

Guidelines for Referees of Scientific Articles for *Medical Physics*

Table of Contents

This document provides detailed guidance to Referees on how to review scientific papers (Research Articles, Technical Notes, and Medical Physics Letters) that have been submitted to *Medical Physics*. To efficiently navigate through this document, you can use the Adobe Acrobat navigation tools. Left click on the desired heading below to access the corresponding text and Alt-left arrow to return to the Table of Contents. Alternatively, you can open the Acrobat navigation pane by left clicking on View > Show/Hide> Navigation Panes>Bookmarks.

Contents

1.	General Guidelines	2
1.1	INVITATION AND DEADLINES	2
1.2	CONFLICT OF INTEREST	2
1.3	OTHER ETHICAL ISSUES.....	3
1.4	COURTEOUS AND PROFESSIONAL TONE OF REVIEWS	3
1.5	LANGUAGE AND GRAMMAR ISSUES.....	3
1.6	REFeree RESPONSIBILITIES AND LIMITS.....	4
1.7	OTHER CONSIDERATIONS	4
2.	Criteria for publication in <i>Medical Physics</i>	4
2.1	JOURNAL AIMS AND SCOPE	4
2.2	GENERAL CRITERIA FOR PUBLICATION IN MEDICAL PHYSICS	5
2.2.1	Novelty	5
2.2.2	Impact.....	6
2.2.3	Scientific rigor.....	6
2.2.4	Clinical Physics Papers	6
2.2.5	Manuscript type-specific guidance	6
3.	Template section-specific review guidance	7
3.1	OVERALL RATING	7
3.2	OVERALL ASSESSMENT	8
3.3	NOVELTY OF MANUSCRIPT IN ITS CURRENT FORM.....	9
3.4	FREE FORM REVIEW	9
3.5	RECOMMENDATIONS FOR IMPROVING THE MANUSCRIPT	9
3.6	READABILITY	9
3.7	TITLE	9
3.8	ABSTRACT.....	9
3.9	INTRODUCTION	10
3.10	METHODS	10
3.11	RESULTS.....	11
3.12	DISCUSSION.....	11
3.13	CONCLUSIONS.....	12
3.14	FIGURES	12
3.15	TABLES	12
4.	Other review considerations	12
4.1	SI UNITS.....	12
4.2	REFERENCES	13

Guidelines for Referees of Scientific Articles for *Medical Physics*

1. General Guidelines

Every scientific article submitted to *Medical Physics* is peer-reviewed by individuals selected for their expertise and reputation in the topic of the article, as well as their objectivity and experience in assessing the scientific merit and clarity of presentation of scientific articles. Because you meet these criteria, you have been asked to review an article for *Medical Physics*. The Journal's editors and associate editors appreciate your willingness to serve in this capacity. Your review will contribute to the stature and impact of the Journal as a forum for communicating cutting-edge medical physics science to the scholarly and clinical community. Your evaluation will help the author(s) present their research in an understandable and succinct manner. These guidelines cover scientific articles, including Technical Notes, Research Articles, and Medical Physics Letters. Other types of articles, including Consensus Reports, Review Articles, Dataset Articles, and Future of Medical Physics Articles have their own specialized review guidelines.

Your review should provide a critical and impersonal evaluation that includes suggestions to be considered and actions to be taken that you consider necessary for you to recommend to the Editor that the article be accepted. Below are some general considerations.

1.1 Invitation and Deadlines

Please respond promptly to a request to serve as a referee. For scientific articles, we expect reviews to be completed within 2 weeks from the date you accept the invitation, unless you have negotiated a longer time with the Editor or Associate Editor. If you are unable to meet this requirement, please decline the invitation to review at your earliest opportunity so that we can recruit an alternative referee. The Associate Editor will greatly appreciate your suggestions for alternative referees.

- Once you accept the invitation, you will receive a “chaser” message reminding you that your review is due soon 3 days before the deadline. If your review is late, you will receive increasingly aggressive reminders and pleas to submit your review at 3, 8, and 13 days after the due date.
- If you do not respond with a review or request for extension within 15 days after the due date, your review will be closed and the Associate Editor asked to recruit another referee.

Requests for additional time should be routed to medphys@wiley.com. Extensions up to 14 days will be automatically granted by editorial staff. Requests for longer delays will be granted only if the Associate Editor concurs.

1.2 Conflict of Interest

Before you accept an assignment, you should confirm that you have no conflicts-of-interest (COI) with the article authors. *Medical Physics* generally follows NIH grant review rules (See https://grants.nih.gov/grants/peer/peer_coi.htm). In general, you should decline the assignment if

- You are employed by the same department or academic unit as one of the co-authors.
- In the last three years, you have mentored, collaborated with, or coauthored scientific papers with any of the authors.

- You or your family could financially or otherwise benefit from acceptance or rejection of the article or delaying its editorial decision..
- You are close personal friend, relative or adversary of a co-author or financially benefit from acceptance or rejection of the paper.
- Any other situation that could cause a reasonable person with all the relevant facts to question your impartiality or that leads you to question your own objectivity.

If you feel that you could provide an objective and fair review despite having one of the above COIs, or if you feel the COI is too minor to be relevant, please contact the Editor to receive an exemption.

The following are not COI:

- Having reviewed the paper for another journal
- Working in the same research area as the authors
- Serving on a national volunteer committee with an author or co-authoring non-scientific articles, e.g., consensus reports, book chapters, or review articles, with a coauthor

If in doubt about whether a situation constitutes COI, please contact the Editor. Often declaring a COI is sufficient management.

1.3 Other Ethical Issues

Medical Physics articles may and often should include scientific critiques of previously published articles. However, disrespectful or harsh dismissal of the work of others in a paper is not acceptable. Violations of this practice or any other suspected ethical lapses, e.g. suspected plagiarism or submission of the work to multiple journals, must be brought to the Editor's attention via "private comments for the Editor" or email. More details on scientific misconduct can be found in our detailed guidelines:

<https://www.aapm.org/org/policies/details.asp?id=464&type=PP¤t=true>

1.4 Courteous and professional tone of reviews

Referee reports should always maintain a professional and courteous tone. While reports can and should clearly and transparently identify weaknesses in the manuscript, they should aim for a balanced, respectful, and constructive tone. Harsh, condescending, or angry comments towards the article under review or its authors are not acceptable. Reviews should be balanced, highlighting strengths as well as weaknesses. Please be sensitive to the scope of the work by limiting recommended out-of-scope additions or changes to those you deem essential to achieve publishable quality.

1.5 Language and grammar issues

Authors are expected to submit articles in clear, concise, and stylistically correct scientific English and follow applicable *Medical Physics* guidelines in terms of paper structure and format. It is not the responsibility of *Medical Physics* reviewers to exhaustively identify or edit misspellings, typographical errors or grammatical misconstructions, unless they contribute to ambiguous expression of technical or scientific content that is unlikely to be correctable by the copyediting process. The Wiley production process provides light copy editing to correct routine misspellings and minor grammatical errors. If you feel that that the English writing needs to be improved beyond light copy editing, you should note the type and severity of scientific writing lapses in your review. A referee may return the manuscript without review if the English is so poor that reading it becomes a burden or it fails to clearly articulate the authors' intended meaning. While exhaustive editing should be avoided, providing an example or two is helpful to the authors.

1.6 Referee responsibilities and limits

- In addition to identifying strengths and weaknesses of the paper, your review should include clear and actionable suggestions for improving the paper such that it meets the standards for publication in *Medical Physics*.
- If you believe the article is unworthy of publication in *Medical Physics*, you must state your reasons objectively, completely and without prejudice. Critical comments are important in a review, but they must always be presented in a respectful manner. Even if the paper is rejected, its authors will appreciate your suggestions as how they might achieve publishable quality.
- Be judicious in **requiring** additional data collection and analysis. As a reviewer, you are not expected to redesign the experiment, recommend extensive changes in the method used, or to extensively expand the data reported in the article. Please focus your remarks on the article as written and not on how you would have performed the experiment. In general, the required improvements you recommend should be easily achievable within the 6-to-8-week interval allotted for submitting revisions. If more extensive revisions are required, you should consider rejecting the article. If you feel that the work is very innovative and promising, you may recommend rejection with resubmission possible after performing the suggested additional studies.

1.7 Other Considerations

- *Medical Physics* uses single-blinded peer review: reviewers know who the authors are, but the identities of the Associate Editor and Referees must remain anonymous to the authors. Thus, you must avoid inadvertently including anything in your review that would betray your identity or those of the other reviewers. Recommend citing your own articles sparingly, only when they enhance the manuscript's literature review. You must never communicate directly with the authors regarding the manuscript. If you wish to request additional information from the authors or otherwise communicate with them, contact the editor who will present your request to the authors. You may communicate openly with the Associate Editor as well as the Editor.
- In serving as a referee, it is permissible to ask a student or fellow to review an article as a learning experience, provided that the need for confidentiality is stressed. However, you also must review the article yourself and the trainee's review comments, take final responsibility for the review, and submit the review under your name. If you would like your trainee to receive credit for the review, you should decline the review assignment and suggest that the Associate Editor invite your trainee instead.

2. Criteria for publication in *Medical Physics*

2.1 Journal Aims and Scope

Please use the following statement of Journal Aims and Scope to determine whether papers you are reviewing are appropriate for publication in *Medical Physics*

- ***Medical Physics*** publishes original, high-impact physics, imaging-science, and engineering research that advances patient diagnosis and therapy through contributions in 1) Basic science developments with high potential for clinical translation; 2) Clinical applications of cutting-edge engineering and physics innovations; or 3) Broadly applicable and innovative clinical physics developments.

Medical Physics is a journal of global scope and reach. By publishing in ***Medical Physics*** your research will reach an international, multidisciplinary audience including practicing medical physicists as well as physics- and engineering-based translational scientists. We work closely with authors of promising articles to improve their quality.

Medical Physics encourages submissions describing novel, cutting-edge physics and engineering developments in medical imaging, ionizing radiation therapy, non-ionizing therapy, and other image-guided therapeutic interventions. Topics of particular interest include:

- Experimental and computational ionizing and non-ionizing dosimetry including instrumentation and algorithm development.
- Image reconstruction, image analysis, computer-aided detection and diagnosis, radiomics, biomarkers, machine learning, deep learning, image registration, and feature extraction.
- Treatment optimization, treatment outcomes analysis, mathematical modeling of treatment biological effects.
- Novel imaging and treatment delivery platforms and instrumentation, including MRI-linac, multimodality imaging, x-ray phase-contrast imaging, and nanoparticles and devices for thermal therapies, ultrasound ablation, and image guided therapy.
- All imaging and treatment modalities including photon/electron/particle therapy, thermal therapies, ultrasound ablation, CT imaging, radiography, fluoroscopy as well as ultrasound, magnetic resonance, microwave, optical, photoacoustic, electrical impedance, and nuclear medicine imaging.
- Observer studies and methodologies, virtual clinical trials.
- Archived datasets for imaging and therapy research.
- Applications of medical physics science to preclinical animal models, physiology, and translational biology applicable to diagnosis and treatment of disease.

High-impact clinical physics innovations addressing a significant problem of broad interest to our readership fit within the scope of *Medical Physics*. However, the following types of articles are, in general, not appropriate for *Medical Physics*.

- Articles that address a narrow clinical physics problem, e.g., evaluation of a specific quality-assurance commercial product, should be submitted to more clinically-oriented physics venues, e.g., our sister publication, *Journal of Applied Clinical Medical Physics*.
- Clinical studies utilizing well-established medical physics, image analysis, biostatistical technologies, data-acquisition, or treatment interventions and do not include novel medical physics content.
- Engineering and physics innovations that do not address clearly-defined translational or clinical problems.

If you feel the article does not fall within the scope of *Medical Physics*, you may recommend rejection without a detailed review. However, you must provide a paragraph explaining the basis of your recommendation. Suggestions for alternative publication venues will be appreciated by the authors and editors.

2.2 General Criteria for publication in *Medical Physics*

The essential features of an acceptable scientific article are **novelty**, **impact**, and adherence to applicable standards of **scientific rigor**. Each of these features will be reviewed in more detail below.

2.2.1 Novelty

Medical Physics articles must make new or original contribution to the literature. Such contributions can take many forms:

- A new measurement instrument, method of data analysis, novel computational technique, or substantive improvement to existing technologies that addresses a significant issue in preclinical research or clinical medicine.

- A new application of an existing cutting edge medical physics science technology to a relevant problem, e.g., demonstrating that a deep learning model is able to successfully mitigate CT image artifacts in a specified setting. The core novelty in this case is validation or refutation of a hypothesis of interest: “Method X delivers Y in clinical setting Z”.
- Generalizable data that fills a gap in the literature, e.g., inelastic and elastic scattering cross sections for eV energy electrons in non-aqueous media.

2.2.2 Impact

Publishable articles must not only impart original and new findings, but findings that are important or relevant for improving treatment or diagnosis of a class of diseases. The new findings must have the potential to influence subsequent research and development and/or to improve clinical/preclinical outcomes or practices.

2.2.3 Scientific rigor

Rigor refers to the soundness and completeness of the study methodology. Rigor is a measure of the credibility of data generation process and its capacity to convince an expert reader of the soundness of the manuscript’s conclusions. The applicable standards of rigor depend on the research area and its maturity. Some examples are:

- Using appropriate statistical hypothesis tests to validate claims of significant differences.
- Using NIST (<https://www.nist.gov/pml/nist-technical-note-1297>) or GUM (https://www.bipm.org/utis/common/documents/jcgm/JCGM_100_2008_E.pdf) uncertainty analysis for comparing measurements and predictions.
- Adequate sample sizes and, if indicated, K-fold cross validation or independent testing of machine learning models.
- Comparing predictions to an appropriate ground truth.
- In a mature field, e.g., CT image reconstruction, demonstrating that the proposed method improves upon competing state-of-the-art approaches.

If you believe the article is unworthy of publication in *Medical Physics* on the basis of inadequate novelty, impact, or scientific rigor, you must state your reasons objectively, completely and without prejudice. Critical comments are important in a review, but they must always be presented in a respectful manner.

2.2.4 Clinical Physics Papers

- Articles proposing novel, generalizable solutions to common clinical problems that could be implemented in many settings are appropriate submissions for the Journal. Either Technical Note or Research Article format may be appropriate.
- Clinical evaluations or clinical experiences with commercially available products are generally not acceptable papers. However, exceptions can be made for very new products that have not been previously reported or evaluated.
- It is appropriate and often unavoidable to use commercial products to facilitate hypothesis-driven translational research. They should be identified in the text, e.g., “MATLAB R2016b (MathWorks, Natick, MA)”. Any in-kind or financial support by the vendor must be acknowledged.
- Scientific investigations of treatment planning, quality assurance, clinical dosimetry, etc. are highly appropriate topics for *Medical Physics* papers.

2.2.5 Manuscript type-specific guidance

2.2.5.1 Research Articles

A Research Article is a report (10 printed journal pages or less) of original experimental or theoretical research. Often, Research Articles report hypothesis-driven investigations. Alternatively, they may report development of a novel instrument or computational process along with proof-of-principle testing. Research articles must be thorough and include novel medical physics scientific or technical content judged to be of substantial impact or broadly applicable clinical physics innovations.

2.2.5.2 Technical Notes.

A Technical Note is a concise (5 printed journal pages or less) description of a specific scientific or clinical development, procedure, computational process, or device that solves a specific problem and has sufficient relevance to be useful to many readers of *Medical Physics*.

2.2.5.3 Medical Physics Letters (MPL)

Medical Physics Letters are short articles (5 printed journal pages or less) on a scientific or clinical topic of overriding importance to medical physicists. Letters are to be reviewed as quickly as possible. Editorial decisions are limited to: Accept, Accept with minor/major Revisions, or Reject and only two review cycles are permitted (see section 3.1 for definitions). While a compelling case for **potential** plausibility or feasibility must be made, the standards for completeness of validation and testing are less stringent than for a Research Article. Subsequent Research Articles that substantively expand a published MPL are acceptable submissions. Rejected *MPLs* may be expanded into Research Papers and resubmitted with the Editor's concurrence.

3. Template section-specific review guidance

Medical Physics utilizes a structured review template to help encourage completeness and uniformity of reviews. It consists of text boxes (template sections) which you, as a referee, can use to address specific manuscript quality metrics and issues associated with specific sections of the paper. The following gives guidance on performing the evaluation required for each template section. Please note that if you prefer, you may instead include your entire review in the Free Form review section (3.4, below) rather than completing the section-specific parts of this template. However, the Overall Assessment ratings and the Novelty section are required.

I. OVERALL RATING:

Accept: No revision needed

II. OVERALL ASSESSMENT

1. Rate the importance of this manuscript to other researchers/clinical practice in terms of impact and new knowledge on a scale from 1 - 9 (1 - 3: high importance, 4 - 6: medium importance, 7 - 9: low importance)

1 (high importance) 2 3 4 5 6 7 8 9 (low importance)

2. Good Science (1=outstanding to 9=marginal)

1 (outstanding) 2 3 4 5 6 7 8 9 (marginal)

3. New Science (1=outstanding to 9=marginal)

1 (outstanding) 2 3 4 5 6 7 8 9 (marginal)

4. Novelty of manuscript in its current form:

1) prostate case comparisons with 3 biological models LET-based
2) implementation in a analytical TPS which could be a commercial product in a near future

3.1 Overall Rating

This pull-down menu provides the editorial decision categories you can recommend to the Associate Editor and Editor. This should be the very last step in performing your review.

- **Accept: No revision needed:** The article is ready for publication except for minor editing and copy editing. It is OK to make minor suggestions for the author to consider or flag minor grammatical errors at this point.
- **Conditionally Accept: Minor revision:** The authors have addressed all substantive scientific criticisms and is clearly of publishable quality, pending relatively minor corrections to improve readability, clarity, or scientific completeness. If elected by the Editor, future peer review of the manuscript will be limited to the Editor and/or Associate Editor.
- **Conditionally Accept: Major revision:** The paper is clearly of publishable quality but substantive scientific criticisms remain to be addressed. If elected by the Editor, the revised manuscript will undergo another cycle of referee review (at least by the reviewer who has raised the major issues in question) in addition to the Editor and Associate Editor. While rejection is rare in this setting, it is a possible outcome if the authors are unable or unwilling to fully address the concerns raised by the Review Team.
- **Editorial decision deferred: Major revision with full peer review:** While the paper is potentially publishable, the issues raised by prior reviews are so substantive that an editorial decision cannot be rendered at this time. Such papers are at significant risk for outright rejection depending upon how their authors respond to prior critiques.
- **Reject and refer to JACMP:** Such papers have insufficient impact and novelty to be competitive for Medical Physics but may be of strong practical interest to practicing clinical physicists. If the Editor concurs with this recommendation, the paper as written, will be electronically transferred to our sister journal, *Journal of Applied Clinical Medical Physics*. You should not recommend transfer to JACMP if you believe that the paper needs major revision before achieving reviewable quality.
- **Reject: Not suitable for *Medical Physics*: Refer to another journal:** Use this rejection category for papers that fall outside the scope of Medical Physics topics, have inadequate novelty or impact, but are competitive for publication in more specialized or lower-impact journals. Papers that are potential candidates for JACMP publication, but require major revisions before submission, should be rejected under this category. It is very helpful to the authors and Editor if you can recommend alternative submission venues.
- **Reject:** This is outright unconditional rejection for papers lacking sufficient quality to be competitive for publication in any legitimate scientific journal.

If you feel that a rejection-quality paper could be transformed into a publishable paper through major revisions to its underlying study design or data acquisition/analysis methods that would require more than 6-8 weeks effort, you can make this recommendation to the Editor. The Editors occasionally reject a paper “with resubmission possible”. This takes the paper off of the revision time clock and provides the authors an opportunity to submit elsewhere. This should be clearly indicated in your review or private “Comments to Editor”.

3.2 Overall Assessment

Use these numerical scores to quantify your assessment of

- Overall importance: your assessment of impact and relevance of the findings to the research or clinical community addressed by the article
- Good Science: your assessment of scientific rigor
- New Science: your assessment of the level of novel, innovative, or original content of the paper.

You should complete this section after you complete your review. Note that Medical Physics uses an NIH-like scale, in which lower score denotes higher quality. Scores greater than 5 place the article at high risk of being rejected. The basis of such unfavorable scores must be outlined in

your written report. Similarly, scores of 1 or 2, which imply that the paper is of outstanding quality, should be justified by the written review.

3.3 Novelty of Manuscript in its Current Form

In a few sentences, assess the originality or novelty of the paper and its overall impact on the relevant scientific or clinical practice domain. Essentially, this should be a justification for your “new science” and “importance/impact” scores above. Note that this is a required section.

3.4 Free Form Review

You may use this section to include the entirety or your review if you choose not to use the section-specific text boxes. Alternatively, you can include any additional information not included in the more specific textboxes. If a paper is out-of-scope, or is uncompetitive for detailed review, please use this field to explain the basis of your recommendation to reject the paper.

3.5 Recommendations for improving the Manuscript

Include any summative recommendations for improving the paper or suggestions not addressed by the section-specific reviews. For rejected papers, feedback on how enhance its quality will be appreciated by the authors. For papers requiring revision, please be judicious in requiring or recommending additional data or major restructuring of the underlying study per the guidance in §1.6.

3.6 Readability

You should use this section to address the following questions:

- Is the paper written in error-free and stylistically correct technical English?
It is authors' responsibility (and definitely NOT your job) to edit the paper. Please give a few examples of poor English and identify what level of rewriting is necessary. If the manuscript is too poorly written to be reviewable, give some examples and guidance to authors, and pass it back to Editor. Other grounds for passing it back to the Editor without review include formatting failures, e.g., no line numbers or illegible figures and equations.
- Is the paper appropriately structured and coherently written?
The paper should be cleanly separated in Introduction, Methods, Results, Discussion, and Conclusions sections. The methods and results coherently and logically explained. Details about the Methods should not be in the Results section, and vice versa. All mathematical notation must be clearly defined and rich enough to unambiguously describe the authors' methodology.
- Appropriate length of article: while papers over 10 pages may be published at the Editor's discretion (and willingness of authors to pay excess page charge), please make recommendations where redundant or unnecessary material can be deleted or moved into electronically-linked supplemental data files.

3.7 Title

The title should succinctly and clearly describe the content of the study. A common pitfall is overstating or generalizing the impact or scope of the paper beyond the results presented. The title must be free of grammatical errors and use only universally recognized acronyms, e.g., “MRI” or “CT”, or abbreviations.

3.8 Abstract

The abstract is limited to 500 words and must adhere to *Medical Physics* structure guidelines which require clearly labeled Purpose, Methods, Results, and Conclusions paragraphs. The abstract must provide a self-contained, condensed summary of the paper that is readable by a

broad scientific audience. Hence jargon, undefined acronyms, excessive detail, and overly technical descriptions should be avoided. The abstract must not overstate, over generalize or contradict the study findings. The abstract should be understandable without having to read the rest of the paper.

- Purpose: identify the problem and its context addressed by the paper along with its main purpose and hypotheses.
- Methods: overview of the study design, including main methodological tools, study endpoints, and analytical methods.
- Results: the key findings of the study, including the most important quantitative findings
- Conclusions: the broader implications of the study outcomes including the main take-home message.

3.9 Introduction

The Introduction should clearly identify the problem or topic addressed by the paper and answer the following questions:

- What is the current stage of knowledge or development?
- What does the paper propose to further expand knowledge in this area?
- Why it is important?

More specifically, the Introduction should:

- Identify the relevant problem or knowledge domain and why it is important to human health or translational research.
- Concisely review relevant prior research and identify limitations or gaps in current knowledge.
- Concisely summarize the manuscript content, clearly articulating its goals and hypotheses.
- Identify the paper's novel or original contribution to the literature and make a compelling case for its impact on subsequent research or clinical practice.

As a referee, you should identify flaws and make suggestions for amending this important section. Common pitfalls include an unfocused, overly broad literature review, or failure to identify competing or prior publications that diminishes the novelty of the authors' contributions.

3.10 Methods

In general, this section should strive to be a concise but self-contained description of the study methodology that would enable a reader who is well-versed but not expert in the topic to fully understand the authors' approach without having to refer to the literature. The References and the Methods section taken together should provide enough detail for others to repeat the study.

As a referee you should assess the following:

- With references, provides enough detail for others to repeat the study
- Appropriate balance between detailed description of methods and summary by citation so that "what did the authors do?" is apparent without consulting references.
- Explains and supports experimental method choices made by the authors.
- Explains competing methods that are implemented for comparison.
- Addresses novel and unexpected deviations from standard approaches.
- Describes quantitative endpoints and data analysis processes.
- For studies using clinical or preclinical datasets, data acquisition/selection processes, relevant clinical parameters, and compliance with applicable ethical standards must be described.
- Adheres to relevant standards of scientific rigor.

Your assessment of the level of scientific rigor is an essential part of your review. The applicable standards are highly topic- and research area-dependent. Some examples are given below

- Appropriate statistical tests to justify claims of “significant” differences.
- Acceptable evaluation metrics and appropriate ground truth where relevant. For example, gamma analysis is not suitable for benchmarking a new detector or Monte Carlo against more standard multi-dimensional dosimetry techniques.
- Appropriate testing and validation, e.g., k-fold cross validation, for machine and deep learning models
- In mature research areas, e.g., autosegmentation and CT image reconstruction, comparisons with competing state-of-the-art methods.
- Following NIST/GUM recommendations for uncertainty analysis for physical measurements or simulations of a well-defined quantity.
- The NIH has biology-focused resources posted on their transparency/rigor website (<https://grants.nih.gov/policy/reproducibility/index.htm>) which may be useful for papers utilizing patient data or animal experiments.

In general, you should avoid trying to create the paper you wish you would have written on this topic. If methodological weaknesses require redesigning the study, it's best to reject the paper, Additional required work should not exceed 8 weeks of effort.

3.11 Results

This section should concisely summarize study findings, leading the reader through each figure and table, pointing out important patterns or findings in the data. Importance characteristics of a good Results section are:

- Avoids deep discussion, generalizations, and comparisons that are best deferred to the Discussion section.
- The presentation follows the order of Methods section.
- Avoids describing methods in the “Results” section.
- Is well integrated with the figures and tables. Detailed description of figure contents (color coding, symbol types, axes labels, etc.) should be left to the caption. The “Results” text should identify figures and tables by number and include a high level description of the quantities and/or comparisons made. The main text should not duplicate information from figure captions or table headers.
- Statistical test outcomes should accompany all claims of the form “X is significantly lower than Y”. Conversely, words such as “significant” should not be used without accompanying statistical validation; qualitative adjective descriptions, e.g., “dramatic”, should be avoided.

3.12 Discussion

The Discussion should not be a rehash or restatement of the Results. It should be a high level summary of the results focused on answering the following questions:

- Do the results support or refute the hypotheses and accomplish the purpose set forth in Introduction?
- How do the results affect the field of study, i.e., assessment of impact?

Typically, the Discussion includes the following components:

- Study strengths and limitations.
- Comparison to previous studies.
- Uncertainty analysis when comparing theory and experiment.
- Meaning and impact of study.

- Unanswered questions and future research.

Common Discussion section pitfalls include overstating significance of findings, discussing extraneous ideas, concepts or claims not addressed by the data presented, and excessive duplication of Introduction and Results material.

3.13 Conclusions

Typically, the Conclusions section is 1-3 paragraphs and includes the following:

- Final summative statements of study outcomes that avoids restatement of Results section.
- Accurate assessment of extent to which paper succeeds in addressing its stated goals.
- Useful and accurate statement of the meaning of study findings that summarizes the “take-home message“ and/or anticipated impact of findings.

3.14 Figures

Well-designed and rendered figures are essential for communicating the results of a study to the reader. Below are some evaluation rubrics:

- Are illustrations and flow charts being used appropriately to describe algorithms and complex experimental designs?
- Are figures being appropriately used? Tables are most useful for communicating a small number of highly quantitative results, while figures are good for illustrating data trends and comparing datasets. Are the most scientifically relevant comparisons being graphically performed?
- Are the figures readable?
 - Axes should be carefully labelled as to physical quantity and units. Legends, axes labels, and tick labels, line widths, and data symbols should be large and bold enough (Helvetica or Arial bold font preferred for text labels) so that figures are legible when reduced to column (3.375”) or full-width (7”) size.
 - Appropriate colors with high contrast against a white background should be used.
 - Line colors (perhaps in combination with data symbols and line type) should be chosen so that when printed in B&W/gray scale, the different lines can be distinguished. Color printing is costly (several hundred U.S. dollars per figure). However, there is no charge for color figures in the electronic version of the paper.
- To support quantitative and statistical comparisons, error bars should be considered.
- Captions are detailed enough so that readers can understand figures without reading the paper.

3.15 Tables

As with figures, carefully-designed tables are incredibly useful both for concise description of methods and quantitative comparison of key numerical results.

- Should have captions that make the tables intelligible without reference to the text.
- Structure should be clear, with simple column headings denoting all units.

4. Other review considerations

4.1 SI Units

SI units should be used throughout the article. If other Non-SI units/quantities are still widely used, e.g., apparent activity in mCi, the quantity in question in SI units should be expressed in parentheses

4.2 References

Because reformatting references to meet the Journal's formatting requirements is now automated, Referees need not be concerned with format details, so long as the required information is present. This includes full journal citation (journal name, volume, issue and inclusive pages) along with full title and at least the first three authors. Referees are not responsible for the accuracy of the citations themselves, but should assess whether cited literature adequately supports the associated claims made by the paper. When available, seminal peer-reviewed citations are preferred, but other citable media, including proceedings papers, abstracts, websites, book chapters, review articles, manuals, etc., are appropriate in many settings.