

BJA

British Journal of Anaesthesia

International Journal of Anaesthesia

Volume 103 Number 1 July 2009

Editors: P. M. Hopkins and J. G. Hardman

POSTGRADUATE EDUCATIONAL ISSUE

ADVANCES IN PHARMACOLOGY AND THERAPEUTICS



Journal of The Royal College of Anaesthetists

OXFORD JOURNALS
OXFORD UNIVERSITY PRESS

OXFORD  OPEN

Editorial Board 2009

Editor-in-Chief

CHARLES S. REILLY, Professor of Anaesthesia, *University of Sheffield*

Editors

H. F. GALLEY, Senior Lecturer in Anaesthesia and Intensive Care, *University of Aberdeen*

H. C. HEMMINGS, Professor of Anesthesiology and Pharmacology, *Cornell University, New York*

S. J. HOWELL, Senior Lecturer in Anaesthesia, *University of Leeds*

R. P. MAHAJAN, Professor of Anaesthesia and Intensive Care, *University of Nottingham*

M. M. R. F. STRUYS, Professor and Chairman, Department of Anaesthesia, *University Medical Center Groningen, The Netherlands*

J. P. THOMPSON, Senior Lecturer in Anaesthesia and Critical Care, *University of Leicester*

J. G. HARDMAN (CME editor), Associate Professor and Reader in Anaesthesia, *University of Nottingham*

Board Members

F. BONNET, Professor of Anaesthesia, *Assistance Publique Hopitaux de Paris*

D. J. BUGGY, Professor of Anaesthesia, *Mater Misericordiae University Hospital and University College Dublin, Ireland*

L. COLVIN, Consultant/Senior Lecturer in Anaesthesia and Pain Medicine, *Western General Hospital, University of Edinburgh*

C. DODDS, Vice President, *Royal College of Anaesthetists*

G. M. HALL, Professor of Anaesthesia, *University of London*

P. M. HOPKINS (Secretary), Professor of Anaesthesia, *University of Leeds*

J. A. HULF, President, *Royal College of Anaesthetists*

J. M. HUNTER (Chairman), Professor of Anaesthesia, *University of Liverpool*

D. G. LAMBERT, Professor of Anaesthetic Pharmacology, *University of Leicester*

P. A. LONNQVIST, Professor of Paediatric Anaesthesia and Intensive Care, *Lingrens Children's Hospital, Stockholm, Sweden*

P. MARHOFER, Professor of Anaesthesia and Intensive Care Medicine, *University of Vienna, Austria*

A. M. MOLLER, Consultant Anaesthetist, *KAS Herlev, Denmark*

P. NIGHTINGALE, Vice President, *Royal College of Anaesthetists*

I. POWER (Treasurer), Professor of Anaesthesia, Critical Care and Pain Medicine, *University of Edinburgh*

H.-J. PRIEBE, Professor of Anaesthesia, *University of Freiburg, Germany*

D. J. ROWBOTHAM, Professor of Anaesthesia and Pain Management, *University of Leicester*

J. W. SEAR, Professor of Anaesthesia, *University of Oxford*

J. R. SNEYD, Professor of Anaesthesia, *Peninsula Medical School, Plymouth*

N. R. WEBSTER, Professor of Anaesthesia, *University of Aberdeen*

International Board Members

T. ASAI, Assistant Professor, Department of Anaesthesiology, *Kansai Medical University, Japan*

K. HIROTA, Professor, Department of Anesthesiology, *University of Hirosaki, Japan*

G. LEES, Professor of Neurophysiology and Neuropharmacology, *University of Otago, New Zealand*

P. S. MYLES, Professor and Director, Department of Anaesthesia and Perioperative Medicine, *Alfred Hospital and Monash University, Australia*

S. L. SHAFER, Professor of Anesthesia, *Columbia University, New York*

Assistant Editors

Z. L. S. BROOKES, Lecturer in Anaesthesia and Microcirculation, *University of Sheffield*

Production Staff

H. J. LAMB, Senior Production Editor, *Oxford University Press*

Please visit the Journal's World Wide Web site at <http://bj.a.oxfordjournals.org>

General Information

Subscriptions

All Fellows of the College, world-wide, should notify changes of address directly to the Royal College of Anaesthetists.

An annual subscription to *BJA* comprises 12 issues (two volumes of 6 issues), with Author and Subject Indexes. Subscriptions are entered on a calendar year basis only. Please add local sales tax to the prices quoted. Prices include postage by surface mail, or for subscribers in the USA and Canada by Airfreight, or in Japan, Australia, New Zealand, and India by Air Speeded Post. Airmail rates are available on request.

Annual subscription rate 2009

Full rate (institutions): print and on-line £389, US\$751, €584; print only: £370, US\$714, €555; on-line only: £366, US\$706, €549

Personal: print and online £368, US\$710, €552

Trainee: print and online £181, US\$349, €272

ESA/EACTA/EAA/ESRA/JSA/IARS members: print and online £181, US\$349, €272

Single issue print only (institutions) £39, US\$74, €58; (personal) £38, US\$74, €58

Orders

Orders and payments from, or on behalf of, subscribers in the various geographical areas shown below should be sent to the office indicated.

Methods of payment. Payment should be made: by cheque (to Oxford University Press, Cashiers Office, Great Clarendon Street, Oxford, OX2 6DP, UK); by bank transfer [to Barclays Bank Plc, Oxford Office, Oxford (bank sort code 20-65-18) (UK); overseas only Swift code BARC GB22 (GB£ Sterling Account no. 70299332, IBAN GB89BARC20651870299332; US\$ Dollars Account no. 66014600, IBAN GB27BARC20651866014600; EU€ EURO Account no. 78923655, IBAN GB16BARC20651878923655]; or by credit card (Mastercard, Visa, Switch or American Express).

For further information, please contact: Journals Customer Service Department, Oxford University Press, Great Clarendon Street, Oxford OX2 6DP, UK. Email: jnls.cust.serv@oxfordjournals.org. Tel (and answerphone outside normal working hours): +44 (0)1865 353907. Fax: +44 (0)1865 353485.

In the US, please contact: Journals Customer Service Department, Oxford University Press, 2001 Evans Road, Cary, NC 27513, USA. Email: jnorders@oxfordjournals.org. Tel (and answerphone outside normal working hours): 800 852 7323 (toll-free in USA/Canada). Fax: 919 677 1714.

In Japan, please contact: Journals Customer Services, Oxford University Press, 4-5-10-8F, Shiba, Minato-ku, Tokyo, 108-8386 Japan. Email: custserv.jp@oxfordjournals.org. Tel: (03) 5444 5858. Fax: (03) 3454 2929.

Please address orders and enquiries about availability as follows: *For current year and two previous years' issues* to Oxford University Press.

For earlier volumes to Periodicals Service Company, 11 Main Street, Germantown, NY 12526, USA. Tel: +1 (518) 537 4700; Fax: +1 (518) 537 5899.

Oxford Journals Environmental and Ethical Policies

Oxford Journals is committed to working with the global community to bring the highest quality research to the widest possible audience. Oxford Journals will protect the environment by implementing environmentally friendly policies and practices wherever possible. Please see <http://www.oxfordjournals.org/ethicalpolicies.html> for

further information on Oxford Journals' environmental and ethical policies.

DOIs

For information about DOIs and to resolve them, please visit: <http://dx.doi.org/>

Rights and permissions

Please send any requests for permission to reproduce articles/information from this journal to: Rights and New Business Development, Journals Division, Oxford University Press, Great Clarendon Street, Oxford OX2 6DP, UK. Tel: +44 (0)1865 354490 or 353695; Fax: +44 (0) 1865 353485; E-mail: journals.permissions@oxfordjournals.org or visit www.oxfordjournals.org/jnls/permissions

Advertising

Advertising, inserts and artwork enquiries should be addressed to Advertising and Special Sales, Journals Division, Oxford University Press, Great Clarendon Street, Oxford, OX2 6DP, UK. Tel: +44 (0)1865 354767; Fax +44 (0)1865 353774; E-mail: jnlsadvertising@oxfordjournals.org.

© The Board of Directors of the British Journal of Anaesthesia 2009

All rights reserved; no part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise without the prior written permission of the *British Journal of Anaesthesia*, requests for which should be addressed to the Publisher, or a licence permitting restricted copying issued in the UK by the Copyright Licensing Agency Ltd, 90 Tottenham Court Road, London W1P 9HE, or in the USA by the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923. For those in the US/Canada not registered with CCC, articles can be obtained by fax in 48 hours by calling: WISE for MedicineTM1-800-667-WISE.

British Journal of Anaesthesia (ISSN 0007-0912) is published monthly by Oxford University Press, Oxford, UK. *British Journal of Anaesthesia* Advance Access contains papers that have recently reached corrected proof stage, but have not yet been included within an issue. Advance Access is updated weekly.

British Journal of Anaesthesia is distributed by Mercury International, 365 Blair Road, Avenel, NJ 07001, USA. Periodicals postage paid at Rahway, New Jersey, and additional entry points.

US Postmaster: send address changes to *British Journal of Anaesthesia*, c/o Mercury International, 365 Blair Road, Avenel, NJ 07001, USA.

Disclaimer

Whilst every effort is made by the publishers and editorial committee to see that no inaccurate or misleading data, opinions or statements appear in this Journal, they wish to make it clear that the data and opinions appearing in the articles and advertisements herein are the responsibility of the contributor or advertiser concerned. Accordingly, the publisher and the editorial committee and their respective employees, officers and agents accept no liability whatsoever for the consequences of any such inaccurate or misleading data, opinions or statements. While every effort is made to ensure that drug doses and other quantities are presented accurately, readers are advised that new methods and techniques involving drug usage, and described within this Journal, should only be followed in conjunction with the drug manufacturer's own published literature.

Printed by Bell and Bain Ltd, Glasgow, UK.

Editorial Notices

ELECTRONIC SUBMISSION OF LETTERS TO THE EDITOR

(eletters)

All Letters to the Editor relating to an article published in the *BJA* must be submitted electronically through the *BJA* web site (<http://bj.oxfordjournals.org>). To submit a Letter to the Editor about an article published in the *BJA*, you need to 'Browse the Archive', enter the Full Text of the article, and then click on 'E-letters: Submit a response to the article', in the 'This Article' box on your right-hand side of the screen. To read Recent article eletters which have already been submitted, enter through this box on the *BJA* web site, View Current Issue page. To submit an Out of the blue eletter, which is unrelated to a recently published article in the *BJA*, follow the instructions after clicking on this box on the web site. You will be able to 'Submit a new Topic' as well as view recently submitted Out of the blue eletters. The Editor-in-Chief will select the best eletters each month for publication in the hard copy of the *BJA*.

Jennifer M Hunter
Charles S Reilly
Ravi Mahajan

Publisher's Note

On behalf of *British Journal of Anaesthesia*, the Publisher would like to announce that the Journal has a new policy covering publication of data from clinical trials concordant with that of the International Committee of Medical Journal Editors (www.icmje.org).

From January 2009, *British Journal of Anaesthesia* will only consider for publication results from clinical trials fully registered in a publically accessible trials registry at or before the onset of participant enrollment. Further details of the policy can be found in the updated Instructions for Authors, which are available online here: http://www.oxfordjournals.org/our_journals/bjaint/for_authors/index.html

Manuscripts on clinical trials should also comply with the Consolidated Standards of Reporting Trials (CONSORT) and include a flow diagram presenting the enrollment, intervention allocation, follow-up, and data analysis with number of subjects for each (www.consort-statement.org).

Questions on this new policy for *British Journal of Anaesthesia* should be addressed to the editorial office:

Professor Charles S Reilly
Editor-in-Chief, *British Journal of Anaesthesia*
Academic Unit of Anaesthesia
Floor K, Royal Hallamshire Hospital
Glossop Road
Sheffield S10 2JF
United Kingdom

bj.oxfordjournals.org

Continuing Education in Anaesthesia, Critical Care & Pain (CEACCP) Editorial Committee Membership

The *British Journal of Anaesthesia* invites applications for membership of the Editorial committee of *Continuing Education in Anaesthesia, Critical Care & Pain* (CEACCP) to commence in January 2010. The appointment will be for a 5-year term in the first instance, renewable for a further 5 years.

To be eligible for appointment, applicants should be engaged in a substantive academic or clinical position, with significant clinical experience in one or more fields of anaesthesia, critical care and pain medicine. Applicants should in addition, have experience of the editorial process, and in the preparation and submission of high quality articles for publication.

We would welcome applicants with clinical experience in any of the fields of anaesthesia, critical care & pain. However, we have a particular requirement for applicants with acute and chronic pain experience and neuro-anaesthesia expertise, to complement the existing Editorial committee.

There are up to 4 vacancies

The duties of Editorial committee membership include:

1. To commission at least five continuing education articles per year;
2. To attend and contribute to the two Editorial committee Meetings each year;
3. To assist the Editor in Chief by providing editorial expertise and reviewing articles submitted for publication.

Applications, in the form of a covering letter, a brief CV (maximum 2 sides of A4) and a list of publications in the past 5 years should be sent to the Joint Editor in Chief, Dr Jeremy Langton (Jeremy.langton@btinternet.com) by 31st Oct 2009.

British Journal of Anaesthesia is a company limited by guarantee and having no share capital incorporated in England and Wales with company number 06410445.

Registered as a charity in England & Wales (number 1121817) and Scotland (number SC039825).

Registered Office: Department of Anaesthesia, University of Liverpool, Duncan Building, Daulby Street, Liverpool L69 3GA.

Directors: Professor JM Hunter, Professor I Power, Professor NR Webster, Professor PM Hopkins, Dr J Hulff.

NMM 2009 Neuromuscular Meeting 9th International Expert Meeting on Neuromuscular Physiology and Pharmacology Coupling Muscle and Nerve

Munich, Germany, July 1–4, 2009

Programme forthcoming at www.nmm2009.de

For more details, please contact: Nicola Möll, Klinikum rechts der Isar, Ismaninger Str. 22, 81675 Munich, Germany; Tel: +49 89 4140 2681; Fax: +49 89 4140 6282; E-mail: nmm2009@lrz.tum.de

12th Anaesthesia, ICM and Pain Forum

Da Balaia, The Algarve, Portugal, October 5–8, 2009

In a beautiful setting of the Algarve, a four day update on new developments in anaesthesia, ICM and pain management.

Broaden your horizons with lectures, hands on workshops and discussions conducted by high quality faculty.

For further details and on-line registration please look up www.doctorsupdates.com; E-mail: info@doctorsupdates.com; Tel: +44 (0)208 7151924.

ACTA Autumn Meeting Blackpool 2009

De Vere Herons Reach Hotel, Blackpool, UK, November 5–6, 2009

Thursday November 5, 2009, Thoracic Day Programme includes: One Lung Ventilation in the difficult airway; Complications of Thoracic Epidurals Debate; Thoracic Epidurals vs Paravertebrals Lung Transplantation; Carinal Resections; Lung resection following pneumonectomy. Friday November 6, 2009, Cardiac Day Programme includes: Cerebral oximetry; Safety in Cardiac surgery; New Drugs/New Targets; Trans Apical Aortic Valve replacement; Update on Aprotinin and other Anti-fibrinolytics.

ACTA Dinner to be held on Friday November 6 at Royal Lytham and St Annes Golf Club. For further details and application form, please visit the web site: <http://www.actablackpool2009.nhs.uk> or contact Andrea Reid, Secretary to Cardiac Anaesthetists, Lancashire Cardiac Centre, Blackpool Victoria Hospital, Whinney Heys Road, Blackpool, Lancashire, FY3 8NR; Tel: 01253 657789; Fax: 01253 657134; E-mail: andrea.reid@bfwhospitals.nhs.uk

**ASURA 2009 (Australasian Symposium on
Ultrasound and Regional Anaesthesia)
Queensland University of Technology, Brisbane, Australia,
November 20–23, 2009**

In the wake of the highly successful ASURA 2008, held at St Vincent's Hospital Melbourne in February of 2008, the Regional Anaesthesia Special Interest Group were keen to repeat the process for anyone who may have missed out the first time

around. General feedback indicated that delegates found the hands-on workshops to be of significant interest and benefit, and as a result, these workshops will be run again in 2009.

For further information, please contact: Cassandra Hargreaves, Australian Society of Anaesthetists Ltd PO Box 600, Edgecliff NSW 2027, Australia; Tel: +61 (0)2 9302 2709; Fax: +61 (0)2 9327 7666; E-mail: chargreaves@fed.asa.org.au; Web site: www.asura2009.anaesthesia.org.au

**Backdated Copies of *British Journal of
Anaesthesia* (from 1993)**

If you are interested in these, please contact Dr Jane Baker, Specialist Anaesthetist, Department of Anaesthetics, Concord Hospital, PO Box 345, Concord West, NSW 2138, Australia. E-mail: iaspdesk@juno.com; web site: www.iasp-pain.org

OXFORD OPEN

The *British Journal of Anaesthesia* has joined 'Oxford Open', an optional open access initiative from our publishers, Oxford University Press. Authors of accepted manuscripts will be asked if they wish to choose to pay for access to the article to be made available immediately on publication. Oxford Open gives authors the opportunity to pay an 'open access' publication charge to make their paper **freely available online immediately** via the journal's web site. The optional charge payable will depend on whether the Corresponding Author is based in an institution with an online subscription to *BJA* and special charges will apply to authors in developing countries. Readers do not need a journal subscription to view open access content. If an author does not choose to pay the open access publication charge, their paper will be published in the normal manner (this usually means that it will only be available immediately to subscribers). More information about the initiative can be found at <http://www.oxfordjournals.org/oxfordopen/>