

## Guide to Authors and Referees

### Aims and scope of journal

*Nature Cell Biology* publishes papers of the highest quality from all areas of cell biology, encouraging those that shed light on the molecular mechanisms responsible for fundamental cell biological processes. The journal's scope is broad and includes the following areas (not listed in order of preference):

Specific areas of interest include, but are not limited to:

- Membrane traffic and protein sorting
- Cell adhesion and migration
- Signal transduction
- Proteolysis
- Apoptosis
- Organisation of the nucleus and nuclear transport
- Developmental biology
- Cell cycle and cell growth
- Cytoskeletal dynamics and molecular motor function
- Transcription and chromatin
- DNA replication and repair
- Cellular mechanisms of neurobiology, immunology and human disease (provided that the primary focus is on general processes of cell biology)
- Microbiology
- Plant cell biology
- Stem cells

### Mission

Our aim is to publish high-impact research relevant to a broad range of cell biologists. Manuscripts selected for publication in this journal will have to contain data of exceptional quality that provides a striking conceptual advance and an in-depth understanding of the processes under study. We place a high priority on maintaining an open, active dialogue with the community, and encourage you to contact the editors.

### Sample issue

Free online access to the November 2006 issue, which can be found at <http://www.nature.com/ncb/journal/v8/n11/index.html>

### Editorial Process

The overview of the journal's manuscript decision process includes submission, editorial decision on whether the paper should be reviewed, peer review, decisions after review, revision, acceptance in principle, final submission and acceptance, proofs, advance online publication, and print publication. Before submitting a paper, authors should consult our editorial policies as well as technical tips for using our online submission system.

Please also consult our general guide for manuscript preparation and submission, which includes information on article formats, journal style, and figure preparation tips. Note that procedures for initial submission,

revision, and final submission are slightly different, so please consult the directions before proceeding to the online submission system.

Presubmission inquiries are not a prerequisite for the regular submission process, but are intended as a mechanism for authors to receive rapid feedback on whether a manuscript in preparation is likely to be of interest to the journal. We encourage authors who have already prepared their manuscripts to bypass the presubmission inquiry process and upload their papers as a regular submission to the journal.

Journals in the Nature family no longer take copyright on the primary research articles we publish. Instead we ask authors to sign a licence for us to publish their work. US government employees sign a different licence.

### Editors and Contact Information

Like the other Nature titles, *Nature Cell Biology* has no external editorial board. Instead, all editorial decisions are made by a team of full-time professional editors. For information on their research backgrounds and scientific interests, see *About the Editors* [http://www.nature.com/ncb/about/about\\_eds/](http://www.nature.com/ncb/about/about_eds/)

A full list of journal staff appears on the masthead.

### Relationship to other Nature journals

*Nature Cell Biology* is editorially independent; its editors make their own decisions, independent of the other Nature journals. If a paper is rejected from one Nature journal, the authors can use an automated manuscript transfer service to submit the paper to another Nature journal via a link sent to them by the editor handling the manuscript. Authors should note that referees' comments (including any confidential comments to the editor) and identities are transferred to the editor of the second journal along with the manuscript. In that case, the journal editors will take the previous reviews into account when making their decision, although in some cases the editors may choose to take advice from additional or alternative referees. Alternatively, authors may choose to request a fresh review, in which case they should not use the automated transfer link, and the editors will evaluate the paper without reference to the previous review process. More details are available on the manuscript transfer service [http://www.nature.com/authors/author\\_services/transfer\\_manuscripts.html](http://www.nature.com/authors/author_services/transfer_manuscripts.html) and on the relationships between Nature titles. [http://www.nature.com/authors/author\\_services/about\\_nature\\_family.html](http://www.nature.com/authors/author_services/about_nature_family.html)

### Editorial and publishing policies

Please see authors & referees @ npg [<http://www.nature.com/authors/index.html>] for detailed information about author and referee services

and publication policies at the Nature family of journals. These journals, including *Nature Cell Biology*, share a number of common policies including the following:

- Author responsibilities
- License agreement and author copyright
- Embargo policy and press releases
- Use of experimental animals and human subjects
- Competing financial interests
- Availability of materials and data
- Digital image integrity and standards
- Security concerns
- Refutations and complaints
- Duplicate publications
- Confidentiality and pre-publicity
- Plagiarism and fabrication

### Impact Factor

The 2008 impact factor for *Nature Cell Biology* is 17.776, according to *ISI Journal Citation Reports*.

The 2008 impact factor represents the aggregate number of citations in 2008 of papers published in 2006 and 2007, divided by the total number of papers published in this period. A more detailed explanation of impact factors appears on the Thomson Reuters web site ([http://thomsonreuters.com/products\\_services/science/free/essays/impact\\_factor/](http://thomsonreuters.com/products_services/science/free/essays/impact_factor/)).

Further information can be obtained from our Editorials in the November 2002 and August 2003 and October 2005 issues of *Nature Cell Biology*.

### Abbreviation

The correct abbreviation for abstracting and indexing purposes is *Nat. Cell. Biol.*

### ISSN and EISSN

The international standard serial number (ISSN) for *Nature Cell Biology* is 1097-6256, and the electronic international standard serial number (EISSN) is 1476-4679.

### Further editorial information

Please see the following editorials for more information on various aspects of journal policy.

- November 2002 'Microarray data standards'
- January 2003 'The name game'
- January 2003 'A new section for the new year'
- January 2003 'Picture this'
- February 2003 'Cloning terror'
- March 2003 'Evolving NCB'
- June 2003 'Whither RNAi?'
- July 2003 'Editorial procedure reviewed'
- August 2003 'Making Impact'
- September 2003 'Molecular Biology, Cell Biology and NCB'
- November 2003 'NCB geography/democracy'
- December 2003 'Developing open access'
- Jan 2004 'Value added'
- April 2004 'Gel slicing and dicing: a recipe for disaster'
- June 2004 'Spotlight on membrane traffic'
- October 2004 'Images to reveal all?'
- January 2005 'Journal transfer made easy'
- January 2005 'The ultimate search engine?'

- March 2005 'Policy update'
- May 2005 'Editor seeks strong-minded researchers for lively debate...'
- July 2005 'Moving forward with cell migration'
- September 2005 'The web as originally intended'
- October 2005 'Delayed impact'
- November 2005 'Policy matters, policies that matter'
- February 2006 'Beautification and fraud'
- March 2006 'Appreciating data: warts, wrinkles and all'
- May 2006 'Sharing science'
- June 2006 'Reproducing data; Nothing to hide'
- August 2006 'Agreeing to disagree'

### Editorial Blogs

We encourage community participation in all Nature journal blogs. *Nautilus* [<http://blogs.nature.com/nautilus>] is a blog for authors and aspiring authors of Nature Publishing Group journals. *Peer-to-Peer* [<http://blogs.nature.com/peer-to-peer/>] is a blog for reviewers and is about peer review. Other Nature Publishing Group blogs can be found on the blog index page [<http://www.nature.com/blogs/index.html>].

## Primary research formats

An **Article** is a substantial novel research study, with a complex dataset often involving several techniques or approaches. The main text (including abstract, but excluding Methods, references and figure legends) is up to 3,500 words. The abstract is typically 150 words, unreferenced. Articles have up to 8 display items (figures and/or tables). An introduction (without heading) is followed by sections headed Results, Discussion and Methods. The Results and Methods should be divided by topical sub-headings. Methods should be restricted to 1,600 words and will appear online only. If statistical testing was used to analyze the data, the Methods section must contain a subsection on statistical analysis. References are limited to 70.

Articles include received/accepted dates. They may be accompanied by supplementary information, comprising four items of text, figures or movies. Articles are peer reviewed, and authors must provide a competing financial interests statement before publication.

A **Letter** reports an important novel research result, but is less substantial than an Article. This format begins with an introductory paragraph (not abstract) of approximately 180 words, summarizing the background, rationale, main results and implications. This paragraph should be referenced, as in Nature style, and should be considered part of main text, so that any subsequent introductory material avoids too much redundancy with the introductory paragraph. The text is limited to 2,500 words, including the introductory paragraph, but excluding Methods, references and figure legends. References are limited to 40. Letters should have no more than 5 display items (figures and/or tables). Letters are not divided by headings. If statistical testing was used to analyze the data, the Methods section must contain a subsection on statistical analysis.

Letters include received/accepted dates. They may be accompanied by supplementary information, usually comprising a limited number of text, figures or movies. Letters are peer reviewed, and authors must provide a competing financial interests statement before publication.

A **Brief Communication** reports a concise study of high quality and broad interest. Brief Communications begin with a brief unreferenced abstract (no more than 100 words), which will appear on Medline. The main text is typically 1,000-1,500 words, including abstract, but

excluding online Methods, references and figure legends, and contains no headings. Brief Communications normally have no more than 2 display items, although this may be flexible at the discretion of the editor. References are limited to 20. Article titles are omitted from the reference list.

Brief Communications include received/accepted dates. They may be accompanied by supplementary information. Brief Communications are peer reviewed, and authors must provide a competing financial interests statement before publication.

### Other Formats

**Correspondence** (formerly 'Letters to the Editor') is a flexible format that may include anything of interest to the journal's readers, from policy debates to announcements to 'refutations' of research papers. A Correspondence may describe primary research data, but only in summary form; this format is not intended for full presentation of data. Correspondence should never be more than one printed page, and usually much less. The number of references should not exceed 10 for either the Correspondence or its Reply, and article titles are omitted from the reference list. Titles for correspondence are supplied by the editors.

Authors must submit a competing financial interests statement, which is printed only if they declare that they have competing interests. In cases where a correspondence is critical of a previous research paper, the authors are normally given the option of publishing a brief reply. Criticism of opinions or other secondary matter does not involve an automatic right of reply.

**Refutations** are always peer reviewed. Other types of Correspondence may be peer reviewed at the editors' discretion.

**News and Views** are by prior arrangement only. They may be linked to articles in *Nature Cell Biology*, or they may focus on papers of exceptional significance that are published elsewhere. Unsolicited contributions will not normally be considered, although prospective authors are welcome to make proposals. News and Views are not peer reviewed. Authors must provide a competing financial interests statement before publication.

**Book Reviews** are by prior arrangement only, although suggestions are welcome. Book reviews are not peer reviewed. Authors must provide a competing financial interests statement before publication.

A **Review** is an authoritative, balanced and scholarly survey of recent developments in a research field. The requirement for balance need not prevent authors from proposing a specific viewpoint, but if there are controversies in the field, the authors must treat them in an even-handed way. Reviews are normally 3,000–4,000 words, and illustrations are strongly encouraged. References are limited to 140, with exceptions possible in special cases. Citations should be selective and, in the case of particularly important studies ( $\leq 10\%$  of all the references), we encourage authors to provide short annotations explaining why these are key contributions. The scope of a Review should be broad enough that it is not dominated by the work of a single laboratory, and particularly not by the authors' own work.

Review authors must provide a competing financial interests statement before publication. Received/accepted dates are not included. Reviews are always peer reviewed to ensure factual accuracy, appropriate citations and scholarly balance.

**Commentary** is a very flexible format; Commentaries may be on policy, science and society or purely scientific issues. The main criteria are that they should be of immediate interest to a broad readership and should be written in an accessible, non-technical style. Their length is typically 1–4 pages, although some may be longer. Because the

content is variable, the format is also flexible. Commentaries do not normally contain primary research data, although they may present 'sociological' data (funding trends, demographics, bibliographic data, etc.). References are limited to 25, and article titles are omitted from the reference list.

The related format **Historical Commentary** is a journalistic treatment of the history of a particular discovery or technical development. These pieces may be a personal account by one of the participants or may present strong personal opinions. This format does not necessarily seek scholarly balance, and it should be journalistic and accessible rather than scholarly in style.

Commentary authors must provide a competing financial interests statement before publication. Commentaries may be peer reviewed at the editors' discretion.

**Perspective** is a new format for scholarly reviews and discussions of the primary research literature that are too technical for a Commentary but do not meet the criteria for a Review—either because the scope is too narrow, or because the author is advocating a controversial position or a speculative hypothesis or discussing work primarily from one group. Two reviews advocating opposite sides in a research controversy are normally published as Perspectives. The text should not normally exceed 3000 words. References are limited to 70.

The related format **Historical Perspective** is a more technical account of a particular scientific development. Like other Perspectives, and in contrast to Historical Commentary, Historical Perspectives are scholarly reviews, including citation of key references, aiming to present a balanced account of the historical events, not merely personal opinions or reminiscences.

Perspective authors must provide a competing financial interests statement before publication. Received/accepted dates are not included. Perspectives are always peer reviewed.

## How to submit

### Online submission

We strongly prefer to receive manuscripts via our online submission system at <http://mts-ncb.nature.com>. Using this system, authors can upload manuscript files (text, figures and supplementary information, including video) directly to our office and check on the status of their manuscripts during the review process. In addition, reviewers can access the manuscript (in a highly secure fashion that maintains referee anonymity) over a direct internet link, which speeds the review process. Please consult our technical information on file formats and tips for using the system effectively are available at [http://mtsccommon.nature.com/tips/nres\\_tips.html](http://mtsccommon.nature.com/tips/nres_tips.html). Revisions, including manuscripts submitted after a presubmission inquiry, should be uploaded via the link provided in the editor's decision letter. Please do not submit revisions as new manuscripts.

### Submission policies

Submission to *Nature Cell Biology* is taken to imply that there is no significant overlap between the submitted manuscript and any other papers from the same authors under consideration or in press elsewhere. (Abstracts or unrefereed web preprints do not compromise novelty.) The authors must include copies of all related manuscripts with any overlap in authorship that are under consideration or in press elsewhere. If a related manuscript is submitted elsewhere while the manuscript is under consideration at *Nature Cell Biology*, a copy of the related manuscript should be sent to the editor.

The primary affiliation for each author should be the institution where the majority of their work was done. If an author has subsequently moved, the current address may also be stated.

If the manuscript includes personal communications, please provide a written statement of permission from any person who is quoted. E-mail permission messages are acceptable.

For bioinformatics manuscripts, please send four copies of a CD containing any new algorithms for data analysis along with other resources necessary to use the algorithm, such as the user manual or spreadsheets. The CDs should be mailed to Nature Cell Biology, Porters South, 4 Crinan Street, London N1 9XW, UK.

Further information on the review process and how editors make decisions please see the manuscript decisions page [[http://www.nature.com/ncb/authors/ed\\_process](http://www.nature.com/ncb/authors/ed_process)].

A high priority of *Nature Cell Biology* is that all papers be accessible to non-specialists. Manuscripts are subject to substantial editing to achieve this goal. After acceptance, a copy editor may make further changes so that the text and figures are readable and clear to those outside the field, and so that papers conform to our style. Contributors are sent proofs and are welcome to discuss proposed changes with the editors, but *Nature Cell Biology* reserves the right to make the final decision about matters of style and the size of figures.

The editors also reserve the right to reject a paper even after it has been accepted if it becomes apparent that there are serious problems with the scientific content or with violations of our publishing policies.

Additional editorial policies can be found on the Nature Journals joint policies page at [[http://www.nature.com/ncb/about/ed\\_policies](http://www.nature.com/ncb/about/ed_policies)]. This page includes information on manuscripts reviewed at other Nature journals, competing financial interests declarations, pre-publication publicity, deposition of data as a condition of publication, availability of data and reagents after publication, human and animal subjects, digital image integrity, biosecurity, refutations, complaints and correction of mistakes in the journal, duplicate publication, confidentiality and plagiarism.

### Costs

There is a charge of \$525 for the first colour figure and \$262.50 for each additional colour figure. Otherwise, there are no submission fees or page charges.

### Advance Online Publication

*Nature Cell Biology* provides Advance Online Publication (AOP) of research articles, which benefits authors with an earlier publication date and allows our readers access to accepted papers several weeks before they appear in print. Note that papers published online are definitive and may be altered only through the publication of a print corrigendum or erratum, so authors should make every effort to ensure that the page proofs are correct. All AOP articles are given a unique digital object identifier (DOI) number, which can be used to cite the paper before print publication. For details, please see 'About advance online publication' at [[http://www.nature.com/authors/author\\_services/about\\_aop.html](http://www.nature.com/authors/author_services/about_aop.html)]

### Covers and other artwork

Authors of accepted papers are encouraged to submit images for consideration as a cover. Cover images are normally linked to a specific paper in that issue, but we may also be able to use other images elsewhere in the journal, such as on the table of contents. Images are selected for their scientific interest and aesthetic appeal. Please send prints or electronic files (rather than slides) in the first instance. Please also include a clear and concise legend explaining the image.

### Preparing the manuscript

*Nature Cell Biology* is read by scientists from diverse backgrounds. In addition, many are not native English speakers. Authors should therefore give careful thought to how their findings may be communicated clearly. Although a shared basic knowledge of biology may be assumed, please bear in mind that the language and concepts that are standard in one subfield may be unfamiliar to non-specialists. Thus, technical jargon should be avoided as far as possible and clearly explained where its use is unavoidable. Abbreviations, particularly those that are not standard, should also be kept to a minimum. The background, rationale and main conclusions of the study should be clearly explained. Titles and abstracts in particular should be written in language that will be readily intelligible to any scientist. We strongly recommend that authors ask a colleague with different expertise to review the manuscript before submission, in order to identify concepts and terminology that may present difficulties to non-specialist readers.

The content types page describes types of contributions that may be submitted to the journal are described at [http://www.nature.com/ncb/authors/article\\_types](http://www.nature.com/ncb/authors/article_types), along with their length and figure limits. The journal's format requirements are described below.

Manuscripts reporting new structures should contain a table summarizing structural and refinement statistics. Templates for such tables describing NMR ([http://www.nature.com/ncb/pdf/nsmb\\_tables\\_nmr\\_f.pdf](http://www.nature.com/ncb/pdf/nsmb_tables_nmr_f.pdf)) and X-ray crystallography data ([http://www.nature.com/ncb/pdf/nsmb\\_tables\\_xray\\_f.pdf](http://www.nature.com/ncb/pdf/nsmb_tables_xray_f.pdf)) are available online. To facilitate assessment of the quality of the structural data, a stereo image of a portion of the electron density map (for crystallography papers) or of the superimposed lowest energy structures (>10; for NMR papers) should be provided with the submitted manuscript. If the reported structure represents a novel overall fold, a stereo image of the entire structure (as a backbone trace) should also be provided.

Please use British spelling throughout. At this time, we are not able to accept manuscripts in Word 2007 format.

Acknowledgments should be brief, and should not include thanks to anonymous referees and editors, or effusive comments. Grants may be specified. *Nature Cell Biology* requires an Author Contribution statement as described in the Authorship section of our joint Editorial policies ([http://www.nature.com/authors/editorial\\_policies/index.html](http://www.nature.com/authors/editorial_policies/index.html)).

The Methods section of original research articles will appear online only. Note that it will be copyedited as before and remain integral to the main paper online. Print readers will be directed to the online version of the paper for detailed methods and associated references. Please provide a Methods section with subsections detailing all the methods used in the paper. The Methods section should be no longer than 1600 words and should be placed at the very end of the manuscript, after the Acknowledgments, Author Contributions, figure legends and tables, but before the references.

A single list of references should be provided, with any new citations that appear in the Methods section numbered consecutively beginning after the last reference cited in the main text, figure legends and tables. The combined reference number in the main text, figure legends, tables and online Methods should not exceed 70 for 'Articles', 40 for 'Letters' and 20 for 'Brief Communications'.

References are numbered sequentially as they appear in the text, figure legends, tables and online Methods. Only one publication is given for each number, and footnotes are not used. Only papers that have been published or accepted by a named publication should be in the numbered list; meeting abstracts that are not published and papers in preparation should be mentioned in the text with a list of authors (or initials if any of the authors are co-authors of the present contribution).

URLs for web sites should be cited parenthetically in the text, not in the reference list; articles in formal, peer-reviewed online journals should be included in the text, not in the reference list. Grant details and acknowledgments are not permitted as numbered references.

All authors should be included in reference lists unless there are more than five, in which case only the first author should be given, followed by 'et al.'. Authors should be listed last name first, followed by a comma and initials of given names. Titles of cited articles are required for Articles, Letters, Perspectives and Reviews, but not for Commentaries, Brief Communications, Correspondence or News and Views. Titles of articles should be in Roman text and titles of books in italics; the first word of the title is capitalized, the title written exactly as it appears in the work cited, ending with a period. Journal names are italicized and abbreviated (with periods) according to common usage; refer to Index Medicus for details. Volume numbers appear in bold. For book citations, the publisher and city of publication are required (e.g., John Wiley & Sons, Hoboken, New Jersey, USA, 2003).

Figure legends for Articles or Letters begin with a brief title for the whole figure and continue with a short description of each panel and the symbols used, focusing on describing what is shown in the figure and de-emphasizing methodological details. Each legend should total no more than 250 words. Brief Communications have short figure legends (generally less than 100 words), which may include details of methods.

### Gene nomenclature

Authors should use approved nomenclature for gene symbols, and use symbols rather than italicized full names (*Ttn*, not *titin*). Please consult the appropriate nomenclature databases for correct gene names and symbols. A useful resource is LocusLink at <http://www.ncbi.nlm.nih.gov/LocusLink>. Approved human gene symbols are provided by HUGO Gene Nomenclature Committee (HGNC), e-mail: [hgnc@genenames.org](mailto:hgnc@genenames.org); see also [www.genenames.org](http://www.genenames.org). Approved mouse symbols are provided by The Jackson Laboratory, e-mail: [nomen@informatics.jax.org](mailto:nomen@informatics.jax.org); see also <http://www.informatics.jax.org/mgihome/nomen>.

For proposed gene names that are not already approved, please submit the gene symbols to the appropriate nomenclature committees as soon as possible, as these must be deposited and approved before publication of an article.

Avoid listing multiple names of genes (or proteins) separated by a slash, as in '*Oct4/Pou5f1*', as this is ambiguous (it could mean a ratio, a complex, alternative names or different subunits). Use one name throughout and include the other at first mention: '*Oct4* (also known as *Pou5f1*)'. See *Nature Cell Biology* 5, 1; 2003 for further details.

### Statistical guidelines

The description of all reported data that includes statistical testing must state the name of the statistical test used to generate error bars and P values, the number (n) of independent experiments underlying each data point (not replicate measures of one sample), and the actual P value for each test (not merely 'significant' or ' $P < .05$ ').

Descriptive statistics should include a clearly labeled measure of center (such as the mean or the median), and a clearly labeled measure of variability (such as standard deviation or range). Ranges are more appropriate than standard deviations or standard errors for small data sets. Standard error or confidence interval is appropriate to compare data to a control. Graphs should include clearly labeled error bars. Authors must state whether a number that follows the  $\pm$  sign is a standard error (s.e.m.) or a standard deviation (s.d.).

Since for complex biological experiments the number of independent repeats of a measurement often has to be limited for practical reasons, statistical measures with a very small n are commonplace. However, statistical measures applied to too small a sample size are not significant and they can suggest a false level of significance. For this reason, error bars should not be provided for  $n < 3$ . Instead, the actual individual data from each experiment should be plotted. If  $n < 5$  individual data should be plotted alongside an error bar. In cases where n is small, a justification for the use of the statistical test employed has to be provided. It is admissible to present a single 'typical result' of n experiments. If n is not based on independent experiments (that is n merely represents replicates of a measurement), it may still be meaningful to present statistics, but a detailed description of the repeated measurement is required.

A basic description of n, P and the test applied should be provided in the figure legends, and a further discussion of statistical methodology should be provided in the methods section. Authors must justify the use of a particular test and explain whether their data conform to the assumptions of the tests.

Three errors are particularly common:

**Multiple comparisons:** When making multiple statistical comparisons on a single data set, authors should explain how they adjusted the alpha level to avoid an inflated Type I error rate, or they should select statistical tests appropriate for multiple groups (such as ANOVA rather than a series of t-tests).

**Normal distribution:** Many statistical tests require that the data be approximately normally distributed; when using these tests, authors should explain how they tested their data for normality. If the data do not meet the assumptions of the test, then a non-parametric alternative should be used instead.

**Small sample size:** When the sample size is small (less than about 10), authors should use tests appropriate to small samples or justify their use of large-sample tests. A checklist to help authors minimize statistical errors is available at [http://www.nature.com/ncb/pdf/checklist\\_of\\_statistical\\_accuracy.pdf](http://www.nature.com/ncb/pdf/checklist_of_statistical_accuracy.pdf), although the guidelines are most pertinent to clinical data.

### Preparing the figures

Authors are responsible for obtaining permission to publish any figures or illustrations that are protected by copyright, including figures published elsewhere and pictures taken by professional photographers. The journal cannot publish images downloaded from the internet without appropriate permission.

Figures should be uploaded upon submission via our online submission system at <http://mts-ncb.nature.com>, in one of our preferred formats, if possible. Please use the smallest file size that provides sufficient resolution, preferably less than 1 MB, so that referees do not have to download extremely large files. When a paper is accepted, the editors will request high-resolution files suitable for publication.

Unnecessary figures and parts (panels) of figures and tables should be avoided: data presented in small tables or histograms, for instance, can generally be stated briefly in the text instead. Figures should not contain more than one panel unless the parts are logically connected; each panel of a multipart figure should be sized so that the whole figure can be reduced by the same amount and reproduced on the printed page at the smallest size at which essential details are visible. When a manuscript is accepted for publication, we will ask for high-resolution figure files, possibly in a different electronic format. This information will be included in the acceptance letter.

Lettering on figures should be Helvetica or Arial (for example, Helvetica); if possible, the same typeface in approximately the same font

size should be used for all figures in a paper. Use symbol font for Greek letters. Figures should be on a white background, and should avoid excessive boxing, unnecessary color, spurious decorative effects (such as three-dimensional 'skyscraper' histograms) and highly pixelated computer drawings. The vertical axis of histograms should not be truncated to exaggerate small differences. Labeling must be of sufficient size and contrast to be readable after appropriate reduction. The thinnest lines in the final figure should be no smaller than 0.25 point wide. Authors will see a proof of figures. Reasonable requests to enlarge figures will be considered, but editors and production staff will make the final decision on figure size. Any labelling on figure panels should remain on different levels and must **not** be flattened — panels need to be relabelled according to house style, and this requires removal of any text on figures.

Figures divided into parts should be labeled with a lower-case, bold **a**, **b**, and so on, in the same typesize as used elsewhere in the figure. Lettering in figures should be in lower-case type, with only the first letter of each label capitalized. Units should have a single space between the number and the unit, and follow SI nomenclature (for example, ms rather than msec) or the nomenclature common to a particular field. Thousands should be separated by commas (1,000). Unusual units or abbreviations should be spelled out in full or defined in the legend. Scale bars should be used rather than magnification factors, with the length of the bar defined in the legend rather than on the bar itself. In general, please use visual cues rather than verbal explanations, such as "open red triangles", in the legend.

Authors are encouraged to consider the needs of colorblind readers (a substantial minority of the male population) when choosing colors for figures. Many colorblind readers cannot interpret micrographs presented in green and red, for example. Thus, we encourage authors to submit micrographs in color combinations other than green and red.

If the manuscript is initially submitted in hard copy (which is no longer preferred and may cause delays), please follow the instructions below:

Figures should be presented on separate sheets of paper. Please include one original and three copies of sufficient quality for review. The figures should be attached to the review copies of the manuscript (rather than enclosed in a separate envelope). In general, multi-part figures should be arranged as they would appear in the final version. Please avoid sending oversized figures (larger than 8.5 x 11" or A4) wherever possible. Each copy should be marked with the figure number and the corresponding author's name. Reduction to the scale that will be used on the page is not necessary, but any special requirements (such as the separation distance of stereo pairs) should be clearly specified.

### Digital figures guidelines

Please read the digital images integrity and standards policy [[http://www.nature.com/authors/editorial\\_policies/plagiarism.html](http://www.nature.com/authors/editorial_policies/plagiarism.html)]. When possible, we prefer to use original digital figures to ensure the highest quality reproduction in the journal. When creating and submitting digital files, please follow the guidelines below.

### Formats

For publication, we use TIFF and EPS files in PC or Macintosh format, preferably from PhotoShop or Illustrator software. We cannot accept Freehand, Canvas, CorelDRAW or MacDrawPro files. These files must be converted to postscript (eps) format. For any figures submitted in photoshop or tiff format we require layered files to be sent whereby all text, arrows or additional attributes are placed on individual layers within the file.

For line art/charts/graphs we prefer to work with Adobe Illustrator AI or EPS files. We can also accept PDF, Powerpoint and PostScript files. Information on how to produce PostScript files can be found elsewhere.

### Resolution and figure quality

Figure files must be supplied at an appropriate resolution for print publication:

- Color, 300 d.p.i. minimum; please convert all color files into CMYK mode
- Grayscale, 600 d.p.i. minimum for blots and black & white photographs
- Line art, 1200 d.p.i. minimum for graphs and illustrations
- Please use sans serif typefaces such as Arial or Helvetica in your artwork and when labelling panels.
- Levels of grey should be differentiated by at least 20% (i.e. 20% black, 40% black, 60% black).
- Avoid layering type directly over shaded or textured areas.
- Avoid reversed type (white lettering on black background).
- Please ensure that multilayered images are not 'flattened'.

### Colour images

For printing purposes, all RGB colours need to be converted to CMYK (cyan/magenta/yellow/black). This can make colours less vibrant, so you may want to check a CMYK version of your figure before you send it to ensure that you are satisfied with the result.

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