

Reasons for scientific rigor and skepticism revisited

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A hallmark of sound scientific thinking is to be self-critical rather than self-serving. According to American sociologist Robert Merton [1], the core principles that should guide all scientific efforts include *disinterestedness* – acting for the benefit of a common scientific enterprise, rather than for personal gain – and *organized skepticism* – exposing claims in scientific papers to critical scrutiny before submitting or accepting them for publication.

So what (except maybe for outright fraud) could be more detrimental to the scientific enterprise and to public trust in the scientific method than researchers engaging in wishful thinking and cutting too many corners? Yet this is what seems to be happening when much too often publications of dubious quality appear in scientific journals worldwide [2]. Their misleading results need not be caused by fabrication of facts or deliberate deceit. They may well result from much less obvious but much more common bad practices like data fishing, selective reporting, and cherry-picking of desired results [3].

While it has been suggested that optimism may be important for patients [4], wishful thinking by their clinicians and by clinical researchers can be detrimental [5, 6]. To believe in your hypothesis so strongly that you ignore contradictory evidence is not only unscientific but hazardous to patients.

A recent workshop report [7] turns the spotlight on serious problems in biomedical research, related to conflicts of interest. Scientists who are driven more by self-interest (such as

personal career concerns or economic gain) than curiosity or truth-seeking may engage in data dredging, investigating so many potential correlations that chance alone will yield some statistically significant findings [8]. Or they may fail to report null results [9]. Or they may conduct studies too poorly designed to provide accurate answers [2, 3]. Such practices can undermine public trust in research and, more importantly, harm people who are sick, weak, and in need of help.

The editor in chief of *The Lancet*, Richard Horton, recently noted [10] that much of the scientific literature, perhaps half, is untrue. He describes the symptoms of a system failure, where unhealthy competition is fuelled by universities and scientific journals that incentivize productivity at the expense of scientific quality. In such a system, no one wants to take the first step to seriously clean up the mess, according to Horton.

Even if current academic systems aggravate the situation, wishful thinking in medical theory and practice is anything but new and has often been entirely well-intended. The history of medicine provides quite a few examples of credulous self-deception about treatment results [11] which, regardless of intention, resulted in iatrogenic harm, unnecessary suffering, and waste of scarce healthcare resources.

In Sweden, recent accusations of research misconduct and unethical experimental synthetic trachea transplants have sparked intense public debate and, eventually, critical introspection in both clinical and scientific communities. This should offer an opportunity for clinical researchers and practitioners for self-reflection.

Whenever flagrant research fraud is suspected, many of us shake our heads, but are we also prepared to do anything about the less obvious but much more common credulous and truth-stretching practices among ourselves, our peers, and co-investigators, distorting the overall clinical evidence base? This is the perfect time to think about adherence to codes of conduct and good practices, and, above all, for self-reflection.

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