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Be sure the text is clear and concise, conforming to accepted standards of American English style and usage. Avoid jargon, clichés, and laboratory slang. Authors for whom English is not their native language are strongly encouraged to seek the aid of a professional English language editorial service. See Manuscript Sections, below, for further description.

Abbreviations, Symbols, and Terminology

All abbreviations should be explicitly defined at first usage. However, internationally accepted abbreviations do not need to be defined. Please consult the list of accepted abbreviations for our journals (http://www.the-aps.org/publications/journals/abbrv.pdf). For word usage, symbols, etc., authors are referred to Scientific Style and Format: The CBE Manual for Authors, Editors, and Publishers (6th ed., 1994). For chemical and biochemical terms and abbreviations, consult the recommendations of the IUPAC-IUB Combined Commission on Biochemical Nomenclature. Online resources can be found at http://www.iupac.org. Isotope specification must conform to the IUPAC system. Authors are referred to the following articles for style in specialized fields: “Glossary on respiration and gas exchange” (J Appl Physiol 34: 549–558, 1973); and “Glossary of terms for thermal physiology” (J Appl Physiol 35: 941–961, 1973).

Special Symbols

For special characters not available on the standard 104-key keyboard (e.g., Greek characters, mathematical symbols, figure symbols), use the “Insert Symbol” function in Microsoft Word; do not use math font or image files (e.g., GIF) within the text for special characters or text constructions.

Spelling and Editorial Style

Authors should follow Webster’s Third New International Dictionary or Merriam-Webster’s Collegiate Dictionary, 11th edition, for spelling and compounding. The APS Journals use American English rules for spelling.

All manuscripts will be edited by highly trained professional copy editors, according to the APS house style and guidelines.
Citing Unpublished Observations and Personal Communications

Citations of submitted papers still in preparation, in peer review, or of other unpublished materials cannot be included in the bibliography, which may only list published work. Such citations can, however, be provided in parentheses in text as "unpublished observations" (e.g., "J. M. K. Smith, unpublished observations"). The APS Journals discourage the use of personal communications. However, if these are used, the author(s) must have a letter granting permission from the communicant stating that the person whose opinion is cited has seen and approved the actual wording of the citation. If requested, the author will send the letter to the APS Publications office. For both unpublished observations and personal communications provide the cited person's last name and all initials.

Trade Names

Proprietary (trademarked) names should be capitalized, with the spelling carefully checked. The generic name or generic descriptor should accompany the trade name the first time it appears.

Genes and Proteins

When reporting studies on genes and proteins, be sure to follow the established style conventions of the genetics community for properly expressing gene vs. protein symbols and names.

Cell Lines and Reagents

The source of cells utilized (species, sex, strain, race, age of donor, whether primary or established) should be clearly indicated. The source of reagents should be stated (name, city, and state within parentheses) when first cited. If tests to rule out the presence of mycoplasmal contamination were not performed, this fact should be clearly stated. Other data relating to unique biological, biochemical, and/or immunological markers should also be included if available, with their source identified. Publication of results is based on the principle that results must be independently verifiable. Authors are expected to make unique reagents available to qualified investigators either directly or through a recognized distributor. See also Unique Materials Banks (above) and Ethical Policies (above) for other requirements.

Manuscript Sections

Title Page

All submissions must contain a title page, however brief the article may be. The title page must contain the full title of the article; author(s) name(s); all departments and institutions in which the work was done; an abbreviated title for the running head; and the corresponding author's name, e-mail address, and physical address for correspondence. Only one author may be designated as the corresponding author.

Title

Make the title informative. Avoid unnecessary words like "Studies in . . . ." The title must not exceed 160 characters, including spaces between words.

Authors

List all authors' names and their first names or initials exactly as they should be known, in the order of importance of their contribution to the study. Do not include any specific titles (e.g., PhD, MD, and Prof. are not needed). "Group authorship" is allowed, with the name of a group (such as a consortium or program) to be listed as an author, with members of the group listed in the Acknowledgments section; however, the Program Director of the named group must be the one who signs for the group when the group's "author" signature is needed, i.e., on a Mandatory Submission Form or a Change of Authorship Form.

Authors who publish in APS Journals may now present their names in non-Latin languages (in their native writing system) alongside the standard English transliteration of their name in the main author line of the published article; for example, "Ta-Ming Wang (王大明)". We will accept any non-Latin languages that have standard Unicode characters (http://www.unicode.org) designated for the native characters. For authors who choose this option, please only provide the native expression for the original written form of the transliterated name; that is, do not include any associated degree, rank, or title information in the native format. This feature is meant for the person's name only, not for ancillary information regarding academic achievement or institutional affiliation. To take advantage of this new feature, please insert the native expression of your name along side the English transliteration in the main title page of your manuscript submission.

Affiliation

List all departments and institutions in which the work was done, with city and state or country. Identify each author's affiliation by superscript numbers matched to the appropriate institution. Affiliation must reflect the organization(s) supporting the author(s) while the work was done. This may differ from the current affiliations of the author(s), which will be listed in such cases in the Acknowledgments section as the present addresses of the authors.

Running head

The running head is an abbreviated version of the title, which will appear at the top of every page subsequent to the first page. Running heads must not exceed 60 characters including spaces between words.

Contact Information

A full address for correspondence will be published and must be included, with a current, valid e-mail address for the corresponding author. The address of the sole corresponding author (there must be only one corresponding author) will appear on the first page of the article, if the article is accepted for publication. Please note that a valid e-mail address is essential to participate in the APS electronic proofing service. Also, provide phone and fax numbers for use while your article is in production. If the contact information to be used during production differs from that to be included in the final article, indicate this explicitly. To contact APS during the submission and peer review and/or during production after acceptance, go to the APS website (http://www.the-aps.org) and choose the appropriate journal's web page.

Abstract

An informative one-paragraph abstract of not more than 250 words must accompany each manuscript. It must state concisely what was done and why (including species and state of anesthesia), what was found (in terms of data, i.e., space allows), and what was concluded.

Keywords

Include three to five words or short phrases, relevant to the article, that do not appear in the title or running head.

Introduction

Provide a brief overview of the scope and relevance of the study, especially with regard to previous advancements in related fields.

Materials and Methods

(Sometimes called "Experimental Procedures"). Describe techniques, cell/animal models used, and lists of reagents, chemicals, and equipment, as well as the names of manufacturers and suppliers, including URLs for those supplies obtained online, so that your study can be most easily replicated by others. Also in this section, describe the statistical methods that were used to evaluate the data. If clinical trials were used, a statement of registration is required; also, for all investigations involving humans or animals, a statement of protocol approval from an IRB or IACUC, or an equivalent statement, must be included.

Authors who publish in APS Journals may now present their names in non-Latin languages (in their native writing system) alongside the standard English transliteration of their name in the main author line of the published article; for example, "Ta-Ming Wang (王大明)". We will accept any non-Latin languages that have standard Unicode characters (http://www.unicode.org) designated for the native characters. For authors who choose this option, please only provide the native expression for the original written form of the transliterated name; that is, do not include any associated degree, rank, or title information in the native format. This feature is meant for the person's name only, not for ancillary information regarding academic achievement or institutional affiliation. To take advantage of this new feature, please insert the native expression of your name along side the English transliteration in the main title page of your manuscript submission.

Affiliation

List all departments and institutions in which the work was done, with city and state or country. Identify each author's affiliation by superscript numbers matched to the appropriate institution. Affiliation must reflect the organization(s) supporting the author(s) while the work was done. This may differ from the current affiliations of the author(s), which will be listed in such cases in the Acknowledgments section as the present addresses of the authors.

Running head

The running head is an abbreviated version of the title, which will appear at the top of every page subsequent to the first page. Running heads must not exceed 60 characters including spaces between words.

Contact Information

A full address for correspondence will be published and must be included, with a current, valid e-mail address for the corresponding author. The address of the sole corresponding author (there must be only one corresponding author) will appear on the first page of the article, if the article is accepted for publication. Please note that a valid e-mail address is essential to participate in the APS electronic proofing service. Also, provide phone and fax numbers for use while your article is in production. If the contact information to be used during production differs from that to be included in the final article, indicate this explicitly. To contact APS during the submission and peer review and/or during production after acceptance, go to the APS website (http://www.the-aps.org) and choose the appropriate journal's web page.

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Results

Provide the experimental data and results as well as the particular statistical significance of the data. APS has published an editorial on the use of statistics (http://physiolgenomics.physiology.org/cgi/content/full/18/3/249), and authors are encouraged to consult it.

Discussion

(Sometimes combined with the results in a section called “Results and Discussion”). Explain your interpretation of the data, especially compared with previously published material cited in the References.
Acknowledgments

List the people indirectly involved with the research whom you may wish to thank. This is also the appropriate place to thank anyone for technical assistance. Also, current addresses of authors (which may differ from those in the affiliation line) may be included here.

Do not include “promissory notes,” APS Journal policy is against inclusion of implicit or explicit promises that future work will be published.

Do not include dedications (e.g., to persons living or deceased). Dedications of articles are not permitted.

Grants

List the grants, fellowships, and donations that funded (partially or completely) the research. However, industry-sponsored grants should be listed under Disclosures.

Disclosures

Authors of research articles are required at the time of submission to disclose to the APS Publications Office any potential conflict of interest, financial or otherwise. See the Conflict of Interest description above (under “Ethical Policies”), or see the complete details of the APS Ethical Policies and Guidelines at http://www.the-aps.org/publications/authorinfo. If the article is accepted for publication, information on the potential conflict of interest, or lack thereof, must be noted by the author in the manuscript file as a "Disclosures” statement following the Acknowledgments section of the paper.

Bibliography

Authors are responsible for accuracy of citations. References must be limited to directly pertinent published works or papers that have been accepted for publication. An abstract, properly identified as “Abstract”, may be cited only when it is the sole source.

References should be double-spaced, arranged alphabetically by author, and numbered serially. The reference number should be placed in parentheses at the appropriate place in the text.

Important Note: The reference list should not include citations of submitted papers still in preparation, in peer review, or of other unpublished materials. Such information may be provided in parentheses in the body of the article where it logically belongs as “unpublished observations” (e.g., “J. M. K. Smith, unpublished observations”).

Note for references in the Journal of Neurophysiology

References for the Journal of Neurophysiology should be arranged alphabetically by author. The appropriate author name and year for each reference should be included in parentheses at the proper point in the text using the following style:

- One author (Brown 1982).
- Two authors (Brown and Smith 1982).
- Three or more authors (Brown et al. 1982).

If more than two references are cited by different authors, separate entries with a semicolon (Brown 1982; Smith 1983). If more than two references are cited by the same first author (or single author), use “et al.” where appropriate plus the date, even if the subsequent authors are not the same in all the references (Brown et al. 1982, 1983). Note the use of commas between two consecutive years or nonconsecutive years and do NOT use dashes for ranges (Brown et al. 1982, 1983, 1986, 1987, 1988, 1989). If more than two references with the same year and author(s) are cited, use lowercase letters after the year (Brown 1982a, 1982b). Lowercase letters should be inserted in the same-year references in the reference list.

The examples given below are shown with numbers because that is the style for most APS Journals. In all other respects, the reference style used in the example below is the same across all journals.

The style of citation should be as follows, with journal name abbreviated as in Medline, PubMed, and Index Medicus. For a selection of output styles available for a variety of citation management software see http://www.the-aps.org/publications/journals/styles.htm.

Examples

Journal Articles


Book References


APS Handbook of Physiology Series

Large textbooks require very specific citation information. For example, the APS Handbooks series contains a huge amount of information, and the inclusion in the citation of the section, volume, part, and chapter is essential to aid the reader in finding the information quickly (please note that the APS chooses not to list editors for the APS Handbooks).


For an exhaustive set of examples for properly citing various types of publications, including articles published on the web, technical documents, congress proceedings, articles with errata/corrigenda, translations, and articles with large groups of authors, go to http://www.the-aps.org/publications/authorinfo/examplerefs.htm.

DOI’s and Early Publication in Articles in Press

Current technology allows publication of an article in several editions. The APS publishes peer-reviewed articles upon acceptance, as Articles in Press, pending final copyediting and page layout/design. This initial post to the web qualifies as publication, but eventually the article will reach the readership in a final, polished form.

These articles may be cited and establish publication’s priority before they appear in final print and online forms. (Please note the required use of a “digital object identifier”—DOI—in this citation.)


However, once this article has reached its final stage of publication, it will be cited with its new publication data, as follows:


Footnotes

Text footnotes should be numbered consecutively throughout. These should be assembled on a separate page as endnotes.

Types of Articles

The APS Journals publish a variety of article types in addition to the regular research papers. For descriptions of the types of articles published in a particular journal, go to that journal’s page at the APS website (http://www.the-aps.org).

Figures

APS uses digital publishing methods throughout the journal production process. Your article will be published both in the print journal and online. We have several specific requirements for digital graphics formats to ensure the best possible reproduction in both media.

Computer screens, laser printers, and offset presses are significantly different devices. The ability to print your graphics well on a desktop laser printer does not mean the image is suitable for composition and production of your article in final form. A detailed set of guidelines is available from APS to help you prepare image files that will provide high-quality reproductions in the APS Journals, both in print and online.

Authors may be asked to prepare new figures if those submitted are not suitable for publication; this will most likely delay publication of the paper.

Always prepare original graphics at print publication-quality resolution. If your manuscript is accepted for publication, APS will require the high-resolution files for print output.

Use applications capable of creating high-resolution PDF files. Figures should be generated at the size they are to appear in the journal (printed 1:1).
For complete guidelines, go to http://www.the-aps.org/publications/authorinfo/figures/index.htm. These guidelines include important descriptions of inappropriate figure manipulation (and how to avoid these presentation errors), as well as what constitutes unethical manipulation of figures. Fabricating a report of research or suppressing or altering data to agree with one’s conclusions is considered fraud. This includes altering figures in such a way to obscure, move, remove, or introduce information or features.

Use of Animals or People in Photographs

- Photographs of animals or people may be published when scientifically necessary to illustrate a setup or convey the findings of the paper. For a photograph of a person, a signed letter of consent is required from the person or their legal agent or guardian.
- When a diagram is preferable to illustrate a setup, if it is not possible to obtain a drawing, the author should describe the setup in the methods section of the paper.
- Photographs to convey findings may be published when the data are conveyed in the image as in developmental biology or genetic modifications where such photographs are standard practice.
- With respect to other areas, the decision whether to publish a photograph will be based upon the editor’s determination whether the photograph is scientifically necessary.
- The journals should avoid publishing photographs that might be perceived as raising animal welfare concerns. For example, it is preferable to show only the relevant portion of the animal, and photographs should not show blood or people handling the animals except close-ups where only gloved hands are seen.

Tables

Whenever possible, authors are encouraged to submit figures rather than tables. Statistical summary tables should be submitted when possible, rather than tables with many lines of individual values. Lengthy tables of data that cannot be presented in a suitable manner, according to APS standards for print publication, may be extracted and set as a supplement to the online article. These supplements remain an integral part of the article for the reader, as referring text to these tables will remain in the article, and links directly to the supplements will be embedded and prominently indicated at all points of entry to the online article (see Data Supplements, below).

Submitted tables should adhere to the following guidelines:

- Each table should appear on a separate page of the manuscript.
- Tables must not duplicate material in text or figures.
- Tables should be numbered consecutively with Arabic numerals and prepared with the size of the journal page in mind: 3.5 in. wide, single column; 7 in. wide, double column.
- Each table should have a brief title; explanatory notes should be in the legend, not in the title.
- Nonsignificant decimal places in tabular data should be omitted.
- Short or abbreviated column heads should be used and explained if necessary in the legend.
- Statistical measures of variations, SD, SE, etc., must be identified. (Example: "Values are means ± SE.")
- Table footnotes should be listed in order of their appearance and identified by standard symbols: *, †, ‡, § for four or fewer; for five or more, consecutive superior lowercase letters should be used.

Mathematical Equations and Modeling

Mathematical aspects of articles normally should be addressed to the many readers of the Journal who are not mathematicians. The presentation should include the mathematical strategy, the assumptions on which the mathematics are based, and a summary of the meaning of the final mathematical statement and its limitations.

Equations

Mathematical equations should be simplified as much as possible and carefully checked.

Use the slant line (/) for simple fractions \( \frac{a + b}{x + y} \) in the text rather than the built-up fraction \( \frac{a + b}{x + y} \), which should only be used if the equation is offset from the text as in this example.

Use subscripts or superscripts wherever feasible and appropriate, to simplify the equations.

Please use notation that is consistent with the standard nomenclature in applied mathematics. As an aid to the reader, please state the convention that you are following, especially if it is uncommon.

Symbols should be defined as they first appear in the text, and a Glossary may be included (and helpful) in articles with many different symbols, specifying the units (dimensions) as well as each definition. The Glossary will usually precede the Methods section.

APS style allows punctuation in displayed equations.

Mathematical Models

Presentation of the model(s) must be sufficiently clear to allow physiologists with limited experience in modeling to follow the model development, limitations, and physiological relevance. Assumptions concerning the importance of physiological processes included in the model should be clearly stated.

If the model equation(s) require solution, the method of solution should be described in sufficient detail to permit readers to duplicate the solution in their own laboratories. Algorithms from commercial software packages should be so identified. Details of the solution strategy may be summarized in an Appendix (for an example, see http://jap.physiology.org/cgi/reprint/96/1/65.pdf).

For simulations, sources or estimation methods for all parameter values should be presented and the numerical values given in the text or a table. A sensitivity analysis must be performed for important parameters (covering ranges of values relevant to the manuscript) to determine how the model predictions are affected by numerical parameter values.

If the model is used to estimate parameter values, measures of the uncertainties associated with the estimated parameter values should be presented.

For models intended for use in a predictive setting, validation of the model with a data set not used for model parameter estimation (i.e., cross-validation) is recommended. Sensitivity analysis or parameter uncertainty determination is an important component of modern modeling practice that allows assessment of the validity of a model.

Results obtained with the model(s) should be compared with appropriate physiological data, either from literature or from new experiments. Simulation results may be examined for prediction of changes or trends in physiological variables similar to those reported for in vitro or in vivo studies. The discussion should include information on the physiological significance of the model study, limitations of the model, and suggestions for new modeling and/or experimental studies.

Data Supplements

Video files, extensive tables of data, and other supplemental material that cannot be feasibly published in the printed journal may be submitted for inclusion in the online journal (without charge to the author). Such material must be submitted for peer review along with the finished manuscript and must meet the approval of the journal Editor.

Questions regarding data supplements may be directed to the Online Production Editor (mgentry@the-aps.org). For microarray data deposits, see above (MIAME Standard for Microarray Data).

Video

Authors are responsible for compiling their own digital video. Files should be in MPEG or Quicktime format and should be no more than 10 megabytes in size. Authors may be requested to resubmit their videos with shorter running time, smaller frame size, or lower resolution in order to conform to the recommended file size. Authors should include a written caption with each video file, explaining what is happening in the video.

Contact the Online Production Editor (mgentry@the-aps.org) for further assistance or questions.

Long Data Tables

Long data tables should be submitted in Microsoft Excel or in Microsoft Word table format. Each table should include a title explaining what the table shows. Tables published online may look different from how they were originally submitted due to the limits of the HTML format.
GUIDING PRINCIPLES FOR RESEARCH INVOLVING ANIMALS AND HUMAN BEINGS

The research described in papers submitted to any of the APS publications that involve the use of human beings must adhere to the principles of the Declaration of Helsinki and Title 45, U.S. Code of Federal Regulations, Part 46, Protection of Human Subjects, Revised November 13, 2001, effective December 13, 2001 (http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm). Research involving animals must adhere to APS’s Guiding Principles in the Care and Use of Animals. APS insists that all investigations involving humans or animals reported in its publications be conducted in conformity with these principles and that a statement of protocol approval from an IRB or IACUC or equivalent is included in the methods section of the paper. In describing surgical procedures, the type and dosage of the anesthetic agent should be specified. Curarizing agents are not anesthetics; if these are used, evidence must be provided that anesthesia of suitable grade and duration was employed. Editors/Associate Editors are expected to refuse papers in which evidence of the adherence to these principles is not apparent. They reserve the right to judge the appropriateness of the use of animals and humans in experiments published in the journals. Differences of opinion will be adjudicated by the Publications Committee.

WORLD MEDICAL ASSOCIATION
DECLARATION OF HELSINKI

Ethical Principles for Medical Research Involving Human Subjects

A. Introduction

1. The World Medical Association has developed the Declaration of Helsinki as a statement of ethical principles to provide guidance to physicians and other participants in medical research involving human subjects. Medical research involving human subjects includes research on identifiable human material or identifiable data.

2. It is the duty of the physician to promote and safeguard the health of the people. The physician’s knowledge and conscience are dedicated to the fulfillment of this duty.

3. The Declaration of Geneva of the World Medical Association binds the physician with the words, “The health of my patient will be my first consideration.” and the International Code of Medical Ethics declares that, “A physician shall act only in the patient’s interest when providing medical care which might have the effect of weakening the physical and mental condition of the patient.”

4. Medical progress is based on research which ultimately must rest in part on experimentation involving human subjects.

5. In medical research on human subjects, considerations related to the well-being of the human subject should take precedence over the interests of science and society.

6. The primary purpose of medical research involving human subjects is to improve prophylactic, diagnostic and therapeutic procedures and the understanding of the aetiology and pathogenesis of disease. Even the best proven prophylactic, diagnostic, and therapeutic methods must continuously be challenged through research for their effectiveness, efficiency, accessibility and quality.

7. In current medical practice and in medical research, most prophylactic, diagnostic and therapeutic procedures involve risks and burdens.

8. Medical research is subject to ethical standards that promote respect for all human beings and protect their health and rights. Some research populations are vulnerable and need special protection. The particular needs of the economically and medically disadvantaged must be recognized. Special attention is also required for those who cannot give or refuse consent for themselves, for those who may be subject to giving consent under duress, for those who will not benefit personally from the research and for those for whom the research is combined with care.

9. Research Investigators should be aware of the ethical, legal and regulatory requirements for research on human subjects in their own countries as well as applicable international requirements. No national ethical, legal or regulatory requirement should be allowed to reduce or eliminate any of the protections for human subjects set forth in this Declaration.

B. Basic Principles for All Medical Research

10. It is the duty of the physician in medical research to protect the life, health, privacy, and dignity of the human subject.

11. Medical research involving human subjects must conform to generally accepted scientific principles, be based on a thorough knowledge of the scientific literature, other relevant sources of information, and on adequate laboratory and, where appropriate, animal experimentation.

12. Appropriate caution must be exercised in the conduct of research which may affect the environment, and the welfare of animals used for research must be respected.

13. The design and performance of each experimental procedure involving human subjects should be clearly formulated in an experimental protocol. This protocol should be submitted for consideration, comment, guidance, and where appropriate, approval to a specially appointed ethical review committee, which must be independent of the investigator, the sponsor or any other kind of undue influence. This independent committee should be in conformity with the laws and regulations of the country in which the research experiment is performed. The committee has the right to monitor ongoing trials. The researcher has the obligation to provide monitoring information to the committee, especially any serious adverse events. The researcher should also submit to the committee, for review, information regarding funding, sponsors, institutional affiliations, other potential conflicts of interest and incentives for subjects.

14. The research protocol should always contain a statement of the ethical considerations involved and should indicate that there is compliance with the principles enunciated in this Declaration.

15. Medical research involving human subjects should be conducted only by scientifically qualified persons and under the supervision of a clinically competent medical person. The responsibility for the human subject must always rest with a medically qualified person and never rest on the subject of the research, even though the subject has given consent.

16. Every medical research project involving human subjects should be preceded by careful assessment of predictable risks and burdens.


treatment, in studies where no proven prophylactic, diagnostic or therapeutic method exists. Note of clarification on paragraph 29 of the WMA Declaration of Helsinki: The WMA hereby reaffirms its position that extreme care must be taken in making use of a placebo-controlled trial and that in general this methodology should only be used in the absence of existing proven therapy. However, a placebo-controlled trial may be ethically acceptable, even if proven therapy is available, under the following circumstances: Where for compelling and scientifically sound methodological reasons its use is necessary to determine the efficacy or safety of a prophylactic, diagnostic or therapeutic method; or Where a prophylactic, diagnostic or therapeutic method is being investigated for a minor condition and the patients who receive placebo will not be subject to any additional risk of serious or irreversible harm. All other provisions of the Declaration of Helsinki must be adhered to, especially the need for appropriate ethical and scientific review.

30. At the conclusion of the study, every patient entered into the study should be assured of access to the best proven prophylactic, diagnostic and therapeutic methods identified by the study. Note of clarification on paragraph 30 of the WMA Declaration of Helsinki: The WMA hereby reaffirms its position that it is necessary during the study planning process to identify post-trial access by study participants to prophylactic, diagnostic and therapeutic procedures identified as beneficial in the study or access to other appropriate care. Post-trial access arrangements or other care must be described in the study protocol so the ethical review committee may consider such arrangements during its review.

31. The physician should fully inform the patient which aspects of the care are related to the research. The refusal of a patient to participate in a study must never interfere with the patient-physician relationship.

32. In the treatment of a patient, where proven prophylactic, diagnostic and therapeutic methods do not exist or have been ineffective, the physician, with informed consent from the patient, must be free to use unproven or new prophylactic, diagnostic and therapeutic measures, if in the physician’s judgement it offers hope of saving life, re-establishing health or alleviating suffering. Where possible, these measures should be made the object of research, designed to evaluate their safety and efficacy. In all cases, new information should be recorded and, where appropriate, published. The other relevant guidelines of this Declaration should be followed.

APS GUIDING PRINCIPLES IN THE CARE AND USE OF ANIMALS

Animal experiments are to be undertaken only with the purpose of advancing knowledge. Consideration should be given to the appropriateness of experimental procedures, species of animals used, and number of animals required.

Only animals that are lawfully acquired shall be used in the laboratory, and their retention and use shall be in every case in compliance with federal, state and local laws and regulations, and in accordance with the Institute for Laboratory Animal Research (ILAR) Guide for Care and Use of Laboratory Animals.

Animals used in research and education must receive every consideration for their comfort; they must be properly housed, fed, and their surroundings kept in a sanitary condition.

The use of animals must be in accordance with the ILAR Guide for Care and Use of Laboratory Animals. Appropriate anesthetics must be used to eliminate sensibility to pain during all surgical procedures. Drugs that produce muscle paralysis are not anesthetics, and they must not be used alone for surgical restraint, but may be used in conjunction with drugs known to produce adequate anesthesia. The care and use of animals shall be such as to minimize discomfort and pain. All measures to minimize pain and distress that would not compromise experimental results may be employed.

If the study requires the death of an animal, the most humane euthanasia method consistent with the study must be used.

When animals are used by students for their education or the advancement of science, such work shall be under the direct supervision of an experienced teacher or investigator.

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