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Viewpoint

The JCI Scholar program was established with the goal of mentoring young physician-scientists on the art and science of peer review and scientific editorship. While simultaneous training in basic research and clinical reasoning serves as the foundation of a young physician-scientist's career, peer review and editorial decision making around submitted scientific work are not often a focus of physician-scientist training. These processes remain enigmatic to many physician-scientists in training. The program seeks to benefit trainees as they design their scientific pursuits by providing a behind-the-scenes look at peer review — being a “Drosophila on the wall” during conversations among editorial board members as they evaluate the merit of scientific and clinical research, then taking a more active role in assisting on manuscript reviews and editorial decisions. Throughout our tenure as JCI Scholars, we have had the privilege of serving as reviewers and editors in training, mentored by physician-scientists who are pioneers in their respective fields. Here, we hope to share a few of our experiences with the aim of educating and motivating other young physician-scientists and their mentors. Hedging your bets: how editors triage and review submissions As physician-scientists in training, we are taught to tackle research questions that we hope will not only lead to cutting-edge scientific advances, but will also change the trajectory of disease management in the [...]

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The *JCI* Scholar experience: perspectives from young physician-scientists

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The *JCI* Scholar program was established with the goal of mentoring young physician-scientists on the art and science of peer review and scientific editorship. While simultaneous training in basic research and clinical reasoning serves as the foundation of a young physician-scientist's career, peer review and editorial decision making around submitted scientific work are not often a focus of physician-scientist training. These processes remain enigmatic to many physician-scientists in training.

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Hedging your bets: how editors triage and review submissions

As physician-scientists in training, we are taught to tackle research questions that we hope will not only lead to cutting-edge scientific advances, but will also change the trajectory of disease management in the clinic. We package our findings into manuscripts for the first time, faced with strategic decisions about framing a scientific narrative. After submission, we eagerly await peer reviews and editorial comments. But what actually happens while we

are waiting? This middle is largely a black box to many of us.

Though our mentors may engage us to coauthor review papers or assist in drafting the occasional peer review, the factors editors use to make decisions are often a mystery. The editorial process can seem particularly opaque for journals that have broad readership and that uphold a standard for publishing only science that achieves both rigorous mechanistic investigation and clinical relevance. Editorial decision making toward achieving this standard is not as straightforward as a linear distillation of reviewer comments; rather, there are broader considerations related to the impact of a story, its likelihood of changing clinical or public health care, and its priority both in and out of the scientific and clinical fields the work represents.

In our time as *JCI* Scholars, we have observed and synthesized five factors that are key to the trajectory of the manuscript's novelty, scope, and translational relevance as well as constructive reviews and respect for authors on the part of the journal. These factors have been gleaned from our time at *JCI*, yet we think their importance is generalizable.

Novelty. One of the first qualities editors assess is the novelty of a paper's findings. Do the results significantly advance our understanding of a scientific field through mechanistic *in vitro*, *in vivo*, and/or epidemiologic study? Does the hypothesis represent the discovery of a missing link or a critical tool long sought in the field? Does the work represent a launching point for a clinical intervention or an opportunity to alter clinical practice? When deciding whether a manuscript should be sent for peer review, editors comb the literature to determine whether

any part of the submission — hypothesis, experimental approach, or results in whole or part — has already been published.

For this reason, we have found that appropriately framing the submission is crucial. Highlighting the current state of research and how the submitted manuscript shifts existing paradigms improves the odds that a paper will be sent for review. This framework can be effectively built through use of introductory exposition that situates the work and its motivation, presentation of research findings to highlight key data, and discussion to provide broad context for the study's findings, its limitations, and new areas it opens.

Scope. Another factor we have found important to consider is the readership scope of a journal. This operates on at least two axes: (a) the choice between a journal of broad readership or one that is directed toward a specific field, and (b) the tendency of a journal to focus on basic scientific mechanism versus overt translational applicability. Put more simply, one might ask any of the following: Will all physicians read this or just renal pathologists? Is this paper digestible across scientific fields, or will only experts in cancer genomics data analysis be likely to read and cite it?

Generally, journals publish papers that are interesting to the majority of their readers. Manuscripts with findings that are clearly generalizable to broad areas of science (e.g., cancer, cardiovascular disease, immunology, infectious diseases) are thus more likely to be accepted into journals with broad readership than are manuscripts focused on specialized topics. Though this may seem intuitive, it is often difficult to know whether your own work is of broad interest. Thinking critically about the scope of the work being submitted will improve chances of a positive result in the editorial process — How impactful is the story? How convincing are the data? How broad is the set of experimental approaches

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taken? Will those outside my field be intrigued by this work?

Translational relevance. A primary focus of life sciences journals with broad readership is publishing findings that may help clinicians and scientists better understand or improve human health. Studies that are rooted in human specimens or extend findings in model organisms to clinical samples are often more compelling. Choice of animal models is similarly critical. Scientists must consider to what extent a model recapitulates human disease, whether knockouts or transgenic overexpression models are overly artificial, and whether multiple animal models are needed to best elucidate a mechanism. In our experience, even if these experiments were not part of the initial submission, reviewers commonly request these additional studies. We have found that manuscripts that include direct human connections are more successful than those that do not, and those that have a combination of the above strategies are more successful still.

Quality of peer reviews. Constructive peer reviews by experts in the manuscript's scientific field (or fields) strengthen the manuscript and help editors further assess novelty, scientific rigor, and relevance to human disease. Helpful reviews demonstrate a thorough reading of the paper by assessing contribution to the field overall, scientific rigor of the studies depicted (including the use of proper controls and the validity of the animal and cell line models chosen in the studies), and generalizability of the findings beyond the specific disease studied. As future reviewers, we note that reviews of sufficient length and detail can be incredibly helpful to editors and authors alike, although it is not necessary (and often unhelpful) to provide fine-grained comments line by line, figure by figure. Editors will synthesize major/key concerns and suggestions from reviews received.

It is important to dedicate time to serving as a reviewer when one is asked. Not only is this crucial to the advancement of science, but were more researchers to take a "pay it forward" philosophy such as this, it would go a long way toward streamlining the editorial processes at many journals. Editors can often have a difficult time finding sufficient reviewers (in quantity

or quality) in a timely manner, particularly because editors will often need to solicit reviews from those with different types of expertise on the manuscript in question. Editors are thus grateful for reviewers who are thoughtful and reliable.

One last point is critical: peer reviews are not the only consideration for editors when deciding the fate of a manuscript. Editors may allow authors to revise a paper with unfavorable reviews due to the potential impact of the work if sufficiently revised; conversely, editors may choose to reject a paper with favorable reviews due to concerns raised during the editorial board meeting or because the favorable review from one reviewer is offset by unfavorable reviews from others.

Fairness to authors. Most journals aim to be fair to authors. Editorial boards respect the reviews by experts in the field and encourage authors to incorporate suggestions that strengthen the manuscript and improve its clarity. Generally, addressing all comments made by reviewers significantly improves the chances of acceptance, so doing that one additional experiment or validating the findings in an additional data set suggested during the review is advantageous. In exchange, journal editorial boards discuss the importance of due process. Due process involves providing editorial decisions in a timely manner and seeking reviews expeditiously, attempting to avoid moving the goalpost by considering what authors were previously asked to do during a first revision when reviewers suggest a second round of edits, and considering the novelty of a manuscript at the time of original submission.

The roundtable discussion

Beyond consideration of individual manuscripts, scientific journals and their editors shape the progress of science and dissemination of its findings. In our experience, how the *JCI* operates is unique among its peers in ways that demonstrate the quality of work that come from the *JCI*. Our editors meet in person weekly to discuss each manuscript sent for review. These meetings are fundamental to the success of the journal: they allow editors to collaborate when discussing manuscripts that bridge multiple scientific disciplines, ask clarifying questions about the paper's story, debate how to weigh the input of various

reviewers, and hold a consensus vote on a paper's outcome.

These roundtable discussions help us refine the scientific method in modern times. Technological advancements—next-generation sequencing, CRISPR, transgenic animal models, and pluripotent stem cells, among many others—have accelerated and often transformed science. Yet each comes with limitations. As the scientific community wrestles with establishing a gold standard for these advancements, the varied experiences and expertise of the *JCI* editors form a sounding board for advice. Fellow editors help investigate the appropriateness of a model system, stress the need for human relevance, detect flaws in an approach, weigh the statistical analysis and applicability of genome-wide association studies and RNA-sequencing data analysis, and study the methods used to derive stem cells and their progeny. Likewise, discussions would often take a broader philosophical turn, with editors engaging one another in debates on policies of open access, engaging with preprint servers, and disseminating science in an era of social media and new electronic platforms.

See one, do one, teach one

Mentorship roles evolve as science progresses. Young physician-scientists still require the technical and intellectual training that is an essential foundation to performing high-quality research and conducting rigorous and innovative experimental design. Increasingly, however, there is a need to train these new members in the arts of peer review, editorship, scientific dissemination, and communication to the public discourse writ large.

Strong mentorship allows young physician-scientists the opportunity to strengthen their analysis of scientific accuracy, learn how to communicate with other authors about additional experiments that would strengthen their manuscripts, translate research articles into language accessible to the larger research community, and explain the importance of their work to the public. These young scientists will grow to be more punctual, organized, thoughtful, and constructive in their own work and in returning assessments of peers' works. The earlier in a scientist's career a researcher learns these skills, the more impactful he or she will be.

Our tenure as *JCI* Scholars has shaped not only how we approach our own experiments and professional interactions, but also how we prioritize fulfilling an obligation to the larger scientific community by reviewing and strengthening others' works. We hope that sharing our experience with *JCI* will stimulate mentors to teach young scientists how to craft con-

structive reviews and encourage other journals to educate the next generation of editors. We also hope young physicians and scientists embrace these opportunities as another facet of their professional training. The earlier we participate in these roles, the greater our potential to affect the trajectory of scientific advancement and benefit our current and future patients.

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