### **Editor-in-Chief**

C. Soon Lee (Australia)

Runjan Chetty (Reviews and Molecular Pathology; Canada) Dhiren Govender (Regional Editor for Africa; South Africa) Slade Jensen (Microbiology: Australia) Mary Frances McMullin (Haematology;

Tahir Pillay (Chemical Pathology; South Africa) Des Richardson (Experimental and Cell Biology; Australia) Stephen Jolles (Immunology, UK)

### Weh Editor

Dhiren Govender (South Africa)

### **Best Practice Editor** Newton Wong (UK)

### **Statistical Editor** Mario Cortina Boria (UK)

### Social Media Editor Francisco Beca (USA)

Impact Factor: 2.915

Disclaimer: Journal of Clinical Pathology is owned and published by the Association of Clinical Pathologists and BMJ Publishing Group Ltd, a wholly owned subsidiary of the British Medical Association. The owners grant editorial freedom to the Editor of Journal of Clinical Pathology. Journal of Clinical Pathology follows guidelines on editorial independence produced by the World Association of Medical Editors and the code on good publication practice of the Committee on Publication Ethics

Journal of Clinical Pathology is intended for medical professionals and is provided without warranty, express or implied. Statements in the Journal are the responsibility of their authors and advertisers and not authors' institutions, the BMJ Publishing Group Ltd or the BMA unless otherwise specified or determined by law. Acceptance of advertising does not imply endorsement.

To the fullest extent permitted by law, the BMJ Publishing Group Ltd shall not be liable for any loss, injury or damage resulting from the use of Journal of Clinical Pathology or any information in it whether based on contract, tort or otherwise. Readers are advised to verify any information they choose to rely on.

Copyright: © 2016 by the BMJ Publishing Group Ltd & Association of Clinical Pathologists. 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 permission of Journal of Clinical Pathology.

Journal of Clinical Pathology is published by BMJ Publishing Group Ltd, typeset by Nova Techset Private Limited, Bengaluru & Chennai India and printed in the UK

Journal of Clinical Pathology (ISSN No: 0021-9746) is published monthly by BMJ Publishing Group and distributed in the USA by Air Business Ltd. Periodicals postage paid at Jamaica NY 11431 POSTMASTER: send address changes to Journal of Clinical Pathology, Air Business Ltd, c/o Worldnet Shipping Inc., 156-15, 146th Avenue, 2nd Floor, Jamaica, NY 11434, USA

# Journal of Clinical Pathology

**Journal of the Association of Clinical Pathologists** JCP is a core publication for workers in all disciplines of pathology. Clinical pathology is its central theme but the Journal also publishes basic science papers with a clear clinical application.

International Advisory Board F Al-Mulla (Kuwait), S Asa (Canada), S Badve (USA), F Baehner (USA), B Bandarchi (Canada), A C Bateman (UK), M Catherwood (Ireland),

S Chakraborty (USA), L Cheng (USA), K-J Cho (Korea), K Cooper (USA),

W Cooper (Australia), F Couto (India), P Coyle (UK), M Crook (UK), G Cserni (Hungary), A P Dei Tos (Italy), B Delahunt (New Zealand),

V Deshpande (USA), S Devaraj (USA), R Drut (Argentina), W Erber (Australia),

O Fadare (USA), A Folpe (USA), S Fox (Australia), R Gama (UK),

D Ghazarian (Canada), A Giordano (USA), I Gosbell (Australia) O Harada (Japan),

D Ghazarian (Canada), A Giordano (USA), I Gosbell (Australia) U Harada (Japan), S W Hong (Seoul, South Korea), C-C Huang (Taiwan), P Hui (USA), W Irving (UK), J Iqbal (Singapore), C Jones (UK), S Kakar (USA), K Kerr (UK), T-H Koh (Singapore), C Le Roux (UK), S-Y Leung (Hong Kong), K H Lim (Singapore), S Marshall (UK), G McCluggage (UK), M F McMullin (UK), A Merlot (Sydney, Australia), E A Montgomery (USA), T Mori (Japan), T Moriya (Japan), R Murali (USA), S Nayler (South Africa), H-K Ng (Hong Kong), A Oliveira (USA), M Papotti (Italy), G Perry (USA), T Reynolds (UK), S Sahni (Australia), M Salto-Tellez (UK), F Schmitt (Portugal),

J Y Scoazec (France), R R Seethala (USA), B Simpson (UK), P H Tan (Singapore),

S Y Tan (Singapore), G Tse (Hong Kong), P Twomey (UK), J Wainscoat (UK), I S Young (Northern Ireland), J Yuan (USA)

### **Association of Clinical Pathologists**

S A S Knowles

### Vice President

P Twomey

### **Chairman of Council**

M F Wood

### **Honorary Secretary**

T M Reynolds

### **Honorary Treasurer**

A Oriolowo

### **General Administrator**

R Fustace

189 Dyke Road, Hove, East Sussex BN3 1TL UK

T: +44 (0)1273 775 700 F: +44 (0)1273 773 303

E: info@pathologists.org.uk http://pathologists.org.uk





### JCP Online Archive

The full back archive of Journal of Clinical Pathology is now available from 1969 at http://jcp.bmj.com/. Users have FREE access to all articles, older than 12 months\* right back to Volume 1, Issue 1. The online archives were digitised with the help of the US National Library of Medicine.

Personal subscribers must sign in to access this content. Users not covered by an institutional or personal subscription will have to complete a one-time registration that grants access to all archive content, across all our titles

\*Articles that are 12 months old or less require a subscription to access them.

## **Subscription Information**

Journal of Clinical Pathology is published monthly (subscribers have access to all supplements)

### **Institutional Rates** 2016

### Print

£822: US\$1603: €1110

Site licences are priced on FTE basis and allow access by the whole

### **Personal Rates 2016**

Print (includes online access at no additional cost)

# £313; US\$611; €423

**Online only** £157; US\$307; €212

ISSN: 0021 9746 (print) ISSN: 1472 4146 (online)

Personal print or online only and institutional print subscriptions may be purchased online at http://group.bmj. com/group/subs-sales (payment by Visa/ Mastercard only)

Residents of some EC countries must pay VAT; for details, call us or visit www.bmi.com/ subscriptions/vatandpaymentinfo.dtl

### **Contact Details**

### **Editorial Office**

BMJ Publishing Group Ltd, BMA House, Tavistock Square, London WC1H 9JR, UK

T: +44 (0)20 7383 6309

E: info.jcp@bmj.com

Twitter: @JClinPath BMJ

### **Production Editor**

T: +44 (0)20 7874 7094

E: production.jcp@bmj.com

http://jcp.bmj.com/site/help/index.xhtml

### **Supplement Enquiries**

T: +44 (0)20 7383 6795

E: Ifountain@bmj.com

### **Subscriptions**

For all subscription enquiries and orders

T: +44 (0)20 7111 1105

W: support.bmj.com

### **Display Advertising Sales**

Sophie Fitzsimmons (Sales Manager)

T: +44 (0)20 7383 6783

E: sfitzsimmons@bmj.com

http://group.bmj.com/advertising

### **Online Advertising Sales**

Marc Clifford (Sales Manager)

T: +44 (0)20 7383 6161

E: mclifford@bmj.com

http://group.bmj.com/advertising

### Display & Online Advertising Sales (USA)

Jim Cunningham T: +1 201 767 4170

E: jcunningham@cunnasso.com

### Reprints

Dennis Barber

T: +44 (0)20 7383 6305

E: admin.reprints@bmj.com

### Commercial Reprints (except USA & Canada)

Nadia Gurney-Randall

T: +44 (0)20 8445 5825

M: +44 (0)7866 262344

E: ngurneyrandall@bmj.com

### Commercial Reprints (USA & Canada)

Ray Thibodeau

T: +1 267 895 1758 (toll free in the USA)

T: +1 215 933 8484 (outside the USA)

E: ray.thibodeau@contentednet.com

For all other JCP journal contacts http://jcp.bmj.com/site/help/index.xhtml

### **Guidelines for Authors and Reviewers**

Full instructions are available online at http://jcp.bmj.com/ifora. Articles must be submitted electronically jcp.bmj.com/submit. Authors retain copyright but are required to grant Journal of Clinical Pathology an exclusive licence to publish http://jcp.bmj.com/ifora/licence.dtl