
ANNALS OF THE NEW YORK ACADEMY OF SCIENCES

Volume 673
December 26, 1992

**PHYSIOPATHOLOGICAL PROCESSES
OF AGING**

TOWARDS A MULTICAUSAL INTERPRETATION^a

Editors and Conference Organizers

NICOLA FABRIS, DENHAM HARMAN, DICK L. KNOOK,
ELIZABETH STEINHAGEN-THIESSEN, AND IMRE ZS.-NAGY

CONTENTS

Preface. By N. FABRIS, D. HARMAN, D. L. KNOOK, E. STEINHAGEN-THIESSEN, AND I. ZS.-NAGY	ix
Part I. The Problems of Biomarkers of Aging and Longevity	
The Reliability and Stability of Biomarkers of Aging. By GERALD E. MCCLEARN	1
Biomarkers of Aging and Survival Kinetics. By L. PIANTANELLI, G. ROSSOLINI, AND A. BASSO	9
Biomarkers of Connective Tissue Aging: Biosynthesis of Fibronectin, Collagen Type III, and Elastase. By J. LABAT-ROBERT, P. KERN, AND L. ROBERT	16
Normal Values in Extreme Old Age. By V. MARIGLIANO, C. BAUCO, F. CAMPANA, M. CACCIAFESTA, E. BAGAGLINI, C. FRITZ, AND E. ETTORRE	23
Retardation of Aging Processes by Nutritional Means. By EDWARD J. MASORO	29
Dietary Restriction in Nonhuman Primates: Progress Report on the NIA Study. By M. A. LANE, D. K. INGRAM, R. G. CUTLER, J. J. KNAPKA, D. E. BARNARD, AND G. S. ROTH	36
Effect of Social Order, Lack of Social Hierarchy, and Restricted Feeding on Murine Survival and Virus Leukemia. By PETER EBBESEN, JAN A. VILLADSEN, HENRIK D. VILLADSEN, AND KNUD E. HELLER	46

^a The papers in this volume were presented at the 4th International Congress of the International Association of Biomedical Gerontology in Ancona, Italy on June 26-29, 1991.

Effect of Pineal Peptide Preparation (Epithalamin) on Life Span and Pineal and Serum Melatonin Level in Old Rats. By V. N. ANISIMOV, L. A. BONDARENKO, AND V. KH. KHAVINSON	53
---	----

Part II. Aging Mechanisms at the Cellular and Molecular Levels

The Dynamics of Genome Organization and Expression during the Aging Process. By P. ELINE SLAGBOOM AND JAN VIJG	58
Senescence, Immortalization, and Apoptosis: An Intriguing Relationship. By DANIELA MONTI, EMANUELA GRASSILLI, LEONARDA TROIANO, ANDREA COSSARIZZA, STEFANO SALVIOLI, DANIELA BARBIERI, CATERINA AGNESINI, SAVERIO BETTUZZI, MARIA CRISTINA INGLETI, ARNALDO CORTI, AND CLAUDIO FRANCESCHI	70
Transposable Elements as a Factor in the Aging of <i>Drosophila melanogaster</i> . By CHRISTOPHER J. I. DRIVER AND STEPHEN W. MCKECHNIE	83
Mitochondrial DNA Mutation Associated with Aging and Degenerative Disease. By PHILLIP NAGLEY, IAN R. MACKAY, ALESSANDRA BAUMER, RONALD J. MAXWELL, FRANÇOIS VAILLANT, ZHONG-XIONG WANG, CHUNFANG ZHANG, AND ANTHONY W. LINNANE	92
Intracellular Distribution of Protein as a Determinant for Ubiquitination and Proteolytic Degradation. By M. MAGNANI, R. CRINELLI, D. CORSI, AND G. SERAFINI	103
The Response of Human Lymphocytes to Phytohemagglutinin Is Impaired at Different Levels during Aging. By CARLO PIERI, RINA RECCHIONI, FAUSTO MORONI, FIORELLA MARCHESELLI, AND SÁNDOR DAMJANOVICH	110
Cell-to-Cell Interactions in Bone Tissue. By LUCIA FORMIGLI, SANDRA ZECCHI, SUSANNA BENVENUTI, AND MARIA LUISA BRANDI	120

Part III. Mechanisms of Membrane Aging

Role of Free Radicals in Aging and Disease. By DENHAM HARMAN	126
A Proposal for Reconsideration of the Role of Oxygen Free Radicals in Cell Differentiation and Aging. By IMRE Zs.-NAGY	142
Free Radical Injury in Skin Cultured Fibroblasts from Alzheimer's Disease Patients. By G. TESCO, S. LATORRACA, P. PIERSANTI, S. SORBI, S. PIACENTINI, AND L. AMADUCCI	149
Changes of Chloride Channel Regulation in Rat Skeletal Muscle during Aging. By A. DE LUCA, D. TRICARICO, S. PIERNO, AND D. CONTE CAMERINO	154
Age-Dependent Changes in the Activity of Anion Carriers and in the Lipid Composition in Rat Heart Mitochondria. By G. PARADIES, F. M. RUGGIERO, AND E. QUAGLIARIELLO	160

Transmembrane Signaling Changes with Aging. <i>By</i> T. FÜLÖP, JR., G. BARABÁS, Zs. VARGA, J. CSONGOR, M. HAUCK, S. SZÜCS, I. SERES, A. MOHACSI, D. KÉKESSY, J. P. DESPONT, L. ROBERT, AND A. PENYIGE	165
--	-----

Part IV. Brain Aging Mechanisms

The Age Decline in Memory: Can It be Eliminated? <i>By</i> MONIKA KNOPF	172
Brain Aging and Neuronal Plasticity. <i>By</i> L. F. AGNATI, F. BENFENATI, V. SOLFRINI, G. BIAGINI, K. FUXE, D. GUIDOLIN, C. CARANI, AND I. ZINI	180
Correlation between Zinc Level in Hippocampal Mossy Fibers and Spatial Memory in Aged Rats. <i>By</i> D. GUIDOLIN, P. POLATO, G. VENTURIN, A. ZANOTTI, E. MOCCHEGIANI, N. FABRIS, AND M. G. NUNZI	187
Age-Dependent Structural Variations in Rat Brain Mitochondrial DNA. <i>By</i> V. PETRUZZELLA, F. FRACASSO, M. N. GADALETA, AND P. CANTATORE	194
Differential Regulation of Brain β -Adrenoceptor Subpopulations in Aging Rodents. <i>By</i> A. ZAIA, C. VITICCHI, AND L. PIANTANELLI	200
Altered Sensitivity of α_2 -Adrenoceptors in the Brain during Aging in Rats. <i>By</i> G. NISTICÒ, G. B. DE SARRO, G. BAGETTA, AND V. MOLLACE	206

Part V. Aging Mechanisms at the Systemic Level

Endocrinology of Aging. <i>By</i> LUCIANO MARTINI, D. DONDI, P. LIMONTA, R. MAGGI, E. MESSI, F. PIVA, M. ZANISI, AND M. MOTTA	214
An Immunological Approach to Aging. <i>By</i> GINO DORIA, DANIELA FRASCA, AND VINCENZO COVELLI	226
Thymic Involution in Aging: Prospects for Correction. <i>By</i> JOHN W. HADDEN, PIOTR H. MALEC, JORGE COTO, AND ELBA M. HADDEN ..	231
Aging in the T Lymphocyte Compartment: A Developmental View. <i>By</i> A. GLOBERSON, A. SHARP, M. FRIDKIS-HARELI, T. KUKULANSKY, L. ABEL, A. KNYSZYNSKI, AND R. EREN	240
Gonadectomy in Old Mice Induces Thymus Regeneration but Does Not Recover Mitotic Responsiveness. <i>By</i> ROBERTO BRUNELLI, DANIELA FRASCA, MARCELLO SPANÒ, LUCIO ZICHELLA, AND GINO DORIA	252
Restorative Effect of Thymomodulin and Zinc on Interferon-Gamma Production in Aged Mice. <i>By</i> G. GRASSO, M. MUSCETTOLA, R. STECCONI, M. MUZZIOLI, AND N. FABRIS	256

Part VI. Aging and Age-Associated Pathology

Age-Related White Matter Atrophy in the Human Brain. <i>By</i> WILLIAM MEIER-RUGE, JÜRG ULRICH, MARCEL BRÜHLMANN, AND ELISABETH MEIER	260
---	-----

Alzheimer's Disease Neuropathology: Current Status of Interpretation of Lesion Development. By HENRYK M. WISNIEWSKI AND JERZY WEGIEL	270
Structural Dynamics of Synaptic Junctional Areas in Aging and Alzheimer's Disease. By CARLO BERTONI-FREDDARI, PATRIZIA FATTORETTI, TIZIANA CASOLI, MOIRA GAMBINI, WILLIAM MEIER-RUGE, AND JÜRG ULRICH.	285
Deterioration of β -Adrenergic Modulation of Cardiovascular Function with Aging. By RUI-PING XIAO AND EDWARD G. LAKATTA	293
Increased Incidence of Arrhythmias with Aging in Normal and Pathological Rat Hearts. By P. U. CARBONIN, M. PAHOR, AND G. OLIVETTI	311
Arteriosclerosis: Impairment of Cellular Interactions in the Arterial Wall. By VICTOR W. M. VAN HINSBERGH.	321
Cell-Matrix Interactions in the Genesis of Arteriosclerosis and Atheroma: Effect of Aging. By L. ROBERT, M. P. JACOB, AND J. LABAT-ROBERT	331
New <i>in Vitro</i> Findings on the "Free" Form of Apolipoprotein A-1. By SERGIO GIUNTA, ANNA MADDALENA-PERUZZI, MARIA ROSA GAUDIO, AND ALBERTO SEMPRINI.	342
Physical Performance and Sensory Functions as Determinants of Independence in Activities of Daily Living in the Old and the Very Old. By MARKUS F. BORCHELT AND ELISABETH STEINHAGEN-THIESSEN.	350
Subject Index.	363
Index of Contributors	367