

Deutsche
Forschungsgemeinschaft

Functional Food: Safety Aspects

Symposium

edited by the
Senate Commission on Food Safety
SKLM
Gerhard Eisenbrand (Chairman)

Scientific Secretariat
Sabine Guth, Monika Kemény
and Doris Wolf



WILEY-VCH Verlag GmbH & Co. KGaA



Inhaltsverzeichnis

Vorwort	XI
Preface	XIII
I Hauptschlussfolgerungen und Empfehlungen	1
1 Einleitung	1
2 Allgemeine Aspekte der Sicherheitsbewertung	3
3 Spezielle Aspekte der Sicherheitsbewertung	4
4 Erkenntnislücken und Empfehlungen zum Forschungsbedarf für die Sicherheitsbewertung	6
5 Literatur	8
II Kriterien zur Beurteilung Funktioneller Lebensmittel	9
1 Vorbemerkung	9
2 Abgrenzung von Funktionellen Lebensmitteln gegenüber anderen Lebensmitteln und Produkten	10
3 Bewertung der gesundheitlichen Unbedenklichkeit	11
4 Funktionalität und Auslobung	15
5 Beobachtung nach Markteinführung	17
6 Schlussbemerkung	17
7 Literatur	17
III Main Conclusions and Recommendations	19
1 Introduction	19
2 General Aspects of the Safety Evaluation	21
3 Special Aspects of the Safety Evaluation	22
4 Gaps in Knowledge and Recommendations for Research for the Safety Evaluation	23
5 References	25

IV	Criteria for the Evaluation of Functional Foods	27
1	Preamble	27
2	Differentiation of Functional Foods From Other Foodstuffs and Products	28
3	Evaluation of the Safety to Health	29
4	Functionality and Claims	32
5	Observation after the Market Introduction	34
6	Concluding Remarks	34
7	References	35
V	Contributions	37
1	Diet, Genes, and Cancer Risk <i>Cornelia M. Ulrich</i>	37
2	Regulatory Requirements for Functionality and Safety: A European View <i>Burckhard Viell</i>	50
3	Functional Foods Research and Regulation in Japan <i>Shaw Watanabe</i>	67
4	Aspect on the Chinese Functional Food and their Safety <i>Yi-Min Wei</i>	85
5	Regulatory Framework for Functionality and Safety: A North American Perspective <i>Barbara O. Schneeman</i>	90
6	Dose-Response Relationships with Special Reference to Antioxidants <i>Aalt Bast and Guido R. M. M. Haenen</i>	98
7	Low Dose Competition of Flavonoids with Endogenous Thyroid Transport Proteins: Potential Relevance to the Thyroid Hormone Axis <i>Josef Köhrle</i>	112
8	Host Factors Relevant for Bioavailability: Transporters, Metabolizing Enzymes and Genetic Polymorphisms <i>Dieter Schrenk</i>	137
9	Food Matrix and Related Factors Affecting Bioavailability <i>Karin H. van het Hof and Johan M. M. van Amelsvoort</i>	144
10	Toxicokinetics/Toxicodynamics <i>Ron Walker</i>	152
11	Biomarkers to Assess Safety Aspects and Functional Effects of Food <i>Beatrice L. Pool-Zobel</i>	164
12	Biomarkers Relevant to Cardiovascular Disease <i>Margreet R. Olthof</i>	178
13	Biomarkers of Effect on the Immune System <i>Raymond Pieters</i>	179

14	Mechanistic Understanding of Potential Adverse Effects of β -Carotene Supplementation	189
	<i>Xiang-Dong Wang</i>	
15	Potential Adverse Mechanisms of Antioxidants During Cancer Therapy	216
	<i>Hans Konrad Biesalski</i>	
16	Cholesterol Lowering Vegetable Oil Spreads: Results of a Post Launch Monitoring Programme	217
	<i>Linda J. Lea</i>	
17	Effect of Flavonoids on Human Topoisomerases	231
	<i>Doris Marko</i>	
18	Risk/Benefit Aspects of Phytoestrogen Consumption	237
	<i>Catherine Boyle</i>	
19	Influence of Phytoestrogens on the Biotransformation of Endogenous Estrogens	238
	<i>Manfred Metzler</i>	
20	How Selective are Prebiotics?	247
	<i>Walter P. Hammes</i>	
21	Pathogen or Probiotic – Where is the Boundary?	264
	<i>Maria Saarela</i>	
VI	Posters	279
1	<i>In vitro</i> Study of Prebiotic Properties of Levan-Type Exopolysaccharides from Lactobacilli and non-Digestible Carbohydrates using Denaturing Gradient Gel Electrophoresis	279
	<i>F. Dal Bello, J. Walter, C. Hertel, and W. P. Hammes</i>	
2	Effects of Butyrate on Glutathione S-Transferase P1 Expression in Human Colonic Adenoma Cells	281
	<i>G. Festag, N. Haag, G. Beyer-Sehlmeyer, M. N. Ebert, B. Marian and B. L. Pool-Zobel</i>	
3	<i>In vitro</i> Fermentation Supernatants of Inulin-associated Prebiotics Modulate Proliferation and Glutathione S-Transferase Activity in Human Colon HT29 Cells	284
	<i>Eva Gietl, Annett Klinder, Stella Pistoli, Beatrice Pool-Zobel</i>	
4	β -Carotene Effects in a Tobacco Smoke Carcinogen-induced Lung Cancer Model <i>in vivo</i>	289
	<i>R. Goralczyk, H. Bachmann, G. Riss, C.-P. Aebischer, B. Lenz, and K. Wertz</i>	
5	Influence of Daidzein and its Metabolites on the Expression of Catalase in Rat Hepatoma Cells	293
	<i>A. Kampkötter, E. Röhrdanz, K. Iwami, S. Ohler, W. Wätjen, Y. Chovolou, S. E. Kulling, and R. Kahl¹</i>	
6	Flavonoids and the Central Nervous System: The Anxiolytic Flavone Hispidulin	299
	<i>D. Kavvadias, P. Sand, P. Riederer, E. Richling, P. Schreier</i>	

7	Comparative Bioavailability of Synthetic and Tomato-Based Lycopene in Humans?	303
	<i>Peter P. Hoppe, Klaus Kraemer, Henk van den Berg, Gery Steenge, Trinette van Vliet</i>	
8	The Mycotoxin Ochratoxin A Induced DNA Damage in MDCK Cells and Primary Cultured Porcine Urinary Bladder Epithelial Celles (PUBEC) <i>in vitro</i>	308
	<i>S. Lebrun, H. Schulze, and W. Föllmann</i>	
9	Genotoxic Potential of the Phytoestrogen Resveratrol in Cultured V79 Chinese Hamster Fibroblasts	315
	<i>Leane Lehmann, Erika Pfeiffer, and Manfred Metzler</i>	
10	Investigation of Oxidative Stress in H4IIE Cells: Modulation by the Flavonoid Kaempferol	319
	<i>P. Niering, W. Wätjen, S. Ohler, I. Köhler, Y. Chovolou, A. Kampkötter, Q.-H. Tran-Thi, and R. Kahl</i>	
11	<i>In Vitro</i> Studies on the Estrogenic Activity and the Metabolism of Curcumin	325
	<i>Erika Pfeiffer, Harald L. Esch, Simone Höhle, Aniko M. Solyom, Barbara N. Timmermann and Manfred Metzler</i>	
12	Structural Studies of Sphingolipids, a Class of Chemopreventive Compounds in Food	329
	<i>W. Seefelder, N. Bartke, T. Gronauer, S. Fischer, H.-U. Humpf</i>	
13	Modulation of (Oxidative) DNA Damage by Constituents of Carob Fibre	334
	<i>S. Schäfer, H. G. Kamp, C. Müller, B. Haber, G. Eisenbrand, C. Janzowski</i>	
14	Pro- and Antiapoptotic Effects of Flavonoids in H4IIE-Cells: Implication of Oxidative Stress	338
	<i>W. Wätjen, Y. Chovolou, P. Niering, A. Kampkötter, Q.-H. Tran-Thi, and R. Kahl</i>	
15	Analysis of the Hypotheses on β -Carotene/Tobacco Smoke Interactions in the A/J Mouse Lung Cancer Model	345
	<i>Goralczyk, R., Wertz, K., Riss, G., Bachmann, H., Buchwald, P., Hansen, T., Niehof, M., Dangers, M., and Borlak J.</i>	
16	Carob Fibre – Functional Effects on Human Colon Cell Line HT29	346
	<i>Stefanie Klenow, Michael Glei, Gabriele Beyer-Sehlmeyer, Bernd Haber, Beatrice L. Pool-Zobel</i>	
17	Influence of Food Constituents on Cytochrome P450 1A Activity	351
	<i>Annette Baumgart, Melanie Schmidt, Hans-Joachim Schmitz, and Dieter Schrenk</i>	
18	Red Grape Products and Ethanol Modulate Coagulation and Fibrinolysis in Healthy Male Volunteers	355
	<i>Achim Bub, Bernhard Watzl, Gerhard Rechkemmer</i>	

19	Long-Term Treatment with a Prebiotic Modulates the Gut-Associated Immune System of Azoxymethane-Treated F344 Rats	356
	<i>M. Roller, G. Caderni, G. Rechkemmer, B. Watzl</i>	
20	β -Carotene Inhibits Growth of Human Colon Carcinoma Cells (HT 29) <i>in vitro</i> by Induction of Apoptosis	357
	<i>Karlis Briviba, Kerstin Schnäbele, Elke Schwertle, Gerhard Rechkemmer</i>	
21	The Influence of Short-Chain Fatty Acids on Intracellular pH and Calcium-Concentration in the HT-29 Colon Carcinoma Cell Line	358
	<i>Kerstin Rebscher, Stephan W. Barth, Gerhard Rechkemmer</i>	
22	Effect of Short Chain Fatty Acids on Cytotoxicity, Proliferation, and Apoptosis in Human Colon Carcinoma Cell Lines	359
	<i>Silvia Roser, Heike Lang, Gerhard Rechkemmer</i>	
23	Investigation of the Antihormonal Potential of Xanthohumol, the Major Prenylated Flavonoid of <i>Humulus Lupulus</i>	361
	<i>Anette Höll, Sabine Guth, Gerhard Eisenbrand</i>	
24	Anthocyanidins Potently Interfere with Signalling Cascades Regulating Cell Proliferation	368
	<i>Doris Marko, Monika Kemény, Michael Habermeyer, Edda Bernardy, Susanne Meiers, Ulrike Weyand</i>	
VII Participants and Contributors of the Symposium		377