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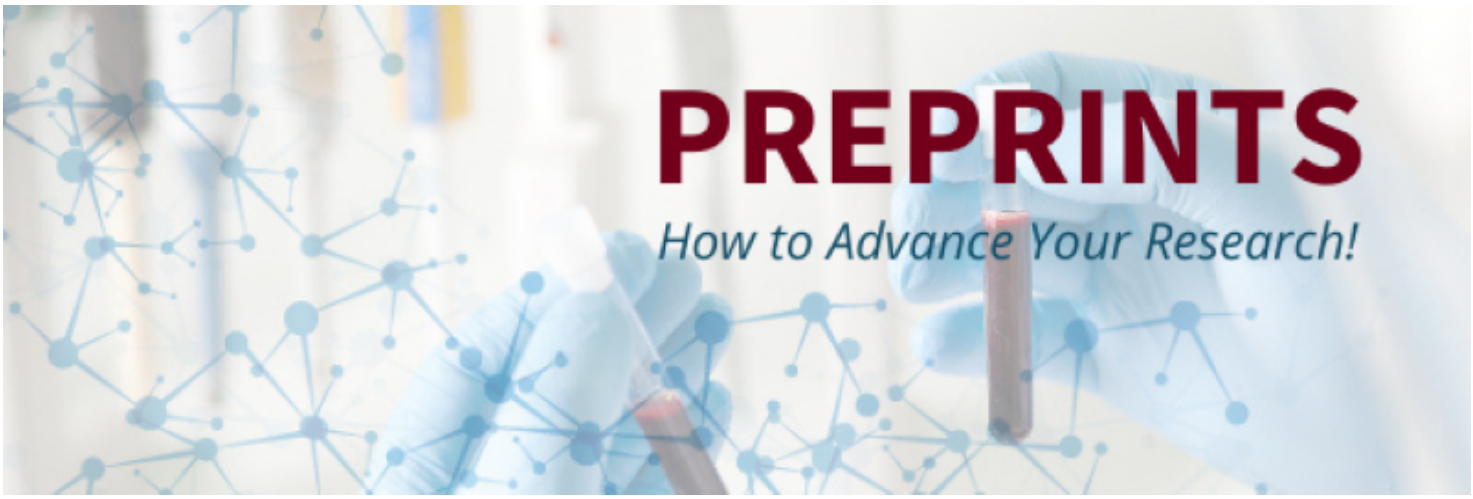
Preprints: How To Advance Your Research!

- November 19, 2020



The pace of science is accelerating. Papers are becoming ever more interdisciplinary and complex, and the revision process is turning more and more arduous. As jobs become more competitive, the pressure to publish in top impact journals keeps getting higher. The result of all this is that high quality submissions are suffering from unacceptably long publishing queues, which negatively impacts the dissemination of important results.

To accelerate the speed at which important findings are shared with the global scientific community, researchers in physics, economics, mathematics and computer sciences have long used the preprint model. This involves depositing a finished manuscript in an open access preprint server for the community to interpret, judge and ultimately learn from. The server operators minimally check the manuscript for appropriate content, but do not judge or peer-review the science. Thus, a preprint does not substitute for properly peer-reviewed research in an indexed journal, but it helps to make the scientific process more transparent, and it ensures that relevant results are shared much sooner.

While preprints have been around for almost 40 years, it wasn't until 2013 that we saw the launch of bioRxiv, a preprint server specifically oriented to the life sciences community. More recently, in 2019, a clinical-focused preprint server, medRxiv, has launched as well. Since their foundation, the adoption of

preprints from the biomedical community has been steadily increasing, with now over 3000 preprints deposited each month. The fields of neurosciences and bioinformatics have long been the top categories submitted, possibly related to their interdisciplinary teams of researchers with backgrounds in computer sciences, physics and mathematics, more used to the preprint model. However, preprints in experimental hematology and stem cell biology have also seen a recent uptick, likely carried by a swath of quantitative and large-scale sequencing projects. Of note, over 70% of the preprints end up being published in article form in a scientific journal, supporting that preprints serve their intended purpose as a way to advance the sharing of real science.

It is evident that the practice of submitting preprints will continue to rise in the life sciences community, with more and more adoption in less quantitative fields as well. Researchers across the biomedical sciences have applauded the transparency that preprints add to grant, fellowship or job applications. On the other hand, advocates for cautious implementation argue that the preprint model can be easily poisoned by authors intending to self-publicize without willing to undergo the more rigorous curation that journal editors provide. Taking advantage of this niche, editorial houses such as CellPress, Nature Springer and others, have recently created their own repositories of preprints, featuring studies under review in one of their journals and charging users for accessing this “higher-quality” advanced content.

More importantly, funders and institutions around the world are increasingly expecting (and even requiring) their supported research to be published as preprints, as a way to advance (or perhaps short-cut) the path towards total open-access science. But how can you make the most out of your preprint? And when are you ready to press “submit”?

The many reasons to submit a preprint:

Similar to publishing your studies in a journal, the ultimate goal of submitting a preprint would be to share your findings with the scientific community. Because preprints bypass the often lengthy and unpredictable peer review process, they are usually publicly available online in just a few days after submission. This ensures timely dissemination of your work, which is particularly important in fields that are rapidly advancing (such as computational biology and single cell technology) or when new knowledge is urgently required and time sensitive (such as COVID-19). Furthermore, because a preprint has an indelible time stamp on when it is first made available publicly, it might help to establish priority of discovery in the field.

Due to early exposure, posting a preprint might help your study to gain more attention and feedback from a wider community prior to final publication and get more citations. In some cases, this helps to add visibility to editors and potentially fast-track the reviewing process when editors and/or potential reviewers have read the preprint prior to formal consideration. Posting preprints prior to formal submission could also be beneficial when you are unsure where the study fits and would like to gauge the interests from different fields to help decide the target journals.

Preprints can also be beneficial, or even critical, for your career advancement in some scenarios. For example, if you are a PhD student who has not yet published any papers, you might consider submitting a preprint to demonstrate research output and productivity to the university/committee for thesis completion. Similarly, if you are an early career researcher applying for a job, promotion, grant or fellowship with few or no publications, a recent preprint on your CV might play a key role in boosting your chance for a successful outcome. Of note, although preprints have become more popular and more recognized in recent years, some funding agencies are yet to allow preprints as part of the application and evaluation process, including the NHMRC and ARC in Australia.

When should I submit a preprint?

Given that the key motivation for posting a preprint is to share your findings in a timely manner, it is ready for the spotlight as soon as your story is well developed. This means the data relevant to the study has been fully collected, analyzed and interpreted, and figures have been generated in a mature and logical manner. It should almost go without saying, but preprints should have new data or data analysis. This means not reusing any figures, materials and methods, supplementary information or text duplications. The rule of thumb is treating it as your first submission to a journal. So, make sure there are no placeholders, statistics errors, image duplications or any other scientific issues. Include and list all co-authors and their contributions and make sure they have read and approved its contents. Although there is no need to format-adjust it, it is helpful to use the same format as per the guidelines of your first journal submission, to avoid repeating the work.

Usually, many researchers choose to submit a preprint just prior to, or in parallel with the first journal submission. Because most research journals do not consider a preprint as a duplicate publication, this will not jeopardize the traditional peer review process (though you should always read the author guidelines!). However, it is important to note that posting of preprint revisions that incorporate editorial input and reviewers' comments is considered a policy violation for some journals. Some researchers also post a preprint much earlier than journal submission when they are unsure about where the study fits and would like to test the interest of the field. Early feedback from the community could help to inform whether the story is completed and well developed enough, or whether other critical experiments are required for further improvement of the manuscript. Even if you are depositing the preprint for career advancement reasons, you should still expect that the scientific community will be as critical as usual with its contents, so make sure that it fulfills all appropriate criteria for a submitted manuscript (figure quality, cohesiveness, readability, statistics and code accessibility). The process itself still takes a few days (especially if you consider the back and forth with other coauthors), so do consider starting the submission at least a few weeks before the deadline of any job, grant or committee meeting that you are planning to apply to.

What are some concerns before submitting a preprint?

For many authors, the top concern with submitting a preprint in the biomedical field is whether it will affect

its consideration to be published in a peer-reviewed journal. While some journals like Science or Nature have been used to the preprint model from the early days, the biomedical journals (and in particular the medical society journals) have not had the same amount of experience with preprints. For some number of years, journals had ambiguous guidelines regarding preprints, which were prone to interpretations of individual editors. Luckily, these issues are now a matter of the past, with most, if not all, major publishing houses now accepting and even encouraging preprints.

The second top concern among life scientists is getting “scooped”. The gold standard for scientific career advancement is to publish peer-reviewed manuscripts in indexed journals. But since preprints are not “peer-reviewed”, nor indexed in the same way, most biomedical scientists are still not used to counting them as proof of priority. Many also worry about whether submitting a preprint might force a competing group with similar data to fast-track publication in a quicker journal, to avoid getting scooped themselves. This is particularly concerning if you are considering a submission to journals in high-demand, which can have delays of up to a year before acceptance. Some journals are offering scoop-protection when the preprint has a date stamp that proves originality, but until the practice of using bioRxiv becomes commonplace in the life sciences, you can avoid submitting things too far in advance of your planned journal submission.

Another concern that many researchers have is whether the visibility might play against you. For example, a preprint that does not receive positive comments from the community might lead to editors being biased about its relevance or prospective recruiters being less enthusiastic about your proposal. To minimize these issues, you should publicize the preprint through common social channels, including editors and prominent leaders in your field. Make sure you don’t harass them and actually provide valuable content to catch their eye. Most importantly, as with any other publication, be self-critical and gather comments from your peers before submitting the preprint. Do not be tricked into thinking that this is a mock publication. A preprint is proof of your hard work and effort, and people will judge it like so, so treat it appropriately!

Preprints as a tool for the job market:

Perhaps the single most important aspect of preprints is that they can be used as proof of your achievements leading to a job, grant or fellowship application. In the last few cycles, preprints have basically emerged as a standard requirement for the academic job market (as unpublished data is not usually considered for an applicant CV). Many researchers that obtained jobs in the past year have mentioned to us that publishing their preprints helped significantly in their recruitment. This is because: 1) panels knew about the preprint, the quality and completeness of the studies, 2) the preprint showed the breadth and scope of the most current work much better than just a few comments in a short 3-page research plan, and 3) the impact could be gauged by seeing how the community responded to work that was still unpublished. These three things were almost impossible to do before bioRxiv, and make a huge impact on the fairness of candidate appraisal (before bioRxiv, you were lucky to address potential

evaluators in a scientific meeting where you presented unpublished work, but that was it).

Moreover, publishing a preprint says something about your confidence in your work, your openness to criticism, and your willingness to prioritize open science. These are all attributes that many colleagues would hope to find in their potential recruits. But remember that just because you can produce a preprint, this does not mean you should rush in a bunch of unfinished work to call the attention of job evaluators. Take your time and make sure that you do the best job that you can, since recruiters will especially want to hear about your most recent work during your job talk.

Preprint platforms for life and health sciences have come a long way since the first establishment of bioRxiv back in 2013. In the first few years, many life scientists, funding organizations and publishing groups were skeptical about this new way of scientific communication, and some still remain conservative in the current time. Nevertheless, it is hard to ignore the fact that posting and reading preprints have become increasingly integrated into our daily scientific activities. Many have submitted their work as preprints, and many frequently read preprints for new ideas, findings and technologies in the field to shape their own research directions. The take-home message is that preprints will keep getting more relevant the more and more people in our field choose to submit them. With the increasing impact of quantitative biology in hematology research, it is a no-brainer that our community is bound to benefit tremendously from the preprint system, as we should all strive to make our science more fair, dynamic and accessible.

Hear what members of the ISEH community have to say!

"In principle, preprints are a fantastic idea and have worked really well in other disciplines. I don't know that medical science is maximizing its potential just yet though and some journals still don't accept papers that have been posted on preprint servers. I also have concerns that some people are using preprint servers to artificially boost their career and play the system rather than a genuine desire to get their work 'out there' for evaluation. That said, preprints as a concept are an important mechanism for getting science out there sooner, we just need to be careful about taking everything at face value."
- David Kent, PhD (University of York, UK)

"For us, preprinting this work allowed us to share our science as we completed it, and to get critical feedback which both improved our subsequent studies and analyses and helped us in the manuscript review process. We are fully committed to preprinting our work, both to increase scientific dissemination and to engage the field and build new collaborative interactions."
- Ross Levine, MD (Memorial Sloan Kettering Cancer Center, New York, NY)

"I believe pre-prints are extremely valuable for rapidly sharing new and important scientific findings. We have benefited from pre-printing papers from our group on bioRxiv and medRxiv and I learn so much from reading pre-prints in our field. Hopefully the practice will become more universal, particularly in our field of

hematology."
- Vijay Sankaran, MD PhD (Boston Children's Hospital, Boston, MA)

"I have posted 2 preprints to date. Both have been commented positively in grant applications. I think as a fairly junior investigator they are an important way to show productivity. As a reader, I don't particularly search Biorxiv routinely for new papers in my field. But I do read some articles, and I have cited them in reviews. They are never really the full story but they are a good glimpse of what is to come."
- Elisa Laurenti (Cambridge Stem Cell Institute)

"I've submitted to BioRxiv in the past and I've always had a positive experience. For me, it was an extremely useful way to get a broader feedback on my work than the one provided by the peer-review process prior to final publication. Moreover, one of the preprints I posted gathered significant attention, which served as a great strategy to encourage the editor to publish it quickly. Indeed, we now review pre-prints almost as often as peer-reviewed papers in our Journal Club. We found it's an excellent way to understand the publication process better (i.e. what's the shape of the paper when it's initially submitted for peer-review) and to get new ideas for our own research well before the paper is in press."
- Alba Rodriguez Meira, PhD (University of Oxford, UK)

"As a technologist and bioinformatician, I am a big fan of preprints since they disseminate methods rapidly and thereby accelerate progress. On the other hand, review has always helped me make my manuscripts better. For biology papers, I much prefer reading journal articles over preprints since clearly the editorial and review process helps selecting the best works. To my shame, I only ever posted one manuscript as preprint, but this one has helped me a lot with grant and job applications. I will do it more often, especially for manuscripts focusing on technology."
- Lars Velten, PhD (Center for Genome Regulation, Barcelona, Spain)

"We live in interesting times. Traditional models of scientific publication have been undergoing a number of transitions since last century. While published and stringently conducted scientific studies still remain as landmarks, the process of submission and rejection through the various mastheads can delay access to important knowledge, sometimes by years, by a handful of editors and reviewers. No where have the issues related to publication and pre-publication been highlighted in the most stark ways with the emergence of Covid-19: exposing all the cracks that lie within all the current pre-publication and publishing models. I believe pre-publication is an important way to improve accessibility to research. While not peer reviewed, it does allow review and critique of data by the very same readers that will consume the information in published form. Science is ultimately a self correcting process: ideas that are wrong won't be reputable replicated, whereas truth will always stand the test of time."
- Ashley Ng, PhD (Walter and Eliza Hall Institute, Melbourne, Australia)

"I strongly support the use of preprint as it allows the field to get quicker access to paper. Getting access

to other people results without having to wait for the publication that usually take time can help advance your own research. Although one has to keep in mind that it is not peer-reviewed! For now, it has never impacted the publication process of our papers. I'm a bit disappointed that we (as a community) don't use so much the preprint system to give feedback to our colleagues. We mainly use comments via twitter to congratulates each other and rarely for criticial discussion. I will definetely continue to read and submit preprint."
- Dr Leïla Perié, (Curie Institute, France)

Resources:

“5 common concerns about publishing preprints” by Anna Clemens (Scientists Who Write) @scientistswrite https://www.annaclemens.com/blog-overview

Abdill and Blekhman. Meta-Research: Tracking the popularity and outcomes of all bioRxiv preprints eLife 2019;8:e45133. DOI: https://doi.org/10.7554/eLife.45133 https://rxivist.org/stats

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