

# Physical Therapy

---

## Deputy Editor in Chief

**Daniel L. Riddle, PT, PhD, FAPTA**  
Richmond, VA

## Editor in Chief

**Rebecca L. Craik, PT, PhD, FAPTA**  
Philadelphia, PA  
rebeccacraik@apta.org

## Editor in Chief Emeritus

**Jules M. Rothstein, PT, PhD, FAPTA**  
(1947–2005)

## Editorial Board

**Rachelle Buchbinder, MBBS(Hons), MSc, PhD, FRACP**, Malvern, Victoria, Australia; **W. Todd Cade, PT, PhD**, St Louis, MO; **James R. Carey, PT, PhD**, Minneapolis, MN; **John Childs, PT, PhD, MBA**, Schertz, TX; **Leonardo Costa, PT, PhD**, São Paulo, Brazil; **Gammon Earhart, PT, PhD**, St Louis, MO; **Janice J. Eng, PT/OT, PhD**, Vancouver, BC, Canada; **Janet K. Freburger, PT, PhD**, Durham, NC; **Mary Gannotti, PT, PhD**, Hartford, CT; **Steven Z. George, PT, PhD**, Gainesville, FL; **Arlene Greenspan, PT, DrPH**, Atlanta, GA; **Kathleen Gill-Body, PT, DPT, NCS, FAPTA**, Boston, MA; **Jill C. Heathcock, PT, PhD**, Columbus, OH; **Rana Shane Hinman, PT, PhD**, Melbourne, Victoria, Australia; **Diane U. Jette, PT, DSc, FAPTA**, Boston, MA; **Sarah H. Kagan, PhD, FAAN, RN**, Philadelphia, PA; **Teresa Liu-Ambrose, PT, PhD**, Vancouver, BC, Canada; **Christopher Maher, PT, PhD**, Sydney, NSW, Australia; **Chris J. Main, PhD, FBPsS**, Keele, United Kingdom; **Sarah Westcott McCoy, PT, PhD, FAPTA**, Seattle, WA; **Patricia J. Ohtake, PT, PhD**, Buffalo, NY; **Elizabeth K. Rasch, PT, PhD**, Bethesda, MD; **Darcy Schwartz Reisman, PT, PhD**, Wilmington, DE; **Linda Resnik, PT, PhD**, Providence, RI; **Samuel R. Ward, PT, PhD**, La Jolla, CA; **Philip J. van der Wees, PT, PhD**, Nijmegen, the Netherlands; **Advisor, Clinical Practice Guidelines: James J. Irrgang, PT, PhD, ATC, FAPTA**, Pittsburgh, PA; **Chair, Rothstein Roundtable: Anthony Delitto, PT, PhD, FAPTA**, Pittsburgh, PA

## Statistical Consultants

**Hang Lee, PhD**, Boston, MA; **Xiangrong Kong, PhD**, Baltimore, MD; **Gregory F. Petroski, PhD**, Columbia, MO; **Michael E. Robinson, PhD**, Gainesville, FL; **Paul Stratford, PT, MSc**, Hamilton, Ont, Canada; **David Thompson, PT, PhD**, Oklahoma City, OK; **Samuel Wu, PhD**, Gainesville, FL

## Committee on Health Policy and Ethics

**Linda Resnik, PT, PhD, OCS** (Chair), Providence, RI; **Janet Freburger, PT, PhD**, Chapel Hill, NC; **Alan M. Jette, PT, PhD, FAPTA**, Boston, MA; **Michael Johnson, PT, PhD, OCS**, Philadelphia, PA; **Justin Moore, PT, DPT**, Alexandria, VA; **Ruth B. Purtilo, PT, PhD, FAPTA**, Boston, MA

## Senior Reviewers

Karen Abraham-Justice, PT, PhD; Peter Altenburger, PT, PhD; Paul Beattie, PT, PhD, OCS, FAPTA; Leanne Bisset, PhD; Timothy Brindle, PT, PhD, ATC; Donna Cech, PT; Daniel Cipriani, PT, PhD; Barbara H. Connolly, PT, DPT, EdD, FAPTA; Chad Cook, PT, PhD, MBA, OCS, FAAOMPT; Christian Evans, PT, PhD; Manuela Ferreira, PT, PhD; Cheryl Ford-Smith, PT, DPT, MS, NCS; Jorge Fuentes, PT, BSc, MSc, RS, PhD Candidate; Meryl Gersh, PT, PhD; Adam Goode, PT, DPT, PhD; Kathy Green, PhD; Bruce Greenfield, PT, PhD, OCS; Mijna Hadders-Algra, MD, PhD; Lisa (Elizabeth) Hannold, PhD; Regina Harbourne, PT, PhD, PCS; Karen Hayes, PT, PhD, FAPTA; Jessie Huisinga, PhD; Kenton Kaufman, PhD; Suzanne Kuys, GDPubth, BPhysio(H); Merrill Landers, PT, DPT, OCS; Sandra Levi, PT, PhD; Kathleen Mangione, PT, PhD, GCS; Sunita Mathur, PT; Karen McCulloch, PT, PhD, NCS; Christine McDonough, PT, PhD; Irene McEwen, PT, PhD, FAPTA; Michael Mueller, PT, PhD; Susan Muir, PT; Gina Musolino, PT, MEd, EdD; Jacqueline Nuysink, PT, MSc, PCS; Stéphane Poitras, PhD; Emilio Puentedura, PhD; Kathleen Rockefeller, PT, MPH, ScD; Mark Damian Rossi, PT, PhD, CSCS; Susan Roush, PhD; Lisa Selby-Silverstein, PT, PhD, NCS; Mary Shall, PT, PhD; Elizabeth Skinner, PhD; Beth Smith, PT, DPT, PhD; Jane Sullivan, PT, PhD, NCS; Greg Thielman, PT, EdD, ATC; David Thompson, PT, PhD; Carole Tucker, PT, PhD, PCS; Ann Vendrely, PT, DPT, EdD; Susan Wainwright, PT, PhD; Joseph Zeni, PhD

---

## PTJ Editorial Office

**Managing Editor:** Jan P. Reynolds, janreynolds@apta.org; **PTJ Online Editor / Assistant Managing Editor:** Steven Glaros; **Associate Editor:** Stephen Brooks, EL5; **Editorial Assistant:** Natacha Leonard; **Editorial Tracking Manager:** Karen Darley

## Association Staff

**Chief Executive Officer:** J. Michael Bowers; **Vice President of Research:** Robyn Watson Ellerbe, PhD; **Director of Publishing / Member Communications:** Lois Douthitt; **Advertising Manager:** Julie Hilgenberg; **Permissions / Reprint Coordinator:** Michele Tillson

## Advertising Sales

**Ad Marketing Group, Inc,** 2200 Wilson Blvd, Suite 102-333, Arlington, VA 22201; 703/243-9046, ext 102; **President / Advertising Account Manager:** Jane Dees Richardson

## Board of Directors

**President:** Sharon L. Dunn, PT, PhD, OCS; **Vice President:** Lisa K. Saladin, PT, PhD, FASAHP; **Secretary:** Laurita M. Hack, PT, DPT, MBA, PhD, FAPTA; **Treasurer:** Elmer Platz, PT; **Speaker of the House:** Susan R. Griffin, PT, DPT, MS, GCS; **Vice Speaker of the House:** Stuart Platt, PT, MSPT; **Directors:** Susan A. Appling, PT, DPT, PhD, OCS; Jeanine M. Gunn, PT, DPT; Roger A. Herr, PT, MPA, COS-C; Matthew R. Hyland, PT, PhD, MPA; Kathleen K. Mairella, PT, DPT, MA; Sheila K. Nicholson, PT, DPT, JD, MBA, MA; Carolyn Oddo, PT, MS, FACHE; Robert H. Rowe, PT, DPT, DMT, MHS, FAAOMPT; Sue Whitney, PT, DPT, PhD, NCS, ATC, FAPTA

## Subscriptions

Physical Therapy (**PTJ**) (ISSN 0031-9023) is published monthly by the American Physical Therapy Association (APTA), 1111 North Fairfax Street, Alexandria, VA 22314-1488, at an annual subscription rate of \$12 for members, included in dues. Nonmember rates are as follows: Individual (inside USA)—\$129; individual (outside USA)—\$149 surface mail, \$209 air mail. Institutional (inside USA)—\$169; institutional (outside USA)—\$189 surface mail, \$249 air mail. Periodical postage is paid at Alexandria, VA, and at additional mailing offices. **Postmaster:** Send address changes to *Physical Therapy*, 1111 North Fairfax Street, Alexandria, VA 22314-1488. Single copies: \$15 USA, \$15 outside USA. All orders payable in US currency. No replacements for nonreceipt after a 3-month period has elapsed. Canada Post International Publications Mail Product Sales Agreement No. 0055832.

## Members and Subscribers

Send changes of address to: APTA, Attn: Member Services Dept, 1111 North Fairfax St, Alexandria, VA 22314-1488. Subscription inquiries: 703/684-2782, ext 3124. **PTJ** is available in a special format for readers who are visually impaired. For information, contact APTA's Member Services Department at 703/684-2782, ext 3124.

## Mission Statement

*Physical Therapy* (**PTJ**) engages and inspires an international readership on topics related to physical therapy. As the leading international journal for research in physical therapy and related fields, **PTJ** publishes innovative and highly relevant content for both clinicians and scientists and uses a variety of interactive approaches to communicate that content, with the expressed purpose of improving patient care. **PTJ** is the official scientific journal of the American Physical Therapy Association (APTA).

Readers are invited to submit manuscripts to **PTJ**. **PTJ**'s content—including editorials, commentaries, and letters—represents the opinions of the authors and should not be attributed to **PTJ** or its Editorial Board. Content does not reflect the official policy of APTA or the institution with which the author is affiliated, unless expressly stated.

## PTJ Online at [ptjournal.apta.org](http://ptjournal.apta.org)

**RSS** **PTJ** Online is available via RSS feeds. **PTJ** posts articles ahead of print and rapid reader responses to articles. Articles, letters to the editor, and editorials are available in full text starting with Volume 79 (1999) and in searchable PDF format starting with Volume 60 (1980). Entire issues are available online beginning with Volume 86 (2006) and include additional data, video clips, and podcasts.

## Indexing and Document Delivery

**PTJ** is indexed by MEDLINE, PubMed, Cumulative Index to Nursing & Allied Health (CINAHL), EMBASE/Excerpta Medica, AgeLine, Allied and Complementary Medicine Database (AMED), Index Medicus, and Science Citation Index (SCI), among others. A complete list is available from [ptjournal.apta.org/site/misc/about.xhtml](http://ptjournal.apta.org/site/misc/about.xhtml).

Article abstracts are available online at [ptjournal.apta.org](http://ptjournal.apta.org) (1980 through present) and via MEDLINE, PubMed, Allied and Complementary Medicine Database (AMED), Cumulative Index to Nursing & Allied Health (CINAHL), Dialog, and OCLC FirstSearch, among others.

Full-text articles are available for free at [ptjournal.apta.org](http://ptjournal.apta.org) 12 months after the publication date (1980 to present). Full text is also provided through Dialog, EBSCOhost, InfoTrac, ProQuest, and Westlaw.

## Reprints

Readers should direct requests for reprints to the corresponding author of the article. Students and other academic customers may receive permission to reprint copyrighted material from this publication by contacting the Copyright Clearance Center Inc, 222 Rosewood Dr, Danvers, MA 01923. Authors who want reprints should contact June Billman, Cadmus Communications, at 800/487-5625, or [billmanj@cadmus.com](mailto:billmanj@cadmus.com). Non-academic institutions needing reprint permission information should go to [ptjournal.apta.org/site/misc/terms.xhtml](http://ptjournal.apta.org/site/misc/terms.xhtml).

## Advertising

Advertisements are accepted by **PTJ** when they conform to the ethical standards of the American Physical Therapy Association. **PTJ** does not verify the accuracy of claims made in advertisements, and acceptance does not imply endorsement by **PTJ** or the Association. Acceptance of advertisements for professional development courses addressing advanced-level competencies in clinical specialty areas does not imply review or endorsement by the American Board of Physical Therapy Specialties.

## Statement of Nondiscrimination

APTA prohibits preferential or adverse discrimination on the basis of race, creed, color, gender, age, national or ethnic origin, sexual orientation, disability, or health status in all areas including, but not limited to, its qualifications for membership, rights of members, policies, programs, activities, and employment practices. APTA is committed to promoting cultural diversity throughout the profession.

