



RadioGraphics

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RadioGraphics

Publication Information for Authors

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See also the following editorial: "[Publication of RadioGraphics Manuscripts Revisited: Suggestions for Authors and Description of Peer Review](#)"

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RadioGraphics will consider for publication materials prepared according to the following instructions. (These instructions are in accord with the Uniform Requirements for Manuscripts Submitted to Biomedical Journals [N Engl J Med 1997; 336:309–315].) All manuscripts are subject to peer review, and recommendations of the reviewers are considered in the decision for acceptance. Solicited manuscripts, that is, those based on education exhibits from the RSNA annual assembly that were selected by *RadioGraphics* subspecialty panels, are reviewed at submission. Unsolicited manuscripts based on exhibits that were **not** selected will not be considered. All other unsolicited manuscripts are previewed by the Editor or editorial board members and, if judged to merit review, are sent to two reviewers.

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Sole Submission to *RadioGraphics* and Redundant Publication

Authors must ensure that no manuscript on the same or similar material has been or will be submitted to another journal by themselves or others before their work appears in *RadioGraphics* (see the Copyright Agreement, Part 2A). **This restriction applies to publication in *Radiology* as well as to electronic and Web-based publication by other organizations.** Authors who submit similar material to advertising media must indicate this and provide a copy when they send their manuscript to *RadioGraphics*.

If the Editor becomes aware of a possible redundant publication (ie, an attempt to publish a work that is substantially similar—with common authors, similar or identical study populations and methodologies, and similar results and interpretations [Council of Biology Editors Views 1996; 19(4):76–77]), he will ask the authors to provide a written explanation and, if suspected redundant publication is not refuted, he will reject the manuscript.

Financial Disclosure

Authors must describe any direct or indirect financial interest and must authorize RSNA to publish a financial disclosure with the article. **Each author of any single composition must complete the Financial Disclosure information in RGXPRESS.** The RSNA's Financial Disclosure policy is as follows:

“As an ACCME-accredited provider of continuing medical education, the RSNA must ensure that all decisions about the content of an education activity were made free of the control of a commercial interest. The ACCME defines a *commercial interest* as ‘any proprietary entity producing health care goods or services, with the exemption of non-profit or government organizations and non-health care related companies.’ Further, RSNA must be able to show that everyone who is in a position to control the content of an education activity, including committee chairpersons, editors, reviewers, and **authors**, has disclosed all relevant financial relationships with any commercial interest to the RSNA. The ACCME defines *relevant financial relationships* as ‘financial relationships in any amount occurring within the past 12 months that create a conflict of interest.’ RSNA must identify and resolve all identified conflicts of interest prior to an education activity being delivered to the learners. Authors who have or have had within the previous 12 months such a relationship or affiliation must disclose this information. Likewise, disclosure that no relationship(s) exists is also required.”

Author Contributions and Responsibility

The primary author is responsible for ensuring that all individuals named as coauthors have made a major contribution to the manuscript (see the Copyright Agreement, Part 2B, which is based on criteria from the International Committee of Medical Journal Editors in *Ann Intern Med* 1997; 126:36–47).

Changes in authorship must be submitted in writing to the Editor. All such changes, including author order, must be approved by all authors and guaranteed by the corresponding author. If a coauthor is deleted, he or she must either sign the letter or send a separate one acknowledging the change.

The authors are responsible for all statements made in their work, including changes made by the Editor or manuscript editor. An accepted manuscript will

be copyedited to conform to Journal style and usage, which is based on widely accepted conventions of grammar and the *AMA Manual of Style*. This editing may be substantive. Authors will be sent galley proofs via e-mail for review and approval. It is the corresponding author's responsibility to read the edited manuscript proof, answer all queries fully, and return the proof by the requested deadline. Once an article is printed, the only redress for an error in the article is to publish an erratum in both the print and online Journal. The online article itself will not be changed. If the corresponding author will be unavailable to review galleys, he or she must arrange for a coauthor to read and return the proofs or publication will be delayed.

Acknowledgments

Individuals who have contributed to the scientific content of the manuscript but who do not fulfill requirements for authorship (*Ann Intern Med* 1997; 126:36–47) should be listed in the Acknowledgments. Authors must obtain written permission from those acknowledged, as readers may infer that such persons endorse the data or conclusions in the article (“New Information for Authors and Readers: Group Authorship, Acknowledgments, and Rejected Manuscripts.” *JAMA* 1992; 268:99). Copies of these permissions should be ready to submit.

Rights and Permissions

To reprint any previously published figures or tables, the author must obtain permission from the publisher and author, including permission to reproduce the items in electronic format. Any such material must be clearly noted, with its source given. Copies of the letters of permission should be ready to submit with the manuscript.

We recommend that authors do not use previously published figures because of the difficulties in obtaining permission from commercial publishers to reprint this material in the online Journal. **In corresponding with publishers about such permissions, authors must ensure that permission to reprint is (a) granted for both print and online publication and (b) unrestricted by time limits or requirements for Internet links.** An author should not pay any reprint fees unless both of these conditions are met because if they are not, the material cannot appear in the online Journal. Images used without permission for online publication will appear as black boxes in the online article and PDF printouts; images for which reprint permission is time restricted will be converted to black boxes after the permission expires. For more information, contact RSNA Permissions Coordinator at 630-590-7771 (e-mail permissions@rsna.org).

To preserve the anonymity of patients and subjects, all potentially identifying information (including patient likenesses, identification numbers, names, and initials) must be removed from images, charts, graphs, tables, and the text before the manuscript is submitted. If this cannot be done or if the author uses a clinical photograph in which the patient is identifiable, a letter of permission from the patient, subject, or guardian must accompany the manuscript.

CME Activity

Authors who are asked to prepare a CME exercise must (a) provide three learning objectives for the exercise, (b) write 10 multiple-choice questions, and (c) provide an answer key. Authors of unsolicited manuscripts should also submit a CME exercise to avoid delays in the review process. Manuscripts for Best Cases from

the AFIP, Editorials, historical anecdotes (Scenes from the Past), Invited Commentaries, Lifelong Learning, the Oncodiagnosis Panel, and Special Reports do not have CME exercises.

Authors must provide three learning objectives. Each objective should be phrased as an action that a reader should be able to fulfill after reading the article. Use quantifiable action verbs such as “list,” “identify,” “recognize,” “describe,” and “discuss” to write the learning objectives.

Authors must write 10 multiple-choice questions, each with only four answer choices. For each CME question, the authors must cite one reference for the correct answer. The reference should be in the list of references for the article. Two of the 10 questions should be image based; that is, the question should direct the reader to a specific image in the article and pose a problem answerable upon review of the image. **Authors are strongly encouraged to refer to the CME Question Writing Guidelines before writing their questions.** For more guidance, see “Writing Multiple-Choice Questions for Continuing Medical Education Activities and Self-Assessment Modules” (RadioGraphics 2006; 26:543–551) at radiographics.rsna.org/cgi/content/full/26/2/543.

Answers to test questions must be clearly stated in the article (incorrect choices should also be disproved in the text). The correct answer and its location within the text should be shown by using brackets or braces to demarcate the appropriate sentence(s), preceded by a boldfaced label, CME #1a, CME #2c, etc. Do not insert annotations for CME answers in the margin of the manuscript, and do not use the Comment feature of MS Word for these annotations.

The 10 questions, answer key, and three learning objectives should be submitted as a separate document file.

Informed Consent and Disclosure of Investigational or Off-Label Use

Manuscripts reporting the results of experimental studies on human subjects must state that informed consent was obtained after the nature of the procedure(s) had been explained. Care of experimental animals to provide humane treatment and to ensure reliable results is described in the National Institutes of Health guidelines for use of laboratory animals. Authors are advised to comply with these guidelines and acknowledge such compliance by disclosing the information to readers at the beginning of their article.

The RSNA recognizes that authors may discuss the application of some devices, products, or pharmaceuticals that are not approved by the U.S. Food and Drug Administration (FDA). In keeping with the highest standards of professional integrity and ethics, the RSNA requires that authors fully disclose to readers that there will be discussion of the unlabeled (ie, investigational) use of a medical device, product, or pharmaceutical that has not been approved for such purpose by the FDA. The corresponding author must complete the Disclosure of Investigational or Off-Label Use information in RGXPRESS.

SUBMISSION OF NEW MANUSCRIPTS

The following instructions will help you prepare your manuscript for submission to the *RadioGraphics* online manuscript management system, RGXPRESS. Submit manuscripts to <http://rgxpress.rsna.org>. No hard-copy or e-mail submissions will be accepted. **NOTE: These instructions are for new submissions only. Detailed instructions for submitting revised manu-**

scripts will be sent after the original manuscript has been reviewed.

To ensure anonymity in the review process, authors' names should appear on only the full title page, and the name of the institution should not be given in text.

The manuscript should be submitted in three separate document files. Do not use #, %, @, or ? in any file name. The first file, named as *title page.doc*, should contain the Full Title Page and the Acknowledgments. The second document file, named as *manuscript.doc*, should contain the following components in order: Abbreviated Title Page, Abstract, Text, References, and Legends. The manuscript file must include page numbers and line numbers. If you used the Comment feature in preparing the text, you must “accept all changes” and “delete all comments” before you save and upload your file to RGXPRESS. The third document file, named as *figures and tables.doc*, should contain all figures and tables. Each figure, with its corresponding legend, and each table should appear on a separate page.

If a CME exercise is included, it should be sent as a fourth separate file, named as *CME.doc*. Refer to the section CME Activity for detailed instructions on CME test preparation.

Title Pages

The full title page should include (a) the title of the submission; (b) the department, institution, and location from which the work originated; (c) names of all authors, including first names, middle initials, highest academic degrees, and affiliation if different from b; (d) information concerning grants; (e) the RSNA exhibit space number and any awards received, if applicable; and (f) telephone and FAX numbers and e-mail address of the corresponding author. The complete address should include the department, full institution name, complete street address (not a postal box), and zip code.

The abbreviated title page should include only the title of the manuscript. Contact information for the corresponding author in the hard-copy must match that in RGXPRESS.

Abstract and Summary Statement

An abstract of 250 words or less must be submitted with each manuscript. An abstract is a synopsis, not an introduction to the article. The abstract should summarize (a) the purpose of the article, (b) the approach or methods used by the authors, (c) the most pertinent facts presented, and (d) the authors' conclusion. The abstract should answer the question “What should readers know after completing this article.”

After the abstract, include a brief one-sentence summary statement that will accompany the title of the article in the Table of Contents. The statement is intended to tell readers the main topic of the article, not to repeat the abstract. Manuscripts for Best Cases from the AFIP, Editorials, historical anecdotes, Invited Commentaries, or the Oncodiagnosis Panel do not need an abstract or summary statement.

Teaching Points

As a service to *RadioGraphics* readers, online versions of major journal articles feature an enhancement, or reading aid, entitled Teaching Points. These key concepts are highlighted in the text of the article when it is viewed online or as a PDF. Key concepts are clinically useful information—the facts that you want your readers to remember after reading your article. A teaching point may consist of a single concept or a series of ideas in a single sentence, as in the following sample: “Potential

benefits of microwave ablation are consistently higher intratumoral temperatures, larger tumor ablation volumes, faster ablation times, ability to use multiple applicators, improved convection profile, optimal heating of cystic masses, and less procedural pain.”

For this feature, please identify five concepts in the text (not the abstract). Use brackets or braces to demarcate each point, preceded by a boldfaced label, **TP**. Do not insert annotations for teaching points in the margin of the manuscript, and do not use the Comment feature of MS Word for these annotations.

Text

The organization of the manuscript will depend on the purpose and scope of the material (refer to “Publication of *RadioGraphics* Manuscripts Revisited: Suggestions for Authors and Description of Peer Review” [*RadioGraphics* 1993; 13:1177–1178]). Every manuscript should contain an introduction and a conclusion or summary. The introduction should state the objectives of the article, give any background information necessary to understand why the topic is important, and briefly describe the subtopics covered. The summary should give the conclusions of the authors and briefly recap the important facts. We recommend that authors for whom English is not their native language seek assistance from an English-speaking colleague to ensure that the words convey the intended meaning both accurately and clearly.

Avoid using abbreviations. When used, abbreviations should be spelled out the first time a term is given in text, for example, positron emission tomography (PET). Laboratory slang, clinical and radiologic jargon, and uncommon abbreviations should be avoided. References to equipment, software, drugs, etc, should include a generic description and the manufacturer’s name and city.

Radiation measurements and laboratory values should be given in the International System of Units (SI) (SI Units in Radiation Protection and Measurements, NCRP Report no. 82 [August 1985]; “Now Read This; The SI Units Are Here,” *JAMA* 1986; 255:2329–2339). If both traditional and SI units are given, list the traditional first, followed by the SI equivalent in parentheses. Blood pressure should be reported in millimeters mercury.

Figures

Figures should be numbered consecutively in the order in which they are first mentioned in text. Refer to the section Rights and Permissions for detailed instructions on use of previously published images.

Images used for publication should be first-generation files retrieved from the work station. All window and level adjustments should be made before images are exported. Save exported files in TIFF or PSD format of the highest quality. Authors will need two file formats for each image: JPEG for initial submission and TIFF or PSD for final submission.

Choice of Figures.—Authors should choose figures carefully to support concepts in text and should avoid redundant figures. A maximum of 40 image parts is required. Color images are acceptable if use of color is essential to convey meaning. Color images may be printed in black and white, however, if use of color is deemed unnecessary.

Composition of Images.—Illustrations should show only the area of interest and the anatomy necessary to establish a frame of reference. Images to be combined

in one figure, such as anteroposterior and lateral views, should be the same height to facilitate reproduction. When several images of a given type (eg, CT, MR, US) are used, please reproduce each type at the same magnification. Figures should correspond to the tonal relations of the original image (ie, radiographs should show the bones white on a dark background, with the patient’s right to the observer’s left; CT scans, MR images, and sonograms should observe the “view from below” convention).

Image Annotation and Editing.—Digital image files may be labeled in Photoshop, provided the keys are clearly visible (eg, do not place a white key on a white background). Do not add numbers or part labels (eg, 1a, 1b) to identify figures to the image file itself. For excellent advice on image editing, manipulation, and annotation, refer to Corl et al, “A Five-Step Approach to Digital Image Manipulation for the Radiologist,” *RadioGraphics* 2002; 22:981–992 and Caruso and Postel, “Image Editing with Adobe Photoshop 6.0,” *RadioGraphics* 2002; 22:993–1002. For final image files (ie, PSD files), position the labels on separate layers, with the image placed on the background layer. Do not flatten the image or merge the layers. Save the image files in PSD format. Our professional graphics staff will convert these files to TIFF format.

Initial Submission Format.—For initial submission, figures should be submitted as JPEG files embedded in a separate MS Word document, named *figures and tables.doc*. For each figure, the legend should be electronically copied and pasted to the page on which the figure appears. Do not use PowerPoint or other presentation software to send images.

Final Submission Format and Digital Quality of Final Image Files.—Authors should submit individual images files of only the highest quality: 300 ppi (pixels per inch) TIFF or PSD for color or gray-scale images and 1200 ppi TIFF or Word or Excel files for graphs and diagrams. Image size should be as close as possible to final printed size. If you cannot see the pertinent radiologic finding on a computer printout of a 3-inch version of the image, your reader will not see it on the printed page. **Images embedded in programs such as PowerPoint will not be accepted.**

To accompany the annotated revised version of your manuscript, include the final version of your images and legends as JPEGs embedded in the text file, as you did for the original submission.

Author Responsibility.—**Authors are responsible for the accuracy of image orientation and labels. Authors do not receive photo proofs of images for approval; they should check images carefully before the final versions are submitted. Modifications to images may be requested by RSNA Publications staff after final acceptance of the manuscript.**

Figure Legends

A legend must be supplied for each figure, should follow Journal style, and should explain it in detail without duplicating material in text. For example, the legend should give the diagnosis or topic illustrated; identify the type of image shown, including important imaging parameters; and describe what is actually seen in the image. For cases of disease, the legend should include the age, sex, and clinical history of the patient, if relevant to the case. For photomicrographs, the original magnification (ie, the original optical enlargement, not a recalculated value) and stain should be given, if known. All legends should appear collectively following

the text, and each legend should also appear below the corresponding illustration.

Tables

Tables should be numbered consecutively in the order in which they are first mentioned in text. All tables should have a title. All abbreviations should be explained in a footnote. Tables should be prepared without vertical or horizontal lines and without shading.

Supplemental Material

Publication of online-only material allows *RadioGraphics* to supplement its print articles with Web-based enhancements, such as multimedia (animation, movies, and sound) and interaction (Java applets and other programs that allow interactivity in areas such as image display and computer-assisted instruction). Online-only supplements may also include material that could not be accommodated in print: additional data (tables, text), relevant background information, and large numbers of images. Supplemental material should be prepared and submitted according to instructions at radiographics.rsnaajnl.org/misc/supeppia.shtml.

References

The authors are responsible for the accuracy of the bibliographic information. This accuracy is essential for one of the features of *RadioGraphics* Online. The hyperlinks in the references of the online article to the abstracts of the referenced articles will not work unless the bibliographic information in the two matches exactly.

A maximum of 75 references is recommended. References should be numbered consecutively in the order in which they are first cited. References in tables or legends must be numbered in sequence with those in text. Unpublished data, including papers submitted but not yet accepted for publication, should not be in the reference list. The source should be given parenthetically in text: (Jones M, oral communication, May 2005). Periodical titles should be abbreviated in the style of *Index Medicus*. Issue numbers and inclusive page numbers should be given for all references. Abstracts, editorials, and letters to the editor should be noted as such. List surnames and initials of all authors when there are six or less, such as:

1. Kronthal AJ, Kang YS, Fishman EK, Jones B, Kuhlman JE, Tempany CM. MR imaging in sclerosing mesenteritis. *AJR Am J Roentgenol* 1991;156(3):517-519.

When there are seven or more authors, only the first three names need be identified, followed by "et al." In the case of books, the authors of a chapter, title of the chapter, editor(s), title of the book, edition, city, publisher, year, and chapter pages must be provided:

1. Brown M, Gray L. Indications for hematology. In: Wintrobe MM, ed. *Clinical hematology*. 3rd ed. Philadelphia: Lea & Febiger, 1975; 1146-1167.

Citations to articles in online-only formats should include the authors' names; title of the article; journal or Web page title; year, volume, and issue of publication; the complete URL for the document; and the date the document was accessed or consulted:

1. Middleton MS, McNamara MP. Breast implant classification with MR imaging correlation. *RadioGraphics* [serial online]. 2000; vol 20, no. 3. Available at: <http://radiographics.rsnaajnl.org/cgi/content/full/20/3/e1>. Accessed October 5, 2000.

FINALIZING SUBMISSION OF AN ORIGINAL MANUSCRIPT

Authors are strongly encouraged to refer to the Manuscript Submission Checklist before submitting the manuscript. The checklist summarizes important requirements, some of which must be fulfilled before a manuscript can be reviewed and some of which may help reduce the number of revisions requested by the Editor and reviewers. Authors will be required to complete all steps marked Incomplete before the system will allow final submission of a manuscript.

All manuscripts are acknowledged; please allow 5-7 working days for an acknowledgment.

The acknowledgment letter will include a unique identifier referred to as a "manuscript number." This identification number is permanently assigned to your manuscript and will be used in all future correspondence. Immediately upon receipt of the acknowledgment letter and manuscript number, fill in the appropriate blanks on the Copyright Agreement for each author.

You will receive instructions on how to submit all forms from the *RadioGraphics* Editorial Office.

NOTE: A manuscript cannot be submitted until all of its authors have completed or updated their Financial Disclosure information.

The corresponding author receives instructions for ordering reprints of the article with the galley proofs; reprints should be ordered at that time.

ONLINE-ONLY SUBMISSIONS

Standards for evaluating manuscripts for online-only publication are the same as those for manuscripts submitted for the print version of *RadioGraphics*. Online-only submissions must have a feature that cannot be produced in print, such as interactivity or multimedia, or contain a large number of images beyond the scope of print publication. Refer to radiographics.rsnaajnl.org/misc/rgeppia.shtml for instructions on manuscript preparation and submission.

ELECTRONIC EDUCATIONAL MATERIALS REVIEWS

Any person who would like to help in reviewing educational materials for *RadioGraphics* should contact:

Harry J. Griffiths, MD
Department of Radiology • University of Florida-Jacksonville
655 W 8th St • Jacksonville, FL 32209
(904) 244-4225 • FAX (904) 244-3382

RadioGraphics Manuscript Submission Checklist

More detailed information about each item can be found in the Publication Information for Authors in each issue of **RadioGraphics**.

MANUSCRIPT CONTENT

Abstract

- Is the abstract a summary of the article (rather than an introduction)?
- Does the abstract state why the topic is important?
- Does the abstract contain the most important facts presented in the article?
- Is the abstract 250 words or less?
- Did you include a brief Summary Statement (for the Table of Contents)?

Introduction

- Is there sufficient background information to understand why the topic is important?
- Does the Introduction state the purpose of the article?
- Is there a brief description of subtopics?

Text

- Do the major headings match the list of subtopics in the Introduction?
- Are abbreviations used only when necessary and spelled out at first mention? Are they standard (not jargon)?
- For any trademarks, have you provided a generic description and the manufacturer's name and location?
- Are radiation measurements and laboratory values given in SI units?
- Is there a Summary or Conclusions section (with your conclusions and a brief review of the important facts)?

References

- Have you made discriminatory choices among references and used 75 or less?
- Did you use the standard RSNA format for references?
- Have you checked each reference for bibliographic accuracy?
- Are the references numbered in the order they are cited?

Legends

- Does each legend (and its figure) support the point being made in the text?
- Does each legend describe what is actually seen in the image (rather than simply repeating the text)?
- Does each legend begin with the diagnosis or the topic illustrated?
- For cases of disease, does the legend include the age and sex of the patient and any relevant patient history?
- For radiologic images, does the legend include the type of image, the imaging plane, and important imaging parameters?
- For photomicrographs, does the legend include the original magnification and the histologic stain?
- Have you provided a collective listing of figure legends following the references?
- Have you copied and pasted the legend to the page with its corresponding figure part?

Figures

- Have the best, least redundant figures been included, with the total count no more than 40 images?
- Are all image parts for each figure of a similar size?
- Is the orientation of each figure correct?
- Is each figure, including drawings, correctly labeled and identified? Do keys match the legend?
- Are your keys (arrows, letters) clearly visible?
- Are all figures cited in text, numbered in the order they are cited?
- For initial submission of your manuscript**, have you saved your images as JPEGs and embedded them in a separate document file?

- For final submission of your manuscript**, have you prepared a separate, duplicate set of images saved in TIFF or PSD format? For these final images,
 - Have you used 1,200 ppi and bitmap mode for line art?
 - Have you used 300 ppi and gray-scale mode for halftones?
 - Have you used 300 ppi and CMYK mode for color images?
 - For images with keys or text labels, have you used 600 ppi, positioned the labels on layers, kept the layers separate (ie, not merged), and saved the files in PSD format?
 - Have you saved each figure part as a separate image file?

Tables

- Does each table have a descriptive and specific title?
- Are all abbreviations in the table explained in a footnote?
- Are all tables cited in text, numbered in the order they are cited?
- Are the tables in a separate document file?

CME TEST

- Did you read the CME Question Writing Guidelines?
- Did you provide three Learning Objectives for the test?
- Did you provide a total of 10 multiple-choice questions, each with only four answer choices?
- Did you provide two questions that are image based (ie, did you write a question about a specific image, which you identify, and give four possible answers)?
- Did you limit the questions that ask for a true or false answer to no more than two questions?
- Did you avoid negatively structured questions (eg, "Which of the following is *not*...")?
- Did you avoid using the terms "never" and "always" in the questions and answer choices?
- Did you avoid using "all of the above" and "none of the above" as answers?
- Did you double check that the questions, correct answers, and incorrect distractors match the information given in the article?
- Did you double check that only one answer is correct for each question and that you have provided a reference for the correct answer?
- Did you provide an answer key?
- Did you clearly identify the locations of the correct answers in the manuscript?

ASSEMBLY OF COMPLETED MANUSCRIPT

- Is the manuscript double-spaced with 1-inch margins (including references, legends, and tables)?
- Is the manuscript paginated?
- Will the manuscript authorship be anonymous to the reviewer?
- Are the Full Title Page and Acknowledgements in a separate document file? Are the abbreviated Title Page, Abstract, References, Legends in another document file?
- Does the Full Title Page include the following essential elements:
 - First name, middle initial, and last name of each author
 - Degrees for all authors
 - Complete street address (including building or room number), NOT a PO box, for Federal Express shipping
 - Phone, fax, and e-mail information for the corresponding author
 - Space/reference number of your exhibit
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- Is the Copyright Agreement ready to submit?
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- Have you obtained written consent for Acknowledgment (if necessary) for all persons who contributed to the scientific content of the manuscript?
- Do you have a Financial Disclosure form for each author?
 - Are both Parts 1 and 2 completed, including check marks for either yes or no?

RadioGraphics CME Question Writing Guidelines

GENERAL RULES FOR WRITING TEST QUESTIONS

Test development researchers generally place multiple-choice questions into one of three categories of mental activity. These categories are not necessarily related to an item's difficulty, but they are used to gauge what kinds of mental tasks a reader must go through to answer a given question. A question will usually ask the test-taker to (a) **recall** an isolated fact, (b) **interpret** supplied information and reach a desired conclusion, or (c) **reason** through a problem and determine a course of action.

In writing a "simple" series of recall questions, you can fall into writing what are essentially true-false questions. In testing as in life, a fact can seldom be declared absolutely true or absolutely false. To avoid the potentially misleading ambiguity involved in declaring absolutes, we prefer not to use true-false questions. A question that asks "Which of the following _____ is true [or false]?" is essentially a true-false question and should be avoided. A question for which the answer is "all of the above" or "none of the above" is also a true-false question and should not be used.

The following general rules should help writers work through some of the difficulties in writing the four-answer multiple-choice question.

1. Each question (stem) should focus on a **single important concept**. Packing a question with too much information or too much verbiage is simply confusing to the reader. Many question writers find that this pitfall can be avoided by concentrating on questions that might be encountered in "real life."
2. Answers (distractors) should be **homogeneous or parallel in construction**. That is, if you are trying to assess diagnostic ability with a question, make the responses a list of diagnoses. In this way, the reader's attention is more fairly focused on the subject at hand. Each question should have four possible answers.
3. When possible, try to assess the reader's **application of knowledge**, not his or her recall of isolated facts. Facts are important to real practice, but only when they are applied to a clinical situation, not listed in a vacuum.
4. Avoid "**red herrings**" or extraneous information in either questions or answers. Your point is not to "trick" the test-taker or to measure reading comprehension. Your point is to measure application of knowledge to clinical practice.

APPLYING THE GENERAL RULES

Everyone approaches writing in his or her own way. But when it comes to constructing good test questions, use of a systematic approach often helps one avoid writing poor questions.

1. First, identify the **key concepts** in the source material. What is most important for the reader to know after reviewing the material? In the case of questions on *RadioGraphics* articles, the key concepts will align with the learning objectives, although they will be more detailed.
2. Identify **actions** the reader should be able to take by using these key concepts in the real world. To identify these actions, choose words that *do* something rather than words that describe something.
3. Using the key concepts and the actions you've identified, write some **direct** questions for the reader. For the responses, list four "real-life" options that might actually confront the reader.
4. Review the questions. For each question, cover the listed responses and read the question itself. You should be able to provide the **single correct** answer, even though you cannot see the list of answers from which to choose.

AN EXAMPLE

What is the key concept in the following question? If you cover the answers, can you provide the correct one?

1. Zonal anatomy of the prostate gland _____.
 - a. Is best depicted with T2-weighted MR images. *
 - b. Is most easily depicted with CT images.
 - c. Has been in common use since the 1960s.
 - d. Is ideally depicted with T1-weighted MR images.

The above weak question has been rewritten below to give it a clear purpose. With that, it becomes a question that asks the reader to reason the path to the answer, to apply knowledge.

2. Which of the following kinds of MR images best depicts the zonal anatomy of the prostate gland?
 - a. T1 weighted.
 - b. T2 weighted. *
 - c. Diffusion weighted.
 - d. Contrast enhanced.

OTHER QUESTION WRITING HINTS

Following the general rules about focus and clarity will help writers construct better questions. But even the most experienced test writers must watch for the following common errors.

1. **Absolute terms** are a cue that a response is wrong. Words such as “always” or “never” are rarely true in life and so are almost never the right answer on a test.
2. **Word repeats**—that is, a word that appears in both the question and the response—are a cue pointing to a correct answer.
3. **Unparallel language** in a response is a cue that a response is wrong. Savvy test takers know that the response with the correct grammar is also the correct answer.
4. A **very short question with long answers** generally means a poor question. Include as much information as possible in the question and keep the responses as short as possible.

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