



TELOMERASE: A KEY FACTOR IN PHYSIOLOGY OF PREVENTION OF CANCER THROUGH *ACHAR RASAYAN*

Ayurveda

Dr. Swati N. Khandale*

Asst. Professor, Dept. of Kriya Sharir, IPGT & RA, Jamnagar. Gujarat *Corresponding Author

Dr. Mukund Sonavane

Asso. Professor, Dept. of Kriya Sharir, Y.A.C. Kodoli, Maharashtra

ABSTRACT

Charak Samhita, have narrated the effect of specific thought-behavior-lifestyle pattern (Achar Rasayan) on health. It emphasizes that lifestyle code has rejuvenatory properties. It has been stated that the medicine dependant methods will show their rejuvenating effect only after following comprehensive lifestyle code. Mechanism of action or physiological aspects of such measures remained in disguise until recently. Recent studies by eminent researchers like Nobel laureate Elizabeth Blackburn, Dean Ornish & Dr. Khalsa have shown the very existence of telomerase and its normal activity as an enzyme is a biological boon for life at micro level. The life style code, and in some studies even the specific thought pattern in form of meditation have significantly associated with optimum telomerase activity. Life style based preventive program has shown improvements in biological markers of malignancies. Given all this, such drugless lifestyle based rejuvenatory approach holds great promises for prevention & even therapy of cancer.

KEYWORDS

telomerase, lifestyle code, rejuvenation, prevention.

INTRODUCTION –

Despite of growth & development of modern technical knowhow in diagnostics & therapeutics, constant rise is seen in nearly all types of cancers throughout the world. Hence, prevention is the point of growing importance. Telomere & telomerase, discovery of which lead to Nobel Prize for Elizabeth Blackburn, are recently known factors that play an important role in cell longevity & aging. It is not only important as a regenerative point of view, but also very important key factor in cancer development, as there is growing body of evidence that it may be the pivotal factor in development of cancer. As the regenerative medicine has become the buzz-word for futuristic medicine because of its multifold implications for hitherto incurable diseases, everything that supports regeneration becomes very important for medical world in many ways. Though Ayurveda has given very serious consideration to the aspect of regenerative angel of therapeutics & prevention in form of *Rasayan* branch of Ashtang Ayurved, it is hardly practiced in the form in which it has been originally proposed. Moreover, the *Achara Rasayan* part of *Rasayan* therapy is near to extinct in want of thorough attention & proper practice. But a close look at *Achara Rasayan* regimen(s) shows that it is very highly possible that the practice of *Achara Rasayan* may be associated with biology of telomerase, which asserts the validity of vision of Ayurvedic texts as they advocate this life style measures as basis of regenerative process.

DISCUSSION

Biology of telomerase -

In eukaryotic cells the end portions of chromosomes are covered with telomeres like the plastic covers at the end of shoe-less protect the integrity of that threaded structure from being disrupted. Similarly telomeres protect the end of chromosomes. They prevent the physical degeneration of chromosome. Due to telomere the base sequence of that particular chromosome is preserved. Telomere contain the typical base pair sequence of TTAGGG. It is repeated there few hundreds or thousands of times. Usually in humans there is a repetition of 15000 times. But with every cell division loss of base pairs in telomere occurs. Few hundreds of base pairs are lost in cell division so that after many divisions, gradually reducing number of base pairs in chromosomal telomere reaches to a minimal critical point. This is a biological milestone in cell division and life span of a cell because cell is no more capable of divisions beyond this point. After this, programmed cell death is started to end the life of cell. But telomerase, which is a ribonucleoprotein, can repair the telomere to avoid all this for some time span. This has tremendous biological implications which seem to be self contradictory as far as the human health is concerned. This very fact that telomerase repairs the damaged end of chromosome makes telomerase a key factor in seemingly opposite processes – longevity & cancer.

Telomerase – longevity and cancer -

Many studies have shown that factors that reduce stress are associated with longer life span. The link is the telomerase activity. Higher stress is shown to be associated with poorer outcomes of cardiovascular and immune systems. But the key factor for “how” is cellular aging. Stress has been shown to be associated with higher levels of oxidative stress, lower levels of telomerase and shortened length of telomeres. These are significant markers of cellular aging. Stress reducing meditative procedures like *Kirtankriya* meditation and mindfulness meditation are associated with increased telomerase activity. Telomerase activity is one of the key factors in coping mechanisms with degenerative diseases as shown by Dr. Shanahoff Khalsa. Dr. Elizabeth Blackburn and her colleagues themselves have shown the link between mindfulness meditation and telomerase. Thus, early onset of age related diseases in highly stressed individuals can be explained. Taking all these points in consideration, role of telomerase for health and longevity cannot be overemphasized.

But the coin has another side also. The age related senescence at cellular levels is also related with telomere and telomerase. The inappropriate telomerase activity can make the cell 'immortal' by halting the process of cell death at wrong places. The immortal cell thus can become malignant. It takes many mutations for these changes to occur. But increased lifespan of wrong cell due to inappropriate telomerase activity facilitates all these changes to accelerate the process of carcinogenesis. Thus telomerase is a sharp sword at biological micro levels having one dangerous edge towards the person herself. If it had been that one could arrest or reverse the telomerase activity inside the tumor cells, it may be the turning point in victory over cancer.

But there are studies which suggest that the above said stress reducing measures and other lifestyle changes show reduction in biological cancer markers. A study by Dr. Dean Ornish has shown this in individuals of prostate cancers. A life style modifying stress reducing regimen of meditation, fiber rich vegetarian diet and exercise was given to cancer patients suffering from prostate cancer. There was a significant reduction in biological cancer marker in those patients. Levels of 'prostate specific antigen' were significantly reduced in those individuals. Another study by Dr. Shanahoff Khalsa with patients of Alzheimer's disease has also shown the optimum telomerase activity after practicing the *Kirtankriya* meditation.

Thus, this molecule of ribonucleoprotein is a curse as well as boon for body. Many studies have shown the link between telomerase and cancer. Still it is a point to be noted that the very activities which are known to be telomerase-increasing like stress reduction, exercise are also associated with cancer reduction as far as the biological markers are concerned. The shifting gear seems to be the appropriate use of this

molecule by body. It just requires at right place, at right time, at right proportions.

Acharya Rasayan & its link with telomerase -

Brihat Trayis and *Laghu Trayis*, being the available authentic & basic texts of Ayurveda have given the guidelines about 'how to' regarding the life style. The Acharyas were fully aware about the fact that these are not only supportive guidelines for the medicinal regimen. Charak and Sushrut Samhitas give very clear indications about this. Charaka Samhita has given very detailed discourse about the do's & don'ts in this regard. Charak has mentioned the basic properties of regenerative or *Rasayan* type of medicine. It mentions about longevity, health of body and mind, excellent intellectual activity and excellence in appearance also. But the significant point which strongly indicates towards the scientific vision of *Acharyas* is their clear understanding about this complex life style regimen collectively called as *Acharya Rasayan* that this is not a just supplementary to regenerative medicine. Charak clearly states that this is the very foundation of regenerative medicine. This regimen, if followed clearly can give all the benefits of *Rasayan* or regenerative medicine. Moreover, Charak has emphasized that this life style regimen effect overpowers the effect with that of medicines. Charaka Samhita further goes with the warning that if this regimen is not followed properly even after taking best quality of medicines, the whole process will not give the desired regenerative results. Thus, the clarity about the right place of this regimen (*Acharya Rasayan*) in the hierarchy of therapeutic effect as far as the rejuvenation is concerned. This is noteworthy in the light that these measures suggested by *Acharyas* are the potent means of optimum telomerase related activity.

Some important measures suggested by Charak Samhita regarding *Acharya Rasayan* are as follows:

- Truthfulness,
- Compassion towards mankind and animals
- Control over anger
- Chastity and complete fidelity
- Non violence
- Maintaining a cool & sweet nature
- Philanthropy
- Austerity
- Moderation in every action
- Regenerative diet like equal proportions of milk & ghee
- Respect for elders, well wishers and love for the world
- Courage to follow the spiritual path for well being of all
- Activities leading to thoughtful actions & inclination towards spiritual introspection

Collectively, all these are suggestions for food, thought and actions. They are based on principles of altruism, austerity, healthy habits and food, moderation in everything and personal-social-global axis of interactive well being.

Though there is no study which directly links *Acharya Rasayan* with telomerase, keen look at these ingredients of regimen clearly indicates that *Acharya Rasayan* is nothing but the conglomeration of the mental and physical factors that individually or collectively have a very huge potential of increasing the appropriate levels and activity of telomerase. It has not only therapeutic potential but it may serve as a huge preventive measure.

CONCLUSION -

The scientific vision of Ayurveda is once again proved with *Acharya Rasayan* and telomerase link. The specific studies from Ayurvedic academia are needed to precisely evaluate the overall correlates of health and longevity including but not limited to telomerase and its relationship with *Acharya Rasayan*. May be some day medical fraternity will precisely calculate and expect the effects of such non medicinal measures as seriously as that of molecules. In today's world where one third of population craves with hunger without adequate food and pure water to drink, it is needed on war foot to explore the promising non medicinal measures which are strongly associated with health and well being in every aspect and not only the cancer therapy. It is immaterial that whether it is associated with patent(s) that herald(s) the breakthrough of molecular cure for hitherto incurable disease like cancer and followed by torrent of dear dollars. *Acharya Rasayan* is a call of Ayurveda to the world (including Ayurveda community) to move towards non medicinal approach wherever necessary, not as an appendix to so called main course of medicinal treatment but as a

prominent pillar on which the rest of material or molecular medicine will stand firmly.

REFERENCES -

- 1) Wanil Kim et al, Regulation of the Human Telomerase Gene TERT by Telomere Position Effect—Over Long Distances (TPE-OLD): Implications for Aging and Cancer, Published December 15, 2016 <https://doi.org/10.1371/journal.pbio.2000016>
- 2) Agnivesh, Charak Samhita, Chikitsasthan adhyaya 1- Pad 4, shlok 30-35.
- 3) Jerry W Shay, Woodring E Wright, Role of telomeres & telomerase in cancer, Seminars in Cancer biology, December 2011, www.researchgate.net/publication/51732441
- 4) Elizabeth Blackburn et al, Accelerated telomere shortening in response to life stress, PNAS, December 7, 2004, vol. 101, no. 49, 17315.
- 5) Eli Puterman et al, The power of Exercise: Buffering the Effect of Chronic Stress on Telomerase Length, Ann N Y Acad Sci, Manuscript available in PMC 2011 march 15. PLoS ONE/www.plosone.org May2010/ Vol.5/Issues/e10837
- 6) Elissa Epel et al, Can Meditation slow rate of cellular aging? Cognitive stress, mindfulness and telomerase, article published in NIH Public Access, Ann N Y Acad Sci, 2009 August 1172:34-53 doi 10.1111
- 7) Carol W Greider et al, Telomerase; Telomerase and Cancer, Scientific American, March 1996
- 8) Carol W Greider et al, Telomerase; Telomerase aging and Cancer, Biochemical Society August 2015
- 9) Agnivesh, Charak Samhita, Chikitsasthan adhyaya 1- Pad 4, shloka 7- 8
- 10) Sushrut, Sushrut Samhita, Chikitsasthana Adhyaya 28 shloka 27-28
- 11) Steven E, et al Telomeres and Telomerase in Cancer, Carcinogenesis Vol -31 no.9-18, 2010 doi: 10.1093/carcin/bgp268, Advance Access Publication November 3, 2009.
- 12) Ornish D et al, Inreasive lifestyle changes may affect the progression of prostate cancer, Pubmed J Urol 2005 Sep; 174(3):1065-9; discussion 1069-70.
- 13) Khalasa et al, Lifestyle therapy for prostate cancer: Does it work?, Harward health publication, Published: July, 2007