

THE BIOLOGY OF AGING (JARA)– AN ĀYURVEDIC APPROACH

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ABSTRACT

Āyurveda considers *Rasāyana* as one of the foremost branches of *Aṣṭāṅga Āyurveda* and have rightly justifies its status by the place its given in the *Āyurvedic* treatises. The word *Rasāyana* should not be mistaken as a therapy exclusively related to old age. It can be applied from pediatrics to geriatrics. *Suśruta* defines *Rasāyana* as a measure, which prolongs and provides positive health, improves mental faculties and provides resistance and immunity against diseases. *Caraka* states that the means of obtaining optimum nourishment to the *Dhātus* are called *Rasāyanas*.

This paper is dealt in two ways - Components, which accelerate or trigger an early onset of aging and the measures adopted to reverse them.

Introduction

Aging is both a complex and challenging scientific problem and a fact of universal concern. In his classic- "The Biology of death", Raymond Pearl asserts that "Probably no subject so deeply interests human beings as that of the duration of human life". This concern is extremely ancient. Despite the various, recent efforts of modern science to unravel the mystery of aging, the age old science of Indian Medicine, *Āyurveda*, clearly explains the various details of aging in its classics.

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Aging in modern science is defined as a progressive failure of the body haemostatic adaptive response. This concept of aging is widely scattered in various texts in the *Āyurvedic* classics, but has also been focally concerned under a specialty called *Rasāyana*. A saying by Dostoevsky that “If you were to destroy in mankind the belief in immortality, not only love, but every living force maintaining the life of the world would at once be dried up”. Probably this psychological pursuit towards attaining immortality would have been the driving force for our ancient sages, who have established and rightly justified *Rasāyana* as the foremost branch of *Aṣṭāṅga Āyurveda*.

The word *Rasāyana* should not be mistaken as a therapy exclusively related to old age. It can be applied from pediatrics to geriatrics. *Suśruta* defines *Rasāyana* as a measure, which prolongs and provides positive health, improves mental faculties and provides resistance and immunity against diseases (*S. su. 17.7*). *Caraka* states that, the means of obtaining optimum nourishment to the *Dhātus* are called *Rasāyana*.

The equivalent term for aging in *Āyurveda* literature is *Jara*.

Jara: Its definition and place in Āyurveda

Āyurveda has considered *Jara* or *Vārdhākya* as a natural and inevitable process as well as a *Swabhāvaja vyādhi* (natural disease). This term has been used frequently in almost all the treatises of philosophy, mythology, art etc. It is depicted as an unwanted, distressful phase of life full of miseries. Etymologically, the term *Jara* comprises of *Jr+* *Ana+* *Tap*. The term *Jara* has been derived from the Sanskrit root, “*Jrish vayohanow*” which can be explained as “*Vayah krta slata mamsadya vastha visesa*” which means the muscles and other tissues are loosened under the influence of aging. Totally this term indicates of the ‘loss’ in the period of life span.

A synonym of *Jara* “*Visrasa*” is derived from the word “*Sramsū adahpatane*” which means a degradation / retardation in the physical, physiological and psychological well-being.

Sequential Kṣaya in Aging

Vāgbhaṭa and *Sārangadhara* presented an interesting scheme for loss of different biological factors during the lifetime, as a function of aging in different decades.

Mile stones of Aging or sequential loss of biological factors in Aging

| Decades | Year | <i>Vāgbhaṭa</i> | <i>Sārangadhara</i> |
|---------|--------|---------------------|---------------------|
| First | 1-10 | <i>Balya</i> | <i>Balya</i> |
| Second | 11-20 | <i>Vṛddhi</i> | <i>Vṛddhi</i> |
| Third | 21-30 | <i>Prabha</i> | <i>Cabi</i> |
| Fourth | 31-40 | <i>Medha</i> | <i>Medha</i> |
| Fifth | 41-50 | <i>Tvaca</i> | <i>Tvaca</i> |
| Sixth | 51-60 | <i>Śukra</i> | <i>Dṛsti</i> |
| Seventh | 61-70 | <i>Dṛsti</i> | <i>Śukra</i> |
| Eight | 71-80 | <i>Śrotrendriya</i> | <i>Śukra</i> |
| Ninth | 81-90 | <i>Maṇa</i> | <i>Buddhi</i> |
| Tenth | 91-100 | <i>Sparśendriya</i> | <i>Karmendriya.</i> |

Need to study *Jara* (Aging)- “Why study the Aged?”

In gerontology (study of aging), one has to view aging as a life long process in which we and all other living things participate. From this perspective, aging is seen as ongoing, starting from conception and ending with death. Thus, aging is not reserved for senior citizens or golden-age clubbers; infants, children, teenagers and young adults share it. In fact, in our prime youthful age, we tend to disbelieve the fact that we will ever be aged. Aging is growing. It occupies the total life span and does not occur as

merely the final stage of life. Without the knowledge and understanding of the entire life span, it becomes difficult to understand the events and happenings in any individual life span. In this sense we study the aged to learn not only about the final phase of life but to learn about the physiological progress of the body as a whole. Secondly, the dramatic increase in the general health problem and diseases associated with the aged has increased in the recent times. Statistics show that India currently has 75 million people aged over 65 years, coming to around 6.7% of the population, a gigantic leap from 3.4 % in 1988. Thirdly, the study of aging is intrinsically exciting and interesting.

Classification of Vaya

According to *Candogyopaniṣad* the total life span of 116 yrs is divided into:

- | | | | | | |
|----|-----------|---|---------------|---|--------|
| a. | Childhood | - | <i>Balya</i> | - | 24 yrs |
| b. | Youth | - | <i>Yavana</i> | - | 44 yrs |
| c. | Old | - | <i>Vṛddha</i> | - | 48 yrs |

| | <i>Ācārya</i> | <i>Balya</i> | <i>Madhya</i> | <i>Vṛddha</i> |
|----|----------------|--|---|---------------|
| 1. | <i>Caraka</i> | Birth to 30 yrs 1. <i>Aparipakvadhātu-</i> birth to 16 yrs. 2. <i>Vivardhamana dhātu-</i> Birth to 30 yrs | 30 - 60 yrs | 60- 100 yrs |
| 2. | <i>Suśruta</i> | Birth to 16 yrs 1. <i>Kseerapa</i> —up to 1yr 2. <i>Kseerannada</i> up to 2 yrs 3. <i>Annada</i> up to 16 yrs | 16 - 70 yrs 1. <i>Vṛdhi</i> (16 - 20 yrs) 2. <i>Yavana</i> (20 - 30 yrs) 3. <i>Sampurṇa</i> (40 yrs) 4. <i>Hani</i> (40 - 70 yrs) | |

Defining “Āyu”

‘*Etigaccati iti ayuh*’, derived from the root “*Umm gamanaseela*” indicates its nature of continuation. *Caraka* and *Vagbhata* named the very first chapters of their treatise, *Deergham*, *Jjivitiyam* and *Ayuskamiyam* respectively, indicating the measures adopted for a healthy longevity. This proves beyond any doubt that the concept of geriatrics were embedded in *Ayurveda* since time immemorial.

‘Āyu’ is the integral combination of *Sattwa* (psyche), *Ātma* (soul), *Śarira* (body) and *Indriyas* (senses). Leaving *Ātma*, which is immune to the cycle of birth, death and disease, the other three components have to be considered for understanding the aging process.

Śarira

Śarira is the grossest component of Āyu, which is made up of five *Mahabhutas* and is the abode of mind and consciousness.

Indriyas represent the sensorial apparatus, motor activities and the psyche. The *Indriya vyāpara* i.e., functioning of senses is the manifestation of *Ātma*. *Indriyas* connect the external world with the inner world. *Indriyas* are of 3 types: *Jnānendriya* (organs of perception) helps in receiving the knowledge; *Karmendriya* (organ of action) are meant for response through motor functions. The *manas* (mind) is responsible for the action of both *Jnāna* and *karma* *Indriyas*, hence it is called as *Ubhayendriya*.

Puruṣa comprises of ‘*Sattva*’, ‘*Ātma*’ and ‘*Śarira*’ and these three constitute the tripod of life. *Ātma* is omnipotent, imperceptible; unmanifested and is the conscious element in the body.

Pathophysiology of Aging

Śarira : “*Doṣa dhātumala moolam hi śariram*”

The three basic constituents of human body, *Vāta*, *Pitta* and *Kapha*, in a balanced state

structurally and functionally, maintain the health and in an imbalanced state produce disease.

Aging and the *Tridoṣas*

| <i>Doṣa</i> | <i>Bālyāvastha</i> | <i>Madhyāvastha</i> | <i>Vṛddhāvastha</i> |
|--------------|--------------------|---------------------|---------------------|
| <i>Kapha</i> | +++ | ++ | + |
| <i>Pitta</i> | ++ | +++ | ++ |
| <i>Vāta</i> | + | + | +++ |

Amongst, these *Doṣas*, *Kapha* is predominant in *Bālya*, *Pitta* in *Madhya* and *Vāta* in *Vārdhākya* / *Vṛddhāvastha*. In the old age, many syndromes are observed which are the result of imbalance in the body constituents i.e., *Vāta*, *Pitta* and *Kapha* to a lesser or greater extent. This imbalance varies in velocity and intensity depending upon many factors such as life style, habits, age etc.

Thus, these variations are observed in the psychosomatic constitution of a person (*Su. S. 41: 62*)

The normal function of *Pancavidha vāta* such as *Utsāha*, *Uccwāsa*, *Niśwāsa*, *Chesṭa* etc., are affected or deteriorated in old age.

| Type of | Functional part affected | Result |
|----------------------|--|--|
| 1. <i>Prāna Vāyu</i> | <i>Āharaṇa</i> <i>Udgāra</i> (GIT) | difficult in deglutition increased <i>Udgāra pravṛtti</i> due to fermentation of food because of delayed digestion. |

| | | |
|------------------|--|--|
| | <i>Niśwāsa/Ucwāsa</i> (RS) | <i>Śwāsa</i> on slight exertion <i>Manokarmas</i> (psyche) etc deranged <i>Buddhi</i> , weakness of <i>Hṛdaya</i> diminished sensory functions. |
| 2. <i>Udāna</i> | <i>Vāk pravritti</i> <i>Bala, varṇa, smṛiti etc.</i> | Indistinct or unclear pronunciation (may be to loss of teeth) <i>Smṛitināśa, Balakṣya,</i> <i>Varṇaviparyāya</i> |
| 3. <i>Samāna</i> | <i>Annagrahana</i> <i>pariṇāma</i> <i>Rasa malādi vivecana,</i> <i>muncana etc</i> <i>Nimeṣa</i> <i>Unmeṣa</i> <i>Apakṣepana</i> <i>Utkṣepana</i> | Decreased appetite, less ingestion capacity, weakened digestion reduced separation and elimination may lead to <i>Gulma, Mandāgni, Atisāra</i> <i>Kampana</i> (tremor) palpitation, unsteady gait vertigo etc impaired circulation to the various tissues |
| 5. <i>Apāna</i> | <i>Utsarga</i> of <i>Sūkra,</i> <i>Mootra, Puriśa</i> <i>Ārtava, Garbha</i> etc | constipation urinary incontinence scanty micturition Scanty menstruation less or delayed seminal discharge etc. |

The various functions of *Vikṛta vāyu* mentioned in *Caraka Cikitsa* 28 such as *Sramśa*, *Bramśa*, *Vyasa*, *Sanga*, *Bheda*, *Sada*, *Toda*, *Vyatha*, *Paruśya*, *Śośa*, *Supti*, *Viśleṣa*, *Samkoca* etc are observed in old age.

Pitta

| Type of Pitta | Function affected in old age | Results in |
|----------------------|--|---|
| 1. <i>Pācaka</i> | <i>Annapācana</i> <i>Kṣut</i> <i>Ojas</i> | loss of appetite, indigestion, <i>Āma</i> formation leading to <i>Āmajanya roga</i> , improper formation of <i>Rasādi dhātu</i> . |
| 2. <i>Ranjaka</i> | formation of <i>Rakta dhātu</i> | anemia, skin disorders diseases in haemopoietic system. |
| 3. <i>Ālocaka</i> | <i>Rupa grahana</i> (visual psychology) | myopia, glaucoma, cataract etc. |
| 4. <i>Brājaka</i> | <i>Prabha</i> <i>Cāya (Prakāśana)</i> <i>Dehamārdavam</i> | loss of luster of skin, atrophy, wrinkles, loss of elasticity etc. |
| 5. <i>Sādhaka</i> | <i>Buddhi</i> , <i>Medha</i> , <i>Abhiprārthita</i> <i>Manorathas</i> , <i>Harṣa</i> (psychophysiology) | <i>Smṛtināśa</i> , <i>Bhaya</i> , <i>Kroda</i> , <i>Harṣa</i> , <i>Moha</i> , etc. psychosomatic disorders or depression etc. |

Kapha

| Type of Kapha | Function affected in old age | Result in |
|----------------------|---|--|
| 1. <i>Avalambaka</i> | <i>Trikavalambane, Bala, Dhruti Utsāha, Buddhi</i> etc. | <i>Hṛddrava, Hṛt Śula</i> other cardiovascular diseases. |
| 2. <i>Tarpaka</i> | <i>Indriya tarpana</i> | improper functioning of <i>Jnānendriyas</i> and <i>Mastiṣka</i> . |
| 3. <i>Bodhaka</i> | <i>Rasa bodhana</i> | atrophied taste buds, increased oral cavity malignancies. |
| 4. <i>Śleṣaka</i> | <i>Asthisandhi śleṣanam Sandhishthainjūm sthiratwa</i> | Rheumatoid arthritis, Oestradioarthritis, osteoporosis & other loco motor disorders. |
| 5. <i>Kledeka</i> | <i>Anna kledana</i> | Loss of appetite, gastritis peptic ulcer diseases enteritis etc. |

Aging and Saptadhātus

The next component of *Śarira* is *Dhātus*, which are responsible to maintain a state of equilibrium with the help of *Doṣas* and *Malas*. “*Heyamāna dhātu*” is a feature of old age. They basically perform two functions:

a) *Dhāraṇa* (b) *Poṣaṇa*. In old age due to *Vikrita vāta*, *Viṣamāgni*, *Kṣeena kapha*, the first *Dhātu rasa* is not formed properly and its function of *Preenaṇa* to the rest of the *Dhātus* is not performed, resulting in sequential weakening of all the *Dhātus* i.e., *Dhātukṣya*. Hence, due to this malformed *Rasa*, it sets off a chain of malformed *Upadhātus* and *Dhātumalas*. The various *Kṣeena lakṣaṇas* and *Vikāras* observed in old age are:

| <i>Dhātu</i> | <i>Lakṣaṇa</i> | <i>Vikāra</i> |
|----------------------|---|--|
| 1. <i>Rasakṣaya</i> | <i>Roukṣya</i> , <i>Bhrama</i> , <i>Śabda sahisuta</i> | <i>Aruci</i> , <i>tandra</i> , <i>arasgnata</i> <i>Angamarda</i> , <i>Pāndutwa</i> , <i>Agnināśa</i> , <i>Valipalita</i> , <i>Kṛsangata</i> |
| 2. <i>Raktakṣaya</i> | <i>Sirasaithilya</i> , <i>Rukṣata</i> | skin diseases etc, hypertension, vertigo, decreased luster etc, |
| 3. <i>Māmsakṣaya</i> | <i>Śuṣkata of Sphik etc.</i> | <i>Arbuda</i> of <i>Māmsa</i> , loss of weight, improper sensory function etc. |
| 4. <i>Medokṣaya</i> | <i>Sandhivedana</i> , <i>Glani</i> <i>Śuṣkata etc.</i> | <i>Splenomegaly</i> , <i>Prameha</i> <i>Purvaroopo etc.</i> |
| 5. <i>Asthikṣaya</i> | <i>Astitoda</i> , <i>Danta kesa</i> <i>Nakha sadanam</i> | diseases of hair root, nail, diseases of bone |
| 6. <i>Majjakṣaya</i> | <i>Asthisouśriya</i> , <i>Bhrama</i> <i>śukrālpata</i> | <i>Vāta vikāra</i> , pain in joints, vertigo etc. decreased <i>Dehabala</i> |
| 7. <i>Śukrakṣaya</i> | <i>Harṣa</i> , <i>Dainya</i> , <i>Cirapracyuti</i> | anaemia, decreased libido etc. |

Aging and Agni

There are 13 types of *Agni* described in *Āyurveda* which represents the digestive and metabolic fire in the body. It consists of digestive juices, enzymes, hormones etc, participating in metabolism. *Caraka cikitsa 15 / 3* states that *Agni* is responsible for *Āyu, Varṇa, Bala, Svāsthya, Utsāha, Upacaya, Prabha, Ojas, Agni, Prāṇa etc.*

Based on the *Bala*, *Agni* in turn is of 4 types: *Tikṣṇāgni, Samāgni, Viṣamāgni* and *Mandāgni*. In old age, due to the predominance of *Vāta doṣa*, *Viṣamāgni* prevails leading to *Viṣamāgnijanya rogas* such as *Ajeerṇa, Ādhmāna, Śula, Udāvarta, Atisāra, Āntrakuja, Pravahana etc.*

In young adults, due to increased activity of *Pitta*, the digestive capacity will be at its peak. The optimum activity of *Agni* is responsible for growth and development of the body and maintains vitality and vigor of an individual. So, in old age, due to *Viṣamāgni*, defective metabolism occurs within the body leading to involuntary changes such as *Kṣaya* and '*Śoṣa*'.

Aging and Malas

Malas are equally important as that of *Doṣa* and *Dhatus*. They form the *Mula dravya* of the body. They arise out of *Kittapāka* at the *Pācakāgni* and *Dhātawāgni* levels. The various *Malas* mentioned in *Aṣṭāṅga hr̥daya* are *Vāta, Pitta, Kapha, Khamala, Karṇamala, Akṣimala, Āsyamala, Prajananamala, Nāsikamala, Lomakupamala, Keśa, Smaśru, Loma* and *Nakha etc.*

These play a vital role in the body dynamics, as elimination of *Mala* is an index of life activities. Hampered *Agni* in old age leads to *Malakṣaya*. The common features such as pain in chest, dysuria, haematuria, excessive thirst, dryness of mouth, skin are found in *Malakṣaya*.

Aging and *Indriyas*

Indriya is defined as “*Lingamindrasya*” sign of life. *Indriyas* in turn are of three kinds: *Jnānendriya*, *Karmendriya*, *Ubhayendriya*. The *Tridoṣas* influences the *Indriya* in performing its functions as it has been described in *Caraka* that *Prāṇavāta* does the function of *Sarvendriya yojana* and *Indriya tarpana* is done by *Tarpaka kapha* etc.

Various disorders of *Jnānendriya* are observed in old age such as *Akṣihundana*, *Karṇanāda*, *Supti*, *Kandu*, *Arasagnata* etc. The functions of *Karmendriyas* are also adversely affected in old age.

| <i>Karmendriya</i> | Governed by | Function |
|---------------------------|--------------------------------------|---------------------------------------|
| 1. <i>Jihwa</i> | <i>Udānavāyu</i> <i>Vyānavāyu</i> | <i>Vākprayṛtti</i> <i>Vākduṣṭi</i> |
| 2. <i>Hasta</i> | <i>Vyānavāyu</i> | <i>Kāyacesta</i> |
| 3. <i>Pāda</i> | <i>Vyānavāyu</i> | <i>Gati</i> |
| 4. <i>Pāyu</i> | <i>Apānavāyu</i> | <i>Malasamkoca</i> |
| 5. <i>Upastha</i> | <i>Apānavāyu</i> | <i>Śukrotsarga</i> |

The various functions of *satwa (manas)* are also affected in old age. *Manoniyamana*, *Manapreeraṇa*, *Harṣa*, *Utsāha*, *Prayatna*, *Buddhi*, *Medha*, *Abhimāna* etc. are the functions of *Manas* affected due to aging.

Aging and *Srotas*

“*Srotomayam hi śāriram*” (C. Ch.4)

The Ancient *Ācāryas* have stressed the fact that the whole body is composed of *Srotas* which act as a network in connecting the whole body. Transportation of various types of nutrition, waste materials, etc takes place through different channels. *Srotas*

may be large, minute, long, cylindrical, etc, as their synonym indicates. There is no structure in the body devoid of *Srotas*. Hence, a structural deformity ensures the deformity within the stores and vice-versa, and hence, due to the *Khavaigunya / Srotovaigunya* the *Doṣa-duśya sammorcana* occurs leading to different features manifested by the *Srotoduṣṭi*. *Caraka* has clearly discussed four types of Pathophysiological conditions of *Srotas* in terms of *Atipravṛtti*, *Sanga*, *Vimārga gamana* and *Siragranthi* (C.vi.5/24)

The manifestation of various *Srotoduṣṭi* are

| Type of <i>Srotas</i> | Diseases |
|--------------------------------|--|
| 1. <i>Prāṇavaha / Rasavaha</i> | Dyspnea, chest pain, vertigo, <i>Śwāsa</i> , <i>Kāsa</i> , R.T.I, Diabetes, HTN <i>etc.</i> |
| 2. <i>Annavaha</i> | <i>Agnimāndya</i> , <i>Aruci</i> , <i>Ādhmāna</i> , <i>Avipāka</i> , <i>Cardi.</i> |
| 3. <i>Udakavaha</i> | <i>Jihwa</i> , <i>tālu</i> , <i>kantā śoṣa</i> <i>etc.</i> |
| 4. <i>Rasarakthavaha</i> | <i>Pānduta</i> , <i>Dourbhalya</i> , <i>Dāha</i> . |
| 5. <i>Māmsavaha</i> | Emaciation, loosening of muscle, wrinkled skin, loss of elasticity <i>etc.</i> |
| 6. <i>Medovaha</i> | <i>Tāluśoṣa</i> , <i>Pipāsa</i> , deranged cholesterol and lipid metabolism, arterioscleroses, nephropathy, HTN. |
| 7. <i>Asthivaha</i> | Osteoporosis, osteo arthritis, gout, Polyarthrititis, Rheumatoid arthritis. |
| 8. <i>Majja</i> | Joint pain, <i>Bhrama</i> , darkness before eyes <i>etc.</i> |

| | |
|-------------|---|
| 9. Śukra | <i>Klibata, Cirāta, Śukra praśeka.</i> |
| 10. Mootra | Polyuria, dribbling of urine, dysuria, scanty urination <i>etc.</i> |
| 11. Pureeṣa | Constipation, distension, <i>āṭopa, grathitantra, I.B.S. etc.</i> |
| 12. Sweda | <i>Swedādikyata, Paruśata, Paridāha Lomaharṣa etc.</i> |
| 13. Ārtava | <i>Vandhyatva, Yoni vyāpath etc.</i> |

Aging and Ojas

According to *Āyurveda*, the quintessence of all seven *Dhātus* is *Ojas*. The same is *Bala* and is responsible for resistance against diseases i. e., *Vyādhi kṣamatva śakti*. The seat of *Ojas* is *Hṛdya*. *Ojas* is able to nourish and strengthen the *Dhātus*, giving energy, provides happiness, and luster, and balances the function of *Indriyas*.

In old age as the *Kṣaya* of *Saptadhātus* is observed, naturally it leads to *Ojokṣaya* which is again of three types;

1. *Ojovisramśa* — *Sandhiviśleṣa, Gātra sāda, Doṣa cyavana, Kriya sannirodha.*
2. *Ojovyāpat* — *Stabda, Gurugātrata, Vātaśopha, Glāni, Tandra, Nidra, varcobheda*
3. *Ojokṣaya* — *Murca, Moha, Mānasakṣaya, Pralāpa, Maraṇa.*

Thus, the aging (*Jara*) which in an inevitable process involves a structural & functional change in the body and the role of *Doṣa, Dhātu, Mala, Satwa, Agni, Srotas, Ojas* has been considered with respect to the aging process. This unique concept, which

is hidden in *Āyurveda*, shows that the methods to minimize or delay the inevitable process are already known by the ancient *Ācāryas* and was the secrets behind a healthy longevity.

Modern theories about Aging

Unfortunately, there are no generally accepted theories about the cause or causes of aging. The contemporary student of aging is faced with more theories than a centipede has legs. Some are conflicting and some mutually supporting and appear to deal with different aspects of the same general events. Most can claim, at least, some degree of credibility and some are backed by considerable means of evidence, but in no case is there anything like a definite proof. However, all these theories fall into two general categories. According to one view, termed “epiphenomenalism” by Alex Comfort, a leading English student of aging, but also called the “extrinsic” or “random” theory aging results from the “contingencies of living rather than from a programmed development.” Aging can be simply put as a result from some form of wear and tear. Perhaps one organ or organ system becomes worn or damaged, and this throws added strain on other system and that, now under duress, strain a third, so an interacting downward spiral is produced. Possibly, there in an accumulation of waste products, or various chemical changes occur which irreparably damage cells or the DNA and protein-synthesizing machinery.

The other view holds that aging is genetically programmed by some kind of a pacemaker or biological death clock. Comforts term this as the “fundamentalist” view.

Some of the few theories of aging accepted in modern science are

1. Cellular theories

- a. Wear and Tear
- b. Free radicals
- c. Cross-linking
- d. Age pigment

2. Genetic molecular theories

- a. Gene regulation
- b. Somatic mutation
- c. Codon restriction
- d. Error theories

3. System level theories

- a. Neuro-endocrinal control
- b. Immune control

The theory of free radicals

Dr. Derham Harman of the university of Nebraska stated that one of the important cause of aging at a cellular level in excessive liberation of free radicals. Free radicals are unstable variation of Oxygen atom, having an extra electron in its outermost orbit. They become stable by binding with molecules, which are generally cellular structures, and causes cell damage. To protect themselves from damage, cells produce enzymes to neutralize or detoxify the free radicals. These enzymes are known as free radicals scavengers or antioxidants. Thus, an imbalance between free radicals and antioxidants results in disease.

In *Āyurvedic* view, body (*Śarīra*) consist of *Doṣa*, *Dhātu* & *Malas* which are the structural, functional and excretory products of the body. All these collectively maintain the structural and functional integrity of the body.

As old age sets in, homeostasis between the *Tridoṣas* are disturbed. *Kapha* decreases resulting in an increased *Vāta*. This results in disturbance in *Pitta* too. *Vāta* is responsible for the fine or gross movements where as *Pitta* for the chemical & enzymatic activities and *Kapha* for the structural integrity & moistness etc.

Thus, a disturbance in *Pitta* along with an increased *Vāta* and decreased *Kapha* results in damage to the structural integrity, resulting in a disease.

Apart from this, recent studies on nutrition and aging prove that a specific calorie diet (not maximum nor minimum) minimizes aging. Experiments on rats, which are put on calorie restricted diet, proved to live longer than the rats, which were allowed unlimited access to food.

Āyurveda have emphasized in its *Upasthambas*, the importance of *Āhāra*. *Aṣṭavidha āhāra Viśeṣayāthanā*s emphasizes the importance of diet on aging process. *Mātrasana* is important for a healthy longevity. Thus the diet plays an effective role in reversing the changes during aging.

Summary

The concept of aging (*Jara*) has been dealt with, keeping in view of the *Tridoṣas*, *Saptadhātus*, *Malas*, *Srotas*, *Indriyas*, *Agni* and *Ojas*. When all of these are in homeostasis the body functions well. But due to old age, increase of *Vāta*, vitiation of *Pitta* and decrease in *Kapha* causes an impact on the various other components of body, thus allowing the aging to take over. The whole biology of aging has been dealt with, within the *Āyurvedic* frame.

REFERENCES

- | | | |
|--------------------|------|---|
| Agniveśa | 1977 | <i>Caraka saṁhita 5th Ed.</i> <i>Su.Sṭhāna -5- Commentary by</i> <i>Kāśināth Śāstry</i> , Published by chowkamba, Varanasi. |
| Ibid | 1977 | <i>Su.Sṭhāna -6, Verse 9-48</i> |
| Ibid | 1977 | <i>Su.Sṭhān - 12, verse 8</i> |
| Andrew, P. Wickens | 1982 | <i>The causes of Aging</i> , United Kingdom |

- Bhāva Miśra 1974 *Bhāvaprakāśa, 8th Ed Commentary by Viśvanāth Śāstry, Published by Motilal Banarsi Das, N. Delhi*
- Caleb, E. Finechew 1982 *The Biology of Aging*
- Chopra, K.L et al 1990 *Free radicals in the pathogenesis of atherosclerosis and role of herbal anti oxidants Amrit kalash on the same, IJCP, Vol No .1*
- Dwarakanath, C. 1986 *Introduction to Kāya cikitsa , 2nd Ed pp.63-69 Published by Chowkamba Orientalia, Varanasi*
- Elsiever 1979 *The Biology of Senescence*
- Kart, S. Cary 1986 *Aging and health, Biological and Social Perspective*
- Nicholas, Coni 1974 *Lecture notes on Geriatrics, 4th Ed Published by Blackwell Scientific Publications*
- Oxford University 1984 *Aging – The Facts, Oxford press*
- Singh, R. H. 1998 *Holistic principles of Āyurvedic medicine, 1st Ed. Published by Chowkamba Sanskrit Prathīṣṭān, Varanasi.*

सारांश

जरा के जीव विज्ञान के सम्बन्ध में एक आयुर्वेदीय दृष्टिकोण

- डा. के. गाडविन न्यूटन

जरावस्था एक सर्वव्यापी जटिल एवं चुनौतीपूर्ण समस्या है। रेमण्ड पर्ल की शास्त्रीय पुस्तक 'बयालजि आफ एजिंग' के अनुसार सम्भवतः मानव जाति के लिये जीवनावधि का चिंतन या अध्ययन से बढ़कर कुछ भी रोचक नहीं.

आधुनिक विज्ञान के प्रयासों के फलस्वरूप प्राचीन चिकित्सा शास्त्र आयुर्वेद में पहले ही जरावस्था से सम्बन्धित गुत्थियों को सुलझा दिया था। आयुर्वेद ने जरा या वार्धक्य को एक स्वाभाविक और आवश्यक प्रक्रिया तथा व्याधि मानता है।

यह लेख जरा से सम्बन्धित दोष, घातु, मल, इन्द्रिय एवं स्रोत का चिंतन करता है।