



**Dr Sanjay Kalra**  
Dept. of Endocrinology,  
Bharti Hospital,  
Karnal, Haryana,  
India; University  
Center for Research  
& Development,  
Chandigarh University,  
Mohali, Punjab, India



**Dr Saurabh Arora**  
Dept. of  
Endocrinology,  
Dayanand Medical  
College and  
Hospital, Ludhiana,  
Punjab, India



**Dr Nitin Kapoor**  
Dept. of Endocrinology,  
Diabetes and  
Metabolism, Christian  
Medical College,  
Vellore, Tamil Nadu,  
India; Baker Heart  
and Diabetes Institute,  
Melbourne, Victoria,  
Australia

# Elegant Aging Through Endocrine Optimization

## THE QUEST FOR YOUTH

*“Even women and servants scoff at old age.”*

Yayati’s eldest son; Mahabharata<sup>1</sup>

From time immemorial, man has sought immortality. The oldest book in the world, The Epic of Gilgamesh, bears testimony to this. Set in modern-day Iraq, it tells the story of Gilgamesh, who undertook a perilous journey to search for an antidote to death.<sup>2</sup>

An example of eternal youth in Indian history is Markandeya, son of the sage Mrikanda. The sage had chosen a boon in which Lord Shiva offered him a virtuous and pious son, with the rider that the son would die at a young age. Shiva protected Markandeya when Yama came to collect him, and ensured that Markandeya remained “young forever”. Yet another example from the Mahabharata is Yayati, who traded his old age with his son Puru, enjoyed an extended period of youth, and then returned to his old age.<sup>1</sup>

This focus on youth and prevention of aging, is also reflected in medical science. Ayurveda lays emphasis on rejuvenation therapy or rasayana chikitsa. Rishi Chyavana is an example of a personality who achieved youthful vigor and vitality with Chyavanprash, a pharmaceutical preparation that is used even today.<sup>3</sup> Modern medicine works tirelessly to increase our life expectancy, and has succeeded in doing so through a multitude of interventions.

## THE DEFINITION OF YOUTH

Youth is a state of appearance as well as attitude; a feeling of freshness. Youth overlaps with health; it is the peak of physical, emotional and social well-being that one can achieve during the human lifespan. Optimal health is not limited to youth; it can extend throughout one’s life.

In fact, the definition of youth itself is debatable. The United Nations (UN) defines youth as the age between 15 and 24 years, while Youth Habitat, an UN-linked agency, mentions this age group as 15 to 32 years.<sup>4</sup>

## HEALTHY AGING

*“Pain is inevitable, but suffering is optional.”* –The Buddha

While aging is inevitable, ill-health is optional. The main organ/tissue targets of old age, as listed in Table 1, allow us to explore means of optimizing health during the process of aging. We classify anti-aging, or “elegant aging” interventions as preventive/promotive or corrective/curative, and as “broad-spectrum” or specific “narrow-spectrum” actions (Table 2). This classification rubric helps in understanding the importance of elegant aging, as well as in promoting a pragmatic approach towards geriatric medicine.

## ENDOCRINE OPTIMIZATION

Endocrine optimization is defined as the maintenance of endocrine and metabolic health, and correction of pre-existing endocrine and/or metabolic dysfunction, by using appropriate therapeutic interventions, to achieve person-centric therapeutic/biochemical thresholds, in a safe and well-tolerated manner, to enjoy optimal health status.

**Table 1.** Targets of Aging

- Musculoskeletal system
- Metabolic and endocrine system
- Myocardium (cardiovascular system)
- Mental and psychological health
- Mutual connections and social health

**Table 2. Anti-aging Interventions**

Preventive/promotive or “broad-spectrum” practices
<ul style="list-style-type: none"> <li>• Sensible sustenance (nutrition)</li> <li>• Stress management</li> <li>• Skills and strategies for coping with change</li> <li>• Spirituality</li> <li>• Sleep hygiene</li> <li>• Substance abuse and drug misuse avoidance</li> </ul>
Corrective/curative or “narrow-spectrum” treatments, to address the individual
<ul style="list-style-type: none"> <li>• Concerns</li> <li>• Complaints</li> <li>• Comorbid conditions</li> <li>• Complications</li> </ul>

**Table 3. Endocrine Interventions for Elegant Aging****Preventive/promotive**

## Nutritional optimization

- Macronutrient balance and adequacy: Proteins, energy
- Micronutrient adequacy: Vitamins, minerals, electrolytes
- Mega nutrient adequacy: Hydration

## Lifestyle optimization

- Physical activity
- Structured exercise

## Social and spiritual optimization

- Social connections
- Yoga
- Spirituality

**Corrective/curative**

## Management

- Management of endocrine/metabolic conditions, e.g., growth hormone deficiency, hypothyroidism, diabetes, adrenal insufficiency
- Preventive treatment of osteoporosis, sarcopenia
- Rational menopausal hormonal therapy/androgen replacement, if indicated
- Physician-guided use of anabolic steroids

## Prevention

- Avoidance of overdiagnosis/labeling of endocrine disease
- Avoidance of abuse/overuse of endocrine drugs
- Understanding of age specific, person-centric biochemical targets
- Focus on well-being and satisfaction, rather than guideline-driven targets

No single intervention is perfect or complete, and a combination of endocrine and nonendocrine therapies may be required for endocrine optimization. Various endocrine therapies can be offered to ensure elegant aging. These are listed in Table 3. It must be noted that every therapy should be prescribed only if there is a “confident clinical indication”, keeping caveats, concerns and contraindications in mind. Shared decision making should be practiced, after counseling the patient (and his/her caregivers, if necessary).<sup>5</sup> The BLACK model (Benefits, Limitations, Adverse possibilities, Cost, Knowledge required to take the drug) is helpful in ensuring comprehensive counseling.<sup>6</sup>

Older persons are uniquely sensitive to certain drugs, and may, have different thresholds for intervention, as well as therapeutic targets. The glucose, glycated hemoglobin and thyroid-stimulating hormone targets, for example, are higher or more relaxed in older persons, as compared to younger ones. Older persons are more sensitive to side effects of drugs and may require lower doses of blood-pressure and glucose-lowering medicines. On the other hand, calcium requirements are higher in postmenopausal women than their premenopausal counterparts.

**SUMMARY**

Various endocrine and metabolic interventions help in strengthening the body’s structure as well as function, and in preventing premature aging. We propose a simple framework that can be used to discuss this concept with peers, patients, members of the public and policymakers.

**REFERENCES**

1. Krishnamacharya NVR. The Mahabharata. Tirupati: Tirumala Tirupati Devasthanams. 2012. p. 12.
2. Milholland B, Vijg J. Why Gilgamesh failed: the mechanistic basis of the limits to human lifespan. *Nat Aging*. 2022;2(10):878-84.
3. Kapoor D, Mishra S, Gupta R, Aggarwal S, Mittal R, Kalra S. Endocrinology in Haryana: 50 years of statehood, 15+ years of service. *Indian J Endocrinol Metab*. 2017;21(1):257-8.
4. Tyyskä V. Conceptualizing and theorizing youth: global perspectives. In: *Contemporary Youth Research*. 2017 Mar 2 (pp. 19-30). Routledge.
5. Pel-Littel RE, Snaterse M, Teppich NM, Buurman BM, van Etten-Jamaludin FS, van Weert J, et al. Barriers and facilitators for shared decision making in older patients with multiple chronic conditions: a systematic review. *BMC Geriatr*. 2021;21(1):112.
6. Kalra S, Aggarwal S, Kumar A. Counseling for growth hormone therapy. *Turk Arch Pediatr*. 2021;56(5):411-4.