

REVIEW ARTICLE

Endoplasmic reticulum stress signalling – from basic mechanisms to clinical applications

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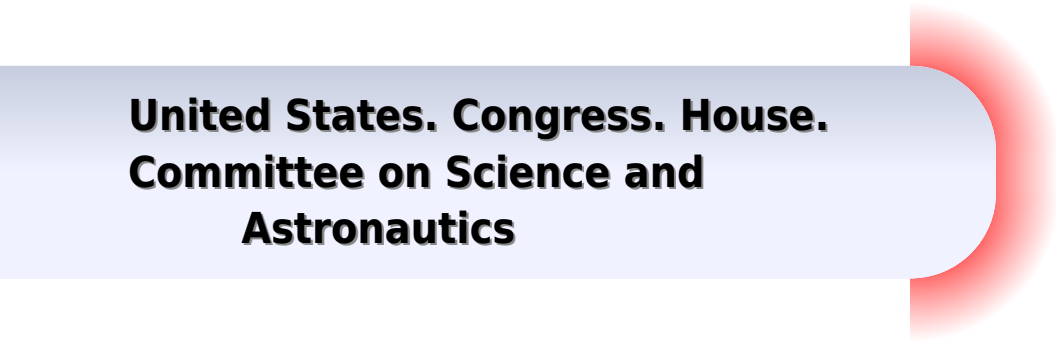
The endoplasmic reticulum (ER) is a membranous intracellular organelle and the first compartment of the secretory pathway. As such, the ER contributes to the production and folding of approximately one-third of cellular proteins, and is thus inextricably linked to the maintenance of cellular homeostasis and the fine balance between health and disease. Specific ER stress signalling pathways, collectively known as the unfolded protein response (UPR), are required for maintaining ER homeostasis. The UPR is triggered when ER protein folding capacity is overwhelmed by cellular

Abbreviations

4-PBA, 4-phenylbutyric acid; ALS, amyotrophic lateral sclerosis; ATF4, activating transcription factor 4; ATF6, cytosolic domain of ATF6; ATF6a, activating transcription factor 6 a; ATF6b, activating transcription factor 6 b; BQF240, cAMP responsive element-binding protein 3 like 2; bP, binding immunoglobulin protein (gene GRP78); bZIP, basic-leucine zipper; CHOP, C/EBP α /enhancer-binding protein (C/EBP α); homologous protein; CRO1, chaperonin cell lysate; CREB3L3, cAMP responsive element-binding protein 3 like 3; CREB, cAMP response element-binding protein; eIF2 β , eukaryotic translation initiation factor 2 β ; eIF2 α , eukaryotic translation initiation factor 2 α ; ERAD, ER-associated protein degradation; ER, endoplasmic reticulum; ERN1, endoplasmic reticulum to nucleus signalling 1; ERN2, endoplasmic reticulum to nucleus signalling 2; ERO-1, ER oxidoreductin 1; ERs, oestrogen receptor α ; GADD34, growth arrest and DNA-damage-inducible 34; GRP78, glucose-regulated protein 78; GSH, glutathione; IBD, inflammatory bowel disease; IRE1 α , inositol-requiring enzyme 1 α ; IRE1 β , inositol-requiring enzyme 1 β ; LUMIN, cAMP responsive element-binding protein 3 or CREB3; MAAM, mitochondria-associated membrane; MBTPS1, membrane bound transcription factor peptidase, site 1; MBTPS2, membrane bound transcription factor peptidase, site 2; MDM1/USAN13, mitochondrial distribution and morphology 1/uracil nase 13; mTOR, mammalian target of rapamycin; N-ATF6, N-terminal portion of ATF6 or ATF6 Δ ; NF- κ B, nuclear transcription factor κ ; NGLY1, N-glycanase; NPL, NAD(P)H-NAD(P)H reductase; OASIS, cAMP responsive element-binding protein 3 like 1; ORAI1, calcium release-activated calcium channel protein 1; PDI, protein disulfide isomerase; p-eIF2 α , phospho-eIF2 α ; PERK, protein kinase R-like (PKR-like) endoplasmic reticulum kinase; PKR, protein kinase R/activated; PM, plasma membrane; PP1, protein phosphatase type 1; qPCR, quantitative polymerase chain reaction; RER, rough endoplasmic reticulum; RGD, regulated IRE1-dependent decay; ROS, reactive oxygen species; SEC22b, vesicle-trafficking protein SEC22b; SERCA, sarcoplasmic endoplasmic reticulum ATPase Ca²⁺-ATPase; SER, smooth endoplasmic reticulum; TAD, transcriptional activation domain; TRAF2, tumour necrosis factor receptor-associated factor 2; TUDCA, tauroursodeoxycholic acid; UDCA, ursodeoxycholic acid; UPR, unfolded protein response; WT, wild-type; XBP1s, spliced isoform of XBP1; XBP1u, unspliced isoform of XBP1; XBP1, X-box binding protein 1.

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Management of Obesity, Part I: Overview and Basic Mechanisms, An Issue of Gastroenterology Clinics of North America, E-Book Lee M. Kaplan, 2023-05-18 In this issue of Gastroenterology Clinics guest editor Dr Lee M Kaplan brings his considerable expertise to the topic of Management of Obesity Part I Overview and Basic Mechanisms Most of the world's population live in countries where being overweight and obese is more life threatening than being underweight This preventable disease leaves patients with a cascade of health problems resulting in serious stress and impact on global economies and healthcare systems This issue the first of two addresses basic mechanisms and contributors of obesity along with health care disparities and access Contains 16 practice oriented topics including the many forms of obesity genetic contributions to obesity health complications of obesity the effect of obesity on gastrointestinal disease disparities in access and quality of obesity care and more Provides in depth clinical reviews of management of obesity offering actionable insights for clinical practice Presents the latest information on this timely focused topic under the leadership of experienced editors in the field Authors synthesize and distill the latest research and practice guidelines to create clinically significant topic based reviews

Adaptive Protection of the Heart Felix Z. Meerson, 1990-11-21 This book explores the possibilities of protecting the heart against stress and ischemia through adaptation to intermittent hypoxia or to mild nondamaging stress exposure These possibilities are based on studies that show an increase in the potency and efficiency of stress limiting systems when subjected to repeated stress actions adaptation to high altitude hypoxia or adaptation to increased physical loads Any stress reaction is coupled with an activation of central and local stress limiting systems such as GABAergic opiodergic and serotonergic systems in the brain as well as antioxidants prostaglandins and adenosine in executory organs The book also presents the use of metabolites of stress limiting systems rather than adaptation as a means to prevent cardiac arrhythmias It also discusses genetically determined deficiencies of stress limiting systems and their role in the etiology of stress induced diseases Cardiologists and researchers studying stress and its effect on cardiovascular systems will find this book extremely useful

Immune Regulation in Kidney Diseases: Importance, Mechanism and Translation Cheng Yang, Songjie Cai, 2021-03-16

The Cambridge Handbook of Age and Ageing Malcolm L. Johnson, Vern L. Bengtson, Peter G. Coleman, Thomas B. L. Kirkwood, 2005-12-01 The Cambridge Handbook of Age and Ageing first published in 2005 is a guide to the body of knowledge theory policy and practice relevant to age researchers and gerontologists around the world It contains almost 80 original chapters commissioned and written by the world's leading gerontologists from 16 countries and 5 continents The broad focus of the book is on the behavioural and social sciences but it also includes important contributions from the biological and medical sciences It provides comprehensive accessible and authoritative accounts of all the key topics in the field ranging from theories of ageing to demography physical aspects of ageing mental processes and ageing nursing and health care for older people the social context of ageing cross cultural perspectives relationships quality of life gender

and financial and policy provision This handbook will be a must have resource for all researchers students and professionals with an interest in age and ageing

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psychiatry This volume offers an overview of neuroendocrinological topics approaching the subject from the perspective of the mechanisms which control hormone actions on behavior Female male and stress hormones are discussed at the cellular behavioral and developmental level and sexual differentiation of the development of hormone dependent neuronal systems neuropeptides neuromodulators and steroid inducedneuroplasticity are addressed There is simply no other current single volume reference with such comprehensive coverage and depth Authors selected are the internationally renowned experts for the particular topics on which they write and the volume is richly illustrated with over 175 figures over 50 in color A collection of articles reviewing our fundamental knowledge of the mechanisms of neuroendocrinology the book provides an essential affordable reference for researchers clinicians and graduate students in the area The most comprehensive single volume source of up to date data on the mechanisms behind neuroendocrinology with review articles covering x y z Chapters synthesize information otherwise dispersed across a number of journal articles and book chapters thus saving researchers the time consuming process of finding and integrating this information themselves Offering outstanding scholarship each chapter is written by an expert in the topic area and approximately 35% of chapters are written by international contributors Provides more fully vetted expert knowledge than any existing work with broad appeal for the US UK and Europe accurately crediting the contributions to research in those regions Heavily illustrated with 175 figures approximately 54 in color Presents material in most visually useful form for the reader *Cumulated Index Medicus* ,1976 **ICRDB Cancergram** ,1986 **1962 NASA Authorization** United States. Congress. House. Committee on Science and Astronautics,1961

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