The Importance of Nutrition as an Integral Part of Disease Management
Nestlé Nutrition Institute Workshop Series

Vol. 82
The Importance of Nutrition as an Integral Part of Disease Management

Editors

Rémy F. Meier  Liestal, Switzerland
B. Ravinder Reddy  Hyderabad, India
Peter B. Soeters  Maastricht, The Netherlands
Contents

VII Preface
X Foreword
XIII Contributors

1 Basics in Clinical Medical Nutrition
   Meier, R.F. (Switzerland); Forbes, A. (UK)

17 Macronutrient Metabolism in Starvation and Stress
   Soeters, P.B. (The Netherlands)

27 Noncaloric Benefits of Carbohydrates
   Reddy, B.R. (India)

39 The Biological Value of Protein
   Moore, D.R. (Canada); Soeters, P.B. (The Netherlands)

53 Enteral Nutrition: Whom, Why, When, What and Where to Feed?
   Reddy, B.R. (India)

61 Management of the Metabolic Syndrome and the Obese Patient with
   Metabolic Disturbances: South Asian Perspective
   Misra, A.; Bhardwaj, S. (India)

75 Nutritional Issues in the Short Bowel Syndrome – Total Parenteral
   Nutrition, Enteral Nutrition and the Role of Transplantation
   O'Keefe, S.J.D. (USA)

91 Nutrition in Cancer
   Ravasco, P. (Portugal)

103 Nutritional Therapy for Critically Ill Patients
   Martindale, R.G.; Warren, M.; Diamond, S.; Kiraly, L. (USA)

117 Perioperative Nutritional Intervention: Where Are We?
   Hoos, T.; Warren, M.; Martindale, R.G. (USA)

129 Health Economics in Medical Nutrition: An Emerging Science
   Nuijten, M. (The Netherlands)
Nutrition, Frailty, Cognitive Frailty and Prevention of Disabilities with Aging
Guyonnet, S.; Secher, M.; Vellas, B. (France)

Subject Index

For more information on related publications, please consult the NNI website: www.nestlenutrition-institute.org
Preface

This book is a reflection of clinical nutrition-related issues taught and discussed during the 12th Nestlé Clinical Nutrition course in New Delhi, India, in 2013. Subjects addressed ranged from basic physiology to the implementation of nutritional practices in the hospital setting as well in the home situation. Although of vital importance, nutrition is still a neglected issue in medical curricula, and inside as well outside hospitals. These interactive courses therefore fill a gap in the knowledge on nutrition. Although reaching front-runners in the nutrition field, continuous efforts are needed to increase awareness and to stimulate nutritional practices. This book, therefore, may expose a larger population to the subjects discussed in an interactive fashion with the course participants and an international group of experts.

Rémy F. Meier (Switzerland) underlines the morbidity and mortality caused by malnutrition and stresses the importance to screen for malnutrition as well as to assess the nutritional state more precisely. Important factors leading to a malnourished state are insufficient up- or intake of nutrition as well as inflammation, together leading to a decrease in muscle, immune and cognitive function, thereby also leading to diminished quality of life and inability to counter disease and heal well from surgical trauma or other types of treatment.

Peter B. Soeters (The Netherlands) provides an introduction to the metabolic events occurring in starved states and situations of illness and trauma. Important viewpoints are the beneficial effects of insulin resistance and the important role of glucose as a building stone in starvation and stress starvation. Amino acids are similarly important but to limit (muscle) protein losses, glucose (in starvation predominantly derived from protein) needs to be utilized only for those purposes that only glucose can fulfill.

B. Ravinder Reddy (India) discusses enteral/oral nutrition and emphasized, apart from covering nutritional requirements, the beneficial effects on the gut. Enteral nutrition activates the intestine stimulating motility, maintains intesti-
nal integrity, and decreases mucosal permeability and inflammation in association with preserving a healthy microbiome.

Another subject, covered by B. Ravinder Reddy, includes the noncaloric benefit of fibers (polysaccharides). Fermentation of soluble fibers can cover as much as 15% of caloric requirements in the presence of an intact colon and rectum but, in addition, fibers promote the absorption of micronutrients, stimulate motility and improve the immune status of the gut probably by influencing the microbiome of the gut and producing butyrate (4-carbon short-chain fatty acid) serving as fuel for the large intestine.

Robert G. Martindale (USA) presented an overview of the different measures that can be taken to improve the nutritional state (= function) before and after operation. A high protein intake, probiotics, immunonutrition, carbohydrate loading, rapid resumption of nutritional intake after operation and exercise contribute to enhanced recovery and improved outcome.

Nutritional practices in critical illness (R.G. Martindale) have shifted from support to treatment. Metabolism can be changed by mitigating the stress-induced immune and hyperdynamic responses by nutritional measures. Many uncertainties still exist, including whom to nourish, what is the best nutritional formula and how to optimize enteral nutrition.

Paula Ravasco (Portugal) emphasizes the increasing number of patients being treated and recovering from cancer. Both cancer and its treatment compromise nutritional intake, which, therefore, needs intensive treatment. This is an often neglected aspect of cancer treatment, despite the reported beneficial effects of continuous and adequate implementation of nutritional support and maintenance of physical fitness before and after different types of therapy.

At a time that there is a substantial increase in the number of aged people, frailty is increasing in prevalence and requires assessment. Bruno Vellas (France) explains that frailty has major negative effects on quality of life and does not only include physical but also mental frailty, which should be distinguished from Alzheimer. A multidisciplinary approach is necessary in which nutrition plays a central role.

In the recent decennia, the metabolic syndrome has become an epidemic all over the world, including South Asia, even more so because the syndrome develops at a lower body mass index than in the Western world. Anoop Misra (India) discusses the management of the metabolic syndrome, including the benefit and harm of drugs, and the crucial role of the prevention of obesity.

Daniel R. Moore (Canada) addresses the dynamics of protein intake and utilization, the role of ‘slow’ proteins like casein and a balanced meal containing whey protein on efficient utilization of protein, minimizing urea formation.
Aged people suffer from ‘anabolic resistance’, requiring more protein per day to maximize muscle protein synthesis due to an increase in the uptake and utilization of protein-derived amino acids in central tissues like liver, spleen, immune system, gut and wounds. This is caused by age-related inflammatory activity related to comorbidity or the aging process itself which utilizes a higher proportion of protein in the meal than in young people, diminishing the amount of amino acids that can be utilized by muscles. The importance of exercise to maintain muscle mass is emphasized.

Stephen J.D. O’Keefe (USA) highlighted the benefits and hazards of parenteral nutrition in patients with intestinal failure. Although lifesaving and adding years of life to these patients, the parenteral route is fraught with infectious, thrombotic and metabolic complications, and substantially inhibits mobility. Apart from optimizing the diet and slowing down motility of the intestine, pharmacological means have been explored to optimize regeneration of the remaining bowel. Especially the glucagon-like peptide-2 teduglutide has been shown to reduce the intravenous caloric need by optimizing gut function.

Mark Nuijten (The Netherlands) explains the modern trend to require the application of the health economic theory to medical nutrition. The role of oral nutritional supplements is discussed as an example. Financial considerations play a role in deciding to treat or to withhold treatment. Costs per quality-adjusted life year play a role in this decision and range in the Western world from 20,000 to 100,000 USD per quality-adjusted life year.

In several parts of the world, endemic malnutrition is still prevalent, and the feeling may arise that attention for sophisticated nutrients and techniques is out of place in such areas. The contrary is true. Expert knowledge is required to make appropriate choices to implement nutritional practices that are of benefit to the population at large as well as to clinical patients. We hope that this book will contribute to spreading this knowledge.

Rémy F. Meier
B. Ravinder Reddy
Peter B. Soeters
Foreword

The last decades have illuminated the important role of nutrition in the prevention and management of diseases. Despite the elaborated knowledge and discussions on the scientific podium, the role of nutrition is often overlooked in clinical practice. Unfortunately, medical nutrition is in most cases not incorporated in the curriculum at medical schools, which might lead to negative attitudes or even total neglect of the nutritional needs of hospitalized patients. Health care providers are often not well informed on the opportunities offered by nutrition to enhance the outcomes of certain treatments to the point that some patients suffer from hospital-related malnutrition. As always, there is also resistance to changes in clinical practice. Even though there are existing nutrition guidelines, their implementation remains suboptimal.

This time the Nestlé Nutrition Institute and Nestlé Health Science, a company aiming to foster the therapeutic role of nutrition in health care, made an effort to propagate the use of science-based, state-of-the-art practices in nutrition as an integrated part of disease management. They organized the 12th Clinical Nutrition Course, which was made available to a wider audience as the 82nd Proceedings of the Nestlé Nutrition Institute Workshop Series. The 5-day theoretical and practical course took place in Gurgaon (New Delhi, India) in October 2013.

The objectives of the course were to promote the education, discussion and exchange of ideas among clinicians globally on medical nutrition practices. The course enables clinicians, including both medical doctors and dietitians, to get a better understanding of medical nutrition, and to connect and share best practices with each other as well as with the course faculty.

The course chairs and the faculty are top leaders and experts in their area of presentation. On behalf of the Nestlé Nutrition Institute and Nestlé Health Science, we would like to thank the Chairmen Prof. Peter Soeters, Prof. Remy Meier and Prof. Ravinder Reddy for their diligent work in establishing a scientific program for yet another successful Clinical Nutrition Course and for assembling
such a distinguished group of experts and clinicians as speakers. Special thanks go to Prof. Soeters and Prof. Meier for their dedicated and passionate work, which contributed to the success of the Clinical Nutrition Courses throughout the years.

We would also like to acknowledge the course faculty for their vigorous efforts in creating such outstanding presentations, preparing related patient cases for the Problem-Based Learning Sessions and sharing their clinical experiences with the course participants. The energy throughout the course, the interest among the participants and the quality of the discussions were all testaments to the quality of the course and its importance.

Finally, we would like to thank Melanie Pittier, who worked tirelessly in the background, for her support with all the course preparations, and Lorena Cheung, Vivek Garg and the team in India for all their support on site in order to make the course run smoothly and yet another Clinical Nutrition Course successful.

Natalia Wagemans, MD
Global Head
Nestlé Nutrition Institute
Vevey, Switzerland

Anette Järvi, RD, PhD
Global Medical Affairs Manager
Nestlé Health Science
Vevey, Switzerland
Contributors

Chairpersons & Speakers

Prof. Robert G. Martindale
Oregon Health and Science University
3181 SW Sam Jackson Park Road
Portland, OR 97239-3098
USA
E-Mail martindr@ohsu.edu

Prof. em Rémy Meier MD
University of Basel
Gastro Center Obach AG
Obachstrasse 23
CH-4500 Solothurn
Switzerland
E-Mail meier.remy@outlook.com

Prof. Anoop Misra
Fortis Hospitals
B-16, Chirag Enclave
Opp. Nehru Place
110048 New Delhi
India
E-Mail anoopmisra@gmail.com

Dr. Marcus Nuijten
Ars Accessus Medica BV
Dorpsstraat 75
1546 Jisp
The Netherlands
E-Mail marknuijten@arsaccessusmedica.com

Dr. Steve J.D. O’Keefe
Division of Gastroenterology,
Hepatology and Nutrition
University of Pittsburgh Medical Center
Mezzanine Level, C-Wing-PUH
200 Lothrop Street
Pittsburgh, PA 15213
USA
E-Mail sjokeefe@pitt.edu

Dr. Paula Ravasco
Faculdade de Medicina da Universidade de Lisboa
Avenida Professor Egas Moniz
1649-028 Lisbon
Portugal
E-Mail p.ravasco@fm.ul.pt

Dr. B. Ravinder Reddy
Care Hospital – The Institute of Medical Sciences
Road No. 1, Banjara Hills
Hyderabad 500034
India
E-Mail drbravinderreddy@yahoo.com

Prof. Peter B. Soeters
Maastricht University Medical Center
Home address:
Putstraat 25
3620 Lanaken
Belgium
E-Mail pb.soeters@maastrichtuniversity.nl
Prof. Bruno Vellas  
Service de Médecine Interne et de  
Gérontologie Clinique  
Hôpital la Grave Casselardit  
170 Avenue de Casselardit  
31059 Toulouse Cédex 9  
France  
E-Mail vellas.b@chu-toulouse.fr

Participants

Lisa Murnane/Australia  
Andrea Owen/Australia  
Tina Beermann/Denmark  
Jeanette Hansen/Denmark  
Pierre Jesus/France  
Lorena Cheung/Hong Kong SAR  
Alka Mohan Chutani/India  
Sandeep Dewan/India  
Sonia Gandhi/India  
Vivek Garg/India  
Pooja Guglani/India  
Yash Javeri/India  
Sumati Joshi/India  
Veena Pai/India  
Kajal Pandya/India  
Hariharan Ramesh/India  
Prakash Shastri/India  
Haritha Shyam Bathina/India  
Ramya Subburaj/India  
Chandrashekhar Tulasigeri/India  
Takeaki Sato/Japan  
Pui Chuan Yeong/Malaysia  
Entisar Malik Al Hani/Middle East  
Mai Al Shahrani/Middle East  
Omar Alshehri/Middle East  
Hamed Alzuhair/Middle East  
Mostafa Ali El Sayed Abd Al Moniem/Middle East  
Ayesha Khan/Middle East  
Sheneshia Moodley/Middle East  
Mohamed Negm/Middle East  
Sarah Qanbou/Middle East  
Christina Kristin Reyes/Philippines  
Paul Bruhn/Singapore  
Joanna Goh/Singapore  
Keat Hong Lee/Singapore  
Sabrina Ng Hui Na/Singapore  
Nishan Kalupahana/Sri Lanka  
Ferdinand Haschke/Switzerland  
Anette Järvi/Switzerland  
Natalia Wagemans/Switzerland  
Chanvit Shinawong/Thailand  
Hale Akpinar/Turkey  
Murat Isci/Turkey  
Cetin Kaymak/Turkey  
Koray Kochan/Turkey  
Truong Ngoc Hai/Vietnam