

# twin research and human genetics

The official journal of the International Society for Twin Studies and the Human Genetics Society of Australasia

Covering all areas of  
human genetics  
with an emphasis on  
twin studies, genetic  
epidemiology, psychiatric  
and behavioral genetics,  
and research on  
multiple births in the  
fields of epidemiology,  
genetics, endocrinology,  
fetal pathology, obstetrics  
and pediatrics.

Volume **20** Number **1**

**February 2017**

**Editor**

**Nicholas G. Martin**

# twin research and human genetics



The official journal of the  
**International Society  
for Twin Studies and the  
Human Genetics Society  
of Australasia**

*Twin Research and Human Genetics* is the official journal of the International Society for Twin Studies and, as such, is the successor journal to *Acta Geneticae Medicae et Gemellologiae*, which was founded in 1952 by Luigi Gedda. He edited it until its cessation in 1998, with Paolo Parisi as Acting Editor and then Executive Editor from 1968 to 1992. *Acta* became the official journal of ISTS when the society was established in 1974. The subtitle *Twin Research* was adopted in 1979. It was published by The Mendel Institute in Rome, except for the years 1979 to 1983, when it was published jointly with Alan R. Liss in New York.

*Twin Research* itself was founded in 1998 by Robert Derom, who edited it in 1998 and 1999. It has been edited by Nick Martin since 2000. It was published by Stockton Press (which became part of Nature Publishing Group) from 1998 to 2000, by Australian Academic Press from 2001 to 2012, and by Cambridge University Press since 2012.

The title *Twin Research and Human Genetics* was adopted from the beginning of Volume 8 in 2005 and is a translation of *Acta Geneticae Medicae et Gemellologiae*, Luigi Gedda's original title.

In 2008, *Twin Research and Human Genetics* was also adopted as the official journal of the Human Genetics Society of Australasia.

## Editor

Nicholas G. Martin, *Brisbane*

## Associate Editors

CLINICAL GENETICS  
Petra Zwijnenburg, *Amsterdam*

BEHAVIOR GENETICS  
Dorret Boomsma, *Amsterdam*

EPIGENETICS  
Jeff Craig, *Melbourne*

TWIN REGISTRIES  
Yoon-Mi Hur, *Jeonnam, South Korea*

COMPLEX DISEASES  
Jaakko Kaprio, *Helsinki*

ENDOCRINOLOGY  
Cornelis Lambalk, *Amsterdam*

HUMAN GENETICS  
Jozef Gecz, *Adelaide*

NEWS & VIEWS  
Nancy Segal, *Fullerton, CA*

FETAL MEDICINE  
Asma Khalil, *London*

PSYCHIATRIC GENETICS  
Wendy Slutske, *Columbia, MO*

SOCIAL SCIENCES  
Levente Littvay, *Budapest*

STATISTICAL MODELING  
Michael Neale, *Richmond, VA*

## Book Review Editor

Dorret Boomsma, *Amsterdam*  
di.boomsma@psy.vu.nl

## Editorial Board

Isaac Blickstein, *Rehovot*  
Charles Boklage, *Greenville*  
Andreas Busjahn, *Berlin*  
Michèle Carlier, *Marseille*  
Kaare Christensen, *Odense*  
Catherine Derom, *Leuven*  
Lindon Eaves, *Richmond, Virginia*  
David Evans, *Bristol*  
Johan Fellman, *Helsinki*  
Jack Goldberg, *Seattle*  
Judith Hall, *Vancouver*  
Jennifer Harris, *Oslo*  
Yoko Imaizumi, *Suita City*  
Kirsten Kyvik, *Odense*  
Barbara Luke, *Miami*  
Nancy Pedersen, *Stockholm*  
Daniel Pérusse, *Montréal*  
Robert Plomin, *London*  
Danielle Posthuma, *Amsterdam*  
Shaun Purcell, *Boston*  
Roger Short, *Melbourne*  
Tim Spector, *London*  
Antonia Stazi, *Rome*  
Martine Thomis, *Leuven*  
Karen Thorpe, *Brisbane*  
Mark Umstad, *Melbourne*

## Subscription Rates 2017

Individual subscriptions to *Twin Research and Human Genetics* as members of the International Society for Twin Studies (ISTS) and the Human Genetics Society of Australasia (HGSA):

1 YEAR INDIVIDUAL SUBSCRIPTION  
Full member ..... AUD 180  
Nonprofessional/  
retired member ..... AUD 140  
Student member ..... AUD 100

For those members who wish to receive a printed copy, an additional fee of AUD 120 may be paid.

ISTS membership application or renewal can be made online at <https://genepi.qimr.edu.au/ists/ists.cgi> Alternatively, the Word document is available upon inquiry from [ISTS@qimrberghofer.edu.au](mailto:ISTS@qimrberghofer.edu.au)

### INSTITUTIONAL SUBSCRIPTION RATES

This journal is published 6 times per year. The institutional rates (excluding VAT) are:

	Electronic Only
Australia	802 AUD
N America	710 USD
UK and ROW	458 GBP

EU subscribers (outside the UK) who are not registered for VAT should add VAT at their country's rate. VAT registered subscribers should provide their VAT registration number. Prices include delivery by air when appropriate. Japanese prices for institutions are available from Kinokuniya Company Ltd, P.O. Box 55, Chitose, Tokyo 156, Japan.

### Orders and subscription enquiries should be addressed to:

Cambridge University Press, Journals Fulfillment Department, UPH, Shaftesbury Road, Cambridge CB2 8BS, UK

### Orders from N America should be addressed to:

Cambridge University Press, 1 Liberty Plaza, Floor 20, New York, NY 10006, USA

*Twin Research and Human Genetics* and all other Cambridge Journals can be found at <http://journals.cambridge.org/>

## ISTS Website

[www.ists.qimr.edu.au](http://www.ists.qimr.edu.au)

## Indexing/Abstracting

This journal is indexed in the following databases: MEDLINE/PubMed, EMBASE/Excerpta Medica, PsycINFO, Science Citation Index®, Journal Citation Reports/Science Edition, Science Citation Index Expanded® (available as the ISI Web of Science®), Current Contents®/Clinical Medicine, Current Contents®/Life Sciences

## E-mail Address for Manuscript Submission

See inside back cover for author instructions.

## Editorial Office

Nicholas G. Martin  
Editor  
*Twin Research and Human Genetics*  
QIMR Berghofer Institute of Medical Research  
Brisbane Qld 4029 Australia  
E-mail: [ISTS@qimrberghofer.edu.au](mailto:ISTS@qimrberghofer.edu.au)

Covering all areas of human genetics with an emphasis on twin studies, genetic epidemiology, psychiatric and behavioral genetics, and research on multiple births in the fields of epidemiology, genetics, endocrinology, fetal pathology, obstetrics and pediatrics.

*Twin Research and Human Genetics* is published six times annually and issued to all financial ordinary, institutional and student members of ISTS and HGSA.

**Copyright** in all articles rests with authors. A limited set of permanent copyright permission licences has been granted by authors to the publisher to allow publication in this journal. Rights in the reproduction and distribution of the published articles as visual facsimiles of this published edition by either mechanical or digital means is controlled by the publisher and any distributions by CAL for copying of an author's work are due to the publisher in the first instance. All other rights in the words contained in this edition are controlled by the authors. Authors are therefore free to adapt and/or republish the words making up their own articles either online or in print.

Published by Cambridge University Press on behalf of Australian Academic Press Pty Ltd. and the International Society of Twin Studies.  
Cambridge University Press,  
The Edinburgh Building  
Shaftesbury Road  
Cambridge CB2 8RU, UK  
[www.journals.cambridge.org.uk](http://www.journals.cambridge.org.uk)

## Articles

- A Novel Approach for Pathway Analysis of GWAS Data Highlights Role of BMP Signaling and Muscle Cell Differentiation in Colorectal Cancer Susceptibility **1**  
*Aniket Mishra and Stuart MacGregor*
- Genetic and Environmental Factors in Invasive Cervical Cancer: Design and Methods of a Classical Twin Study **10**  
*Dorothy A. Machalek, Sepehr N. Tabrizi, John L. Hopper, Minh Bui, Gillian S. Dite, Alyssa M. Cornall, Marian Pitts, Dorota Gertig, Bircan Erbas, Suzanne M. Garland and on behalf of the CeCaGeEn Study Group*
- Bullying and Victimization: The Effect of Close Companionship **19**  
*Sabine A. M. Veldkamp, Elsje van Bergen, Eveline L. de Zeeuw, Catharina E. M. van Beijsterveldt, Dorret I. Boomsma and Meike Bartels*
- Associations Between Obesity Indicators and Blood Pressure in Chinese Adult Twins **28**  
*Chunxiao Liao, Wenjing Gao, Weihua Cao, Jun Lv, Canqing Yu, Shengfeng Wang, Qian Zhao, Zengchang Pang, Liming Cong, Hua Wang, Xianping Wu and Liming Li*
- Genetic and Environmental Influences on General Skin Traits: Healthy Twins and Families in Korea **36**  
*Young Ju Suh, Jeonghyun Shin, Moonil Kang, Hyun Ju Park, Kayoung Lee, Yun-Mi Song and Joohon Sung*
- Prevalence and Heritability of Early Childhood Caries Among Monozygotic and Dizygotic Twins **43**  
*Anuradha Kuppam, Steven Rodrigues, Victor Samuel, Mahesh Ramakrishnan, Hassan S. Halawany, Nimmi B. Abraham, Vimal Jacob and Sukumaran Anil*
- Genetic and Environmental Influences on Pulmonary Function and Muscle Strength: The Chinese Twin Study of Aging **53**  
*Xiaocao Tian, Chunsheng Xu, Yili Wu, Jianping Sun, Haiping Duan, Dongfeng Zhang, Baofa Jiang, Zengchang Pang, Shuxia Li and Qihua Tan*
- Genetic and Environmental Basis in Phenotype Correlation Between Physical Function and Cognition in Aging Chinese Twins **60**  
*Chunsheng Xu, Dongfeng Zhang, Yili Wu, Zengchang Pang, Shuxia Li and Qihua Tan*
- Less is More in Hong Kong: Investigation of BiscrIPTal and Trilingual Development Among Chinese Twins in a (Relatively) Small City **66**  
*Simpson W. L. Wong, Catherine McBride, Bonnie Wing-Yin Chow and Mary Miu Yee Waye*
- Effects of Intrauterine Environment on the Magnitude of Differences Within the Pairs of Monozygotic and Dizygotic Twins **72**  
*Małgorzata Waszak, Marzena Skrzypczak-Zielińska, Marlena Szalata, Karolina Wielgus, Oliwia Zakerska-Banaszak, Grzegorz Bręborowicz and Ryszard Słomski*
- Accuracy of Prenatal Ultrasound in Detecting Growth Abnormalities in Triplets: A Retrospective Cohort Study **84**  
*Cameron Sklar, Sue Ross and Kentia Naud*

# contents

continued

## News, Views and Comments

- Situs Inversus Totalis in Twins: A Brief Review and a Life History / Twin Research: Twin Studies of Trisomy 21; Monozygotic Twin Concordance for Bilateral Coronoid Hyperplasia; Prenatal Hormonal Effects in Mixed-Sex Non- Human Primate Litters; Insurance Mandates and Twinning After In Vitro Fertilization / News Reports: First Report of Identical Twin Puppies; Twins Sisters Turn 100; Remembering an Identical Twin Production Designer; New York City Marathon Quadruplets 90  
*Nancy L. Segal*

## HGSA Abstract

- Poster Presentation From the 40th Human Genetics Society of Australasia Annual Scientific Meeting 96