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Commentary

The Subtle Deception of the H-Index

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Early in my scientific career, I was taught the importance of publishing the results of scientific research in qualified international journals. The goal was twofold: on the one hand, to disseminate the results to the largest possible number of researchers, both to share the research findings and to potentially have a cross-examination; on the other, to enhance the value of one's CV.

Naturally, one has always sought to publish in the most widely read journals with a high circulation. Journals such as Nature, the Lancet, or the Annual Review of Physiology have always been considered among the most important.

In fact, what has always mattered has been the value of a Journal's Impact Factor; having a c.v. with publications in journals with a good Impact Factor has always determined the evaluation of the quality of one's research.

Not anymore.

The digitization of publications, at least those reviewed by PubMed, has enabled an additional evaluation, the H-index, which expresses the extent to which a publication has had an impact on the scientific community by being cited in other publications and has therefore theoretically served to increase the knowledge of those who publish in a given field. In short, if the publication is cited it should be of quality and the greater the number of citations, the higher the quality should be.

While, from a certain perspective, the H-index expresses the validity of a publication and, therefore, offers an objective parameter for evaluating the scientific quality of a candidate for a competition or a certain position, in reality, the parameter suffers from a flaw that is not taken into account, but which I mentioned in the previous paragraph "in a certain field."

And here is the deception. It is, of course, unintentional, but absolutely worth considering. The scientific community is vast and diverse. In the biomedical field, there are countless areas of research: molecular biology, immunology, microbiology, virology, metabolism, endocrinology, oncology, pharmacology, and many others. Each of these research fields has a very different number of researchers, which determines how many citations a given publication can receive; obviously, if a certain line of research is represented by a large number of researchers, the likelihood of a work being cited is greater and therefore the H-index value can increase.

In the past, the Impact Factor of the journal in which one published was taken into account, based on the principle that the higher the Impact Factor, the more interesting the research, as a major, top-tier journal will not accept research that is not of particular interest. Now, the H-index is taken into consideration, considered an objective measure of the importance of research.

But let's look at some evidence of the Deception. Some time ago, a paper published in a journal with an Impact Factor of 10 (a very high value for a journal other than top journals like Nature, Cell, the Lancet, and the New England Journal of Medicine). The research concerned the metabolic process of a certain molecule. There were around twenty citations, as the research community working on that molecule is very limited. A colleague published his research in the field of immunology in a journal with an Impact Factor of 4, which is much less selective, garnering around 300 citations, because the immunology community is very large. 300 citations allow around one additional point in the H-index of a researcher. This is not to say that the metabolic research was better than the immunological one, but unfortunately, what the H-index indicates is that one research is more important than the other one, even if the two studies cannot be compared. This is where the trick lies: using an evaluation method that is completely invalid because the bias lies in the different numbers of researchers working in different research fields.

It is also important to point out that to achieve the objectives with the H-index, one must wait at least one year, if not longer. This is because the publication must reach researchers in the field, who can draw from it for further research, which sometimes

takes months to be completed, submitted for publication, and be accepted. Any citation will only become effective only once the work has been published. Obviously, the H-index isn't changed by a single citation; it takes several, which means a lot of time, which is sometimes unavailable. Imagine a competitive examination based on qualifications: if you publish an important work, it can be immediately reviewed by the committee, but increasing the relevant H-index could take years, and therefore the important publication would not be useful for improving your standing.

In conclusion, should we abandon the H-index? No, but we should consider it only as a useful but not decisive tool for evaluating the quality of a researcher.

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Conflict of Interest

None.