, Goldberg LJ, Ruttenberg A, Glick M. JADA 2010; 141[10]:173-175).

Ontologies are essential to making unstructured or poorly structured information accessible to processing by computer programs. Given the importance of the topic, it was wonderful to see that JADA is beginning to address it. We suggest that the necessarily brief treatment of major concepts such as taxonomies, controlled vocabularies, ontological relations and inferencing be expanded in future articles in order to help practitioners understand the basics of ontologies clearly and comprehensively. In addition, we would like to raise a few issues in response to the editorial.

First, the editorial states that the Ontology for Dental Research (ODR) vocabulary will draw on existing and developing taxonomies for relevant concepts. Over time, a number of taxonomy development efforts have emerged in dentistry, such as the Leake codes,[1] SNODENT,[2] the EZCodes[3] and our own work on a reference terminology for dental diagnoses and findings.[4] As the experience in medicine has shown, for instance, with the Unified Medical Language System, building resources that draw on multiple source taxonomies with overlapping goals and content requires a significant amount of effort to ensure that this collection of resources works well together. Given dentistry's limited resources, what can be done to limit development to a few taxonomies/ontologies that have discrete and complementary goals and designs, and work well together?

Second, the design process of the ODR appears to be focused on the needs of the user community, and on adoption and practicality. This approach is a refreshing departure from historical precedent in light of the fact that several past development efforts, both in dentistry and medicine, have used a top-down approach whose product(s) ultimately did not meet the needs of the user community. However, it is not clear from the editorial how the ODR's development philosophy will be operationalized in practice. Which dental organizations will participate in creating the ODR? Who will lead and organize this effort, and who will perform peer review? Who are the primary users and how will they be incentivized?

Third, the editorial emphasizes the ODR's connection to existing clinical and translational ontologies. This point raises the question as to what degree the ODR will support the collection, annotation and analysis of data relevant for clinical practice. As the National Institute of Dental and Craniofacial Research's Dental Practice-Based Research Networks effort illustrates, dentistry may use much more clinical data for research than has been the case historically. However, in the past it has become clear that terminologies/ontologies designed for research do not support clinical practice very well and vice versa. In order to help the practitioner understand why dentistry should adopt ontologies, it is essential to ensure that they provide tangible benefits for clinical practice.

Last, some dental data, such as tooth numbers, CDT (Current Dental Terminology) codes and tooth surfaces, are represented in highly structured and controlled form, while others, such as progress notes and free-form reports, are not. Clearly, ontologies are more useful for unstructured data, since structured and controlled data do not need to be annotated. How will the ODR represent dental data comprehensively in light of this mix of data types in dentistry?

In closing, we would like to thank you again for a timely and important editorial, and look forward to future reports regarding the development of ontologies in dentistry.

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MORE ABOUT ONTOLOGY

I read with interest Dr. Barry Smith and colleagues' October JADA editorial, "Ontology and the Future of Dental Research Informatics" (Smith B, Goldberg LJ, Ruttenberg A, Glick M. JADA 2010;141[10]:173-175). It was fascinating, reassuring, surprising and a little disappointing all at the same time.

The terms were fascinating: genomic, proteomic, salivaomics, metabalomics and transcriptomics. Research scientists working together with cross-discipline expertise is cutting edge. I was reassured to learn that our profession's research base will be on the same level with connected peer groups.

I was surprised to hear that the dental scientific community is fragmented and disconnected ontologically. Clearly those in charge of this Ontology for Dental Research (ODR) effort are making a serious attempt to rectify the deficiency. Creating a common lexicon to integrate past, present and future data will be a notable achievement that will advance dental research.

While electronic dental records were mentioned in the second sentence, I was disappointed that no further mention was made. Without incorporating ODR into electronic dental records, the sharing of data from clinicians will not be possible. Data from the clinician can be an essential part of research. But embedding and employing ODR in computer-based dental records is imperative to truly involve the practicing dentist. Electronic dental records that can process data should be available for researchers and clinicians

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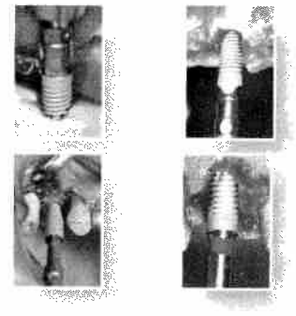

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In their defense, however, maybe the authors know already that electronic dental records prevalent in the market will be of no help, as the informatics literature proves. Unfortunately, electronic records lack common standards that allow for effective data sharing with researchers. Related critical data that would be useful are missing from electronic dental records.

Can this be changed? I think it could. The American Dental Association (ADA) can exert beneficial influence over evolving electronic dental records. The ADA already provides some guidelines for electronic dental records. More significantly, the ADA also charges vendors who use the ADA codes 10 percent of the vendor's gross receipts for the right to use the codes. I suggest the ADA could contribute to the developing ODR financially and through policy development.

And so in that spirit let me ask, what if the ADA deferred the 10 percent fee for companies that complied with ODR standards within their records? Or else reserved the money to pay dentists to help them adopt ODR-compliant electronic dental records? A growing number of dentists could embrace participation in the larger arena of health care rather than functioning in isolation. And one has to ask, in light of the developing ODR, what will happen to the Dental Practice-Based Research Networks if clinicians must continue to engage in a double entry noncompliant task for creating data?

Dentists, informatics specialists and researchers should make recommendations for bringing electronic dental records into the 21st century. Let's have electronic records that not only enable business practices but also make for better doctoring and move our profession to the medical forefront, ready to interact with the National Institutes of Health and similar organizations. Nineteen billion dollars of stimulus for health information technology in the United States, so far, has done little for dentistry.

ODR-compliant electronic dental records that can provide meaningful use in research would do a lot. Here is an opportunity.

I appreciate the work of the authors and hope they will consider seeking a way to draw the practicing clinician into the mix.

Tom Cockerell Jr., DDS
Fort Worth, Texas

Authors' response: Dr. Schleyer and his group are responsible for some of the most important contributions to dental informatics, and we are thus honored by the strong support expressed in their letter for the idea of an Ontology for Dental Research (ODR). We welcome his letter also because it gives us the opportunity to specify more precisely our thinking as it concerns the criteria for membership in the ODR consortium.

As in the case of the Open Biological and Biomedical Ontologies (OBO) Foundry ("http://obofoundry.org"), which serves as the model for the ODR initiative, the intention is that all the leading stakeholders in the relevant field will participate in this consortium, subject only to the requirement that they commit to addressing the tasks involved in building, maintaining and applying ontology resources in a collaborative fashion, so that the results of our efforts can be used in tandem with each other. This means, for example, seeking to minimize redundancy and inconsistency between different resources, and it means also addressing the goal of what is called "semantic interoperability" by ensuring that the same terms are always used to refer to the same types of entities in reality. Our experience with the OBO Foundry has been that potential developers and peer reviewers are able to be incentivized to contribute to such an effort by the fact that they thereby come to enjoy coownership in and influence over the result.

We are grateful also for the support expressed by Dr. Cockerell, and we hasten to reassure him that, while electronic dental records were indeed mentioned only in passing in our editorial, they will, of course, play a central role in our efforts in the future. As he points out, unless some way is found to incorporate into electronic dental records some resource that is, like the proposed ODR, built in concord with the terminologies used to describe clinical and biological data, then the sharing of data from clinicians will be impossible.

Recently, the ontologists at the University at Buffalo initiated a collaboration with the developers of the Picasso dental record system created to support the management of patient data in the University at Buffalo School of Dental Medicine. We see this collaboration as a means to test strategies for incorporating ontology and Semantic Web technology into an electronic dental record system with the goal of creating a virtual laboratory for incorporating biological data and clinical and dental patient data for purposes of research. As the ODR consortium develops, we also hope to incorporate in these experiments the contribu-

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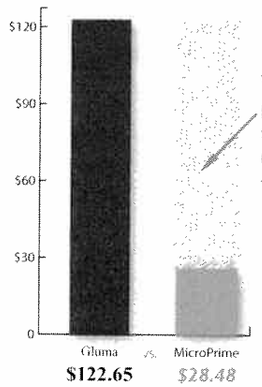

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tions from Dr. Schleyer's laboratory and from other interested groups.

To achieve an outcome of the sort envisaged by Dr. Cockerell, however, it is not only technical problems that need to be solved. We will need to confront also a range of social, educational, legal, economic and political issues. Above all, the major clinical electronic health record systems are proprietary; they are often based on out-of-date and needlessly expensive approaches to the management of data; and they incorporate ontologies, if at all, only in secret, thus denying to the health care institutions that use them the benefits of collaborative development of the sort provided in the biological sphere by the OBO Foundry.

We are strongly optimistic that something better can be achieved in the field of oral medicine and oral biology. Precisely because critical diagnostic and other data are missing from existing electronic dental records, we have an important opportunity, which we should grasp with all means at our disposal. In this respect, it is remarkable that since the publication of our editorial, two sessions on the topic of ontology have been scheduled at the San Diego meeting of the International Association for Dental Research in March 2011. One of these sessions is focused on the ODR, and all those interested in the matters addressed above are warmly invited to attend.

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Response from ADA's Product Development and Sales Department: The American Dental Association developed Current Dental Terminology (CDT) to be a comprehensive language having a consistent format to help dentists record and report the treatments they provide their patients in an accurate, standardized and appropriately detailed way that can be clearly understood by other dentists as well as by others in the health care community. On Aug. 17, 2000, the Code was named as a HIPAA (Health Insurance Portability and Accountability Act) standard code set.

The Code Revision Committee (CRC) is the body that reviews and votes on proposed changes to the Code. In addition to the practicing dentist members, the CRC includes industry representatives from organizations such Blue Cross/Blue Shield, Centers for Medicare and Medicaid Services, Delta Dental, the National Association of Dental Plans and a national purchaser of group dental benefits.

CDT is revised and updated every two years, and the ADA bears the expense of managing the maintenance, update and copyright matters pertaining to the Code. To recoup these costs, to promote effective communication across the entire industry and to generate nondues revenue, the ADA strives to make CDT widely available at a reasonable cost to the entire health care community, including commercial users. The majority of CDT software licensees create systems that support practice management. These licensees pay a small annual royalty fee of $11 per location (that is, per dental office address of the practices that use their software) and have never paid the ADA 10 percent of their gross receipts.

SALIVA-BASED TEST FOR SJÖGREN SYNDROME POSSIBLE

An experimental technique called luciferase immunoprecipitation technology (LIPS) may be able to streamline the diagnosis of Sjögren syndrome, according to an article published online Jan. 6 in Journal of Dental Research.

In the past, the scientists at the National Institutes of Dental and Craniofacial Research have used the LIPS technique to detect specific autoantibodies in serum. They then wanted to see if technique also will work using saliva, which mirrors virtually everything present in blood serum but at concentrations 1,000 to 10,000 times lower.

In collaboration with Dr. Ignacio Sanz at the University of Rochester, New York, the researchers conducted a study that involved 27 healthy control participants and 27 people who previously had received a diagnosis of Sjögren syndrome. The researchers collected whole saliva from the participants and examined the samples for the presence of two autoantibodies, Ro52 and Ro60. Both antibodies are strongly associated with Sjögren syndrome; tests for them commonly are administered to people suspected of having the condition. However, about 30 percent of people with Sjögren syndrome do not have autoantibodies in their serum for Ro52 or Ro60, suggesting that the syndrome may have more than one biological trigger.

The researchers report that LIPS detected Ro60 autoantibodies in the saliva of 70 percent of patients with Sjögren syndrome, with 96 percent specificity. It also detected R052 autoantibodies in the saliva of 67 percent of the patients with Sjögren syndrome, with 100 percent specificity.

The researchers wrote that their study's results suggest that "LIPS salivary-based testing of Sjögren syndrome autoantibodies is a practical alternative to serum and compatible with point-of-care testing."

TUMOR PROTEIN LEVEL MAY INDICATE CHANCES THAT CANCER WILL METASTASIZE

High levels of a protein in cancer cells can be a reliable indicator that a cancer will spread, say researchers in the February issue of The Journal of Clinical Investigation.

The protein carboxypeptidase E (CPE) ordinarily is involved in processing insulin and other hormones. In an analysis of tissue from 99 patients with liver cancer, researchers from the National Institutes of Health, the University of Hong Kong and the Lawson Health Research Institute in Ontario, Canada, compared the amount of the RNA of a variant of CPE called CPE-delta N from the patients' tumors with the RNA levels in surrounding tissue.

They found that when the level of CPE delta-N RNA in tumors was more than twice that of the surrounding tissue, the cancer was highly likely to return or to metastasize within two years. If the level was at or below this threshold, the cancer was much less likely to recur.

Using this threshold measure, researchers accurately predicted metastasis or recurrence in more than 90 percent of cases. Conversely, their predictions that tumors would not return in the two-year period were accurate 76 percent of the time.

Next, researchers measured CPE-delta N RNA levels from stored tumor tissue originally removed from 14 patients with pheochromocytoma, a rare tumor of the adrenal glands, and paraganglioma, a rare tumor occurring primarily in the adrenal glands but sometimes in other parts of the body. Because the adrenal glands are small, tissue surrounding the tumor was not obtainable, so researchers measured the amount of CPE-delta N RNA in the tumor tissue only. The number of RNA copies ranged from 150,000 to 15 million per 200 micrograms of tissue. Researchers found that in all of the cases in which cancer recurred or metastasized, CPE-delta N RNA levels were greater than 1 million copies. Researchers found no metastasis or recurrence in cases in which tumors had less than 250,000 copies. They tracked patients' statuses for up to eight years.

The researchers also examined cells from liver, breast, colon, and head and neck tumors and found that those known to spread the most aggressively had the highest levels of CPE-delta N RNA.

JADA Preview

COMING IN APRIL

- Is secondary endodontic treatment always necessary for aging temporary restorations?
- The effectiveness of text messages as appointment reminders in a pediatric dental setting
- Dental plaque and oral health during the first 30 years of life

Look for this and more in the April issue of JADA.