

## Evidence-Based Spine-Care Journal

# EBSJ

Volume 2/Issue 4—November 2011 ISSN 1663-7976

<b>Original research</b>	Platelet-rich plasma effects on degenerative disc disease: analysis of histology and imaging in an animal model	13–18
	Caudal epidural steroid injection: a randomized controlled trial	19–26
<b>Systematic reviews</b>	Does patient history and physical examination predict MRI proven cauda equina syndrome?	27–33
	Cement augmentation in spinal tumors: a systematic review comparing vertebroplasty and kyphoplasty	35–43
<b>Case reports</b>	Surgical treatment of multiple spine metastases from gastrinoma	45–50
	Hypokalaemic paralysis secondary to thiazide diuretic abuse: an unexpected outcome for cauda equina syndrome	51–54
<b>Selected abstracts</b>		55–59



PROPERTY OF THE  
NATIONAL  
LIBRARY OF  
MEDICINE

Genome & Co. v. Univ. of Chicago  
PGR2019-00002  
UNIV. CHICAGO EX. 2073

Imprint

**EBSJ****Evidence-Based Spine-Care Journal****EDITORIAL BOARD****Senior Editor-in-Chief:**

Luiz Roberto Vialle, MD  
Grupo de Coluna / Spine Unit,  
Universidade Católica do Paraná  
Brigadeiro Franco, 979, 80.430-210  
CURITIBA, Brasil

**Editor-in-Chief and Scientific Editor-in-Chief:**

Jens Chapman, MD  
Chief of Spine Service,  
Harborview Medical Center  
325 Ninth Avenue, Box 359798, Seattle,  
Washington 98104-2499, USA

**Co-Managing Editor-in-Chief:**

Jeffrey Wang, MD  
UCLA Spine Center,  
UCLA School of Medicine,  
Department of Orthopaedic Surgery  
and Neurosurgery  
1250 16th Street, 7th floor, Tower #715,  
Santa Monica, CA 90404, USA

**Co-Managing Editor-in-Chief:**

Karsten Wiechert, MD  
Department of Spinal Surgery,  
Hessingpark-Clinic  
Hessingstraße 17,  
86199 Augsburg, Germany

**Deputy Editor Scientific Methodology:**

Andrea C Skelly, PhD, MPH

**Deputy Editor Clinical Sciences:**

Michael Fehlings, MD, PhD

**Deputy Editor Basic Sciences:**

Keita Ito, PhD

**Deputy Editor Publishing:**

Kathrin Lüssi

**Regional Editors**

**AOSpine Africa:** Robert Dunn, MD

**AOSpine Hong Kong:** Kenneth Cheung, MD

**AOSpine India:** KV Menon, MD

**AOSpine Europe:** Giuseppe Barbagallo, MD,  
and the European Research Committee

**AOSpine Latin America:** Marcelo Gruenberg, MD

**AOSpine Middle East:** Zayed Al-Zayed, MD

**AOSpine North America:** Darrel Brodtko, MD

**AOSpine Pacific:** Bryan Ashman, MD

**CONTACTS****For subscriptions, advertising, and questions regarding distribution contact:**

North, Central, and South Americas  
Thieme Publishers  
333 Seventh Avenue  
New York, NY 10001 USA  
customerservice@thieme.com

**Annual subscription  
(print and online access)**

USA and Canada  
individual US\$ 129  
institutional (print only) US\$ 436

Mexico, Central and South America  
individual US\$ 137  
institutional (print only) US\$ 463

**Change of address**

Notify Thieme Publishers.  
Allow 4 weeks for all changes  
to become effective.

Europe, Africa, Asia, & Australia  
Thieme Publishers  
Postfach 301120  
D-70451 Stuttgart, Germany  
customerservice@thieme.com

**Annual subscription  
(print and online access)**

individual € 89  
institutional (print only) € 298

**Please add handling charges:**

Europe € 24  
Africa, Asia, Australia € 30

**Bulk reprint orders**

For quotes and information, contact  
Thieme International at the address  
indicated.

**Printing**

Brulin AG  
CH-8807 Freienbach  
Circulation: 6340 copies

**Typesetting**

nongat GmbH, Switzerland

**Copyright**

Copyright © 2011 by  
AOSpine International  
Stettbachstrasse 6  
8600 Dübendorf, Switzerland

**Distribution**

Thieme Publishers  
Rüdigerstrasse 14  
D-70469 Stuttgart, Germany  
and Thieme Publishers  
333 Seventh Avenue  
New York, NY 10001, USA

ISSN (Print): 1663-7976  
eISSN (Online): 1869-4136

**DISCLAIMER****Hazards**

Great care has been taken to maintain the accuracy of the information contained in this publication. However, neither AOSpine International, nor the editors and/or the authors can be held responsible for errors or any consequences arising from the use of the information contained in this publication.

The statements or opinions contained in editorials and articles in this journal are solely those of the authors thereof and not of AOSpine International. The products, procedures, and therapies described are only to be applied by certified and trained medical professionals in environments specially designed for such procedures. No suggested test or procedure should be carried out unless, in the reader's professional judgment, its risk is justified. Because of rapid advances in the medical sciences, we recommend that independent verification of diagnoses, drugs dosages, and operating methods should be made before any actions taken.

Although all advertising material is expected to conform to ethical medical standards, inclusion in this publication does not constitute a guarantee or endorsement of the quality or value of such product or of the claims made of it by its manufacturer.

**Legal restrictions**

Some of the products, names, instruments, treatments, logos, designs, etc. referred to in this book are also protected by patents and trade marks in by other intellectual property protection laws: EU, AU, AS, US, AD, AM, CA, BR, AR, BO, CO, CR, CU, EC, EG, ES, FR, GB, GR, HK, HU, IL, IN, JP, KR, MA, MX, NZ, PE, PH, PT, RU, SA, SG, TH, TR, TW, UA, VE, VN, ZW. AOSpine and registered trademarks exist through specific reference to the fact and always made in the text. Therefore, the appearance of a name, instrument, etc. without designation as proprietary is not to be construed as a representation by the publisher that it is in the public domain.

This work was produced by AOSpine International, manufacturer of 8600 Dübendorf, Switzerland. All rights reserved by AOSpine International. This publication, including all parts thereof, is legally protected by copyright. Any use, reproduction or commercialization outside the narrow limits of copyright legislation, without the publisher's consent, is illegal and liable in prosecution. This applies in particular to photostat reproduction, copying, scanning and duplication of any kind, translating, preparation of micro-films and electronic data processing and storage. Institutions' subscriptions allow for reproducible tables of content or prepare lists of articles including abstracts for internal circulation within the institutions concerned. Permission of the publisher is required for resale or distribution outside the institutions. Permission of the publisher is required for all other derivative works, including compilations and translations.

Permission of the publisher is required to store or use electronically any material contained in this journal, in whole or in part of an article. For inquiries contact the publisher at the

---

Table of Contents

# EBSJ

## Evidence-Based Spine-Care Journal

---

### VOLUME 2, ISSUE 4

---

#### MESSAGE FROM THE EDITOR

- 5–7 BMP Debate: evidence in the name of science?  
*Jens Chapman*

---

#### SCIENCE IN SPINE—FUNDAMENTALS

- 9–11 Probability, proof, and clinical significance:  
*Andrea C Skelly*

---

#### ORIGINAL RESEARCH

- 13–18 Platelet-rich plasma effects on degenerative disc disease:  
analysis of histology and imaging in an animal model  
*Gregory Brinker Gullung*
- 19–26 Caudal epidural steroid injection: a randomized controlled trial  
*Vijay G Murakibhavi, Aditya Khemka*

---

#### SYSTEMATIC REVIEWS

- 27–33 Does patient history and physical examination predict MRI proven  
cauda equina syndrome?  
*Jeremy Fairbank, Robin Hashimoto, Andrew Dailey, Alpesh A Patel, Joseph R Dettori*
- 35–43 Cement augmentation in spinal tumors: a systematic review comparing  
vertebroplasty and kyphoplasty  
*Josh E Schroeder, Erika Ecker, Andrea C Skelly, Leon Kaplan*

---

**CASE REPORTS**

- 45–50 Surgical treatment of multiple spine metastases from gastrinoma  
*Kelli L Crabtree, Karen K Anderson, Neal G Haynes, Paul M Arnold*
- 51–54 Hypokalaemic paralysis secondary to thiazide diuretic abuse: an unexpected outcome for cauda equina syndrome  
*Derek T Cawley, Paul Curtin, John P McCabe*
- 

**SELECTED ABSTRACTS**

- 55–56 Tissue-engineered total disc replacement: final outcomes of a murine caudal disc in vivo study  
*Andrew R James, Robby D Bowles, Harry H Gebhard, Lawrence J Bonassar, Roger Härtl*
- 57–58 A synthesis of best available evidence and expert opinion on outcomes after cervical trauma: what should surgeons be telling their patients?  
*Peter Lewkonja, Christian P DiPaola, Rowan Schouten, Marcel Dvorak, Charles G Fisher*
- 
- 59 Definition of classes of evidence (CoE) and overall strength of evidence (SoE)



9-11

# Probability, proof, and clinical significance

Author: Andrea C Skelly

Institution: Spectrum Research Inc, Tacoma, WA, USA



A study reports that treatment A “provided significantly better pain relief” than treatment B. How do you know if the effect is real or due to chance? Assuming that the difference between treatment groups on the outcome is statistically significant, does this mean that your patients will have a clinically significant improvement? This article explores these questions as well as provides some additional points to consider when critically appraising and conducting research.

When a difference in an outcome (eg, pain) between exposures (eg, treatment groups) is observed, one needs to consider whether the effect is truly due to the exposure *or* if alternate explanations are possible. In other words, in order to evaluate the validity of a research study, factors that might distort the true association and/or influence its interpretation need to be carefully considered. This means evaluating the role of bias and considering the study’s statistical precision.

Bias relates to *systematic* sources of error which need to be considered. (Bias will be discussed in more detail in future issues). By contrast, evaluation of statistical precision involves consideration of *random error* within the study, random error being the part of the study that cannot be predicted, ie, that part attributable to chance. In addition, one needs to consider whether a clinically meaningful improvement is represented.

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.