DESCRIPTION

Metabolism promotes excellence in research by publishing high-quality original research papers, fast-tracking cutting-edge papers, research brief reports, mini-reviews, and other special articles related to all aspects of human metabolism. Work considered for publication in Metabolism includes studies in humans, animal and cellular models. Work with strong translational potential is prioritized. Metabolism will consider papers for publication in any aspect of translational and clinical metabolic research, including (but not limited to): Energy Expenditure and Obesity Metabolic Syndrome and Diabetes Nutrition, Exercise, and the Environment Genetics, Proteomics, and Metabolomics Carbohydrate, Lipid, and Protein Metabolism Endocrinology and Hypertension Mineral and Bone Metabolism Cardiovascular Diseases and Malignancies

Benefits to authors
We also provide many author benefits, such as free PDFs, a liberal copyright policy, special discounts on Elsevier publications and much more. Please click here for more information on our author services.

Please see our Guide for Authors for information on article submission. If you require any further information or help, please visit our Support Center.

Published in association with Metabolism Open.

IMPACT FACTOR

2019: 6.159 © Clarivate Analytics Journal Citation Reports 2020

ABSTRACTING AND INDEXING

Scopus
PubMed/Medline
Science Citation Index

EDITORIAL BOARD

Editor-in-Chief
Christos S. Mantzoros, Watertown, Massachusetts, United States
Editor Emeritus
James B. Field
Hilton Head Island, SC, USA

Associate Editors
Michael Andrew Hill, Columbia, Missouri, United States
Ghada El-Hajj Fuleihan, Beirut, Lebanon
Luigi Gnudi, London, United Kingdom
Per-Olof Hasselgren, Boston, Massachusetts, United States
Young-Bum Kim, Cambridge, Massachusetts, United States
Hiroaki Masuzaki, Nakagami-gun, Japan
Giuseppe Matarese, Naples, Italy
Stergios A. Polyzos, Thessaloniki, Greece
Despina Sanoudou, Athens, Greece
Manuel Tena-Sampere, Cordoba, Spain

Consulting Editors
George A. Bray, Baton Rouge, Louisiana, United States
C. Ronald Kahn, Boston, Massachusetts, United States

Editorial Board
Andrew Advani, Toronto, Ontario, Canada
Carlos A. Aguilar Salinas, Mexico City, Mexico
Demetrios A. Arvanitis, Athens, Greece
Arne Astrup, København, Denmark
Vassilios Gabriel Athyros, Thessaloniki, Greece
Salman Azhar, Palo Alto, California, United States
Rene Baudrand, Santiago de Chile, Chile
Per-Olof Berggren, Huddinge, Sweden
Gerard T. Berry, Boston, Massachusetts, United States
Zachary T. Bloomgarden, New York, New York, United States
Sebastien G. Bouret, Lille, France
V Daniel Castacane, Odessa, TX, United States
Theodore Ciaraldi, La Jolla, California, United States of America
Daniela Cota, Rennes, France
Kenneth Cusi, Gainesville, Florida, United States of America
Styliani Stella Daskalopoulou, Montreal, Quebec, Canada
Louis J. Elsas II, Miami, Florida, United States
John N. Fain, Memphis, Tennessee, United States
Gregory Freund, Chicago, Illinois, United States
Aleksander Giwercman, Malmö, Sweden
Julie Glowacki, Boston, Massachusetts, United States
Charles Glueck, Cincinnati, Ohio, United States
 Dimitrios G. Gaulis, Thessaloniki, Greece
Ioanna Gouni-Berthold, Cologne, Germany
Fabio Grassi, Lugano, Switzerland
George Grunberger, Bloomfield Hills, Michigan, United States
Oreste Gualillo, Santiago de Compostela, Spain
W. Elaine Hardman, Huntington, West Virginia, United States of America
Steven Heymsfield, Baton Rouge, Louisiana, United States
Joo Young Huh, Gwangju, Korea, Republic of
Linda Jaffe, Washington, D.C., Massachusetts, United States
Linong Ji, Beijing, China
Madhu Kalia, Philadelphia, Pennsylvania, United States of America
Gregory Kaltsas, Athens, Greece
Masao Kaneki, Boston, Massachusetts, United States
Eun Seok Kang, Seoul, South Korea
Nesrin Kartal Özer, Istanbul, Turkey
Niki Katsiki, Thessaloniki, Greece
Theodoros Kelesidis, Los Angeles, California, United States of America
Abbas Kitabchi, Memphis, Tennessee, United States
Fredric Kraemer, Palo Alto, California, United States
Robert Kraemer, Hammond, Louisiana, United States
Antonio La Cava, Los Angeles, California, United States of America
Faidon Magkos, Copenhagen, Missouri, Denmark
Ariadne Malamitsi-Puchner, Athens, Greece
Stefano Menini, Rome, Italy
Giovanna Muscogiuri, Napoli, Italy
Kazuwa Nakao, Kyoto, Japan
Ruben Nogueiras, Santiago de Compostela, Spain
Vera Novak, Boston, Massachusetts, United States
Michael Pagliassotti, Fort Collins, Colorado, United States of America
Kyong Soo Park, Seoul, South Korea
Kyung-Hee Park, Seoul, Korea, Republic of
Andreas F. H. Pfeiffer, Berlin, Germany
Catherine Postic, Paris, France
Kumaravel Rajakumar, Pittsburgh, Pennsylvania, United States of America
Manfredi Rizzo, Palermo, Italy
Alan Robinson, Los Angeles, California, United States of America
Emilio Ros, Barcelona, Spain
Neil B Ruderman, Boston, Massachusetts, United States
Mario J A Saad, Campinas, São Paulo, Brazil
Ernst Schaefer, Boston, Massachusetts, United States
Peter Schwarz, Dresden, Germany
Mireille J. Serlie, Amsterdam, Netherlands
Jochen Seufert, Freiburg, Germany
James R. Sowers, Columbia, Missouri, United States
Peter W Stacpoole, Gainesville, Florida, United States of America
Elliott Sternthal, Boston, Massachusetts, United States of America
Yu-Hua Tseng, Boston, Massachusetts, United States
Robert Tuttle, New York, United States of America
Gerald Watts, Perth, Western Australia, Australia
Mary Yannakoulia, Athens, Greece

Metabolism Editorial Office
Editorial Office
AIMS AND SCOPE

Metabolism promotes excellence in research by publishing high-quality original research papers, fast-tracking cutting-edge papers, brief reports, reviews, mini-reviews and meta-analyses, as well as editorials and commentaries related to all aspects of metabolism. Work considered for publication in Metabolism includes studies in humans, animal and cellular models. There is a special interest on randomized controlled trials and meta-analyses. Studies with strong translational potential is also prioritized.

Published in association with Metabolism Open.

Reporting guidelines checklist

Articles submitted to "Metabolism" should be prepared according to key reporting guidelines, as defined by the EQUATOR Network. Authors should submit their manuscript together with the appropriate for each article type guidelines checklist. The latter should be submitted as supplementary material.

The recommended reporting guidelines per article type are presented below. If the authors select to follow other reporting guidelines, they should take care to be appropriate for the article type they submit with.

Recommended reporting guidelines per article type:
"CONSORT" for Randomized controlled trials
"STROBE" for Observational studies
"ARRIVE" for preclinical animal studies
"PRISMA" for Systematic reviews and meta-analyses of randomized controlled trials
"MOOSE" for Systematic reviews and meta-analyses of observational studies
"AGREE" for Clinical practice guidelines
"STARD" for diagnostic accuracy studies
"CARE" for case reports

Submission of the reporting guidelines checklists are not required for editorials, commentaries, narrative reviews, narrative min-reviews and letters to the Editor.

For further information about reporting guidelines, authors should visit the EQUATOR Network website, where an updated list of guidelines with links to articles and checklists is maintained.

Original Research Papers

Original Research Papers describe original research findings. They should be no longer than 5000 words, excluding the title page, abstract, references, tables, and figure legends, but including the abbreviation list, acknowledgements, funding, disclosure statement, and author contributions. They should contain no more than 10 tables and figures combined and no more than 60 references. Their final accepted version should, in general, not exceed 8 printed journal pages; additional information may be included as a supplementary appendix, to be published online. There is a special interest on randomized controlled trials. Preregistration of randomized controlled trials in a database of clinical trials is a prerequisite for the submission.

Fast-Track Publications

Fast track publication is offered for concise studies of great novelty and broad interest to the readers of Metabolism. These manuscripts describe original research findings of exceptional novelty and importance, usually in a rapidly growing and competitive field. Submissions for Fast track publications will be peer-reviewed within 3 days of submission, after initial evaluation by the Editors and authors will be given up to 4 weeks for revisions; should these papers be accepted, articles will be published online within 4 weeks from acceptance and will appear in print in the next available issue of the journal.. The quality of fast track publication must fall within the top 5 percent of all articles published in Metabolism. Fast track publications could either have the format of a brief report or a regular report. A brief report must be no longer than 15,000 characters (1,500 - 1,800 words), including spaces, 2 display items, and abstract but excluding references. Abstract is typically a single paragraph of fewer than 150 words. Fast track brief report allows up to 30 references. A fast track regular report allows
up to 4,000 words, up to 100 references and normally has no more than 5 display items. Additional supplementary information (figures/tables) is allowed, but the number of supplementary displays can be equal to or less than the total number of main text displays.

**Brief Reports**

These manuscripts describe limited but novel, focused and straightforward original research findings. Preliminary data, pilot studies, case reports, case series, or studies with small sample sizes do not usually qualify, unless they are of exceptional quality, utilize novel methodologies, or report findings that can form the basis of future, more definitive studies and/or are of great interest to the journal’s readership. They should be no longer than 1500 words, excluding the title page, abstract, references, tables, and figure legends, but including the abbreviation list, acknowledgements, funding, disclosure statement, and author contributions. They should contain no more than 2 tables and figures combined and no more than 20 references. Their final accepted version should, in general, not exceed 3 printed journal pages; no additional information may be included. Other than the length, the requirements and review process are the same as for original research papers.

**Methods Papers**

These manuscripts describe the development of novel methodologies in the field of metabolic research, including significant refinements of well-established techniques. They should be concise but detailed enough so that the method can be readily reproduced. Methodologies utilizing proprietary, non-commercially available tools (whether by the authors themselves or an independent vendor) will not be considered. The requirements and review process are the same as for original research articles.

**Meta-analyses**

There is a special interest on meta-analyses. These articles systematically find, select, critique, and synthesize evidence relevant to well-defined questions in metabolic research. Meta-analyses of randomized controlled trials should follow PRISMA reporting guidelines, whereas those of observational studies should follow MOOSE reporting guidelines. A relevant checklist should be uploaded as a supplementary appendix (please, see on equator network for the relevant checklist). The requirements and review process are the same as for original research articles. Additional information (including references to disqualified papers and study summary tables) should be included as a supplementary appendix, to be published online.

**Review Articles**

Reviews should be a maximum of 5000 words, excluding the title page, abstract, references, tables, and figure legends, but including the abbreviation list, acknowledgements, funding, disclosure statement, and author contributions. Subheadings in the text are recommended to highlight the content of different sections. An unstructured summary of no more than 200 words is required. Reviews should contain no more than 10 tables and figures combined and no more than 150 references. Reviews are generally commissioned by the Editors but unsolicited articles will be considered.

**Mini-reviews**

Mini-Reviews should be a maximum of 3500 words, excluding the title page, abstract, references, tables, and figure legends, but including the abbreviation list, acknowledgements, funding, disclosure statement, and author contributions. Subheadings in the text are recommended to highlight the content of different sections. An unstructured summary of no more than 200 words is required. Reviews should contain no more than 6 tables and figures combined and no more than 100 references.

**Commentaries**

These articles are usually but not necessarily solicited by the journal editors and concisely address a timely or controversial issue of importance to the journal's readership, usually in response to work that has been published in the journal (typically, they are published in the same issue). They should be unstructured (without headings) and should be no longer than 1500 words, excluding the title page, references, tables, and figure legends, but including the abbreviation list, acknowledgements, funding, and disclosure statement (if applicable); no abstract or author contributions are required. They should contain no more than 2 tables and figures combined and no more than 50 references. Their final accepted version should, in general, not exceed 2 printed journal pages; no additional information may be included. These articles are not pre-screened and are usually reviewed by members of the editorial board.
**Editorials**
These articles are written by the journal editors or by invited authors. The requirements and review process are the same as for commentaries, although the scope of the articles may be more liberal.

**Letters**
These articles are unsolicited short commentaries related to specific points of agreement or disagreement with the work that has been published recently in the journal (namely, in the past 3 issues). They should be no longer than 500 words (all inclusive), contain no more than 1 table or figure, and no more than 15 references. Accepted letters will only appear online, not in print.

**EDITORIAL PROCESS**
Metabolism publishes several categories of articles; all submissions must conform to the journal’s reporting and style requirements and must be written in standard scientific English language. New submissions, except for solicited articles (eg, mini-reviews, commentaries), will be initially evaluated in depth by the editorial team that will decide on the overall quality of the work and its suitability for Metabolism. Manuscripts that do not conform to the general criteria for publication will be returned to the authors without detailed review, typically within 14 days. This will facilitate prompt notification of authors and will allow expedited resubmission of the authors’ work elsewhere. Otherwise, manuscripts will be sent for formal review immediately. The editorial board will make every effort to reach initial decision on these manuscripts within 4-6 weeks from the submission date. If revisions are a condition of publication, ~8 weeks will be provided to re-submit a revised version of the manuscript. Accepted manuscripts will generally be published no later than 4 months from acceptance. The journal does not require submission or publication charges.

Please direct any queries to the Editorial Office: metabolism@elsevier.com or to Andrew Miller, Executive Publisher at andrew.miller@elsevier.com

**Submission checklist**
You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

**Ensure that the following items are present:**

One author has been designated as the corresponding author with contact details:
- E-mail address
- Full postal address

All necessary files have been uploaded:
**Manuscript:**
- Include keywords
- All figures (include relevant captions)
- All tables (including titles, description, footnotes)
- Ensure all figure and table citations in the text match the files provided
- Indicate clearly if color should be used for any figures in print
**Graphical Abstracts / Highlights files** (where applicable)
**Supplemental files** (where applicable)

Further considerations
- Manuscript has been 'spell checked' and 'grammar checked'
- All references mentioned in the Reference List are cited in the text, and vice versa
- Permission has been obtained for use of copyrighted material from other sources (including the Internet)
- A competing interests statement is provided, even if the authors have no competing interests to declare
- Journal policies detailed in this guide have been reviewed
- Referee suggestions and contact details provided, based on journal requirements

For further information, visit our Support Center.

**BEFORE YOU BEGIN**
Ethics in publishing
Please see our information pages on Ethics in publishing and Ethical guidelines for journal publication.

Declaration of interest
All authors must disclose any financial and personal relationships with other people or organizations that could inappropriately influence (bias) their work. Examples of potential competing interests include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/registrations, and grants or other funding. Authors must disclose any interests in two places: 1. A summary declaration of interest statement in the title page file (if double anonymized) or the manuscript file (if single anonymized). If there are no interests to declare then please state this: 'Declarations of interest: none'. This summary statement will be ultimately published if the article is accepted. 2. Detailed disclosures as part of a separate Declaration of Interest form, which forms part of the journal's official records. It is important for potential interests to be declared in both places and that the information matches. More information.

Submission declaration and verification
Submission of an article implies that the work described has not been published previously (except in the form of an abstract, a published lecture or academic thesis, see Multiple, redundant or concurrent publication for more information), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. To verify originality, your article may be checked by the originality detection service Crossref Similarity Check.

Preprints
Please note that preprints can be shared anywhere at any time, in line with Elsevier’s sharing policy. Sharing your preprints e.g. on a preprint server will not count as prior publication (see Multiple, redundant or concurrent publication for more information).

Use of inclusive language
Inclusive language acknowledges diversity, conveys respect to all people, is sensitive to differences, and promotes equal opportunities. Content should make no assumptions about the beliefs or commitments of any reader; contain nothing which might imply that one individual is superior to another on the grounds of age, gender, race, ethnicity, culture, sexual orientation, disability or health condition; and use inclusive language throughout. Authors should ensure that writing is free from bias, stereotypes, slang, reference to dominant culture and/or cultural assumptions. We advise to seek gender neutrality by using plural nouns ("clinicians, patients/clients") as default/wherever possible to avoid using "he, she," or "he/she." We recommend avoiding the use of descriptors that refer to personal attributes such as age, gender, race, ethnicity, culture, sexual orientation, disability or health condition unless they are relevant and valid. These guidelines are meant as a point of reference to help identify appropriate language but are by no means exhaustive or definitive.

Author contributions
For transparency, we encourage authors to submit an author statement file outlining their individual contributions to the paper using the relevant CRedit (CRediT) roles: Conceptualization; Data curation; Formal analysis; Funding acquisition; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Roles/Writing - original draft; Writing - review & editing. Authorship statements should be formatted with the names of authors first and CRediT role(s) following. More details and an example

Authorship
All authors should have made substantial contributions to all of the following: (1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, (3) final approval of the version to be submitted.

Changes to authorship
Authors are expected to consider carefully the list and order of authors before submitting their manuscript and provide the definitive list of authors at the time of the original submission. Any addition, deletion or rearrangement of author names in the authorship list should be made only before the manuscript has been accepted and only if approved by the journal Editor. To request such a change, the Editor must receive the following from the corresponding author: (a) the reason
for the change in author list and (b) written confirmation (e-mail, letter) from all authors that they agree with the addition, removal or rearrangement. In the case of addition or removal of authors, this includes confirmation from the author being added or removed. Only in exceptional circumstances will the Editor consider the addition, deletion or rearrangement of authors after the manuscript has been accepted. While the Editor considers the request, publication of the manuscript will be suspended. If the manuscript has already been published in an online issue, any requests approved by the Editor will result in a corrigendum.

Clinical trial results
In line with the position of the International Committee of Medical Journal Editors, the journal will not consider results posted in the same clinical trials registry in which primary registration resides to be prior publication if the results posted are presented in the form of a brief structured (less than 500 words) abstract or table. However, divulging results in other circumstances (e.g., investors' meetings) is discouraged and may jeopardise consideration of the manuscript. Authors should fully disclose all posting in registries of results of the same or closely related work.

Registration of clinical trials
Registration in a public clinical trials registry is a condition for publication of clinical trials in this journal in accordance with International Committee of Medical Journal Editors recommendations. Trials must register at or before the onset of patient enrolment. The clinical trial registration number should be included at the end of the abstract of the article. A clinical trial is defined as any research study that prospectively assigns human participants or groups of humans to one or more health-related interventions to evaluate the effects of health outcomes. Health-related interventions include any intervention used to modify a biomedical or health-related outcome (for example drugs, surgical procedures, devices, behavioural treatments, dietary interventions, and process-of-care changes). Health outcomes include any biomedical or health-related measures obtained in patients or participants, including pharmacokinetic measures and adverse events. Purely observational studies (those in which the assignment of the medical intervention is not at the discretion of the investigator) will not require registration.

Article transfer service
This journal is part of our Article Transfer Service. This means that if the Editor feels your article is more suitable in one of our other participating journals, then you may be asked to consider transferring the article to one of those. If you agree, your article will be transferred automatically on your behalf with no need to reformat. Please note that your article will be reviewed again by the new journal. More information.

Copyright
Upon acceptance of an article, authors will be asked to complete a 'Journal Publishing Agreement' (see more information on this). An e-mail will be sent to the corresponding author confirming receipt of the manuscript together with a 'Journal Publishing Agreement' form or a link to the online version of this agreement.

Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. Permission of the Publisher is required for resale or distribution outside the institution and for all other derivative works, including compilations and translations. If excerpts from other copyrighted works are included, the author(s) must obtain written permission from the copyright owners and credit the source(s) in the article. Elsevier has preprinted forms for use by authors in these cases.

For gold open access articles: Upon acceptance of an article, authors will be asked to complete a 'License Agreement' (more information). Permitted third party reuse of gold open access articles is determined by the author's choice of user license.

Author rights
As an author you (or your employer or institution) have certain rights to reuse your work. More information.

Elsevier supports responsible sharing
Find out how you can share your research published in Elsevier journals.
Role of the funding source
You are requested to identify who provided financial support for the conduct of the research and/or preparation of the article and to briefly describe the role of the sponsor(s), if any, in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication. If the funding source(s) had no such involvement then this should be stated.

Open access
Please visit our Open Access page for more information.

Elsevier Researcher Academy
Researcher Academy is a free e-learning platform designed to support early and mid-career researchers throughout their research journey. The "Learn" environment at Researcher Academy offers several interactive modules, webinars, downloadable guides and resources to guide you through the process of writing for research and going through peer review. Feel free to use these free resources to improve your submission and navigate the publication process with ease.

Language (usage and editing services)
Please write your text in good English (American or British usage is accepted, but not a mixture of these). Authors who feel their English language manuscript may require editing to eliminate possible grammatical or spelling errors and to conform to correct scientific English may wish to use the English Language Editing service available from Elsevier's Author Services.

Informed consent and patient details
Studies on patients or volunteers require ethics committee approval and informed consent, which should be documented in the paper. Appropriate consents, permissions and releases must be obtained where an author wishes to include case details or other personal information or images of patients and any other individuals in an Elsevier publication. Written consents must be retained by the author but copies should not be provided to the journal. Only if specifically requested by the journal in exceptional circumstances (for example if a legal issue arises) the author must provide copies of the consents or evidence that such consents have been obtained. For more information, please review the Elsevier Policy on the Use of Images or Personal Information of Patients or other Individuals. Unless you have written permission from the patient (or, where applicable, the next of kin), the personal details of any patient included in any part of the article and in any supplementary materials (including all illustrations and videos) must be removed before submission.

Submission
Our online submission system guides you stepwise through the process of entering your article details and uploading your files. The system converts your article files to a single PDF file used in the peer-review process. Editable files (e.g., Word, LaTeX) are required to typeset your article for final publication. All correspondence, including notification of the Editor's decision and requests for revision, is sent by e-mail.

Submit your article
Please submit your article via https://www.editorialmanager.com/metabolism.

Referees
Please submit the names and institutional e-mail addresses of several potential referees. For more details, visit our Support site. Note that the editor retains the sole right to decide whether or not the suggested reviewers are used.

PREPARATION

Peer review
This journal operates a single anonymized review process. All contributions will be initially assessed by the editor for suitability for the journal. Papers deemed suitable are then typically sent to a minimum of two independent expert reviewers to assess the scientific quality of the paper. The Editor is responsible for the final decision regarding acceptance or rejection of articles. The Editor's decision is final. Editors are not involved in decisions about papers which they have written themselves or have been written by family members or colleagues or which relate to products or services in which the editor has an interest. Any such submission is subject to all of the journal's usual procedures, with peer review handled independently of the relevant editor and their research groups. More information on types of peer review.
Use of word processing software
It is important that the file be saved in the native format of the word processor used. The text should be in single-column format. Keep the layout of the text as simple as possible. Most formatting codes will be removed and replaced on processing the article. In particular, do not use the word processor's options to justify text or to hyphenate words. However, do use bold face, italics, subscripts, superscripts etc. When preparing tables, if you are using a table grid, use only one grid for each individual table and not a grid for each row. If no grid is used, use tabs, not spaces, to align columns. The electronic text should be prepared in a way very similar to that of conventional manuscripts (see also the Guide to Publishing with Elsevier). Note that source files of figures, tables and text graphics will be required whether or not you embed your figures in the text. See also the section on Electronic artwork.

To avoid unnecessary errors you are strongly advised to use the 'spell-check' and 'grammar-check' functions of your word processor.

Article structure
Subdivision - numbered sections
Divide your article into clearly defined and numbered sections. Subsections should be numbered 1.1 (then 1.1.1, 1.1.2, ...), 1.2, etc. (the abstract is not included in section numbering). Use this numbering also for internal cross-referencing: do not just refer to 'the text'. Any subsection may be given a brief heading. Each heading should appear on its own separate line.

Introduction
State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

Material and methods
Provide sufficient details to allow the work to be reproduced by an independent researcher. Methods that are already published should be summarized, and indicated by a reference. If quoting directly from a previously published method, use quotation marks and also cite the source. Any modifications to existing methods should also be described.

Theory/calculation
A Theory section should extend, not repeat, the background to the article already dealt with in the Introduction and lay the foundation for further work. In contrast, a Calculation section represents a practical development from a theoretical basis.

Results
Results should be clear and concise.

Discussion
This should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

Conclusions
The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

Appendices
If there is more than one appendix, they should be identified as A, B, etc. Formulae and equations in appendices should be given separate numbering: Eq. (A.1), Eq. (A.2), etc.; in a subsequent appendix, Eq. (B.1) and so on. Similarly for tables and figures: Table A.1; Fig. A.1, etc.

Essential title page information
• Title. Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible.
• Author names and affiliations. Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. You can add your name between parentheses in your own script behind the English transliteration. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower-case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.
• **Corresponding author.** Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. This responsibility includes answering any future queries about Methodology and Materials. **Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author.**

• **Present/permanent address.** If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

**Highlights**

Highlights are mandatory for this journal as they help increase the discoverability of your article via search engines. They consist of a short collection of bullet points that capture the novel results of your research as well as new methods that were used during the study (if any). Please have a look at the examples here: example Highlights.

Highlights should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point).

**Structured abstract**

A structured abstract, by means of appropriate headings, should provide the context or background for the research and should state its purpose, basic procedures (selection of study subjects or laboratory animals, observational and analytical methods), main findings (giving specific effect sizes and their statistical significance, if possible), and principal conclusions. It should emphasize new and important aspects of the study or observations.

**Keywords**

Immediately after the abstract, provide a maximum of 6 keywords, using American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, 'and', 'of'). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

**Abbreviations**

Define abbreviations that are not standard in this field in a footnote to be placed on the first page of the article. Such abbreviations that are unavoidable in the abstract must be defined at their first mention there, as well as in the footnote. Ensure consistency of abbreviations throughout the article.

**Acknowledgements**

Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

**Formatting of funding sources**

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, please include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Units**

Follow internationally accepted rules and conventions: use the international system of units (SI). If other units are mentioned, please give their equivalent in SI.
Math formulae
Please submit math equations as editable text and not as images. Present simple formulae in line with normal text where possible and use the solidus (/) instead of a horizontal line for small fractional terms, e.g., X/Y. In principle, variables are to be presented in italics. Powers of e are often more conveniently denoted by exp. Number consecutively any equations that have to be displayed separately from the text (if referred to explicitly in the text).

Footnotes
Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors can build footnotes into the text, and this feature may be used. Otherwise, please indicate the position of footnotes in the text and list the footnotes themselves separately at the end of the article. Do not include footnotes in the Reference list.

Artwork
Electronic artwork
General points
- Make sure you use uniform lettering and sizing of your original artwork.
- Embed the used fonts if the application provides that option.
- Aim to use the following fonts in your illustrations: Arial, Courier, Times New Roman, Symbol, or use fonts that look similar.
- Number the illustrations according to their sequence in the text.
- Use a logical naming convention for your artwork files.
- Provide captions to illustrations separately.
- Size the illustrations close to the desired dimensions of the published version.
- Submit each illustration as a separate file.
- Ensure that color images are accessible to all, including those with impaired color vision.

A detailed guide on electronic artwork is available.
You are urged to visit this site; some excerpts from the detailed information are given here.

Formats
If your electronic artwork is created in a Microsoft Office application (Word, PowerPoint, Excel) then please supply 'as is' in the native document format.
Regardless of the application used other than Microsoft Office, when your electronic artwork is finalized, please 'Save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/halftone combinations given below):
EPS (or PDF): Vector drawings, embed all used fonts.
TIFF (or JPEG): Color or grayscale photographs (halftones), keep to a minimum of 300 dpi.
TIFF (or JPEG): Bitmapped (pure black & white pixels) line drawings, keep to a minimum of 1000 dpi.
TIFF (or JPEG): Combinations bitmapped line/half-tone (color or grayscale), keep to a minimum of 500 dpi.

Please do not:
- Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); these typically have a low number of pixels and limited set of colors;
- Supply files that are too low in resolution;
- Submit graphics that are disproportionately large for the content.

Color artwork
Please make sure that artwork files are in an acceptable format (TIFF (or JPEG), EPS (or PDF) or MS Office files) and with the correct resolution. If, together with your accepted article, you submit usable color figures then Elsevier will ensure, at no additional charge, that these figures will appear in color online (e.g., ScienceDirect and other sites) in addition to color reproduction in print. Further information on the preparation of electronic artwork.

Illustration services
Elsevier's Author Services offers Illustration Services to authors preparing to submit a manuscript but concerned about the quality of the images accompanying their article. Elsevier's expert illustrators can produce scientific, technical and medical-style images, as well as a full range of charts, tables and graphs. Image 'polishing' is also available, where our illustrators take your image(s) and improve them to a professional standard. Please visit the website to find out more.
Figure captions
Ensure that each illustration has a caption. Supply captions separately, not attached to the figure. A caption should comprise a brief title (not on the figure itself) and a description of the illustration. Keep text in the illustrations themselves to a minimum but explain all symbols and abbreviations used.

Tables
Please submit tables as editable text and not as images. Tables can be placed either next to the relevant text in the article, or on separate page(s) at the end. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules and shading in table cells.

References
Citation in text
Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

Reference links
Increased discoverability of research and high quality peer review are ensured by online links to the sources cited. In order to allow us to create links to abstracting and indexing services, such as Scopus, CrossRef and PubMed, please ensure that data provided in the references are correct. Please note that incorrect surnames, journal/book titles, publication year and pagination may prevent link creation. When copying references, please be careful as they may already contain errors. Use of the DOI is highly encouraged.

A DOI is guaranteed never to change, so you can use it as a permanent link to any electronic article. An example of a citation using DOI for an article not yet in an issue is: VanDecar J.C., Russo R.M., James D.E., Ambeh W.B., Franke M. (2003). Aseismic continuation of the Lesser Antilles slab beneath northeastern Venezuela. Journal of Geophysical Research, https://doi.org/10.1029/2001JB000884. Please note the format of such citations should be in the same style as all other references in the paper.

Web references
As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

Data references
This journal encourages you to cite underlying or relevant datasets in your manuscript by citing them in your text and including a data reference in your Reference List. Data references should include the following elements: author name(s), dataset title, data repository, version (where available), year, and global persistent identifier. Add [dataset] immediately before the reference so we can properly identify it as a data reference. The [dataset] identifier will not appear in your published article.

References in a special issue
Please ensure that the words 'this issue' are added to any references in the list (and any citations in the text) to other articles in the same Special Issue.

Reference management software
Most Elsevier journals have their reference template available in many of the most popular reference management software products. These include all products that support Citation Style Language styles, such as Mendeley. Using citation plug-ins from these products, authors only need to select the appropriate journal template when preparing their article, after which citations and bibliographies will be automatically formatted in the journal's style. If no template is yet available for this journal, please follow the format of the sample references and citations as shown in this Guide. If you use reference management software, please ensure that you remove all field codes before submitting the electronic manuscript. More information on how to remove field codes from different reference management software.
Users of Mendeley Desktop can easily install the reference style for this journal by clicking the following link:
http://open.mendeley.com/use-citation-style/metabolism

When preparing your manuscript, you will then be able to select this style using the Mendeley plugins for Microsoft Word or LibreOffice.

Reference formatting
There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the article number or pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct. If you do wish to format the references yourself they should be arranged according to the following examples:

Reference style
Text: Indicate references by number(s) in square brackets in line with the text. The actual authors can be referred to, but the reference number(s) must always be given.
List: Number the references (numbers in square brackets) in the list in the order in which they appear in the text.

Examples:
Reference to a journal publication:
Reference to a journal publication with an article number:
Reference to a book:
Reference to a chapter in an edited book:
Reference to a website:
Reference to a dataset:

Note shortened form for last page number. e.g., 51–9, and that for more than 6 authors the first 6 should be listed followed by 'et al.' For further details you are referred to 'Uniform Requirements for Manuscripts submitted to Biomedical Journals' (J Am Med Assoc 1997;277:927–34) (see also Samples of Formatted References).

Journal abbreviations source
Journal names should be abbreviated according to the List of Title Word Abbreviations.

Data visualization
Include interactive data visualizations in your publication and let your readers interact and engage more closely with your research. Follow the instructions here to find out about available data visualization options and how to include them with your article.

Supplementary material
Supplementary material such as applications, images and sound clips, can be published with your article to enhance it. Submitted supplementary items are published exactly as they are received (Excel or PowerPoint files will appear as such online). Please submit your material together with the article and supply a concise, descriptive caption for each supplementary file. If you wish to make changes to supplementary material during any stage of the process, please make sure to provide an updated file. Do not annotate any corrections on a previous version. Please switch off the 'Track Changes' option in Microsoft Office files as these will appear in the published version.
**Research data**

This journal encourages and enables you to share data that supports your research publication where appropriate, and enables you to interlink the data with your published articles. Research data refers to the results of observations or experimentation that validate research findings. To facilitate reproducibility and data reuse, this journal also encourages you to share your software, code, models, algorithms, protocols, methods and other useful materials related to the project.

Below are a number of ways in which you can associate data with your article or make a statement about the availability of your data when submitting your manuscript. If you are sharing data in one of these ways, you are encouraged to cite the data in your manuscript and reference list. Please refer to the "References" section for more information about data citation. For more information on depositing, sharing and using research data and other relevant research materials, visit the research data page.

**Data linking**

If you have made your research data available in a data repository, you can link your article directly to the dataset. Elsevier collaborates with a number of repositories to link articles on ScienceDirect with relevant repositories, giving readers access to underlying data that gives them a better understanding of the research described.

There are different ways to link your datasets to your article. When available, you can directly link your dataset to your article by providing the relevant information in the submission system. For more information, visit the database linking page.

For supported data repositories a repository banner will automatically appear next to your published article on ScienceDirect.

In addition, you can link to relevant data or entities through identifiers within the text of your manuscript, using the following format: Database: xxxx (e.g., TAIR: AT1G01020; CCDC: 734053; PDB: 1XFN).

**Mendeley Data**

This journal supports Mendeley Data, enabling you to deposit any research data (including raw and processed data, video, code, software, algorithms, protocols, and methods) associated with your manuscript in a free-to-use, open access repository. During the submission process, after uploading your manuscript, you will have the opportunity to upload your relevant datasets directly to Mendeley Data. The datasets will be listed and directly accessible to readers next to your published article online.

For more information, visit the Mendeley Data for journals page.

**Data statement**

To foster transparency, we encourage you to state the availability of your data in your submission. This may be a requirement of your funding body or institution. If your data is unavailable to access or unsuitable to post, you will have the opportunity to indicate why during the submission process, for example by stating that the research data is confidential. The statement will appear with your published article on ScienceDirect. For more information, visit the Data Statement page.

**AFTER ACCEPTANCE**

**Online proof correction**

Corresponding authors will receive an e-mail with a link to our online proofing system, allowing annotation and correction of proofs online. The environment is similar to MS Word: in addition to editing text, you can also comment on figures/tables and answer questions from the Copy Editor. Web-based proofing provides a faster and less error-prone process by allowing you to directly type your corrections, eliminating the potential introduction of errors.

If preferred, you can still choose to annotate and upload your edits on the PDF version. All instructions for proofing will be given in the e-mail we send to authors, including alternative methods to the online version and PDF.
We will do everything possible to get your article published quickly and accurately - please upload all of your corrections within 48 hours. It is important to ensure that all corrections are sent back to us in one communication. Please check carefully before replying, as inclusion of any subsequent corrections cannot be guaranteed. Proofreading is solely your responsibility. Note that Elsevier may proceed with the publication of your article if no response is received.

**Online proof correction**

To ensure a fast publication process of the article, we kindly ask authors to provide us with their proof corrections within two days. Corresponding authors will receive an e-mail with a link to our online proofing system, allowing annotation and correction of proofs online. The environment is similar to MS Word: in addition to editing text, you can also comment on figures/tables and answer questions from the Copy Editor. Web-based proofing provides a faster and less error-prone process by allowing you to directly type your corrections, eliminating the potential introduction of errors. If preferred, you can still choose to annotate and upload your edits on the PDF version. All instructions for proofing will be given in the e-mail we send to authors, including alternative methods to the online version and PDF.

We will do everything possible to get your article published quickly and accurately. Please use this proof only for checking the typesetting, editing, completeness and correctness of the text, tables and figures. Significant changes to the article as accepted for publication will only be considered at this stage with permission from the Editor. It is important to ensure that all corrections are sent back to us in one communication. Please check carefully before replying, as inclusion of any subsequent corrections cannot be guaranteed. Proofreading is solely your responsibility.

**Offprints**

The corresponding author will, at no cost, receive a customized Share Link providing 50 days free access to the final published version of the article on ScienceDirect. The Share Link can be used for sharing the article via any communication channel, including email and social media. For an extra charge, paper offprints can be ordered via the offprint order form which is sent once the article is accepted for publication. Both corresponding and co-authors may order offprints at any time via Elsevier's Author Services. Corresponding authors who have published their article gold open access do not receive a Share Link as their final published version of the article is available open access on ScienceDirect and can be shared through the article DOI link.

**AUTHOR INQUIRIES**

Visit the Elsevier Support Center to find the answers you need. Here you will find everything from Frequently Asked Questions to ways to get in touch.

You can also check the status of your submitted article or find out when your accepted article will be published.

© Copyright 2018 Elsevier | https://www.elsevier.com