



Words of Wisdom

Re: Scientists Rise up Against Statistical Significance

Amrhein V, Greenland S, McShane B

Nature 2019;567:305–7

Experts' summary:

In the March edition of *Nature*, more than 800 scientists added their names to a commentary calling for retirement of the term “statistical significance” [1]. The authors' main arguments surround the fact that the scientific literature is ripe with misconstrued and potentially harmful declarations of association based on an arbitrary and binary classification using a p value of 0.05. The authors detail the faults with this approach and provide specific examples where this has led to faulty conclusions within and between studies. They go on to provide an assessment of 791 articles from five academic journals, finding that 51% of them erroneously interpreted a statistically nonsignificant result as indicating that there is no effect.

Experts' comments:

Immediately on reading this article, one is reminded of the breakout session “Controversies in Data Interpretation” that took place at the 2019 Genitourinary Cancers Symposium of the American Society of Clinical Oncology. During the session, Dr. Steven Goodman delved into this p -value debate and began with an informal survey of the audience. Although far from a scientific exercise, it is telling that in a room full of highly engaged clinicians and scientists, only one person in that room could accurately define a p value. Most producers and consumers of scientific research misperceive what a p value is capable of telling us about the results from any study. The p value is simply an estimate of the likelihood of seeing the data in observation, or more extreme data, if the null hypothesis is correct, but only founded on a number of assumptions.

This is such a relevant and hot topic that an entire issue of *The American Statistician* was devoted to the controversy [2]. Unfortunately, our current concepts around clinical scientific inquiry and statistics appear to be in conflict because of our natural tendencies to want a simplistic, dichotomous answer to a question. The authors of the *Nature* commentary do provide several solutions and alternatives beyond a more nuanced understanding of the p value that include more fully utilizing and rebranding confidence limits, with better interpretation of the estimates of effect

size described therein. As the global scientific community grapples with these issues and the concept of significance evolves, we in the urological community need to urgently start a dialog, particularly given recent high-profile studies that one could consider as having fallen into this trap [3,4]. The issue has immediate repercussions for those involved in clinical and translational research, publishers of their work, and, most importantly, those that rely on this research for policy and funding decisions.

Conflicts of interest: The authors have nothing to disclose.

References

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Jason Izard^a, Yingwei Peng^{b,c}, D. Robert Siemens^{a,d,*}

^aDepartment of Urology, Kingston Health Sciences Center, Queen's University, Kingston, Canada

^bDivision of Cancer Care and Epidemiology, Queen's University Cancer Research Institute, Kingston, Canada

^cDepartments of Oncology and Public Health Sciences, Queen's University, Kingston, Canada

^dDepartment of Biomedical and Molecular Sciences, Queen's University, Kingston, Canada

*Corresponding author. Department of Urology, Kingston Health Sciences Center, Queen's University, 76 Stuart Street, Kingston, Ontario K7L 2V7, Canada.

E-mail address: robert.siemens@kingstonhsc.ca (D.R. Siemens).

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