

.....

**Nutrigenomics – Opportunities in Asia**

.....

# **Forum of Nutrition**

**Vol. 60**

Series Editor

*Ibrahim Elmadfa, Vienna*

.....

# Nutrigenomics – Opportunities in Asia

Volume Editors

*E. Shyong Tai, Singapore*

*Peter J. Gillies, Newark, Del.*

26 figures, 1 in color, and 10 tables, 2007



**KARGER**

Basel · Freiburg · Paris · London · New York ·  
Bangalore · Bangkok · Singapore · Tokyo · Sydney

.....

**Dr. E. Shyong Tai**

Department of Endocrinology  
Singapore General Hospital  
Singapore

**Dr. Peter J. Gillies**

DuPont Haskell Laboratory for Health  
and Environmental Sciences  
Newark, Del. (USA)

Library of Congress Cataloging-in-Publication Data

ILSI International Conference on Nutrigenomics (1st: 2005: Singapore)  
Nutrigenomics : opportunities in Asia / volume editors, E.S. Tai, P.J.  
Gillies.

p. ; cm. – (Forum of nutrition, ISSN 1660-0347 ; v. 60)

Includes bibliographical references and indexes.

ISBN-13: 978-3-8055-8216-2 (hard cover : alk. paper)

1. Nutrition–Genetic aspects–Congresses. 2. Nutrition–Asia–Congresses. 3. Genomics–Asia–Congresses. I. Tai, E.S. (E. Shyong) II. Gillies, P. J. (Peter J.) III. Title. IV. Series.

[DNLN: 1. Genomics–Asia–Congresses. 2. Nutrition Index Physiology–genetics–Asia–Congresses. 3. Nutritional Sciences–Asia–Congresses. W1 BI422 v.60 2007 / QU 145 I29n 2007]

QP144.G45147 2005

612.3–dc22

2007012335

Bibliographic Indices. This publication is listed in bibliographic services, including Current Contents® and Index Medicus.

Disclaimer. The statements, options and data contained in this publication are solely those of the individual authors and contributors and not of the publisher and the editor(s). The appearance of advertisements in the book is not a warranty, endorsement, or approval of the products or services advertised or of their effectiveness, quality or safety. The publisher and the editor(s) disclaim responsibility for any injury to persons or property resulting from any ideas, methods, instructions or products referred to in the content or advertisements.

Drug Dosage. The authors and the publisher have exerted every effort to ensure that drug selection and dosage set forth in this text are in accord with current recommendations and practice at the time of publication. However, in view of ongoing research, changes in government regulations, and the constant flow of information relating to drug therapy and drug reactions, the reader is urged to check the package insert for each drug for any change in indications and dosage and for added warnings and precautions. This is particularly important when the recommended agent is a new and/or infrequently employed drug.

All rights reserved. No part of this publication may be translated into other languages, reproduced or utilized in any form or by any means electronic or mechanical, including photocopying, recording, microcopying, or by any information storage and retrieval system, without permission in writing from the publisher.

© Copyright 2007 by S. Karger AG, P.O. Box, CH-4009 Basel (Switzerland) and ILSI Southeast Asia Region, Singapore  
www.karger.com  
Printed on acid-free paper  
ISSN 1660-0347  
ISBN 978-3-8055-8216-2

This book is dedicated to the international community of scientists  
who believe in the promise of nutrigenomics!



.....

# Contents

## **XI Preface**

Tai, E.S. (Singapore); Gillies, P.J. (Newark, Del.)

Concepts and Methods in Nutrigenomics

---

## **1 Nutrition in the 'Omics' Era**

Milner, J.A. (Rockville, Md.)

## **25 Nutrigenetics**

El-Sohemy, A. (Toronto, Ont.)

## **31 Epigenomics and Nutrition**

Cobiac, L. (Adelaide)

## **42 Early Nutrition: Impact on Epigenetics**

Mathers, J.C. (Newcastle)

## **49 Nutrition and Genome Health**

Fenech, M. (Adelaide)

## **66 Nutrition: Ethics and Social Implications**

Slamet-Loedin, I.H.; Jenie, U.A. (Jakarta)

## **80 Proteomics**

Thongboonkerd, V. (Bangkok)

## **91 Diet and Genomic Stability**

Young, G.P. (Adelaide)

## **97 High-Throughput Genotyping**

Lee, J.-E. (Seoul)

Nutrigenomics and Health

---

## **102 Nutrient-Gene Interactions in Lipoprotein Metabolism – An Overview**

Ordovas, J.M. (Boston, Mass.); Corella, D. (Boston, Mass./Valencia);

Kaput, J. (Chicago, Ill.)

## **110 The Genetics of Lipoprotein Metabolism and Heart Disease**

Tai, E.S. (Singapore)

## **118 Gene-Environment Interactions and the Diabetes Epidemic in India**

Mohan, V.; Sudha, V.; Radhika, G.; Radha, V.; Rema, M.; Deepa, R. (Chennai)

## **127 Gene Expression in Low Glycemic Index Diet – Impact on Metabolic Control**

Takeda, E.; Arai, H.; Muto, K.; Matsuo, K.; Sakuma, M.; Fukaya, M.;

Yamanaka-Okumura, H.; Yamamoto, H.; Taketani, Y. (Tokushima)

## **140 Genetic Polymorphisms in Folate-Metabolizing Enzymes and Risk of Gastroesophageal Cancers: A Potential Nutrient-Gene Interaction in Cancer Development**

Lin, D.; Li, H.; Tan, W.; Miao, X.; Wang, L. (Beijing)

## **146 Dietary Quercetin Inhibits Proliferation of Lung Carcinoma Cells**

Hung, H. (Singapore)

## **158 Osteoporosis: The Role of Genetics and the Environment**

Ongphiphadhanakul, B. (Bangkok)

## **168 Application of Nutrigenomics in Eye Health**

Delcourt, C. (Bordeaux)

Nutrigenomics – Applications to the Food Industry

---

## **176 Nutrigenomics of Taste – Impact on Food Preferences and Food Production**

El-Sohemy, A.; Stewart, L.; Khataan, N.; Fontaine-Bisson, B.; Kwong, P.;

Ozsungur, S.; Cornelis, M.C. (Toronto, Ont.)

## **183 Prospects for Improving the Nutritional Quality of Dairy and Meat Products**

Coffey, S.G. (St. Lucia)

**196 Functionality of Probiotics – Potential for Product Development**

Dekker, J.; Collett, M.; Prasad, J.; Gopal, P. (Palmerston North)

Conclusion

---

**209 Developing the Promise of Nutrigenomics through Complete Science and International Collaborations**

Kaput, J. (Chicago, Ill./Davis, Calif.)

Executive Summary

---

**224 ILSI's First International Conference on Nutrigenomics: Opportunities in Asia**

Florentino, R.F. (Metro Manila)

**242 Author Index**

**243 Subject Index**



.....

## **Preface**

Nutrition plays an important role in optimizing human health and managing disease. Unfortunately, the human response to diet is so incredibly variable that nutritional counseling beyond that of general advice is a complex and challenging task. Nutrigenomics seeks to understand the variability of the individual's response to food and the underlying mechanisms whereby foods exert their health-promoting activities. The promise of nutrigenomics is that with a deeper molecular understanding of nutrition we may some day be able to design diets that truly maximize an individual's potential for health and wellness.

Asia is home to two thirds of the world's population. Many societies within Asia are undergoing rapid socioeconomic development and are experiencing an attendant transition in diet-related morbidity and mortality. Paradoxically, the problem of under- and overnutrition coexists in Asia. This, combined with the tremendous diversity in diet, dietary intake patterns, local culture, and nutritional needs, makes the identification and provision of an optimal diet relevant to all the people living in Asia an extraordinary challenge. This same diversity, however, provides opportunities to ask and answer scientific questions which cannot be investigated elsewhere in the world.

Recognizing the special nutrition science research opportunities afforded in Asia, the International Life Sciences Institute (ILSI) hosted an exciting 3-day meeting in Singapore on December 7–9, 2005. This conference enjoyed the support and guidance of the Commonwealth Scientific and Industrial Research Organization of Australia, the National Institutes of Health in the United States, and the Genome Institute of Singapore. The first ILSI international conference on nutrigenomics, with a focus on opportunities in Asia, was an international

gathering of scientists from the academia, government and industry that attracted speakers and attendees from around the world with everyone coming to share their experience and knowledge in the area of nutrigenomics. This book is a culmination of the efforts of all those who organized and participated in this conference.

The book includes an elegant and articulate summary of the conference that Rodolfo Florentino was kind enough to provide and closes with an invited article by Jim Kaput that provides a road map for international collaboration in nutrigenomics. The core of the book starts off with concepts and methods in nutrigenomics designed to give those interested in this field a general overview; this is followed by specific examples of the applications of these concepts and methods to specific disease states. Unfortunately, it was not possible to include all the presentations from the meeting. Respectful apologies are offered to those speakers and presenters whose work could not be included, but without whose participation the meeting could not have been such a success!

For those of you who were able to attend the meeting we hope this book reinforces your memories of the exciting science and collegiality of the conference; for everyone else we hope the book encourages you to engage in nutrigenomic research and to attend the next ILSI conference on nutrigenomics.

*Dr. E. Shyong Tai, Singapore*  
*Dr. Peter J. Gillies, Newark, Del.*