



REVIEW

The chronobiology, etiology and pathophysiology of obesity

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The effect of CD on human health is an emerging issue. Many records link CD with diseases such as cancer, cardiovascular, cognitive impairment and obesity, all of them conducive to premature aging. The amount of sleep has declined by 1.5 h over the past century, accompanied by an important increase in obesity. Shift work, sleep deprivation and exposure to bright light at night increase the prevalence of adiposity. Animal models have shown that mice with Clock gene disruption are prone to developing obesity and MetS. This review summarizes the latest developments with regard to chronobiology and obesity, considering (1) how molecular clocks coordinate metabolism and the specific role of the adipocyte; (2) CD and its causes and pathological consequences; (3) the epidemiological evidence of obesity as a chronobiological illness; and (4) theories of circadian disruption and obesity. Energy intake and expenditure, relevance of sleep, fat intake from a circadian perspective and psychological and genetic aspects of obesity are examined. Finally, ideas about the use of chronobiology in the treatment of obesity are discussed. Such knowledge has the potential to become a valuable tool in the understanding of the relationship between the chronobiology, etiology and pathophysiology of obesity.

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Keywords: metabolic syndrome; chronobiology; circadian; clock genes

Introduction

Correct timing of the endogenous circadian clock enables organisms to predict and anticipate daily environmental changes, and temporally adjust behavioral and physiological functions accordingly. In humans, current societal habits, including high snacking frequency, a reduction in the time spent sleeping and increased exposure to bright light during the night, act on the brain to induce a loss of 'feeling' for internal and external rhythms. Consequently, the environment sensed by the brain has become metabolically flattened and arrhythmic. Among the well-known consequences of a disrupted circadian function are altered metabolism and even life span, which may be all adversely affected when the circadian time-keeping system is altered.¹

Obesity has emerged as one of the most serious public health concerns in the 21st century and the morbidity and

mortality associated with obesity continue to increase. Endogenous (that is, genetic) and exogenous factors (that is, diet and physical activity) have an important role in the assessment and management of obesity.² Recently, studies have suggested that disruption of the circadian system (chronodisruption (CD)) may lead to obesity.³ CD can also be produced by alteration of the core machinery of the molecular circadian clock. Brain- and muscle ARNT-like protein-1 (BMAL1), Period Circadian Protein-2 (PER2) and Circadian Locomotor Output Cycles Kaput (CLOCK), among others clock proteins, have a specific role in the organism's physiology in addition to their role in the circadian molecular clock. Animal models have shown that mice with Clock gene disruption are prone to developing obesity and a phenotype resembling metabolic syndrome (MetS).⁴

Complications of obesity include cardiovascular disease, hypertension, dyslipidemia, endothelial dysfunction, type-2 diabetes mellitus and impaired glucose tolerance, among others. Interestingly, chronobiology is implicated in most of these alterations.⁵ Circadian control of the cardiovascular function is firmly established. Furthermore, it is known that many hormones involved in metabolism, such as insulin, glucagon, growth hormone and cortisol, show circadian oscillation with different daily patterns. Current studies are

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Chronobiology And Obesity Chronobiology And Obesity

Sharron Dalton



Chronobiology And Obesity Chronobiology And Obesity:

Chronobiology and Obesity Marta Garaulet, Jose M. Ordovás, 2012-11-13 Circadian rhythms are such an innate part of our lives that we rarely pause to speculate why they even exist Some studies have suggested that the disruption of the circadian system may be causal for obesity and manifestations of Metabolic Syndrome MetS Shift work sleep deprivation and bright light exposure at night are related to increased adiposity obesity and prevalence of MetS It has been provided evidence of clock genes expression in human adipose tissue and demonstrated its association with different components of the MetS Moreover current studies are illustrating the particular role of different clock genes variants and their predicted haplotypes in MetS The purpose of Chronobiology and Obesity is to describe the mechanisms implicated in the interaction between chonodisruption and metabolic related illnesses such as obesity and MetS with different approaches **Overweight and**

Weight Management Sharron Dalton, 1997 Health Professions *Chronobiology and Chronomedicine* Germaine Cornelissen, Tsuyoshi Hirota, 2024-02-23 Circadian rhythms have been shown to be ubiquitous and critically important in the experimental laboratory accounting for the difference between life and death in response to identical stimulus The partly endogenous nature of circadian rhythms has been well documented and methods for their characterisation have been developed enabling the cellular and molecular mechanisms to be understood Chronobiology and Chronomedicine aims to provide a review of these mechanisms underlying circadian rhythms and illustrate the role of the brain s suprachiasmatic nuclei in the pace making process and the effects caused by clock genes present in almost all cells Beyond the mechanisms involved the book discusses the relationship between body systems disease and proper circadian function in particular how disruption of the circadian rhythm is associated with ill health and disease status from observations made at the organismic level The book is organised to be an ideal introduction for the postgraduate in various fields reviewing developments and outlining methods to show the depth and breadth of chronobiology and chronomedicine as well as an invaluable companion to researchers and healthcare professionals working in the field with an interest in developing novel therapeutic approaches

Recent Advances in Nutrigenetics and Nutrigenomics , 2012-06-19 This volume of Progress in Molecular Biology and Translational Science covers the recent advances in the expanding fields of nutrigenetics and nutrigenomics Forty authors from eight countries have contributed to the publication representing the most cutting edge research available Contributions from leading authorities Informs and updates on all the latest developments in the field *Chronobiology: Biological Timing in Health and Disease* , 2013-07-27 This special volume of Progress in Molecular Biology and Translational Science focuses on chronobiology Contributions from leading authorities Informs and updates on all the latest developments in the field

Urban Pollution Susanne M. Charlesworth, Colin A. Booth, 2019-01-04 Multidisciplinary treatment of the urgent issues surrounding urban pollution worldwide Written by some of the top experts on the subject in the world this book presents the diverse complex and current themes of the urban pollution debate across the built environment urban development and

management continuum It uniquely combines the science of urban pollution with associated policy that seeks to control it and includes a comprehensive collection of international case studies showing the status of the problem worldwide Urban Pollution Science and Management is a multifaceted collection of chapters that address the contemporary concomitant issues of increasing urban living and associated issues with contamination by offering solutions specifically for the built environment It covers the impacts of urban pollution historical urban pollution evolution of air quality policy and management in urban areas ground gases in urban environments bioaccessibility of trace elements in urban environments urban wastewater collection treatment and disposal living green roofs light pollution river ecology greywater recycling and reuse containment of pollution from urban waste disposal sites bioremediation in urban pollution mitigation air quality monitoring urban pollution in China and India urban planning in sub Saharan Africa and more Deals with both the science and the relevant policy and management issues Examines the main sources of urban pollution Covers both first world and developing world urban pollution issues Integrates the latest scientific research with practical case studies Deals with both legacy and emerging pollutants and their effects The integration of physical and environmental sciences combined with social economic and political sciences and the use of case studies makes Urban Pollution Science and Management an incredibly useful resource for policy experts scientists engineers and those interested in the subject

Psychological Co-morbidities of Physical Illness Sherry Pagoto, 2011-09-15 Evidence for the efficacy of behavioral approaches to the treatment and management of physical illness is mounting as is the evidence for behavioral interventions for psychological disorders A pressing question that remains is how to effectively treat co morbid physical and psychological illnesses Diseases co occur more often than not and the co occurrence of physical and psychological illnesses is associated with greater impairment and healthcare costs Unfortunately the treatment literature has traditionally been disease specific with fewer insights and discoveries regarding the underlying processes of co morbid physical and psychological illnesses and even fewer of approaches to treatment Research on co morbidities between physical and psychological illnesses has focused primarily on depression Quite extensive literatures describe the negative impact of depression on type 2 diabetes cardiovascular disease cancer obesity pain and other physical illnesses More recently higher rates of physical illness have been documented in individuals with bipolar disorder anxiety disorders schizophrenia and impulse control disorders Studies emanating from the National Comorbidity Survey Replication NCS R the only U S population based database that includes diagnostic information on all DSM IV psychological disorders have revealed strong links between a number of physical and psychological illnesses These data draw attention to the prevalence of physical and psychological co morbidities at the population level which has stimulated research on the biobehavioral mechanisms of those co morbidities with the goal of developing and improving treatment approaches As this area of research grows practical resources are needed for clinicians and researchers who encounter individuals with co morbid physical and psychological illnesses in their work This book is the first to provide a

comprehensive overview of psychological co morbidities of physical illness biological and behavioral mechanisms of those co morbidities and implications for treatment Each chapter focuses on a physical condition such as obesity type 2 diabetes HIV infection tobacco dependence cardiovascular disease cancer asthma pain irritable bowel syndrome autoimmune disorders and obstetric gynecological conditions Chapters are structured to cover 1 the epidemiology of the most prevalent co morbid psychological disorders within that physical condition e g depression and other mood disorders anxiety disorders psychotic disorders impulse control disorders and eating disorders 2 biobehavioral mechanisms of the co morbidity 3 a review of the behavioral treatment literature including evidence based practice guidelines where available and 4 treatment considerations including issues of stepped care evidence based treatment decisions treatment sequencing treatment blending treatment interactions and contraindications Content is guided by available research evidence and relevant theoretical models and it is presented in such a way as to inform clinical practice identify important gaps in the research literature and provide directions for future research The book serves as a tool for clinicians and researchers who work in the area of behavioral medicine in medical academic and or training settings Patients with psychological and medical co morbidities may be encountered by clinicians working in either mental health or medical settings where the presenting problem could be either the psychological disorder or the medical disorder As such assessment and treatment issues are discussed from both perspectives For the clinician the book reviews brief assessment tools provides practical summaries of the treatment outcome literature and treatment considerations e g treatment sequencing contraindications and includes treatment decision hierarchies that help the clinician incorporate each facet of evidence based decisions the evidence patient characteristics and their own expertise For the researcher the book brings together the literature for the medical and psychological disorder highlighting still unanswered research questions relevant to the co morbidity Literature relevant to the underlying biobehavioral mechanisms of the co morbidity as well as treatment are summarized While a vast literature exists for the treatment of these disorders in isolation one important purpose of this book is to bring together this literature to uncover specific areas in need of future study that will further our understanding of why different disorders co occur and the best ways to treat them when they do *ANIMAL TAXONOMY, BEHAVIOUR AND CHRONOBIOLOGY* Dr. Vineeta

Rawat,2023-07-26 About the book The book *Animal Taxonomy Behavior and Chronobiology* is a comprehensive and multidisciplinary exploration of the intricate relationship between animal taxonomy behavior and the fascinating field of chronobiology This book delves into the diverse world of animal life investigating how taxonomy the classification of species intersects with the study of behavior patterns and the biological rhythms that govern them Book Overview In this illuminating volume readers are invited on a captivating journey through the animal kingdom where taxonomy behavior and chronobiology converge to offer insights into the intricate workings of different species The book seamlessly blends scientific rigor with accessible explanations making it an engaging resource for both experts in the field and curious enthusiasts Key

Themes Animal Taxonomy The book begins by delving into the classification of animals discussing the principles and methodologies of taxonomy It explores the organization of species into hierarchical categories and the evolutionary relationships that underpin these classifications **Animal Behavior** The second part of the book delves into animal behavior shedding light on the wide array of behavioral patterns exhibited by various species From social interactions to mating rituals readers gain a comprehensive understanding of the behaviors that define different animal groups **Chronobiology** The third section of the book explores the captivating world of chronobiology the study of biological rhythms and their synchronization with environmental cues such as light and dark cycles Readers discover how animals internal clocks regulate physiological processes and behaviors **Interdisciplinary Insights** By merging the realms of taxonomy behavior and chronobiology this book offers a unique interdisciplinary perspective It showcases how understanding animal taxonomy can enhance our comprehension of behavior and chronobiology ultimately deepening our appreciation of the intricate tapestry of life on Earth **Why This Book Matter** Animal Taxonomy Behavior and Chronobiology serves as an invaluable resource for researchers educators and students in fields such as biology zoology ethology and chronobiology Its comprehensive exploration of these interconnected areas fosters a holistic understanding of the animal world illuminating the delicate balance between taxonomy behavior and the rhythmic forces that shape life Whether you re a seasoned scientist or a curious reader eager to explore the wonders of the animal kingdom this book invites you to embark on a captivating intellectual journey With its blend of scientific rigor and accessible prose Animal Taxonomy Behavior and Chronobiology stands as a testament to the rich diversity of life forms that inhabit our planet and the profound insights their study can offer

Nutrition in the Prevention and Treatment of Disease Ann M. Coulston, Carol J. Boushey, Mario Ferruzzi, Linda Delahanty, 2017-04-28 Nutrition in the Prevention and Treatment of Disease Fourth Edition is a compilation of current knowledge in clinical nutrition and an overview of the rationale and science base of its application to practice in the prevention and treatment of disease In its fourth edition this text continues the tradition of incorporating new discoveries and methods related to this important area of research Generating and analyzing data that summarize dietary intake and its association with disease are valuable tasks in treating disease and developing disease prevention strategies Well founded medical nutrition therapies can minimize disease development and related complications Providing scientifically sound creative and effective nutrition interventions is both challenging and rewarding Two new chapters on metabolomics and translational research which have come to be used in nutrition research in recent years The new areas of study are discussed with the perspective that the application of the scientific method is by definition an evolutionary process A new chapter on Genetics and Diabetes which reviews the latest research on causal genetic variants and biological mechanisms responsible for the disease and explores potential interactions with environmental factors such as diet and lifestyle Includes all major omics the exposome metabolomics genomics and the gut microbiome Expands the microbiota portions to reflect complexity

of diet on gut microbial ecology metabolism and health

Bronchial Asthma M. Eric Gershwin, Timothy E.

Albertson, 2008-08-17 A fully updated edition of a widely respected classic on the diagnosis and management of asthma in a variety of patient subpopulations Though this fifth edition continues to emphasize the definition medications and use of asthma treatment plans it also focuses on the special needs patient including the pediatric patient the pregnant patient and the patient undergoing surgery as well as on the perennial issues of exercise and asthma pulmonary aspergillosis occupation recreational drug use and psychological social considerations Highlights for the fifth edition include a liberal use of tables and charts to make the book more practical and user friendly updates on the many new pharmaceuticals used to treat asthma and first time sections on food sensitivity and the diagnosis of asthma

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