

Truth

Richard M. Rosenfeld

Wouldn't it be nice to know that research is really true? Regrettably, this is not always the case, mandating a bit of cautious skepticism when perusing medical journals. Some suggestions for separating fact from fiction follow the letter below.

Letter to the Editor

Having dutifully read the latest medical articles for many, many years, the more I read the more of a skeptic I become. Cynicism has become a way of life, leading me to question why I bother to read journal articles *at all*.

Separating truth from wishful thinking is increasingly arduous, as each study boldly claims to go where no author has gone before, uncovering clandestine wisdom foolishly missed by predecessors. Unfortunately, only rarely does research seem to yield enduring truths, instead providing fleeting fantasy with a barrage of soon-to-be-forgotten grandiose claims.

What, then, should I conclude when a single study claims new wisdom? I have nothing against enthusiastic investigators with unshakeable beliefs, but this cannot substitute for rational thought, valid methodology, and transparent reporting. Besides having a magic ball, is there any way to tell if someone trumpeting a new test, device, or therapy is a fool or a prophet?

How many articles published 20 years ago, or even 10 for that matter, remain relevant, insightful, and highly cited today? I suspect a rarified few, which immediately calls into question the truth of articles currently published. Before I give up reading journals completely, please help me regain some optimism in discovering real, enduring truth.

Truthfully yours,

Debra Determined, MD
Always Hopeful, USA

Editor's Response

Readers of medical journals seek truth in what is published, hoping to confidently use new information to better diagnose, manage, or counsel patients. Consistently accomplishing this feat would be easy if every article offered truths, defined as statements "being in accord with fact or reality."¹ The problem, articulated by our writer above, is that many ideas put forth as "truths" ultimately become false or fleeting.

One, somewhat depressing, way to begin is by acknowledging that truth is often unreachable: "In seeking absolute truth we aim at the unattainable," cautioned Sir William Osler, "and must be content with finding broken portions [emphasis added]"² We may feel entitled to the truth and assume that simply by looking long

and hard it will inevitably come our way. In science, however, we grope toward truth with broken portions called research studies, which, like pieces of a grand puzzle, may confuse or befuddle when viewed in isolation.

So what can we learn from reading a single medical study? Each brings us (hopefully) a bit closer to the truth—to seeing the whole puzzle fully assembled—but is rarely definitive in isolation. Studies arise from specific investigators, analyzing a single (often small) sample of subjects, under tightly defined circumstances, with a single series of measurements analyzed just once. These restrictions lessen our confidence in the results of single studies and their generalizability, sometimes to the point of rendering them useless. Other studies are even further divorced from the truth because of attempts to extrapolate laboratory results or animal experiments to humans, often with great poetic license.

Each new study offers a glimpse at the truth, sometimes pointing us in the right direction, sometimes leading down a blind alley, and often leading nowhere or even backward. With any luck, we grope steadily along the right path, being content with Osler's broken portions of truth along the way. The antidote, therefore, to being duped, wowed, or seduced by the latest study is to view it as just that: one link in a chain of evolving knowledge whose veracity is judged by the integrity and consistency of the links as a whole, not by the newest addition alone.

The art and science of assembling broken portions of truth can be called “systematic review.” Light and Pillemer, who pioneered systematic review in the social sciences, discussed how “reviews can enhance our understanding of complex questions—they also underscore the myth of the single decisive study [emphasis added]. It is seductive to think that, despite dozens of past research efforts with disparate findings, just one new ‘really good’ study would settle the issue.”²³ Moreover, “For science to be cumulative, an intermediate step between past and future research is necessary: synthesis of existing evidence.”²³

We have learned so far that truth is elusive, often unattainable, and appears in broken portions called journal articles, which require careful assembly and scrutiny as a body of evidence, not as single studies, to glimpse whatever truth has been uncovered. When considering the merits of a single study, therefore, we need to determine into which of the following categories it most readily fits:

1. The slam-bang study. An incredibly novel, unexpected, attention-getting study that reports a dramatic new condition, association, or treatment effect. Chances are overwhelming, however, that this is not the case, since they appear very rarely. Time will quickly test the endurance of early enthusiasm.
2. The true, but boring, study. This likely comprises much of what appears in top-ranked medical journals, reflecting high-quality, clinical research showing modest benefits (or harms) of therapy, or possibly no benefit at all. The writing is clear, concise, and humble, putting the current findings in perspective with prior work. Unless it describes a “hot” disease or intervention, however, the media has little interest, since it is difficult to muster enthusiasm over modest, boring results, even if true. Yet this study is perhaps the best “broken portion” of all, soon finding its rightful place in a systematic review that defines outcomes with greater precision or sheds new light on prognostic factors.

3. The promising study. A novel study with eye-catching results, but as first-of-its-kind research all bets are off, since it may represent a lucky outcome, unique finding that applies only to the specific patients studied, or something achievable by the investigators only under very controlled circumstances that cannot be easily repeated. Skepticism is the rule if related studies do not exist to corroborate the findings.
4. The seemingly true study. This begins as a “promising study,” but the luster soon fades as flaws and fallacies surface. Often the early excitement relates to new technology or a futuristic gizmo, touting wishful claims of safety and efficacy beyond the boring old-fashioned methods. Alternatively, the authors hit hot topics adored by the press, with the ensuing media blitz creating a transient aura of interest and importance, at least until refuted by the next seemingly true study.
5. The wishful thinking study. Here the results are obviously of trivial significance or none at all, yet the investigators go to great lengths to emphasize how the insights gained or the “trends” discovered (which, of course, are not statistically significant) are nonetheless really, really, really important. One could question if this study should have been published at all, because it really does not add to existing knowledge or facilitate inquiry. Save your intellectual energy for articles that are truly worth reading.

Although it may be entertaining to classify studies as just suggested, the best approach is likely to consider all conclusions based on single studies at best “seemingly true” until proven otherwise. Judging the truth, or foolishness, of research conclusions is usually impossible without the perspective gained as a body of evidence accumulates. The best way to gain perspective is through systematic review, whereby all the evidence addressing a specific research question is identified, appraised, and combined with an a priori protocol to reduce bias. Even when the evidence is purely descriptive, a systematic review is the best way to get a bird’s eye view of the quality, quantity, and consistency of what is known.

One testimony to the importance of systematic reviews as a barometer of truth is their prominence in the updated levels of evidence from the Oxford Center for Evidence Based Medicine.⁴ Earlier versions of this schema listed randomized controlled trials (RCTs) as the pinnacle of evidence for treatment benefit, but the revised classification places them one level below a systematic review of RCTs. Systematic reviews are deemed better at assessing strength of evidence than single studies with only one exception: questions of local prevalence, where current local surveys are ideal.

A review of research cannot eliminate bias and distortions but at least brings them into clearer focus by highlighting trends, consistencies, and outliers. Human beings, and study investigators, are optimists, which can have serious implications for single-study results: investigators tend to overestimate treatment benefits, especially when trial results are inconclusive, producing an optimism bias, or unwarranted belief in the efficacy of new therapies.⁵ Moreover, human judgment is distorted by many cognitive, perceptual, and motivational biases; most people tend to recognize—and overestimate—these biases, except when that bias is their

own.⁶ Seeing one's self in a perpetual positive light, even when evidence suggests otherwise, could readily distort the reporting of research findings.

The savvy reader of journal articles would be well served to remember that today's wisdom is often tomorrow's folly, especially when based on a single study. Galileo concluded that "all truths are easy to understand once they are discovered; the point is to discover them."⁷ Discovery is slow, arduous, and cumulative; single-study results are a starting point, but rarely a destination, except for the extraordinarily rare slam-bang study with dramatic and generalizable effects. Perhaps the best approach is cautious optimism, while heeding the shrewd advice of William Safire: "Never assume the obvious is true."⁸

Richard M. Rosenfeld. Truth. Otolaryngol Head Neck Surg. 2012 Dec; 147(6):983-5. Reprinted with permission by SAGE Publications, Inc.

References

1. Merriam Webster Dictionary. Truth. www.merriam-webster.com/dictionary/truth. Accessed September 19, 2012.
2. Osler W. *Aequanimitas With Other Addresses to Medical Students, Nurses, and Practitioners of Medicine*. Philadelphia, PA: P Blakiston's Son & Co, 1904.
3. Light RJ, Pillemer DB. *Summing up: The Science of Reviewing Research*. Cambridge, MA: Harvard University Press; 1984.
4. Howick J, Chalmers I, Glasziou P, et al. The 2011 Oxford CEBM evidence levels of evidence (introductory document). Oxford Centre for Evidence-Based Medicine. <http://www.cebm.net/index.asp?o=5653>. Accessed October 2, 2012.
5. Djulbegovic B, Kumar A, Schroen AT, et al. Optimism bias leads to inconclusive results: an empirical study. *J Clin Epidemiol*. 2011;64:583-593.
6. Pronin E. Perception and misperception of bias in human judgment. *Trends Cogn Sci*. 2006;11:37-43.
7. Thinkexist.com. Galileo Galilei quotes. <http://thinkexist.com>. Accessed September 19, 2012.
8. Thinkexist.com. William Safire quotes. <http://thinkexist.com>. Accessed September 19, 2012.