# INTRICEMENT OF A CONTRICT OF A

Volume: 30

Number: 2

December 2017

Available online at www.journals.cambridge.org



ttps://doi.org/10.1017/S0954422417000221 Published online by Cambridge University Press

# **Nutrition Research Reviews**

Volume 30, 2017 ISSN: 0954-4224

### Aims and Scope

*Nutrition Research Reviews* publishes comprehensive and challenging review articles on selected key topics in nutritional science. Authors are encouraged to take a critical approach in appraising the literature while also aiming to advance new concepts and hypotheses. The journal publishes both solicited and unsolicited articles.

Nutrition Research Reviews is published twice a year by Cambridge University Press on behalf of The Nutrition Society.

The contents page of this journal is available on the Internet before publication at www.cambridge.org/nrr

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

J V Woodside, Belfast, UK

**Deputy Editor** Jos Houdijk, Scottish Agricultural College, UK **Editorial Board** M Ashwell, Baldock, UK E Bandera. New Brunswick, USA J L Black, Warrimoo, Australia D Dardevet, Theix, France C Edwards, Glasgow, UK C Haskell-Ramsey, Newcastle, UK J M Hibbert, Atlanta, GA, USA T Hill, Newcastle-upon-Tyne, UK J K Lodge, Newcastle-upon-Tyne, UK C Lowis, Norwich, UK H C Lukaski, Grand Forks, ND, USA N W Solomons, Guatemala City, Guatemala W Stonehouse, Adelaide, Australia C M Weaver, West Lafayette, IN, USA K M Younger, Dublin, Ireland

The Nutrition Society has as its objective the advancement of the scientific study of nutrition and its applications to the maintenance of human and animal health.

Application of membership is invited from anyone whose work has contributed to the scientific knowledge of nutrition, whether such work has been in the laboratory, the field or the clinic, and whether experimental, clinical, agricultural or statistical in nature. There is also a student membership scheme with reduced subscriptions.

Particulars of The Nutrition Society and application forms for membership are available from The Nutrition Society, 10 Cambridge Court, 210 Shepherds Bush Road, London W6 7NJ, UK.

Tel: +44 (0)20 7602 0228, Fax: +44 (0)20 7602 1756, Email: office@nutsoc.org.uk

The Nutrition Society Home Page is at http://www.nutritionsociety.org

# NUTRITION RESEARCH REVIEWS 2017

Volume 30 No. 2 December 2017

Editor-in-Chief

J V Woodside Belfast, UK



## Nutrition Research Reviews Volume 30, 2017 ISSN: 0954-4224

### Publishing, Production, Marketing, and

Subscription Sales Office: Cambridge University Press University Printing House Shaftesbury Road Cambridge CB2 8BS, UK

### For Customers in North America: One Liberty Plaza New York

NY 10006 United States

### Publisher: Katy Christomanou

*Nutrition Research Reviews* is an international journal published biannually (June and December) by Cambridge University Press on behalf of the Nutrition Society.

### Subscription information:

Volume 30 2017 (2 issues) Internet/print package: £306/\$598 American only/€467 EU only Internet only: £207/\$384 Americas only/€305 EU only

**Back volumes** are available. Please contact Cambridge University Press for further information.

**Claims** for non-receipt of journal issues will be considered on their merit and only if the claim is received within six months of publication. Replacement copies supplied after this date will be chargeable.

**US POSTMASTERS:** please send address corrections to *Nutrition Research Reviews*, Cambridge University Press, 100 Brook Hill Drive, West Nyack, New York 10994–2133.

**Information for Authors:** The journal publishes both solicited and unsolicited review articles. For unsolicited material, authors are asked to submit a summary of the article to the Editor-in-chief in the first instance:

Professor Jayne Woodside Centre for Public Health Queen's University Belfast Institute of Clinical Science B Grosvenor Road Belfast, BT12 6BJ UK Tel: 44(0)2890632585 Fax: 44(0)2890235900 Email: j.woodside@qub.ac.uk

Directions to Contributors: are available from the Editor-in-chief.

**Offprints:** The author (or main author) of an accepted paper will receive a free PDF of their paper and a voucher copy of the issue in which their paper has been published. Additional offprints are available for a fee and should be ordered at proof stage. No page charges are levied by this journal.

**Copyright:** As of July 2000 the copyright of all articles submitted to *Nutrition Research Reviews* are retained by the authors or their institutions. For articles prior to this date permission for reproduction of any part of the journal (text, figures, tables or other matter) in any form (on paper, microfiche or electronically) should be sought directly from the Society, at: The Publications Office, The Nutrition Society, 10 Cambridge Court, 210 Shepherds Bush Road, London W6 7NJ, UK.

**Disclaimer:** The information contained herein, including any expression of opinion and any projection or forecast, has been obtained from or is based upon sources believed by us to be reliable, but is not guaranteed as to accuracy or completeness. The information is supplied without obligation and on the understanding that any person who acts upon it or otherwise changes his/her position in reliance thereon does so entirely at his/her own risk. Neither the Society nor Cambridge University Press accepts responsibility for any trade advertisement included in this publication.

This journal is printed on acid-free paper from renewable sources. Printed in the UK by Bell & Bain Ltd., Glasgow.

This journal issue has been printed on FSC-certified paper and cover board. FSC is an independent, non-governmental, not-for-profit organization established to promote the responsible management of the world's forests. Please see www.fsc.org for information.

Subscribers may register for free access to the electronic version of *Nutrition Research Reviews*. For more information visit the website at: journals.cambridge.org

Nutrition Research Reviews is covered by the Science Citation Index<sup>®</sup>, Current Contents<sup>®</sup> / Agriculture, Biology & Environmental Sciences, SciSearch<sup>®</sup>, Research Alert<sup>®</sup>, Index to Scientific Reviews<sup>®</sup>, EMBASE/Excerpta Medica, Chemical Abstracts Services, CINAHL<sup>®</sup> Database, CAB ABSTRACTS<sup>®</sup>, Global Health, BIOSIS<sup>®</sup> Database, SIIC Databases

Vol. 30 No. 2 December 2017

| Dietary fibre in Europe: current state of knowledge on definitions, sources, recommendations, intakes                              |            |
|--|------------|
| and relationships to health  |            |
| Alison M. Stephen, Martine MJ. Champ, Susan J. Cloran, Mathilde Fleith, Lilou van Lieshout,<br>Heddie Mejborn & Victoria J. Burley |            |
| Introduction   | 149        |
| Definitions of dietary fibre, classification of fibre and fibre sources, conditions for nutrition claims and                       | 149        |
| analytical methods (Tables 1–7, Figs 1 and 2)  | 150        |
| Methods used to compile tables   | 150        |
| Results: definitions   | 150        |
| Classification of fibre, fibre sources and conditions for nutrition claims   | 153        |
| Analytical methods   | 157        |
| Dietary fibre recommendations and permitted health claims (Tables 8, 9 and 10)   | 157        |
| Methods used to compile tables   | 157        |
| Results  | 160        |
| Fibre intakes and sources in Europe from surveys and large studies (Tables 11–17)  | 165        |
| Methods used to compile tables   | 165        |
| Results  | 166        |
| Comparison of recommendations and intakes  | 166        |
| Sources of dietary fibre   | 168        |
| Intakes of fibre components  | 171        |
| Dietary fibre and health   | 171        |
| Relationship between dietary fibre intake, fibre types and sources of fibre and risk of chronic                                    |            |
| non-communicable diseases  | 171        |
| Methods used to compile tables   | 172        |
| Results  | 172        |
| All-cause mortality  | 174        |
| Cardiometabolic health   | 174        |
| CVD risk factors   | 174        |
| Hypertension/blood pressure  | 174        |
| Hyperlipidaemias   | 175        |
| Type 2 diabetes  | 175        |
| Obesity (energy intake and appetite)   | 175        |
| Gastrointestinal health  | 178        |
| Constipation and faecal weight<br>Diverticular disease   | 178<br>179 |
| Oesophageal cancer   | 179        |
| Gastric cancer   | 179        |
| Colorectal adenomas and colorectal cancer  | 179        |
| Neoplastic diseases other than gastrointestinal tract  | 180        |
| Breast cancer  | 180        |
| Endometrial cancer   | 180        |
| Prostate cancer  | 180        |
| Pancreatic cancer  | 180        |
| Ovarian cancer   | 180        |
| Renal cancer   | 180        |
| Summary of evidence linking total dietary fibre consumption and fibre sources to cardiometabolic                                   | - 50       |
| disease and risk factors   | 180        |
| Summary of the evidence on total dietary fibre and sources of fibre on gastrointestinal health                                     | 181        |
| Summary of the evidence on total dietary fibre, sources of fibre and neoplastic disease of   |            |
| non-gastrointestinal sites   | 181        |

| Discussion       | 181 |
|------------------|-----|
| Acknowledgements | 183 |
| References       | 183 |
|                  |     |

| larities and interactions between the ageing process and high chronic intake of added sugars |     |
|--|-----|
| Eva Gatineau, Sergio Polakof, Dominique Dardevet & Laurent Mosoni                            |     |
| Introduction   | 191 |
| Comparative deleterious effects of ageing and high chronic intake of 'added sugar'           | 193 |
| Basic alterations  | 193 |
| Oxidative stress   | 193 |
| Protein glycation  | 193 |
| Inflammation   | 194 |
| Dyslipidaemia  | 194 |
| Insulin sensitivity and glucose tolerance  | 195 |
| Secondary diseases   | 196 |
| Non-alcoholic fatty liver disease  | 196 |
| Hypertension   | 197 |
| Central nervous system disorders   | 197 |
| Sarcopenia   | 198 |
| Osteoporosis   | 199 |
| Body composition and weight, and satiety   | 199 |
| Conclusion   | 200 |
| Acknowledgements   | 200 |
| References   | 200 |

| Dietary nitrate and blood pressure: evolution of a new nutrient?    |     |
|---|-----|
| Ann Ashworth & Raul Bescos  |     |
| Introduction  | 208 |
| Inorganic nitrate in food and water                                 | 208 |
| Dietary nitrate consumption   | 210 |
| Metabolism of dietary nitrate                                       | 211 |
| Is dietary nitrate a new nutrient?                                  | 211 |
| Amount of dietary nitrate required to promote cardiovascular health | 214 |
| Implications both at population level and in population groups      | 214 |
| Conclusion  | 215 |
| Acknowledgements  | 215 |
| References  | 216 |

Current and future strategies for the nutritional management of cardiometabolic complications of androgen deprivation therapy for prostate cancer

| 220 |
|-----|
|     |
|     |
| 221 |
|     |
| 221 |
| 221 |
| 221 |
| 223 |
|     |

| Importance of ectopic fat and partitioning of fat between subcutaneous adipose tissue and visceral adipose tissue<br>Does the metabolic syndrome have clinical utility in the identification and management of androgen | 223 |
|---|-----|
| deprivation therapy-related cardiometabolic risk?   | 223 |
| Search strategy and selection criteria for review   | 223 |
| Future strategies for the dietary treatment of androgen deprivation therapy-induced cardiometabolic risk  | 224 |
| Current evidence for the nutritional management of cardiometabolic risk factors   | 224 |
| Dietary fat   | 226 |
| Dietary carbohydrate  | 226 |
| Dietary protein   | 226 |
| Salt and alcohol  | 226 |
| Dietary patterns  | 226 |
| A personalised, phenotypic dietary approach for the treatment of androgen deprivation therapy-related   |     |
| cardiometabolic risk  | 227 |
| Management of weight and fat distribution   | 227 |
| Sarcopenia  | 227 |
| Psychological and clinical considerations   | 228 |
| Summary and conclusions   | 228 |
| Acknowledgements  | 229 |
| References  | 229 |

| A brief review of salient factors influencing adult eating behaviour |     |
|--|-----|
| Christine Emilien & James H. Hollis                                  |     |
| Introduction   | 233 |
| Eating behaviour   | 234 |
| Terminology  | 234 |
| Measurement of eating behaviour and food intake                      | 234 |
| The physiological regulation of eating behaviour                     | 235 |
| Hunger and meal initiation   | 236 |
| Satiation  | 236 |
| Satiety  | 237 |
| Environmental factors that influence eating behaviour                | 237 |
| Hunger and meal initiation   | 237 |
| Satiation  | 238 |
| Satiety  | 239 |
| Discussion   | 239 |
| Acknowledgements   | 240 |
| References   | 240 |

| The role of inorganic nitrate and nitrite in CVD  |     |
|---|-----|
| Jacklyn Jackson, Amanda J. Patterson, Lesley MacDonald-Wicks & Mark McEvoy                |     |
| Introduction  | 247 |
| Production of nitric oxide in the body  | 248 |
| Endogenous production via the L-arginine-nitric oxide synthase pathway                    | 248 |
| The nitrate-nitrite-nitric oxide pathway  | 249 |
| Sources of dietary inorganic nitrate and nitrite  | 250 |
| Nitric oxide in the cardiovascular system   | 251 |
| Cardiovascular protective actions of nitric oxide   | 253 |
| Other nitric oxides and possible mechanisms in the cardiovascular system                  | 253 |
| Inorganic v. organic nitrate and nitrite  | 253 |
| Inorganic nitrate and nitrite: from dietary contaminant to potential therapeutic nutrient | 255 |
| Evidence of cardiovascular benefit from animal studies                                    | 255 |

| Evidence of cardiovascular benefit from human studies | 256 |
|---|-----|
| Conclusion  | 258 |
| Acknowledgements                                      | 258 |
| References  | 258 |
|   |     |

Folate status in women of childbearing age with obesity: a review Silvia Maffoni, Rachele De Giuseppe, Fatima Cody Stanford & Hellas Cena Introduction 265 Materials and methods 266 Results 266 Discussion 267 Folate deficiency definition 268 Erythrocyte folate levels and supplementation 268 Genetic factors Lifestyle factors 269 Oral contraceptives 269 Bariatric surgery and restrictive diet 269 Clinical practice 269 Conclusion 270 Limitations 270 Acknowledgements 270 References 270

268

A structured literature review on the role of mindfulness, mindful eating and intuitive eating in changing eating behaviours: effectiveness and associated potential mechanisms

| Janet M. Warren, Nicola Smith & Margaret Ashwell                              |     |
|---|-----|
| Introduction  | 272 |
| Methodology   | 273 |
| Population  | 273 |
| Intervention  | 273 |
| Outcomes  | 273 |
| Databases   | 273 |
| Inclusion criteria  | 273 |
| Exclusion criterion   | 273 |
| Coding and scoring of results   | 273 |
| Search strategy results   | 273 |
| Results – intervention studies  | 274 |
| Characteristics of the intervention studies                                   | 274 |
| Theoretical basis of the interventions in overweight and obese subjects       | 274 |
| Theoretical basis of the interventions in normal-weight populations           | 274 |
| Intervention length, intensity and scope                                      | 274 |
| Summary of the tools/methods used to measure outcomes in intervention studies | 274 |
| Tools used to measure eating-related behaviours                               | 275 |
| Tools used to measure issues related to food consumption and hunger           | 275 |
| Summary of results from intervention studies                                  | 275 |
| Results of physiological health outcomes                                      | 275 |
| Outcomes of weight management interventions                                   | 275 |
| Weight-loss interventions   | 275 |
| Weight loss in normal-weight populations                                      | 276 |
| Other objective physiological measures  | 277 |
| Eating behaviours and food-related outcomes                                   | 277 |
|   |     |

| Eating-related behaviours   | 277 |
|---|-----|
| Binge eating  | 277 |
| Binge eating interventions  | 277 |
| Emotional eating  | 277 |
| External eating   | 277 |
| External eating and emotional eating interventions                              | 277 |
| Cravings  | 277 |
| Hunger awareness  | 278 |
| Body dissatisfaction  | 278 |
| Food intake and choice  | 278 |
| Results – observational studies   | 278 |
| Theoretical basis   | 278 |
| Summary of results from observational studies                                   | 278 |
| Potential associated mechanisms   | 279 |
| Increased awareness of, and increased responsiveness to, internal physical cues | 279 |
| Increased awareness of, and reduced responsiveness to, internal emotional cues  | 279 |
| Increased awareness of, and reduced responsiveness to, external cues            | 279 |
| Discussion  | 280 |
| Strengths and limitations of the present structured review                      | 281 |
| Conclusions   | 281 |
| Acknowledgements  | 281 |
| References  | 281 |