Yoga physiology and anatomy according to classical yoga and tantra texts

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Abstract
Yoga has grown to be a very popular science. It has become one of the most favored alternative therapy and fitness programs. A huge amount of scientific investigations are being carried out throughout the world using state-of-the-art technology in order to identify, measure and verify the almost miraculous results of yoga on the human body and mind. It is necessary to understand the science of yoga in a holistic sense which necessities the understanding of terms and concepts as mentioned in the classical texts of yoga. These concepts of yoga physiology and anatomy which are presented here, might be easily brushed away as ‘unscientific’ since these concepts have yet to be verified by ‘machines’. Nevertheless, in order to understand and explain the miraculous benefits, the modern medicine needs to look at them to find answers – if not now; at least in the near future.

Keywords: Yoga, yoga physiology, yoga anatomy, yoga texts, tantra texts

1. Introduction
Yoga realizes that the spark of Divinity is present in every human being. This spiritual energy lies in a dormant state, coiled three and a half times like a serpent, at the base of the spine called muladhara cakra (Gheranda Samhita [1], III.49). Ancient sages studied the human body thoroughly and revealed that life force or prana shakti operates in gross body through the nerve system, whose central access is the spiral column. There are frequent references to the cakras (psychic energy centres) in the minor Upanishads, especially yoga and in tantra literature. In the recent wake of interest in yogic sciences, it is important that the yoga physiology and yoga anatomy is understood.

2. Materials and methods
Yoga and Tantra classical texts were thoroughly investigated for references to yoga physiology and anatomy. They are: Hathayoga Pradipika (HYP), Siva Samhita [2] (SS), Gheranda Samhita [3] (GS), Hatha Ratnavali (HR), Goraksha Sataka (GS) Goraksha Samhita (GRS), Siva Svarodaya (SSW) and many Yoga Upanishads [4] such as Dharsana Upanishad (DU), Dhyana Bindu Upanishad (DBU), Sandilya Upanishad (SU) Trisikha Brahmana Upanishad (TBU), Varaha Upanishad (VU), Yoga Chudamani Upanishad (YCU), Yoga Sikha Upanishad (YSU) and Yoga Kundali Upanishad (YKU), Yoga Yajnavalkya (YY), Sat Chakra Nirupana [5] (SCN) others. All the relevant references were identified and noted. It was found that the following classical texts have mentioned about yoga physiology and yoga anatomy to some extent.

3. Results & Discussion
All the yoga practices are tailored with the sole purpose of making the practitioner to rouse the spiritual energy from it dormant resting stage at the root of the spine, higher up through various psychic centres till it reaches the thousand petal lotus, Sahasrara in the top of the head and merges with the Universal Consciousness [6]. This is mukti or liberation in the yogic sense and the process has been described in detail in various esoteric works. Its practical aspect is alive till today, being handed over from generation to generation, from preceptor to disciple, in a hidden lineage spread throughout India underneath the bubbling superficial social and public
life of the country [7]. Here the details of spiritual nerve channels (nadis), nerve centre (kanda) and the different kinds of airs (vayus) is deliberated.

3.1 Nadis

The physical body is structured by an underlying system of nadis. In recent times the nadi system has been associated with the nervous system. Chandhogyya and Bhrihadaranyak Upanishads clearly state that nadis are entirely subtle in nature. The word nadi comes from the Sanskrit root nad which means ‘flow’. Nada is a resonating and subtle vibration. Therefore, we can say that nadis are subtle flows of vibration. The Upanishads explain that the nadi penetrates the body from the soles of the feet to the crown of the head, carrying prana, the breath of life.

The entire network of nadis is so vast that even yogic texts differ in their calculations of the exact number. References in the Goraksha Sataka (GRS; 25), Siva Svarodaya (SSW-32) and Hatha Yoga Pradipika (HYP; IV-18) place their number at 72,000; the Prapancasara tantra says 300,000; while the Siva Samhita (SS-II.13) states that 3,50,000 emerge from the navel center. Regardless of the exact figure, the description of their structure is always the same. They are described as thin strand like threads, similar to those of the lotus stem, which are: 

- hansini
- hastijihva
- pusha, visvodari, alambusa
- kuhu

They conduct the energy to the brahma nadi – the nadi that which starts from the middle of the kanda (SCN-1) up to the head (SCN-2) going up the spine (DU-IV.10) till Sahasrara (TBS-31). It is also called as Brahma nadi (YSU-V.17). Sushumna is like the inner passage of a thin lotus stalk and shines like a ray of lightning (TSB-31). Out of all the nadis sushumna is the highest and the beloved of the yogis (SS-II.16). Sushumna is named as trikunda, suchatha, gosvita, sikara, transanki, vajri and omkari in Hatha Ratnavali (II.142). Lord Siva is in sushumna and Siva is in the form of hamsa (SSW-50). Sushumna represents the fire (SS-II.17) and fire consumes all actions (SSW-125). Sushumna is sambhavi (HYP-IV.18), the power that grants peace, visvarupini (YSU-I.119), visvadharini (SU-I.10) and sarasvati (the river) (HYP-IV.16). It is nirahara (beyond needing nourishment), it is nirarula (unbroken, steady) and it becomes absorbed in the subtlest tattvas (SSW-136).

Within sushumna is a subtle nadi, the vajrini, and within it a still subtler one, the citirini (SCN-1 & 2). Siva Samhita describes citirini as brilliant with five colours, pure and moving in the middle of sushumna (SS-II.19). The interior of the citirini is called the brahma nadi. In that there is the subtletest of all hollows called brahma randhra (SS-II.18). The vital air or prana cannot flow through sushumna if it is filled with impurities (HYP-IV.4). The yoga texts prescribe various practices in order that the nadiis get purified (HYP-IV.6), especially sushumna, making the way clear for Kundalini to rise up. When the prana flows in the sushumna a state of manomonnami (consciousness devoid of mind) is established (HYP-IV.20). It is also called sunyasvaram and destroys all actions (SSW-124). Siva Svarodaya recommends that no action other than spiritual practices should be done when prana flows through sushumna (SSW-130).

The passage through sushumna is the giver of joy of immortality and by contemplating on it the yogis destroy their sins (SS-II.20). The nadi sushumna leads to Brahma loka and immortality (TBU-31). Thus the real purpose of sushumna is to provide a channel for the spiritual energy in man, which is a greater force than either manas or prana sakti. Sushumna contains the three granthis or granthis, viz., the Brahma, Vishnu and Rudra granthis (ref). Hatha Yoga Pradipika (II.66 & 67) recommends pranayama (bhastrika) so that the obstruction at the brahma nadi is cleared and allows the three granthis to be broken, thus quickly arousing Kundalini. When the citta is
absorbed in sushumna, the prana ceases to move, then the impurities are removed (nadis become clear) and prana is absorbed in sushumna. A person who has achieved this is called a yogi (YKU-I).

3.1.2 Ida Nadi
Ida originates at a point just below the base of the spine where the first energy center, known as muladhara cakra, is located. It emerges from the left side of sushumna (DU-IV.13; SU-I.11 & SCN-1) and spirals upwards, intersecting at the other four energy centers and plexuses in the spinal column and comes to a point of termination at the root of the left nostril (DU-IV.13), which joins ajna cakra, the sixth energy center. The Siva Svarodaya (50) likens its nature to the energy created by the moon, therefore, it is also known as the candra nadi. Ida is associated with the parasympathetic nervous system (PNS), which sends impulses to the visceral organs to stimulate the internal processes. This creates a general state of relaxation in the superficial muscles, thus lowering the outer body temperature. Therefore, it is said that ida is cooling, relaxing and introverting. Siva Samhita (II.8) describes that the channel ida, goes over the body to nourish it, like the waters of the heavenly Ganges. Ida is compared to the day (HYP-IV.42).

In Hatha Ratnavali (II-144) the synonyms are ida, candra (moon), sasi, vaiti, and vama (left side), while the others names are bhagavati and ganga (river) (HYP-III.11). Ida is in the form of sakti (SSW-52) and flows on the left side of the body. It is amirt (nectar) and the giver of strength and nourishment (SSW-57). Ida, the candra nadi is the female principle and when this nadi is active one should begin placid work (SSW-60). The flow of prana in ida gives siddhi (perfection or greater psychic ability) (SSW-58). According to svara yoga, left nostril breathing influences the activities of the mind, and it indicates that introversion and mental creativity predominate so that any extremely dynamic or extrovert activity should be avoided. The svara yogi thus manipulates the flow of air in the left nostril in order to directly control ida and bring about its influence at will or suppresses it when necessary. Through ida the mind can be controlled (SSW-67).

3.1.3 Pingala nadi
Pingala emerges on the right side of muladhara exactly opposite to ida starting from the right of sushumna (DU-IV.13, YSU-V.19 & SU-I.11) with its mouth over brahmarandhra (DU-IV.13). It spirals up the spinal column, crossing ida at the four major energy centers, and terminates at the root of the right nostril (SU-I.11). Pingala governs the whole right side of the body. To control pingala the breath in the right nostril is to be manipulated. Pingala is compared to the night (HYP-IV.42) and the river Yamuna signifies it (HYP-II.111).

Hatha Ratnavali (II.143) names pingala as dambhini, surya, yamina, aksara, kalagni, rudri, candi. Pingala is the transmitter of prana sakiti. It is the positive aspect, also known as the surya or the solar nadi (SSW-50 & HR-IV.37) because its energy is as invigorating as the sun’s rays. Pingala’s energy activates the physical body and externalizes the awareness. It is associated with the sympathetic nervous system (SNS), which releases adrenalin to stimulate the superficial muscles. Pingala is energizing, heating and extroverting. Pingala is known as the daksina (right flow) (SSW-49) and aids the growth of the body (SSW-57). Surya, the solar flow is the male principle; sun is Siva (SSW-60) and when prana flows through pingala difficult and hard work should be done (SSW-61). Pingala is the giver of nirvana since the Lord of creation and destruction (the sun) moves in this nadi through auspicious ecliptical signs (SS-II.12). Kundalini arises when all the nadis are purified and when the ida and pingala are controlled. Then Kundalini rises up through the sushumna to reach Sahasrara. Ida is the Sakti and pingala is Siva. When Kundalini rises through sushumna, there is union of Siva and Sakti leading to liberation. This is the culmination of the yoga process.

3.2 Vayus
Vayu is the ‘air’. According to yoga philosophy there are ten different vayus that have different functions and are located at distinct places in the body. It is the vayu that travels through the nadis. Siva Svarodaya (SSW-42–47) is a treatise that dealt with this topic at length. According to it, they are five main pranas: prana, apana, samana, udana, and vyana (SSW-42) and five subsidiary vayus: naga, kurma, krikala, devadatta, and dhanaanjaya (SSW -43). The eternal prana exists in the heart and apana vayu is in the excretory organs (SSW-43). Samana vayu is situated in the navel region, udana is in the throat and vyana pervades throughout the body (SSW-44). Naga vayu is for belching, kurma vayu is for blinking and likewise, krikala, sneezing; devadatta, yawning (SSW-46) and dhanaanjaya pervades after death. In the form of the jiva, these ten vayus work in all nadis (SSW-47). During yogic practices these vayus are controlled and mastered enabling Kundalini to rise up.

3.3 Kanda (Nerve Centre)
There is another important yogic anatomical part of the body that needs description and that is, the kanda. Kanda means a ‘bubb’, ‘knot’, ‘swelling’ or ‘lump’. The shape of kanda is oval (VU-21; Vasitha Samhita-II.12; Yoga Yajnavalkya (YY-IV.17) and is said to be like the egg of a hen covered with skin (YSU-V.21; DU-IV.4 & YCU-14). In Hatha Yoga Pradipika (HYP-III.109) kanda is described as twelve fingers in height and four fingers in width whereas it is said to be four fingers in height and breadth (DU-IV.14; VU-21). Kanda is the place said to be located two inches below the genitals and two inches above the anus, the midpoint of the human being, in a place called tundam (TBUI-32 & YBU-31).

With reference to muladhara cakra, kanda is said to be located nine inches above the level of muladhara (DU-IV.3; HYP-III.109 & YSU-8). Although there are differences relating to the exact location of the kanda, kanda is said as the place from which all the nadis originate (YSU-IV.27; YCU-15; DBU-51 & HR-IV.33). It is said to be soft and white in colour (HYP-III.109). Kanda is the seat of Kundalini (DU-IV.11; YCU-36-37 & HYP-III.103). If the Kundalini rests below the kanda it binds the jiva. If it goes above the level of kanda through the path of sushumna it gives liberation (YCU-44). For this purpose many yoga realises suggest to activate the kanda region by doing specified asanas, pranayama, mudras and bandhas (HYP-III.110 & YKU-I.49).

Once kanda is activated and controlled then sushumna nadi is opened allowing Kundalini to pass through to reach the Sahasrara (HYP-II.41).

4. Conclusions
Scientific investigations all over the world have shown that there are numerous benefits of yoga including physical, psychological, moral and spiritual. All these are brought forth due to the correct passage of the spiritual energy via the nadis.
and the *cakras* in a graded manner. It is imperative to learn about the yoga physiology and anatomy in order to understand this popular alternative medical science by the new age person.

5. References