

## Science in the Land of Google

Throughout our professional lives we have learned from the experiences of others. Information may have been shared through the sage advice of more experienced clinicians, graduate education programs, study clubs, continuing education programs, or through the scientific literature. Each of these sources contributes to our clinical understanding. All of them are valuable and have various advantages and disadvantages: for example, advice from an experienced clinician may be absolutely true for that individual but could be based on skills and experiences that differ from our own. However, review of the scientific literature remains a primary source of unbiased scientific knowledge. True understanding can be accomplished through a dedicated review of the pertinent literature.

The approach used to evaluate the scientific literature has changed dramatically during my 30-plus years in dentistry. Historically, literature was evaluated by assembling and reading a stack, sometimes a very large stack, of articles on a specific topic to glean the pearls of wisdom from it. Depending on who developed the list of articles, the information could broaden the horizons of knowledge or narrow the focus to support a specific philosophy.

Today we use the Internet to search for references on specific topics. This approach is so common that we now "google" rather than search. What we normally receive when we google are huge, often unmanageable lists of authors and titles, but on the bright side, we receive this information in milliseconds. The advent of the Internet has made our lives somewhat easier, definitely faster, but we also realize that this wonderful resource can provide an incredible volume of misinformation. Our ability to differentiate between the expert and the self-appointed font of knowledge is not infallible.

In-depth knowledge demands a dedicated effort to review the pertinent literature. In contrast to the approach where one educator develops a list of references, we now consider the systematic review a more effective method for this task. In a systematic review the authors/reviewers define criteria for inclusion or exclusion of articles. These criteria are described in the materials and methods section, making it the most important part of the review article. The reader knows how articles were selected and is able to decide whether the included or excluded articles could provide the information he or she seeks.


The advantage of a well-done systematic review is that it allows the reader to determine the impact of a study on the reader's clinical practices. Rather than wading through a sea of articles, the reader instead is given a concise report on those articles. This approach to reporting scientific literature represents an incredible opportunity for the reader to gain comprehensive knowledge in a timely manner.

Furthermore, this approach eliminates the opportunity for clinicians to exhibit selection bias when they decide which articles to read. In a systematic review any article

that meets the inclusion criteria and fails to meet the exclusion criteria is included in the review process. Readers are able to determine whether the search used to identify pertinent literature was comprehensive because the search methodology is explained. All data reported in the review article are included in the final data analysis. Research that includes very large numbers of subjects is appropriately weighted in a systematic review rather than being diluted, as was often the case in the more traditional literature review. In many instances this means that a systematic review points out the dichotomous nature of the scientific literature. Indeed, this should come as no surprise to the readers, as there is much contradictory information in the literature.

Systematic reviews can and should be living documents. This means that once information is extracted from the articles that met the inclusion criteria, those articles need not be reviewed again. As more articles are written on the topic, this new information can and should be included in the systematic review database. As numbers grow, the ability to identify significant results also increases. Readers are cautioned that an apparent lack of significant difference in a systematic review may simply indicate that the differences were not great enough, at the time of the review, to demonstrate statistical significance. With time, and the inclusion of more information, this could change.

The Academy of Osseointegration, in keeping with its mission to advance oral health and well being by disseminating state-of-the-art clinical and scientific knowledge of implant dentistry and tissue engineering, initiated a systematic review of the implant literature. Through the efforts of a dedicated organizing committee, reviewers, and participants, the Academy was able to define the current state of the science in implant dentistry as it relates to 8 specific questions. The proceedings of this conference are published in the supplemental issue of *The International Journal of Oral & Maxillofacial Implants*. We encourage all readers of this journal to carefully evaluate the results of this review.



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### Erratum

The article "Effect of titanium surface roughness on human osteoblast proliferation and gene expression in vitro," by Marinucci et al (*Int J Oral Maxillofac Implants* 2006;21: 719-725), should have included the name of the manufacturer of the titanium alloy disks used in the study. The disks were manufactured by Leone, Sesto Fiorentino, Firenze, Italy.