PHYSIOLOGIC INVOLUTION IN NORMAL AGING MAN

A bibliography of literature 1956-1960

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Public Health Service
Washington, D.C.
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Compiled by
Dorothy Bocker, M. D.

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PREFACE

This is another in the National Library of Medicine series of bibliographies on selected subjects of current interest. An upsurge of interest in the social and economic plight of the aged has brought with it inquiries as to the basic norms of involution in man. Data on these are largely lacking or not fully recognized. There still is a definite tendency to consider all old people as sick and in need of medical, social, and economic assistance.

The bibliography consists of a list of English, French, German, Italian and Spanish articles, published between 1956 and 1960. Animal experiments are not included unless they appear incidentally in a report. Some areas of the general subject are fully covered, others sparsely or not at all, the latter reflecting needed research.

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CONTENTS

I. General

1. Andrew, W. Anatomic changes with age. In: Johnson, W. M. ed. The older patient. New York, Hoeber, 1960. p. 8-42. 75 references. Review of literature on skin and subcutaneous tissues, the various organ systems, endocrine glands, etc.

2. Branzi, A. Gerodontostomatologia. G Geront Suppl 9: 65-72, 1956. Age changes occur in tooth structure as well as in the esophagus, stomach, duodenum, the pancreas and in the intestines. Author discusses the changes as seen in biopsy material, X-ray and in chemical analysis of secretions.

3. Bürger, M. Altern und Krankheit. 3rd ed. Leipzig, Thieme, 1937. 684 p. A definitive presentation of every biological phase of aging. Includes (p. 46-300) general phenomena of aging; aging in tissues, organs and systems; and metabolism, hormones, enzymes etc., as they are affected by aging.

4. Cornell, G. N. and others. Physiologic and metabolic problems. In: Glenn, F. and others. Surgery in the aged. New York, McGraw-Hill, 1960. p. 5-23. 53 references. A terse account of the general physiologic changes in aging, covering metabolism, cardiovascular function, pulmonary function, endocrine glands, changes in body composition, renal function, etc. "We must await further advances in the fields of cellular biology for a more fundamental understanding of the nature of aging."

5. Delarue, J. and others. Contribution à l'étude anatomopathologique de la sénescence. Ann Anat Path (Par) 4: 541-73, 1959. 125 references. Post mortem examination of 2 centenarians showed only a moderate degree of arteriosclerosis and no major visceral changes except for the liver in which involution of the parenchyma and diffuse modification of the connective tissue were present.

6. Groen, J. J. General physiology of aging. Geriatrics 14: 318-31, 1959. Aging is an involutional phenomenon that begins with changes in the C. N. S., especially the diencephalon, which determine indirectly other processes of the organism.

7. Kotsovsky, D. 100 years of gerontology; a review backwards and forwards. Excerpta Med [XX] 3: 113-7, 1960. A concise review of theories on aging. Brief summaries under 15 headings include: aging as a consequence of utilization of vital energy, wearing out of the organism, inferiority of the somatic cells, differentiation of the cells, disharmony of the physiological functions, internal physiological discrepancies etc.

8. Scherer, E. and Harrichhausen, K. H. Normale Altersbefunde in Rahmer der medizinischen Röntgendiagnostik im Berich des Rumpfe. Neue Z Aerztl Fortbild 2: 28-38, 1959. Descriptions of the thorax, ribs and sternum, the heart, aorta and other blood vessels, the lungs and trachea, the stomach intestines and gall bladder in the aged as seen in X-ray photographs.

9. Schubert, R. Konstitutionelle Grundprobleme der zweiten Lebenshälfte vom internistischen Stanapunkt. Z Menschl Vererb Konstitutionsl 35: 335-55, 1960. 17 references. Diseases of old age can be understood only if there is knowledge of the physiology of normal aging.

10. Shock, N. W. Age changes in some physiologic processes. Geriatrics 12: 40-8, 1957. 20 references. The age changes found in various body areas in a 20-90 year old group are discussed. Most physiologic functions show a decrement with age. There is some evidence that the cell function changes with aging but the exact nature of this has not yet been determined.

11. Testori, E. ed. Fisiologia della vecchiaia, i confini naturale della senescenza ... Pavia, Renzo Cortina, 1957. 358 p. Bibliography p. 324-51. A concise presentation on reported findings in normal aging. Part I concerns natural senescence, its onset and duration, morphylogy of tissues and organ systems. Part II describes senescence of the blood and circulation, respiration, digestion, excretion, nervous system activity, muscular activity, etc.

12. Verzar, F. Problems of general biology of aging. J Geront Suppl 1: 6-15, 1958. 75 references. "The review is intended to be a comment upon trends in research and dominant themes during recent years and probable future developments of research in Europe upon the general biology of aging." Discusses problems in experimental gerontology in man as well as in animals with specific references to items in the bibliography.

II. Circulatory system

13. Allwood, M. J. Blood flow in the foot and calf in the elderly; a comparison with that in young adults. Clin Sci 17: 331-8, 1958. Comparison of blood flow in 20 healthy old men with that of 10 young men. In the elderly maximal flow diminished due to resistance of vascular bed in both the foot and calf.

14. Antonini, A. F. and others. Fibrinogen and thromboelasticity in the physiopathological process of aging. Geront Clin. 1: 52-9, 1959. 54 persons over 60 years old (21 healthy, 33 arteriosclerotic), showed increase in fibrinogen, total hexoses, and alpha-globulin.

15. Bader, H. and Kapal, E. Altersveränderungen der Aortenelastizität. Gerontologia (Basel) 2: 253-65, 1958. 50 aortas obtained at autopsy of persons 13-85 years of age were tested. In the aortas from old persons there is a straightening of the S-shaped curvature accompanied by a loss of elasticity.

16. Bellini, E. Aspetti balistocardiografici del cuore senile. G Geront 5: 560-5, 1957. 23 references. 60 normal subjects, 60 to 82 years old showed changes in the K wave, increase in height of the H, I and J waves, and clear respiratory changes in all systolic waves.

17. Bronzini, E. and Urbano, U. Le modificazioni della valvole cardiache nella senilita. G Geront 6: 659-82, 1958. 50 cases, 55-95 years of age, were examined for cardiac valve changes at autopsy. Two types of changes were noted; one definitely pathologic, the other simply regressive and part of the normal aging process.

18. Bürger, M. and Knobloch, H. Die Biomorphose der Hand, dargestellt nach der Ergebnessen monuvolumetricher Messungen. Z Alternsforsch 11: 149-61, 1957/58. 14 references. Biophysiologic changes in the hand with aging were noted, especially in peripheral capillaries.

19. Caini, B. and Gallini, R. Sul problema della normalita del cuore senile. Int Ass Geront 4th Congress Merano, Italy July 14-19, 1957. [Fidenza, Mattioli, 1958] 2: 116-9. Normal anatomic and functional changes with few deviations peculiar to old age per se, are discussed.

20. Capuani, G. F. Il balistocardiogramma nella persona anziano (allomorfismo e dismorfisma). Minerva Med 48: 1747-50, 1957. Tracings found in the aged differ from standard tracings. Tracings from pathologic hearts differ from both standard and those of old age.

21. Casassa, P. M. and others. La circolazione periferica nelle persone anziane studiata con la tecnica dei radio-isotopi (albumina I^{131}) G Geront 8: 407-18, 1960. 16 references. The feet of 28 persons, aged 62-88 years, without clinical signs of circulatory changes, were tested for peripheral circulation changes. The peripheral circulation is showed. Changes in the capillary bed also are noted.

22. Casassa, P. M. and others. Ricerche sulla permeabilita capillare nei vecchi con albumina I^{131}. Acta Geront 8: 111-22, 1958. In old subjects albumin fixation is 40 % less than in the young. This is due to diminuation in plasma volume and level rather than to increase in capillary permeability.

23. Casassa, P. M. and Maccotta, V. Sul comportamento dei gradienti di pressione e di indice oscillometrico omerotibiali nelle persone anziane. G Geront 7: 120-32, 1959. 150 healthy men, 60-90 years old were examined. Half showed disappearance of relative tibial hypertension normal in youth; one third, a decrease in oscillometric indexes.

24. Caviglia, E. and others. I circolo periferico nel vecchio. (Studio pletismografico). Arch Maragliano Pat Clin 14: 1247-47, 1958. The reactive hypertension normal in younger persons did not appear in the old.

25. Chavez, I. Las fronteras entre la normotension y la hypertension arterial. Princ Cardio (Méx) 5: 3-17, 1958. Discussion of factors influencing blood pressure. Age-linked upper limit of normal tension is noted.

26. Costanzo, F. and Zangara, A. Comportamento della velocità del circolo portale nella senilità. Minerva Med 50: 1193-6, 1959. Study of portal circulation in 2 groups of healthy men, aged 55-70 years old, and 70-85. Differences in rate between lying and sitting up were related to age.

27. Dees, T. M. and others. Clinical measurement of circulation time. A comparison of magnesium sulphate and Evans blue dye in normal subjects. J Appl Physiol 10: 451-4, 1957. In 39 healthy individuals aged 20-86 tested for mean values for arm-to-pharynx circulation time, peripheral venous pressures showed no significant relation to circulation time.

28. Ebert, H. Das Ballistokardiogramm des älteren Menschen. Z Kreislaufforsch 46: 598-602, 1957. No relationship is established in changes due to advanced age and stroke volume, elastic and total resistance, or depression of function.

29. Garello, L. Il controllo oscillografico della prova dell'iperemia reattiva nei soggetti sani giovane e tarda età. Arch Maragliano Pat Clin 14: 1273-80, 1958. Revoval of pressure on middle third of the leg caused return to normal oscillations much more quickly in those over 65 than in the young.

30. Geill, T. The senile heart. Int Ass Geront 4th Congress Merano, Italy July 14-19, 1957. [Fidenza, Mattioli, 1958] 2: 95-101. 3700 hearts of persons over 60 years of age were tested to determine the pure phenomena of aging. An increase of brown atrophy and sclerosis at the base of the aortic valve was frequently found but was considered of slight clinical significance. Myofibrosis is uncommon.

31. Hellon, R. F. and Clarke, R. S. Change in forearm blood flow with age. Clin Sci 18: 1-7, 1959. Increase of blood flow with age is probably due to skin vascularization.

32. Holenstein, P. Das Verhalten des Blutdruckes im höheren Alter. Basel, 1956. 75 p. [Dissertation--Univ Basel] Frequency distribution curves of systolic and diastolic pressure were noted in 1087 individuals aged 60-89. High systolic pressures were frequent; high diastolic, less frequent.

33. Karel, J. L. and others. Electrophoretic serum protein patterns in aged. J. Amer Geriat Soc 4: 667-82, 1956. 39 references. Serum protein of 21 healthy subjects aged 66-88 years were studied. Decrease in albumin contents of serum is possibly due to diets deficient in protein.

34. Keys, A. and others. Cholesterol estimation on unmeasured drops of whole blood. Proc Soc Exp Biol Med 104: 452-7, 1960. 10 references. Age range of subjects through 65 years. Simplified technic described.

35. Kirk, J. E. The isocitric dehydrogenase and TPN-malic enzyme activities of arterial tissue in individuals of various ages. J Geront 15: 262-6, 1960. 10 references. Fresh samples of descending aorta, pulmonary artery and coronary artery from persons to 85 years were subjected to chemical tests. Results show no certain age variations of enzymic activities.

36. Kirk, J. E. Enzyme activities of human arterial tissue. Ann NY Acad Sci 72: 1006-15, 1959. 32 references. Activities of 7 enzymes in aortic tissue were unchanged by age. The activity of fumarase and phenolsulfatase, succinic dehydrogenase and cytochrome oxidase showed a tendency to decrease with aging.

37. Kirk, J. E. The adenylpyrophosphatase inorganic pyrophosphatase, and phosphomonoesterase activities of human arterial tissue in individuals of various ages. J Geront 14: 181-8, 1959. 15 references. 81 samples of the pulmonary artery, 50 of the coronary artery and 86 of the aorta from individuals aged 30-75 were tested for the enzymes. Comparison of normal arterial tissue with arteriosclerotic tissue showed that enzymetic activity in normal tissue is higher than in diseased tissue.

38. Kirk, J. E. The leucine aminopeptidase activity of arterial tissue in individuals of various ages. J Geront 15: 136-8, 1960. Tissue samples as indicated in a previous article. A "moderate tendency" to decrease with age is noted.

39. Landowne, M. The relation between intra-arterial pressure and impact pulse wave velocity with regard to age and arteriosclerosis. J Geront 13: 153-61, 1958. 28 references. Brachial artery findings are given. Propagation of pulse waves at lower pressure increases but is not evident at higher pressures.

40. Lasser, R. P. and Master, A. M. Observation of frequency distribution curves of blood pressure in persons 20 to 106 years. Geriatrics 14: 345-60, 1959. This study establishes criteria for the differentiation of normal from abnormal heights in blood pressure.

41. Lawson, I. R. Anaemia in a group of elderly patients. Geront Clin 2: 87-101, 1960. 21 references. Of 102 hospital patients, aged 60-91, 37 % had Hb levels below normal. Since blood studies in healthy old persons have not been made the author concludes that anemia may have been present as a normal phenomenon before the onset of the illness for which the patients were hospitalized.

42. Master, A. M. and others. Study of blood pressure in apparently healthy old persons 65 to 106 years of age. Geriatrics 13: 795-801, 1958. Tabulates data on average pressure and average pressure limits.

43. Mezzasalma, G. and Morpurgo, M. L'elettrocardiogramma nell'età senile. Part I. G Geront Suppl 14: 15-30, 1958. 26 references. In 400 subjects 10-90 years old with normal clinical and radiological cardiovascular findings, the P wave showed increased bifidity and flattening; ventricular complex showed increased notching; voltage declined with age.

44. Morpurgo, M. Sulla riposta del cuore senile al lavora muscolare aerobico. G Geront 5: 825-42, 1957. 48 references. 16 persons aged 66-90 years were compared with a control group 24-40 years of age. All were normal clinically and radiologically and had normal ECGs. The systolic, diastolic and peripheral resistance were the same in both groups but after exertion the stroke volume, cardiac output and cardiac index showed a greater increase in the aging group than in the control group.

45. Nöcker, J. and Bemm, H. Einwirkung von Alter und Geschlecht auf die Serumglobuline. Z Alternsforsch 9: 328-39, 1956. 29 references. Tests of 174 persons aged 10-70 were compared with previous reports in the literature. Authors conclude that all tissues undergo a "lawful" change in aging.

46. Pisani, A. Considerazioni sulle modificazioni senili dell'aorta toràcica. G Geront 7: 709-18, 1959. 300 persons, aged 60-85 years were examined radiologically. Aging is denoted in thoracic aorta by a dilatation in the mediastinum.

47. Pollack, A. A. and Gudger, J. R. Benign hypertension. AMA Arch Int Med 103: 758-61, 1959. 'Data support the generally accepted conclusion that the significance of hypertension becomes less important as the age of the person advances."

48. Rechenberger, J. Die proteingebundenen Kohlenhydrate des Blutes in ihrem altersabhängigen Verhalten. Der Altersgang der proteingebundenen Kohlenhydrate der Serumeiweisses. Z Alternsforsch 12: 153-63, 1958. Tests of 138 persons 20-80 years old showed a decrease in the amount of CHO bound to serum protein beginning gradually at age 30. Hexosamine decreases in man at age 40; in women, at age 50.

49. Reeve, T. S. and others. Blood volume studies in aged men. Aust NZ J Surg 28: 221-7, 1959. Studies of 97 persons, aged 55-97, showed reduced blood volume due mainly to reduction of erythrocytes.

50. Ring, G. C. and others. Changes in central pulse and finger plethysmography during aging. J Geront 14: 189-91, 1959. In older persons there is a decrease of blood flow to the extremities due to increasing resistance. Volume of the carotid pulse is decreased.

51. Schröder, J. and Börner, W. Zur Frage der Altersabhängigkeit der zirkulierenden Blutmenge und der Blutströmungsgeschwindigkeit. Arztl Wschr 13: 578-80, 1958. No difference noted between aged group and other group as to volume per kg. Circulation time generally lengthened in the aging, but individuals vary. Healthy old people do not show lowered plasma, mass or RBC.

52. Sethma, N. and Magar, N. G. Cholesterol and phospholipids in aged groups. Indian J Med Res 48: 225-30, 1960. 17 references. Tests of 100 healthy subjects aged 40-50, 51-60, 61-70 are tabulated.

53. Smith, R. Normal blood volumes in men and women over sixty years of age as determined by a modified Cr^{51} method. Anesthesiology 19: 752-6, 1958. 14 references. 97 healthy persons over 60 years of age were tested. Blood volume relation to body weight and body surface did not change with age.

54. Sørensen, L. B. and Kirk, J. E. Variations with age of fumarase activity of human aortic and pulmonary artery tissue. J Geront 11: 28-32, 1956. Fresh autopsy samples of aortic and pulmonary artery tissue from persons 68-98 years of age were tested. It was found that fumarase activity in these tissues decreased with aging.

55. Vallecorsi, G. and Dominici, G. Livelli fosforemici nella senilità avanzata. G Geront 7: 695-700, 1959. 14 references. 43 individuals, aged 80-94, were tested. Values of serum inorganic phosphorus do not differ from those found in younger adults.

56. Zurlo, G. and others. Il tempo di circolo polmonare ed altre misure cardiodinamiche nel vecchio quali risultano dal radiocardiogramma. G Geront 7: 353-6, 1959. Cardiac output of 15 normal persons aged 60-72 was less than that of young persons. Cardiac output may vary as a result of differences in heart rates.

III. Nervous system

57. Andrew, W. Structural alterations with aging in the nervous system. J Chron Dis 3: 575-96, 1956. 61 references. Findings show a certain amount of weight loss of the brain, shrinkage of the nerve cells in various areas, and increase in pericellular lymphatic space. Cell nucleus may be elongated and its position shifted; pigment appears in the cytoplasm, and there is possibly a decrease of nerve fibers in nerve roots.

58. Arslan, M. L'apparato vestibolare nel vecchio. G Geront Suppl 10: 147-62, 1956. 17 references. Little information about the histology and physiology of the vestibule of the ear is available. The author presents the age changes in the bone, blood vessels and nerve changes in aging in the vestibule of the ear indicating those changes which are responsible for hearing loss.

59. Bondareff, W. Morphology of the aging nervous system. In: Birren, J. E. ed. Handbook of aging and the individual. Psychological and biological aspects. Chicago, Univ Chicago Press, 1959. p. 136-72. 124 references. Literature review and authors' findings on lipofuscin, gogli complex, chromidial substance nucleus and nucleolus, cytoplasmic ground substance and the synapse.

60. Brody, H. The deposition of aging pigment in the human cerebral cortex. J Geront 15: 258-61, 1960. 21 references. Examination of 20 brains of individuals to 95 years of age showed that a relatively small number of cells in the aged group contained large amounts of pigment.

61. Ellenberg, M. The deep reflexes in old age. JAMA 174: 468-9, 1960. 5 references. 200 patients, 65 years of age or over, who were not diabetic and were not suffering from overt neurological disease were tested for knee and ankle joint reflexes. The deep reflexes persist into old age. Absence of deep reflexes indicates a pathological condition regardless of age.

62. Ferreri, G. and Fiori-Ratti, L. Studio elettroacustico della voce senile. G Geront Suppl 17: 53-67, 1958. 18 references. Study of the causes for limitation of range and quality of tone in both aged men and women is a complex problem as it involves the larynx as well as extra laryngial factors. Electro-acoustic methods used for the study.

63. Ferreri, G. and Crifo, S. Studio anatomo-istologico della laringe senile. G Geront Suppl 17: 9-51, 1958. 19 references. Study of post mortem specimens indicates anatomic and histologic changes in all parts of the aging larynx. Histoneurologic and other findings are compared with previous reports.

64. Gaffney, G. W. and others. Thyroid function and senescence in man. Fed Proc 18: 49, 1959. 131 healthy men, 41-94, were tested with tracer doses of radioactive thyroxine. In aged there was a reduction of metabolically active tissue causing reduction of thyroxine degradation and O_2 consumption; circulating thyroid hormone was essentially the same as in younger persons and was adequate.

65. Hewer, T. F. The pathology of cerebral artery occlusion and cerebral ischaemia; a review of recent necropsy material. Geront Clin 2: 241-5, 1960. 60 brains of subjects 45-96 years of age were examined. 22 showed no pathology; many others had only minor narrowing.

66. Heydenreich, A. Das Altern des Auges. Z Alternsforsch 11: 169-80, 1957/58. 15 references. Discussion of structural changes in the cornea, lens, sclerotic body and the vitreous in the normal aging eye.

67. Himwich, H. E. Biochemistry of the nervous system in relation to the process of aging. In: Birren, J. E., Ismus, H. A. and Windle, W. F. eds. The process of aging in the nervous system. Springfield, Ill. Thomas, 1959. p. 101-12. 15 references. Review of literature summarized in graphs with comments from author's personal experience.

68. Himwich, W. A. and Himwich, H. E. Brain composition during the whole life span. Geriatrics 12: 19-27, 1957. 33 references. A detailed evaluation of various research findings is listed in tables, covering a wide range of chemical analyses of the brain, spinal cord and sciatic nerve. One of the few reports which summarizes findings for the 9th decade of life.

69. Himwich, W. A. and Himwich, H. E. Neurochemistry of aging. In: Birren, J. E. ed. Handbook of aging and the individual. Psychological and biological aspects. Chicago, Univ Chicago Press, 1959. p. 187-215. 80 references. Discussion of cerebral metabolic rate, foodstuff of the brain, chemical analysis of human brain, brain weight as related to aging, establishment of the period of senescense, influence of age on constituents of whole brain and upon biochemical mapping of brain.

70. Hirsch, M. J. and Wick, R. E. eds. An optometric symposium. Vision of the aging patient. Philadelphia, Chilton Co., 1960. 352 p. Bibliography p. 299-312. Effect of age on visual acuity in a group of persons 37-62 years old is related to normal aging. The emphasis, however, is on correction of defects, rehabilitation of the blind, and old age assistance programs.

71. McFarland, R. A. and others. Dark adaptation as a function of age. A statistical analysis. J Geront 15: 149-54, 1960. 24 references. 240 men aged 16-89 tested. There is a marked correlation between age and the thresholds of dark adaptation; this correlation increases as time in the dark increases. Cone and rod thresholds are correlated.

72. Magladery, J. W. Neurophysiology of aging. In: Birren, J. E. ed. Handbook of aging and the individual. Psychological and biological aspects. Chicago, Univ Chicago Press, 1959. p. 173-86. 69 references. End organ receptor and effector, peripheral afferent and efferent pathways, segmental levels, suprasegmental levels are considered from standpoint of decrease in speed of transmission. In the suprasegmental levels "---the area of highest activity, the inadequacies of functional interpretation are, regardless of age, most glaringly apparent." This is a review of the literature on the neurophysiologic processes underlying normal aging.

73. Magladery, J. W. and others. Cutaneous reflex changes in development and aging. AMA Arch Neurol 3: 1-9, 1960. 46 references. The reaction time of 15 individuals whose ages averaged 75 was unaltered.

74. Morrison, L. R. With the collaboration of Cobb, S. and Bauer, W. The effect of advancing age upon the human spinal cord. Cambridge, Mass., Harvard Univ Press, 1959. 127 p. Illus. Discusses histologic examination of 31 spinal cords from individuals in the 2nd through the 9th decade, giving complete details of findings in all areas with changes as they appear in advancing age.

75. Obrist, W. D. and Busse, E. W. The senescent electroencephalogram. [Abstract] J Geront 14: 508, 1959. 1200 elderly people were tested over a period of 10 years. In normal elderly the EEG undergoes definite but minor alterations. A slight slowing of frequencies and a 30 % incidence of temporal lobe irregularities do not seem to be correlated with intelligence, learning or memory tests.

76. Pietrantoni, L. and Arslan, M. L'orecchio senile. G Geront 5: 329-36, 1956. Emphasis on degree and type of hearing loss due to tissue change in the ear of the elderly.

77. Pietrantoni, L. and Arslan, M. L'orecchio senile. G Geront Suppl 10: 3-143, 1956. Deals with functional disturbances not due to pathologic factors. Describes in detail alterations in conductive and perceptive systems due to aging differentiation between normal changes and those caused by disease.

78. Sércer, A. and Krmpotĭc, J. Uber die Ursache der progressiven Altersschwerhörigkeit. Acta Otolaryng (Stockh) Suppl 143: 1958. 36 p. 42 references. Study made in Yugoslavia. In healthy aged persons changes occur in the labyrinth. Disappearance of ganglionic cells in the basal coil may be due to pressure caused by the thickening of the flat bones of the skull.

79. Seidel, K. Ergebnisse chemischer Untersuchungen am menschlichen Ischiasnerven in Abhängigkeit von Lebensalter und Geschlecht. Z Alternsforsch 12: 34-52, 1958/59. 46 references. 230 sciatic nerves are chemically analyzed. Lipoids apt to show fatty degeneration in the aging, total steroids decrease in amount; these changes are not synchronous.

80. Sokoloff, L. Circulation and metabolism of brain in relation to the process of aging. In: Birren, J. E., Imus, H. A. and Windle, W. F. The process of aging in the nervous system. Springfield, Ill., Thomas, 1959. p. 113-26. Table 3, p. 122, summarizes studies of three groups of individuals including 18 persons aged 72. There is strong indication that decreases in cerebral blood flow and metabolism accompany aging.

81. Sperr, W. Zur Frage des gleichzeitigen Vorkommens von kongophilen Veränderungen in Gehirn und Körperorganen Seniler. Arch Psychiat Nervenkr 196: 307-15, 1957. Brains of 15 persons over 90 years old showed amyloid-like plaques, but only 2 were in significant areas.

82. Vannas, S. and Teir, H. Observations on structures and age changes in the human sclera. Acta Ophthal (Kbh) 38: 268-79, 1960. 39 references. Eyes of individuals 41-74 years of age showed unusual fibers. Tubular structures were more conspicuous in aging; structure is looser and more porous close to exit of veins.

83. Wahal, K. M. and Riggs, H. E. Changes in the brain associated with senility. AMA Arch Neurol 2: 151-9, 1960. 22 references. In the aged the changes are often slight and correspond to those found in younger persons. Arteriosclerosis of the cerebral vessels with infarction of the brain does not cause intellectual deterioration.

84. Wahren, W. Neurohistologischer Beitrag zu Fragen des Alterns. Z Alternsforsch 10: 343-57, 1956/57. 32 references. 30 brains of persons aged 7-99 were histologically examined in 3 separate areas and the presence of lipofuscin in the cells was correlated with aging.

85. Wilcox, H. H. Change in nervous system with age. Public Health Rep 71: 1179-84, 1956. 41 references. This is a summary of the reports appearing in the reference list. Ganglia show fatty degeneration. The brain decreases in weight and the Purkinje cells decrease in number. Lipofuscin may occur in cells located anywhere in the brain as does pigmentation. The reports vary as to the water content of the brain.

86. Wünscher, W. Die Anatomie des alten Gehirn. Z Alternsforsch 11: 60-75, 1957/58. 49 references. Review of literature. No histologic changes can be demonstrated between the normal and "sick" brains in old people.

IV. Digestive system

87. Albona, C. and others. La prova dell'assorbimento gastrico dello iodio nello stomaco senile. Arch Maragliano Pat Clin 14: 2011-8, 1959. 20 individuals aged 60-84 years were given absorption tests. Normal values were found if no disease was present.

88. Barrows, C. H. Jr. and others. Age differences in cholinesterase activity of serum and liver. J Geront 13: 20-3, 1958. A definite decrease in concentration of the enzyme was noted in 128 men 20 to 90 years old.

89. Dal Ri, L. and Vendrame, E. L'attivita protrombinica come indagine funzionale epatica nella vecchiaia. G Geront 5: 166-72, 1957. 21 references. Prothrombine activity studied in 130 old men. This test compared with others is more practical, less toxic and more indicative for determining liver function.

90. Francois, J. Les bas physiologiques d'und alimentation rationnelle du vieillard normal. Paris, 1958. [Thesis - Univ Paris] 47 p. 29 references. Differentiation between normal aging, senescence, and senility. Nutrition needs listed.

91. Frischauf, H. and others. Zur Nierenfunktion im höheren Alter. Int Ass Geront 4th Congress. Merano, Italy July 14-19 1957. [Fidenza, Mattioli, 1958] 2: 351-6. Endogenous creatinine clearance increases with age. Filtration fraction rises. No correlation was found between kidney function and arterial pressure.

92. Gaffney, G. W. and others. Vitamin B_{12} serum concentrations in 528 apparently healthy human subjects of ages 12-94. J Geront 12: 32-8, 1957. Regression of serum B_{12} level is somewhat dependent on the diet.

93. Gherardi, A. L'alimentazione nell'età senile con particolare reguardo alle diete aspedaliere. G Geront 5: 780-92, 1957. Review of diet requirements in normal aged as well as in hospitalized senile patients.

94. Grailly, R. de. Le foie chez les vieillards. Rev Hyg Méd Soc 8: 41-8, 1960. Liver findings in autopsies of 120 aged individuals include diminution in size, frequent ptosis, some arteriole obliteration, and a decrease of glycogen in the cells.

95. Gsell, D. Der Nahrungsverbrauch alter Menschen. Gerontologia (Basel) 2: 290-306, 1958. 105 references. Review of the literature and the author's findings on diet needs for maintaining health in the aged, covering food stuffs, calorie requirements, calcium, iron and vitamins. Self-selected diets of old people frequently lack essentials.

96. Lascalea, M. C. The digestive system in old age. Excerpta Med [XX] 2: 419-22, 1959. Concise presentation of the physiological alterations connected with aging covering wear and tear on the structures and a reduction of capillary circulation. In general there is loss of weight of the alimentary tract and of the volume of the glands; thinning of the muscular layer and of the mucosa are also present. A diminution of the quantity of secretions is found. The author continues with a consideration of the digestive pathology if present.

97. Leonardi, P. Reperti epatobioptici nella senescenza. G Geront 5: 139-45, 1957. 16 references. Needle biopsies of liver in 16 normal subjects aged 60-79 years showed some pigment in liver cells, discrete scattered sclerosis, and congestion of hepatic veins. Histochemical reactions for glycogen, alkaline phosphotase and iron were normal.

98. Makhija, F. R. Physiologic basis of management of old age. Indian Practit 12: 427-31, 1959. General discussion of dietary needs and energy quota. Old age "is a physiological state linked to involutive processes."

99. Moreno, A. H. and others. Studies on the portal tension of human adults. Surg Gynec Obstet 104: 25-35, 1957. Portal pressure in normal individuals undergoing surgery varied between 166 and 266.

100. Ruol, A. and others. Ulteriori ricerche sul metabolismo idrico nell'età senile. G Geront 7: 68-86, 1959. In 23 aged individuals H_2O was normal or increased. The increase may be due to the decrease in the local fat.

101. Shock, N. W. The role of the kidney in electrolyte and water regulation in the aged. Ciba Foundation Colloquia on Aging 4: 229-49, 1958. 22 references. Tests made on a group of men aged 20-90 showed no clinical evidence of renal disease or of various other pathological conditions. There was some impairment of excretion of nitrogenous substances after 70 and some loss of concentration ability of kidney.

102. Stewart, C. P. Renal function in the aged. Geront Clin 1: 160-7, 1959. 13 references. Review of literature. Lowered glomerular filtration rate is not due to blood pressure changes and decrease in tubular activity is probably due to diminution of nephrons.

103. Tassinari, G. and Pin, R. Potere di concentrazione del rene senile; risultati della prova esegueta con ormone post-ipofisario. G Geront 6: 20-5, 1958. Kidney concentration test; show a fall in urine quantity, with density unchanged until very old age.

104. Teramo, A. and Beneglamo, A. Alcuni aspetti della funzionalita renale nell'età senile. G Ital Chir 14: 1015-28, 1958. A slight overall decrease of filtration and secretion activity is seen in the aged kidney. The senile kidney is not to be classified as pathologic but as physiologic.

105. Vignalou, J. and others. L'uropepsine chez le viellard. Rev Franc Geront 5: 489-91, 1959. Uropepsin secretion diminished after age 70. This is not due to decrease in adrenocortical hormone nor to the functional capacity of the stomach cells.

106. Vink, C. L. J. Liver function in age. Clin Chim Acta 4: 674-82, 1959. With increase of age, the liver becomes smaller, and hepatic blood flow decreases; possibly affected by decrease in metabolic rate.

107. Watkin, D. M. The assessment of protein nutrition in aged men. Ann NY Acad Sci 69: 903-15, 1958. 23 references. Review of literature. "For the moment, available evidence implies that an adequately balanced diet containing 1 gm of protein per kilo satisfies the requirement for the healthy aged."

V. Endocrine System

108. Albeaux-Fernet, M. and others. Les variations des steroides urinaires au cours senescence; 17-cétosteroides neutres, corticoïdes et aldostérone. Presse Méd 66: 869-71, 1958. Chemical analysis of urine of 56 aged persons showed a progressive decrease of ketosteroides with aging. ACTH and aldosterone unaffected.

109. Allara, E. Dati morfologici sulle modificazioni delle ghiandole endocrine nella senescenza. G Geront Suppl 13: 37-43, 1956. Data on changes in structure and function of thyroid, parathyroid, pituitary and adrenal glands in the aging individual is given.

110. Brooksbank, B. W. L. and Salokangas, A. Fractional analysis of urinary neutral 17-ketosteroids in relation to age. Acta Endocr (Kbh) 30: 231-41, 1959. In aging there is a fall in the ratio of 11-desoxy-17-ketosteroids to 11-oxy-17 - ketosteroids.

111. Bürger, M. and Seidel, K. Die Biomorphose des Endokriniums. Symposium 7-9 March 1957. Deutsch Gesell Endokr 5: 97-110, 1957. 51 references. Graph 2, p. 100, shows weights of the various glands from ages 10-80.

112. Dorfman, R. I. Steroid hormones and aging. Symposium 7-9 March 1957. Deutsch Gesell Endokr 5: 111-9, 1957. 17-ketosteroids excretion decreases with increasing age; there is a slighter decrease in corticoid; cortisol and related steroids are well maintained.

113. Eisenreich, E. Untersuchungen über den Strukturumbau der Nebennierenrinde im Alter. München, 1958. [Dissertation-Univ München] 54 p. 83 references. Histologic examination at autopsy of adrenals from 501 persons 49-94 years old showed heart pathology associated with changes in structure in 176 cases. Other sickness or "body constitution" did not affect the structure of the adrenals.

114. Johnson, S. T. A clinical routine-method for the quantitative determination of gonadotropins in 24-hour urine samples. Normal values for men and women of all ages from prepuberty to senescence. Acta Endocr (Kbh) 3: 209-27, 1959. 118 men, 25-96 years, 64 women, 51-87 years, examined.

115. Pincus, G. Aging and urinary steroid excretion. In: Engle, E. T. and Pincus, G. Hormones and the aging process. New York, Academic Press, 1956. p. 1-20.

116. Reifenstein, E. C. Steroid hormones and the aging skeleton. Symposium 7-9 March 1957. Deutsch Gesell Endokr 5: 161-206, 1957. 150 references. A complete presentation of research conducted at the Squibb Institute of Medical Research. "In the aging person, there is an actual deficiency of endogenous anabolic hormones which creates at the same time a relative excess of endogenous anti-anabolic hormones."

117. Samuels, L. T. Effect of aging on the steroid metabolism as reflected in plasma levels. In: Engle, E. T. and Pincus, G. Hormones and the aging process. New York, Academic Press, 1956. p. 21-38. 20 references. Changes in the steroid metabolism are the result and not the cause of other body changes that "may be the result of increased accumulation of collagenous connective tissue, the greater density of the ground substance and the decrease in fibroblasts."

118. Seegers, W. and others. The thyroid in aging. Int Ass Geront 4th Congress Merano, Italy July 14-19, 1957. [Fidenza, Mattioli, 1958] 2: 303-7. From 50-80 years of age thyroid gradually reduces in size; after 80, no further decrease. There is a parallel reduction in basal metabolic rate.

119. Sobel, H. and Marmoston, J. The role of the aging adrenal gland in the aging process. Int Ass Geront 4th Congress Merano, Italy July 14-19, 1957. [Fidenza, Mattioli, 1958] 2: 308-11. Gel-fiber ratio of connective tissue decreases as does excretion of 17-ketosteroids.

120. Stigliani, R. and others. Ricerche sistematiche sulla citologia e la citochemica dell'ipofisi senile. Arch De Vecchi Anat Pat 29: 1-81, 1959. 110 references. Detailed histology of 103 pituitary glands from persons 70 years and older. Cytological and cytochemical tests indicated that in some subjects the senile pituitary gland was normally active; it showed little correlation with chronological age.

121. Swyer, G. I. M. Hormonal aspects of water and electrolyte metabolism in relation to age and sex. Ciba Foundation Colloquia on Aging. 4: 78-98, 1958. 21 references. In hormonal aspects of fluid and electrolyte control, cortico-steroids are the most significant.

122. Walker, A. Ausscheidung der Nebennierensteroide und Alter. Schweiz Med Wschr 89: 1215-7, 1959. Urine of 240 persons aged 20-94, were tested for presence of 17-hydroxycorticoide and 17-ketosteroide. Excretion of the first has no relationship to age; the second, decreases gradually with aging.

123. Warter, J. and Schwartz, J. Glandes endocrines et vieillissement. Internat Ass Geront 4th Congress Merano, Italy July 14-19, 1957. [Fidenza, Mattioli, 1958] 1: 102-7. 97 references. Review of literature. Aging in glands accompanies aging of body in general. Histologic changes in each gland are described.

124. Warter, J. and others. La fonction cortico-surrénale chez le vieillard. G Geront 4: 391-6, 1956. 18 references. In 60 aging persons tested, aging is not caused by adrenal changes but accompanies them.

125. Wenner, R. and Hauser, G. A. Die Umstellung der innersekretorischen Drüsen bei der alterenden Frau und ihre Folgen für den Organismus. Symposium 7-9 March 1957. Deutsch Gesell Endokr 5: 120-40, 1957. 90 references. Details of aging in ovary are given. Illustrates the differing ages at which aging of a part of the body may occur before the body as a whole ages.

VI. Respiratory system

126. Cowan, N. R. The heart lung coefficient in older people. Brit Heart J 21: 238-42, 1959. 332 healthy persons, 60-89 years old, were tested. There is a significant correlation between the heart lung coefficient and age. "The reasons that account for the increase are complex and need further investigation."

127. Frank, N. R. and others. The mechanical behavior of the lungs in healthy elderly persons. J Clin Invest 36: 1680-7, 1957. 19 references. In two age groups, 22-47 and 50-89, lung capacity was unchanged but decreased with a increase in functional residual air.

128. Ghiringhelli, G. and others. Il volume residuo e la capacità polmonare totale nell'età senile. G Ital Tuberc 13: 184-6, 1959. Residual air increased with aging and lung capacity was reduced 16-22%. Changes were ascribed to ossification of costal cartilage, hypotony of muscle, pulmonary fibrosis, and decrease of elasticity in lung tissue.

129. Holman, W. and others. Uber das Verhalten von Ventilalion und Staffwechsel gesunder mannlicher Personen verschiedenen alters bei lichter und mittel- schwerer Arbeit. Z Alternsforsch 13: 60-7, 1959. Findings in old men were increased O_2 consumption, long restoration phase, decreased capacity for exertion of long duration, and a decreased quotient for cardiac capacity.

130. Kenter, H. and others. Beobachtungen unter O_2-Mangel bei alten und jungen Menschen. Z Alternsforsch 13: 41-53, 1959. 71 references. 11 in group tested were aged 50-79. Diminution of O_2, approximating O_2 found in air at height of 4000-6000 feet, was the basis of the tests. The ECG showed disturbances, the blood pressure decreased, pulse rate and respiratory rate increased in the aged.

131. McGrath, M. W. and Thomson, M. L. The effect of age, body size and lung volume change on alveolarcapillary permeability and diffusing capacity in man. J Physiol (Lond) 146: 572-82, 1959. There is a fall in capillary permeability with age.

132. Norris, A. H. and others. Pulmonary function studies; age differences in lung volumes and bellows function. J Geront 11: 379-87, 1956. 28 references. 42 individuals, aged 60 to 89, who were free of acute or chronic illness, were examined. There was an increase in fixed lung space and a decrease in mobile lung space.

133. Richards, D. W. The aging lung. Bull NY Acad Med 32: 407-17, 1956. 12 references. Of 5 groups of varying ages studied, three are ages 64-91. With aging vital capacity decreases, residual air increases, and total capacity shows a slight decrease. Steady exertion at a substantial level is feasible in normal persons well into the seventies. Aging lung tissue is remarkably adequate.

134. Sieker, H. O. Pulmonary disease. In: Johnson, W. M. ed. The older patient. New York, Hoeber, 1960. Anatomic and physiologic changes of the aging lung. p. 242-4. As an introduction to disease of the lungs the author has written a terse informative summary of the normal lung in the aged.

135. Wu, Shao-Ch'ing and others. Normal value of residual air and its clinical significance. Chin Med J 77: 442-51, 1958. Normal value of residual air under age 30 is 28%, over 30 is 35%.

136. Yokoyama, T. and others. Studies on the ventilatory functions. Resp Circul (Tokyo) 6: 789-97, 1958. Study of 609 cases, most of them in the old age group. Vital capacity reduces; ventilatory reserve increases.

VII. Muscular activity

137. Astrand, I. Aerobic work capacity in men and women with special reference to age. Acta Physiol Scand Suppl 169 1960. 92 p. 121 references. At submaximal loads, O_2 uptake and related functions are the same in young and old. At maximal loads the heart beat in the young is 187, in the old, 170. The mechanical efficiency is lower and the vital capacity somewhat lower in the old.

138. Astrand, I. The physical work capacity of workers 50-64 years old. Acta Physiol Scand 42: 73-86, 1958. Pulse reaction to submaximal work the same in the 50-64 year old group and in a younger group.

139. Astrand, I. and others. Maximal heart rate during work in older men. J Appl Physiol 14: 562-6, 1959. 13 references. O_2 uptake, pulmonary ventilation, heart rate, lactic acid in the blood during maximal and submaximal work were measured in 9 healthy physically active men, 56-68 years old.

140. Bajusz, E. Die Beziehungen einer myometrischer und myographischer Untersuchungsergebnisse zur Gerontologie. Z Alternsforsch 10: 27-39, 1957/58. 16 references. 5,000 normal old men and women were tested at the Institute for Industrial Hygiene, Budapest. Graphs indicate findings.

141. Dill, D. B. and others. Response to exercise as related to age. J Appl Physiol 12: 195-6, 1958. A 66 year old man was tested in 1938 for metabolic and circulatory response to maximal work and retested in 1957. The later findings compared with those of 1938 were heart rate 1st test 172, 2nd test 160; O_2 consumption 1st test 3.28, 2nd test 2.80.

142. Hohu Christensen, E. Capacidad física para el lrabajo de las personas de edad avanzada. Med Trab 23: 160-5, 1958. Respiratory and circulatory capacities decrease with age as does physical capacity. Decrease of O_2 tension is probably due to resistance of capillary walls and of pulmonary epithelium to the diffusion of gas.

143. Holmgren, A. and Strandell, T. The relationship between heart volume, total hemoglobin and physical working capacity in former athletes. Acta Med Scand 163: 149-60, 1959. 19 former racing cyclists inactive at time of study were compared with young athletes. Heart volume was the same in both groups; working capacity in older group was lower.

144. Mezzasalma, G. and others. Sul comportamento dell'acido lattico, dell'acido piruvico et della latticodeidrogenasi nel sangue del vecchio prima e dopo lavoro muscolare. G Geront 7: 216-21, 1959. 22 references. Studies in normal and aged men, before and after mild physical work show: At rest the lactate pyruvate ratio was signally lower in aged than in young men; the differences of excess lactate between young and old was not significant after exercise, indicating that O_2 debt is of the same magnitude in young and aged people after mild physical work.

145. Parrot, J-L. L'activité musculaire chez l'homme âgé. Rev Franc Géront 4: 409-11, 1958. Muscular coordination decreases during activity; O_2 consumption increases. No significant difference during localized muscular activity was noted.

146. Sartorelli, E. and Scottle, P. Rapporti tra ventilazione polmonare e consumo evergetico durante il lavaro nell'età senile. G Geront 5: 256-60, 1957. In 10 normal individuals aged 70-78 the relationship between expenditure of energy and pulmonary ventilation during work was studied. Ventilation was significantly lower in the aged than in younger persons.

147. Sartorelli, E. and others. Efficienza della ventilazione alveolare ed ematosi durante il lavoro nei soggetti di età avanza. G Geront 7: 649-52, 1959. 10 normal individuals, aged 65-73, tested during muscular activity showed a slight decrease in O_2 use.

148. Sessa, T. and others. Funzionalitá respiratoria nei lavoratori anziani. Valore semeilogico ed importanza sociale. Folia Med (Nap) 41: 1225-41, 1958. In normal aged at work there is a decrease of maximal ventilation per minute and an increase in residual volume.

149. Sessa, T. and others. Funzionalità respiratoria nei lavoratori anziani. G Geront 7: 345-6, 1959. Individuals aged 68-80 show decrease in dynamic lung volume and increase in residual volume with work.

VIII. Tissues and cells

150. Albona, C. and others. Comportamento del tessuto connetivo della mucosa nella stomaco senile (Studio bioptico). Arch Maragliano Pat Clin 15: 203-12, 1959. In the normal individual there is no change in the stroma of gastric mucosa with advanced age.

151. Andrew, W. Tissue changes in old age. Similarities in man and laboratory animals. Geriatrics 12: 433-8, 1957. In both man and animals there is a primary degeneration of the parenchyma with a secondary replacement by adipose or fibrous connective tissue.

152. Banfield, W. G. Age changes in the acetic acid-soluble collagen in human skin. AMA Arch Path 68: 680-4, 1959. 10 references. A gradual rise in positive skin extracts occurs between the age of 60 and 80 years.

153. Becker, R. Die Differentialdiagnose und Therapie der Altersosteoporose. Z Alternsforsch 12: 373-88, 1958/59. 24 references. Senile osteoporosis is a physiologic involutionary phenomenon due to an insufficiency of osteoblasts hormonally conditioned. It must be differentiated from pathologic osteomalacia.

154. Bjorksten, J. A common molecular basis for the aging syndrome. J Amer Geriat Soc 6: 740-8, 1958. 55 references. Studies included a 60 to 85 age group. "---the possible role of protein immobilization by means of progressive cross-linking reactions is critically examined in the light of known data on potential cross-linking agents present in the blood stream---"

155. Bohatirchuk, F. P. Micromorphological data on aging bone atrophy as seen in microradiographs and colored specimens. J Geront 15: 142-8, 1960. 18 references. Illus.

156. Börner, W. and others. Uber das Verhalten der zirkulierenden Blutzellen im Greisenalter. Z Alternsforsch 12: 336-9, 1958/59. 20 references. 103 healthy men 50-92 years of age showed a slight diminution of the red blood cells and leucocytes of the peripheral blood and a proportional diminution of the hemoglobin.

157. Boucek, R. J. and others. The effect of age, sex and race upon the acetic acid fractions of collagen. (Human biopsy connective tissue). J Geront 13: 2-9, 1958. Alaskan Indians and Eskimos, Negroes and Whites, aged 9 to 70 years, were tested. Intrinsic viscosity, molecular weight and asymmetry increased with age in all races.

158. Boucek, R. J. and others. Properties of fibroblasts. In: Page, I. H. ed. Connective tissue, thrombosis and atherosclerosis. New York, Academic Press, 1959. p. 193-211. 27 references. Vascular changes with aging include deposition of collagen in the intima and media directly related to fibroblastic activity. Collagen synthesis, reactivity of part of the ground substance, sterol synthesis, and enzymatic processes are properties of fibroblasts.

159. Brozek, J. and Kinzey, W. Age changes in skinfold compressibility. J Geront 15: 45-51, 1960. 33 references. Review of literature. Tests made on 107 men 20-69 years old. Decreased compressibility "may be expected to exaggerate somewhat the trends toward increase in subcutaneous fat..." There is "...a decrease in amount of elastic tissue and some splitting of elastic fibers."

160. Burgoon, C. F. Jr. and Burgoon, J. S. Aging and the cutaneous system. Geriatrics 13: 391-401, 1958. 11 references. Decrease in elasticity is due to changes in fibrous connective tissue and to altered hydration of the dermis. Histologic changes in exposed skin are due to alterations in collagen fibers and ground substance.

161. Deloche, M. Recherches hématologiques chez le vieillard. Lyon, 1958. [Thesis-Univ Lyon] 94 p. 80 references. In 103 individuals, 60-95 years old, normal blood often showed an increase in polymorphonuclear leukocytes, but anemia was rare.

162. Dyrbye, M. and Kirk, J. E. The beta-glucuronidase activity of aortic and pulmonary artery tissue of various age. J Geront 11: 33-7, 1956. Examination of 144 fresh autopsy samples from individuals 3 days-88 years old indicated that enzyme activity increases up to 50 years, is stable to 69 years, after which there is a decrease.

163. Dyrbye, M. O. Aging of human arterial tissue. Biochemical studies of the acid mucopolysaccharides. København, Munksgaard, 1959. 54 p. 115 references. Mucopolysaccharide concentration in aortic tissues is constant until age 60; then it begins to decrease. Differentiation between normal aging changes and pathologic changes does not seem clear.

164. Dyrbye, M. O. Studies on the metabolism of the mucopolysaccharides of human arterial tissue by means of S^{35} with special reference to changes related to age. J Geront 14: 32-6, 1959. In 16 fresh post mortem specimens of the thoracic aorta, the intima and media showed definite decreasing incorporation with increasing age.

165. Egli, A. The physiological involution of the prodontium. Int Ass Geront 4th Congress Merano, Italy July 14-19, 1957. [Fidenza, Mattioli, 1958] 1: 278-82. Physiologic involution is still confused with pathologic processes. Histologic examination indicates a loosening of collagen fibers from their firm attachment.

166. Garelli, R. Studio istologico delle modificazioni strutturali della capsula articolare del ginocchio nel corso del'accrescimento e dela senescenza. G Geront 8: 321-75, 1960. 44 references. 30 autopsy specimens of knee joint were studied. Among the age changes were shrinking of synovial membrane with decrease in size and change in shape of cells, change in ground substance in stromal collagen, increase in elastic fibers and signs of regression in these and the blood vessels.

167. Groen, J. J. General physiology of aging. Int Ass Geront 4th Congress. Merano, Italy July 14-19, 1957. [Fidenza, Mattioli, 1958] 1: 61-77. Aging consists of progressive biochemical and biophysical changes localized in protoplasm and intercellular substances; it is probably not a single biological process.

168. Hieronymi, G. Uber den alternsbedingten Forwandel elastischer und muskulärer arterien. Heidelberg, Springer, 1956. 134 p. Bibliography p. 130-4. Findings of histological examination of important arteries were compared with published reports. From about 20 years of age gradual changes in the intima and media cause a thickening of the blood vessels.

169. Hornstein, O. Lebensalter und histologische Lipoidverteilung im menschlichen Hoden. Med Welt 10: 545-8, 1960. 22 references. Post mortem examination of testes of 20 males, aged 1 to 82, 10 of whom were 50-82 years old showed a gradual accumulation of lipoids in direct ratio with urinary 17-ketosteroides.

170. Jebens, E. H. and Monk-Jones, M. E. On the viscosity and pH of synovial fluid and the pH of blood. J Bone Joint Surg [Brit] 41B: 388-400, 1959. 19 references. Studies of groups aged 50-59 years 60-68 years and 70-78 years showed decrease of viscosity with aging.

171. Jeffrey, M. R. The waning joint. Amer J Med Sci 239: 104-24, 1960. 150 references. A knowledge of the normal aging of a joint is necessary as a basis for the recognition of joint pathology in the aged. The histology and chemistry of cartilage, synovial fluid etc. in aging joints is contrasted with the finding in diseased joints. This is an informative and complete discussion.

172. Joseph, N. R. and others. Aging of the skin. Titration curves of human epidermis in relation to age. Gerontologia (Basel) 1: 18-40, 1957. 26 references. Finger epidermis was tested in 36 subjects, aged 5-95; the technic is described. Changes in titration curves were due to diminution of keratin formation in the aged.

173. Kaplan, D. and Meyer, K. Aging of human cartilage. Nature (Lond.) 183: 1267-8, 1959. Human rib cartilage obtained at autopsy from new born babies to persons 74 years old was examined. Chondroitin sulphate decreased with aging, keratosulphate remained constant after about 30 years of age. Cartilage did not show degeneration usually associated with aging.

174. Kirk, J. E. and Sørensen, L. B. The aldolase activity of aortic and pulmonary artery tissue in individuals of various ages. J Geront 11: 373-8, 1956. From 10-69 years there is a tendency to increase in activity of aortic tissue; though not significant, there is a similar but slighter tendency in pulmonary artery tissue.

175. Kohn, R. R. and Rollerson, E. Aging of human collagen in relation to susceptibility to the action of collagenose. J Geront 15: 10-4, 1960. In vitro experiments with human tendon indicate that both thermal denaturation and a chemical reaction may be of significance in aging of human collagen.

176. Kohm R. R. and Rollerson, E. Age changes in swelling properties of human myocardium. Proc Soc Exp Biol Med 100: 253-6, 1959. Hearts from 148 autopsies performed on day of death were obtained and samples of left ventricles showing no macroscopic lesions were examined. Decrease in swelling ability beginning in the fourth decade probably represents a degenerative process which increases the rigidity of the protein structure. "Swelling properties of myocardium have apparently not been described previously."

177. Lagier, R. and Exer, B. Etude de la composition chimique de tissus humains de mature conjonctive en rapport avec l'âge; derme et aponévrose de la paroi abdominale, tendon d'Achille. [Acide glucuronique, arginine, typrosine et hydroxyproline.] Gerontologia (Basel) 4: 39-59, 1960. 38 references. 3 types of connective tissue from subjects ranging in age from infancy to 92 years were analysed for polysaccharides and certain amines. After 60 years of age the values are constant. Authors suggest more precise methods are needed for analysing polysaccharides in the conjunctiva.

178. Leonardelli, G. B. and others. Aspetti istomorfologici ed istochimici del contingente ghiandolare bronchiale nella senescenza. G Geront 7: 334-7, 1959. Deep seated glands of the bronchial mucosa show involution secondary to fibrosclerosis of themesenchymal structure or may show hypertrophy. Histochemical studies demonstrate persistance of functional activity.

179. Leutert, G. Die Biomorphose der Gewebe aus der Sicht der normalen Anatomie. Z Alternsforsch 14: 1-17, 1960. Normal tissue undergoes histologic modification in aging. Histological tissue studies of epithelium, connective tissue, cartilage, bone, smooth muscle, striated muscle, heart muscle and nerves are presented.

180. Lorincz, A. L. Physiology of the aging skin. Illinois Med J 117: 59-63, 1960. Appearance of aging due to exposure to sunlight, weathering, and senile changes are largely due to degenerative alteration in the subpapillary connective tissue which is interspersed long, narrow collagen fibers. Flattening and thickening of the horny layer and pigmentation were observed. The etiology for the aging of the nonexposed skin is unknown.

181. Louyot, P. and others. L'ostéose raréfiante sénile, étude biologique. Rev Franc Géront 5: 525-45, 1959. In harmonic rarefying osteosis of old age, loss of density is gradual.

182. Parker, H. V. and others. Body water compartments throughout the lifespan. Ciba Foundation Colloquia on Aging 4: 102-15, 1958. 21 references. Total body and intracellur H_2O tends to decrease with a relative increase in total body solids. Extracellur H_2O tends to increase.

183. Pilz, W. Das Transparenzphänomen der Zahnwurzel als ein Ausdruck der Biomorphose der menschlichen Dentins. Z Alternsforsch 13: 139-52, 1959. 29 references. Micromorphologic alteration is clearly seen radiologically. Differential diagnosis between this aging condition and disease is discussed.

184. Renaud, M. Sclérose et vieillissement. Les sénescences sans sclérose. Bull Acad Nat Med (Par) 141: 37-9, 1957. 50 postmortem histologic examinations were performed. 23 showed no sclerosis. The author concludes that old age is not an obligatory or a primary factor in senescence.

185. Ries, W. and Sack, G. Die Altersabhängigkeit des subkutanen Gewebsinnendruckes. Z Alternsforsch 13: 122-30, 1959. 26 references. Group tested included persons aged 51-80. Tests consisted of taking subcutaneous internal tissue tension in various body areas. Tension decreased with advancing age; all tissues undergo their own alterations.

186. Ruol, A. Sulla fisiopatologia della circolazione arteriolo-capillare e degli scanbi emato-tissutali nel vecchio. G Geront 7: 103-12, 1959. 13 references. 92 persons aged 60 and over were examined. Capillary membrane loses its semipermeability and tissues become more hydrophilic due to H_2O altered distribution.

187. Schaus, R. and Kirk, J. E. The riboflavin concentration of brain, heart and skeletal muscle in individuals of various ages. J Geront 11: 147-50, 1956. Large mass of post mortem material was derived from individuals aged 7 days to 92 years, was subjected to chemical tests for riboflavin. Tissues studied were from frontal lobe, heart muscle and pectoralis major. No certain changes in tissue riboflavin concentration were observed.

188. Schomka, G. and Christiani, H. Untersuchungen über Einflüsse des Lebensalters auf die menschlichen Erythrozyten. Z Alternsforsch 11: 121-49, 1957/58. 24 references. Mechanical resistance of RBC is synchronous with changes in other organ tissues but not dependent on these.

189. Silvestri, U. Osservazioni istologiche su la ghiandola sebacea del vecchio. G Geront 7: 113-9, 1959. 18 references. After 70 years of age the sebaceous gland surface is reduced. An increased number of Barr corpuscles appear in the duct cells and in cells of the peripheral regions.

190. Sobel, H. and others. The influence of age upon the hexosamine-collagen ratio of dermal biopsies in men. J Geront 13: 128-31, 1958. In 23-80 year old men there is a tendency for the collagen to increase and the percentage of hexosamine to decrease with age. Hexosamine collagen ratio of connective tissue may be used as a measure of age.

191. Stidworthy, G. and others. The effect of aging on mucopolysaccharide composition of human costal cartilage as measure by hexosamine and uronic acid content. J Geront 13: 10-3, 1958. Costal cartilage from 15 individuals, premature to 85 years of age, were chemically analysed. Chondroxtin sulfate decreased with aging.

192. Strehler, B. L. and others. Rate and magnitude of age pigment accumulation in the human myocardium. J Geront 14: 430-9, 1959. 29 references. 150 hearts subjected to random shot fluorescence microscopy showed no pigment under 10 years of age but a gradual increase per decade. Pigment was present in all aged hearts, it has no correlation with cardiac disease. This accumulation of lipofuscin "seems to meet the criteria--- for a basic biological aging process."

193. Zinsser, H. H. and others. Metal content correlation in aging aorta. J Amer Geriat Soc 5: 20-5, 1957. 24 references. Manganese and copper may be the agents that change elasticity of aortic tissue.