

ask journals and other public resources accepting scRNA-seq data also to follow the guidelines, while remaining flexible as the technology is developing and community feedback is being received. As single-cell transcriptomics are increasingly combined with imaging of tissue sections or quantification of surface proteins¹⁷, future work will involve alignment of these standards with newly emerging techniques requiring new types of metadata. We also expect minSCe to be expanded to single-cell genomic and epigenomic techniques (for example, single-cell ATAC-seq), which are not covered here, to incorporate a broader selection of single-cell assays. This will support the reuse and interoperability of various types of single-cell data and facilitate the development of atlases^{18,19}. □

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Author contributions

A.F., N. George, M.G., P.N., B.A., S.K.F., C.F., M.A.F., L.H., D.T., N.V. and N.M. curated data and developed metadata standards; L.C., J.K., N.M., R.H.S., A.B. and I.P. supervised the project and engaged with the larger community; S.T. and J.M. provided support and evaluation of the standards and contributed to the manuscript; A.F., N. George, M.G., P.N., B.A., S.K.F., C.F., M.A.F., L.C., N. Gehlenborg, L.H., R.H.S., D.T., N.V., A.B. and I.P. wrote the manuscript.

Competing interests

The authors declare no competing interests.

Additional information

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Sample sharing

To the Editor — I read your recent editorial entitled “Thank you for sharing”¹ with appreciation for its spotlight on materials collections. As executive director of Addgene — a non-profit repository created to help scientists share plasmids — I believe that the impact of materials sharing on science acceleration and reproducibility is enormous, particularly at this time of vital research and product development to rapidly discover diagnostics, vaccines and treatments for COVID-19.

The most expensive and demanding part of fulfilling Addgene's mission is to solicit deposits to keep the collection current and growing. It would be invaluable to the community if journals and granting agencies put more emphasis on materials sharing. For example, although *Nature Biotechnology*

and other *Nature* journals instruct authors that they are “required to make unique materials promptly available to others without undue qualifications” and “strongly encourage” this, it is not enforced and especially not so for plasmids (which are free to deposit at Addgene).

It would be a public good for all research if editors (and grant officers) had a checklist for authors to complete, confirming they have initiated deposit of all materials (including plasmids) associated with a paper. In addition, I would advocate that journals include links to all materials and reagents used in the research described in their publications and that journals have clear minimal requirements (rather than recommendations) for materials deposition.

We wish ‘strong encouragement’ was enough, but alas, once the paper is out the door, authors often need more than encouragement to take the time to execute on materials sharing. An extra push could be a game changer. □

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