

## Keeping science in dentistry



### BACKGROUND

Science is not a belief system, is not omnipotent, and has many imperfections. It is instead the method used to test theories against the available data with the goal of disproving those theories. If a theory cannot be tested, it's not science. Today's vast supply of information and data can make it difficult to keep up with what is actually of value scientifically and what is not. Approaching the situation by trying to determine what is *not* science can be a counterintuitive but ultimately useful method for evaluating all that data. Once the data have been assessed, they can supply useful guidance—or not.

### EVALUATING SCIENTIFIC METHODS

When reading and evaluating scientific research articles, it's important to consider issues regarding randomization, blinding, presence or absence of a control group, confounding variables, and surrogate outcomes. It's also important to avoid “cherry-picking” or extrapolating data from laboratory and bench data to inform clinical practice. False conclusions can result if researchers ignore the placebo effect and fail to comprehend regression to the mean. Both training and experience are needed to recognize all the issues that contribute or detract from the validity of data and conclusions.

### RESULTS OF RESEARCH EVALUATION

Researchers and clinicians should maintain a problem-oriented mindset rather than cling to the same old methods in the face of new evidence. This requires these practitioners to willingly set aside past methods of implementing information and then willingly learn new ones. Critical thinking demands the acceptance of opinions other than one's own.

Social media also enters into the evaluation of scientific evidence. Often findings that can't be substantiated and are therefore not publishable in a peer-reviewed journal find their way into social media under the guise of being science. Having people “like” a post does not make that statement a fact and can actually promulgate misinformation and lead to adverse consequences. Social media is not peer reviewed. Users are left with the responsibility for deciding what is scientifically sound and what is not.

TV health experts also fall under the shadow that clouds social media's treatment of information. Medical advice or health-related recommendations offered in a TV show format were evaluated in a 2014 study. Those offered on *The Dr. Oz Show*

were supported by evidence in only 46% of cases, were contradicted by available evidence 15% of the time, and had no evidence 39% of the time. *The Doctors* fared a bit better, with 63% of their recommendations substantiated by available evidence, 14% contradicted by available evidence, and 24% lacking any supporting evidence. In addition, only 0.4% of the health-related recommendations made by both sources were accompanied by disclosures of potential conflicts of interest.

### DISCUSSION

Evaluating biomedical evidence should be guided by the caveat “take nobody's word for it.” The level of evidence that used to be considered highest was the assertion by an authoritative figure, but this is now considered one of the lowest in value. Observational findings and experimental outcomes can provide evidence, but extreme variability is found in interpreting various studies and determining their implications.

The assessment of true scientific endeavors should also recognize that the outcomes of the assessment may not always be perfect. Humans tend to be uncomfortable when faced by ambiguity and can come to the wrong conclusion simply to deal with their discomfort. It's valid to accept that science may not have all the answers, or may not have them yet.

#### Clinical Significance

Our patients and the public trust us to provide truthful and valuable answers to their oral health questions. Dentists should receive excellent training in scientific evaluation and methods during their years in school and be encouraged to continue to think scientifically throughout their professional years. Leaving the science out of dental practice means we're left with just the art of dentistry. In all cases, practitioners should avoid having a blind passion for unsubstantiated opinions and seek instead to have a passion for science.

Glick M: Science does not care what you believe. *J Am Dent Assoc* 149:829-830, 2018

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