

FOOD ALLERGY

Adverse Reactions to
Foods and Food Additives

Edited by Dean D. Metcalfe,
Hugh A. Sampson and Ronald A. Simon

FOURTH EDITION



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Food Allergy

Adverse Reactions to Foods and Food Additives

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Food Allergy

We dedicate this edition to our wives and children who have supported and encouraged (and tolerated) our career interests; and to the many dedicated investigators who are helping those with adverse reactions to foods and additives.

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Preface

It is the privilege of the editors to present the fourth edition of *Food Allergy: Adverse Reactions to Foods and Food Additives*. As in the first three editions, we have attempted to create a book that in one volume would cover pediatric and adult adverse reactions to foods and food additives, stress efforts to place adverse reactions to foods and food additives on a sound scientific basis, select authors to present subjects on the basis of their acknowledged expertise and reputation, and reference each contribution thoroughly. The growth in knowledge in this area continues to be gratifying, and is reflected in the increased length of this edition. Again this book is directed toward clinicians, nutritionists, and scientists interested in food reactions, but we also hope that others interested in such reactions will find the book to be a valuable resource.

The chapters cover basic and clinical perspectives of adverse reactions to food antigens; adverse reactions to food additives; and contemporary topics. The number of chapters addressing these areas has been increased from 29 chapters in the first edition, 38 chapters in the second edition, and 42 chapters in the third edition, to 47 chapters in the fourth edition. Basic science begins with overview chapters on immunology of particular relevance to the gastrointestinal tract as a target organ in allergic reactions and the properties that govern reactions initiated at this site. Included are chapters relating to biotechnology and to thresholds or

reactivity. This is followed by chapters reviewing the clinical science of adverse reactions to food antigens from the oral allergy syndrome to anaphylaxis. The section on diagnosis of adverse reactions to foods constitutes a review of the approaches available for diagnosis; and their strengths and weaknesses. Adverse reactions to food additives include chapters addressing specific clinical reactions and reactions to specific agents. The final section on contemporary topics includes discussions of the pharmacologic properties of food, the history and prevention of food allergy, diets and nutrition, neurologic reactions to foods and food additives, psychological considerations and adverse reactions to sea-food toxins.

Each of the chapters in this book is capable of standing alone, but when placed together they present a mosaic of the current ideas and research on adverse reactions to foods and food additives. Overlap is unavoidable but, we hope, is held to a minimum. Ideas of one author may sometimes differ from those of another, but in general there is remarkable agreement from chapter to chapter. We, the editors, thus present the fourth edition of a book that we believe represents a fair, balanced, and defensible review of adverse reactions of foods and food additives.

*Dean D. Metcalfe
Hugh A. Sampson
Ronald A. Simon*

Abbreviations

AA	Arachidonic acid	CCD	Cross-reactive carbohydrate determinants
AAF	Amino acid-based formula	CCP	Cyclic citrullinated peptide
AAP	American Association of Pediatrics	CDC	Centers for Disease Control and Prevention
ACCD	1-Aminocyclopropane-1-carboxylic acid deaminase	CFA	Chemotactic factor of anaphylaxis
ACD	Allergic contact dermatitis	CFR	Code of Federal Regulations
AD	Atopic dermatitis	CGRP	Calcitonin gene-related peptide
ADA	Americans with Disabilities Act	CIU	Chronic idiopathic urticaria
AE	Atopic eczema	CIUA	Chronic idiopathic urticaria/angioedema
AEC	Absolute eosinophil count	CLA	Cutaneous lymphocyte-associated antigen
AERD	Aspirin exacerbated respiratory disease	CLSI	Clinical and Laboratory Standards Institute
AFP	Antifreeze protein	CM	Cow's milk
AGA	Anti-gliadin antibodies	CMA	Cow's milk allergy
AI	Adequate intake	CMF	Cow's milk formula
ALA	Alimentary toxic aleukia	CMP	Cow's milk protein
ALDH	Aldehyde dehydrogenase	CMV	Cucumber mosaic virus
ALS	Advanced Life Support	CNS	Central nervous system
ALSPAC	Avon Longitudinal Study of Parents and Children	COX	Cyclo-oxygenase
AMDR	Acceptable Macronutrient Distribution Ranges	CRH	Corticotropin-releasing hormone
AMP	Almond major protein	CRP	C-reactive protein
APC	Antigen-presenting cell	CRS	Chinese restaurant syndrome
APT	Atopy patch test	CSPI	Center for Science in the Public Interest
ASCA	Anti-Saccharomyces cerevisiae	CSR	Class-switch recombination
ASHMI	Anti-asthma Herbal Medicine Intervention	CTL	Cytotoxic T-lymphocyte
ASP	Amnesic shellfish poisoning	CTX	Ciguatoxins
AZA	Azaspiracid	CU	Cholinergic urticaria
AZP	Azaspiracid shellfish poisoning	DAO	Diamine oxidase
BAL	Bronchoalveolar lavage	DBPC	Double-blind, placebo-controlled
BAT	Basophil activation test	DBPCFC	Double-blind, placebo-controlled food challenge
BCR	B-cell receptor	DC	Dendritic cell
BER	Bioenergy regulatory	DHA	Docosahexaenoic acid
BFD	Bioelectric functions diagnosis	DMARD	Disease modifying anti-rheumatic agent
BHA	Butylated hydroxyanisole	DoH	Department of Health
BHR	Basophil histamine release	DRI	Dietary reference intakes
BHT	Butylated hydroxytoluene	DSP	Diarrhetic shellfish poisoning
BLG	β -lactoglobulin	DTH	Delayed-type hypersensitivity
BMI	Body mass index	DTT	Dithiothreitol
BN	Brown-Norway	DTX	Dinophysistoxins
BP	Blood pressure	EAR	Estimate average requirement
BPRS	Brief Psychiatric Rating Scale	EAV	Electroacupuncture according to Voll
BTX	Brevetoxins	ECP	Eosinophil cationic protein
CAS	Chemical Abstract Society	EDN	Eosinophil-derived neurotoxin
		EDS	Electrodermal screening

EE	Eosinophilic esophagitis	HBGF	Heparin-binding growth factors
EEG	Electroencephalogram	HCN	Hydrogen cyanide
EER	Estimated energy requirement	HE	Hen's egg
EFA	Essential fatty acid	HEL	Hen's egg lysozyme
EFSA	European Food Safety Authority	HEV	High endothelial venules
EGID	Eosinophil-associated gastrointestinal disorders	HKE	Heat-killed <i>Escherichia coli</i>
EIA	Enzyme immunoassay	HKL	Heat-killed <i>Listeria monocytogene</i>
ELISA	Enzyme-linked immunosorbent assays	HKLM	Heat-killed <i>Listeria monocytogenes</i>
EMA	Anti-endomysial	HLA	Human leukocyte antigen
EMT	Emergency Medical Technical	HMW	High molecular weight
EoE	Eosinophilic esophagitis	HNL	Human neutrophil lipocalin
EoG	Eosinophilic gastroenteritis	HPF	High-powered field
EoP	Eosinophilic proctocolitis	HPLC	High-performance liquid chromatography
EPA	Eicosapentanoic acid	HPP	Hydrolyzed plant protein
EPO	Eosinophilic peroxidase	HRFs	Histamine releasing factors
EPSPS	Enzyme 5-enolpyruvylshikimate-3-phosphate synthase	HRP	Horseradish peroxidase
EPX	Eosinophil protein X	HSP	Hydrolyzed soy protein
ESR	Erythrocyte sedimentation rate	HVP	Hydrolyzed vegetable protein
FAAN	Food Allergy & Anaphylaxis Network	IAAs	Indispensable amino acids
FAE	Follicle-associated epithelium	ICD	Irritant contact dermatitis
FAFD	Food-additive-free diet	IDECs	Inflammatory dendritic epidermal cells
FALCPA	Food Allergen Labeling and Consumer Protection Act	IEC	Intestinal epithelial cells
FAO	Food and Agricultural Organization	IEI	Idiopathic environmental intolerances
FASEB	Federation of American Societies for Experimental Biology	IgA	Immunoglobulin A
FDA	Food and Drug Administration	IgE	Immunoglobulin E
FDDPU	Food-dependent delayed pressure urticaria	IgG	Immunoglobulin G
FDEIA	Food-dependent exercise-induced anaphylaxis	IgM	Immunoglobulin M
FEC	Food-and-exercise challenge	ISB	Isosulfan blue
FEIA	Fluorescent-enzyme immunoassay	ISS	Immunostimulatory sequences
FFQs	Food Frequency Questionnaires	IST	Intradermal skin test
FFSPTs	Fresh food skin prick tests	ITAM	Immunoreceptor tyrosine-based activation motif
FPIES	Food protein-induced enterocolitis syndrome	ITIM	Immunoreceptor tyrosine-based inhibitory motif
FSIS	Food Safety Inspection Service	IUIS	International Union of Immunological Societies
GALT	Gut-associated lymphoid tissue	JECFA	Expert Committee on Food Additives
GBM	Glomerular basement membrane	KA	Kainic acid
GER	Gastroesophageal reflux	KGF	Keratinocyte growth factor
GERD	Gastroesophageal reflux disease	KLH	Key-hole limpet hemocyanin
GFD	Gluten-free diet	LA	Linoleic acid
GH	Growth hormone	LCPUFA	Long-chain polyunsaturated fatty acids
GHRH	Growth hormone releasing hormone	LCs	Langerhans cells
GI	Gastrointestinal	LFI	Lateral flow immunochromatographic
GINI	German Infant Nutritional Interventional	LGG	Lactobacillus rhamnosus GG
GOX	Glyphosate oxidoreductase	LLDC	Langerhans-like dendritic cell
GrA	Granzymes A	LMW	Low molecular weight
GRAS	Generally recognized as safe	LOAELs	Lowest observed adverse effect level
GrB	Granzymes B	LOX	Lipoxygenase
GRS	Generally regarded as safe	LP	Lamina propria
GSH	Glutathione	LPL	LP lymphocytes
GVHD	Graft-versus-host disease	LPS	Lipopolysaccharide
HACCP	Hazard analysis and critical control point	LRTIs	Lower respiratory tract infections
HAQ	Health Assessment Questionnaire	LSD	Lysergic acid diethylamide
		LT	Leukotrienes
		LTP	Lipid-transfer protein
		MALDI	Matrix-assisted laser desorption/ionization

MALT	Mucosa-associated lymphoid tissue	PMN	Polymorphonuclear leukocytes
MAO	Monoamine oxidase	PPA	Positive predictive accuracy
MAPK	Mitogen-activated protein kinase	PPI	Protein phosphatase inhibition
MAS	Multicenter Allergy Study	PPs	Peyer's patches
MBP	Major basic protein	PPT	PP-derived T-cells
MC	Mast cell	PPV	Positive predictive value
MCS	Multiple chemical sensitivity	PR	Pathogenesis-related
MED	Minimal eliciting dose	PSP	Paralytic shellfish poisoning
MFA	Multiple food allergies	PST	Prick skin test
MHC	Major histocompatibility complex	PTX	Pectenotoxins
MIP	Macrophage inflammatory protein-1	PUFA	Polyunsaturated fatty acids
MMP	Matrix metalloproteinase	PUVA	Psoralen + ultraviolet A radiation
MMPI	Minnesota Multiphasic Personality Inventory	RADS	Reactive airways dysfunction syndrome
MMR	Measles–mumps–rubella	RAST	Radioallergosorbent test
MPO	Myeloperoxidase	RBA	Receptor-binding assay
MSG	Monosodium glutamate	RBL	Basophilic leukemia
MTX	Maitotoxins	RDA	Recommended dietary allowances
MUFA	Monounsaturated fatty acids	RDBPC	Randomized double–blind, placebo-controlled
MWL	Mushroom worker's lung	RF	Rheumatoid factor
NADPH	Nicotinamide dinucleotide phosphate	RIA	Radioimmunoassay
NASN	National Association of School Nurses	ROS	Reactive oxygen species
NCHS	National Center for Health Statistics	SBPC	Single-blinded placebo-controlled
NDGA	Nordihydroguaiaretic acid	SC	Secretory component
NIAID	National Institute of Allergy and Infectious Diseases	SCF	Stem cell factor
NIOSH	National Institute for Occupational Safety and Health	SCIT	Subcutaneous immunotherapy
NK	Natural killer	SCN	Soybean cyst nematode
NLEA	National Labeling and Education Act	SFAP	School Food Allergy Program
NOEL	No observable effect level	SGF	Simulated gastric fluid
NPA	Negative predictive accuracy	SHM	Somatic hyper mutation
NPIFR	Nasal peak inspiratory flow	SIF	Simulated intestinal fluid
NPV	Negative predictive values	SIgA	Secretory IgA
NSAID	Non-steroidal anti-inflammatory drugs	SIgM	Secretory IgM
NSBR	Non-specific bronchial responsiveness	SIT	Specific immunotherapy
NSP	Neurotoxic shellfish poisoning	SLIT	Sublingual immunotherapy
OAS	Oral allergy syndrome	SPECT	Single photon emission computed tomography
ODN	Oligodeoxynucleotides	SPT	Skin prick test
OFC	Oral food challenge	STX	Saxitoxins
OPRA	Occupational Physicians Reporting Activity	SVR	Sequential vascular response
OT	Oral tolerance	TCM	Traditional Chinese medicine
OVA	Ovalbumin	TCR	T-cell receptor
PAF	Platelet-activating factor	TLP	Thaumatococcus-like protein
PAMP	Pathogen-associated molecular pattern	TLR	Toll-like receptor
PBB	Polybrominated biphenyls	TNF	Tumor necrosis factor
PBMC	Peripheral blood mononuclear cell	TPA	Tetradecanoylphorbol-13-acetate
PBT	Peripheral blood T-cells	TSA	Transportation Security Administration
PCB	Polychlorinated biphenyls	TTG	Tissue transglutaminase
PEF	Peak expiratory flow	TTX	Tetrodotoxin
PEFR	Peak expiratory flow rate	UGI	Upper GI
PFS	Pollen–food syndrome	UL	Upper intake level
PFT	Pulmonary function testing	USDA	United States Department of Agriculture
PHA	Phytohemagglutinin	VAR	Voice-activated audiotape recording
PK	Prusnitz-Küstner	VIP	Vasoactive intestinal peptide
PKC	Protein kinase C	WHO	World Health Organization
		YTX	Yessotoxin

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