

PANCHAMAHABHUTA SIDDHANTA AND THE HIERARCHICAL ORGANIZATION OF THE HUMAN BODY: A CONCEPTUAL AND INTEGRATIVE REVIEW

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ABSTRACT

Background: Panchamahabhuta Siddhanta is one of the foundational doctrines of Ayurveda. It holds that every material and physiological entity is composed of five elemental principles: Prithvi (earth), Jala (water), Tejas (fire), Vayu (air) and Akasha (space), in varying proportions. Contemporary biomedical science describes the body as a nested hierarchy that begins at the atomic scale and proceeds through molecules, organelles, cells, tissues, organs and organ systems to the intact organism. Although the two frameworks have different origins, both attempt to explain how simpler units combine to generate the properties of a living being. **Objective:** To correlate the Panchamahabhuta Siddhanta with each recognized tier of biological organization used in modern physiology and cell biology. **Materials and Methods:** A conceptual (narrative) review was carried out. The Brihatrayi (Charaka Samhita,

Sushruta Samhita and Ashtanga Hridaya/Samgraha) served as **primary sources**, and **standard physiology textbooks and contemporary literature on systems biology, network physiology and Prakriti research** served as **secondary sources**. Each biological structure or function was correlated with the Mahabhuta whose classical Gunas best matched its behaviour. Correlation and Discussion: The five Mahabhutas can be correlated with each of the eight organizational tiers examined. Prithvi corresponds to structural rigidity and mass, Jala to cohesion and fluid transport, Tejas to catalysis and energy transformation, Vayu to motion and signal propagation, and Akasha to the spatial or porous domains that permit exchange and communication. In keeping with classical teaching, all five elements are present in every structure, with one or two predominating at a given tier. Conclusion: Read alongside the modern hierarchy of biological organization, the Panchamahabhuta Siddhanta may be interpreted as an early systems-level conceptual model of the body. These correspondences are interpretive rather than empirical. If formalized and validated, they may support integrative teaching, translational research and Prakriti-based clinical approaches.

KEYWORDS: Panchamahabhuta; Ayurveda; biological organization; Kriya Sharir; systems biology; human physiology; integrative medicine.

INTRODUCTION

Philosophical Origins of the *Panchamahabhuta* Concept

Long before Ayurveda took shape as a clinical discipline, Indian philosophical schools — notably *Sankhya*, *Vaisheshika* and *Nyaya* — had already proposed that the universe (*Brahmanda*) and the individual body (*Pinda*) obey the same underlying laws, so that structures at the cosmic scale and structures at the bodily scale could be understood through a shared vocabulary. Ayurveda absorbed this premise and reworked it into a practical, clinically usable model of the body. Classical authors state the principle directly: every substance in existence is composed of the five elements. Under this premise, anatomical form, physiological activity and pathological change are all expressions of shifting proportions among *Akasha* (space), *Vayu* (air or motion), *Tejas* (fire or transformation), *Aap* (water or cohesion) and *Prithvi* (earth or mass).

Panchamahabhuta Within Ayurveda

Within Ayurvedic physiology, the *Mahabhutas* are not treated as inert construction material. They are described as functional states of matter that give rise to the three biological humors

(*Tridosha*), the seven structural tissues (*Sapta Dhatu*), the excretory products (*Mala*), and the network of microchannels (*Srotamsi*) through which the body's exchanges occur. Their physical attributes (*Gurvadi Guna*) determine what they do physiologically: the heaviness and roughness associated with *Prithvi* confer mechanical stability, while the fluidity and softness associated with *Aap* govern hydration and cellular adhesion. Health, in this model, is the sustained equilibrium of the elemental forces (*Svastyā*), and disease is their disturbance (*Vyadhi*).

The Modern Hierarchy of Biological Organization

Contemporary biology arranges the body into successive tiers of increasing complexity: atoms combine into molecules, molecules assemble into organelles, organelles cooperate within cells, cells aggregate into tissues, tissues combine into organs, organs cooperate as organ systems, and organ systems together constitute the organism. A defining feature of this hierarchy is emergence — properties appear at a given tier that could not have been predicted from its component parts in isolation. A cardiac myocyte cannot, by itself, pump blood; only the coordinated tissue of the myocardium can. This principle of emergent, network-level function underlies what is now called systems biology and network physiology.

Rationale for the Present Review

Ayurvedic teaching has traditionally relied on classical analogies that can appear disconnected from modern histology and molecular biology, while biomedical science has tended toward a reductionist style of explanation centered on individual genes or receptors, sometimes at the expense of the wider systemic picture. Prior scholars have examined the elemental composition of isolated tissues or organs, but a single account tracing the *Mahabhutas* continuously from the subatomic scale to the whole organism has not, to our knowledge, been assembled. This review attempts that continuous mapping across all eight tiers of biological organization, with the aim of giving classical scholars and biomedical researchers a shared point of reference.

AIM

To correlate *Panchamahabhuta Siddhanta* with the hierarchical organization of the human body from an integrative Ayurvedic and modern biological perspective.

OBJECTIVES

1. To review the classical Ayurvedic literature describing the concept of *Panchamahabhuta*.

2. To examine the hierarchical organization of the human body from atoms to the whole organism in modern biology.
3. To establish conceptual correlations between the five *Mahabhutas* and each level of biological organization.
4. To explore the relevance of this integrative framework for contemporary physiology, systems biology, and Ayurvedic research.

MATERIALS AND METHODS

A narrative review was performed using *Brihatrayi* (*Charak Samhita*, *Sushruta Samhita* and *Ashtang Hridaya*) and peer-reviewed literature retrieved from PubMed, Scopus, Google Scholar, Web of Science, AYUSH Research Portal, and DHARA. Relevant studies were screened and synthesized according to the hierarchical levels of biological organization to establish conceptual correlations with *Panchamahabhuta*.

REVIEW OF LITERATURE

Embryogenesis offers one of the clearest classical illustrations of elemental participation in structural development. *Sushruta Samhita*, *Sharirasthana* 1/19, describes fetal development (*Garbha Sambhava*) as continuous cell division and differentiation directed by the five elements together: *Vayu* initiates division of the zygote, *Tejas* drives metabolic differentiation, *Aap* supplies moisture, *Prithvi* contributes solid mass, and *Akasha* opens the internal cavities of the developing form.

Among modern attempts at correlation, *Tridosha* theory interpreted as the systemic-level expression of the underlying *Mahabhutas*, the five-element system parallels the thermodynamic phases and kinetic behavior recognized in physical systems. A recurring shortcoming in this literature, however, is the tendency to assign a single element to a single tissue — for example, describing bone (*Asthi*) as purely *Prithvi*. Classical sources do not support so strict a mapping: every structure is *Panchabhautika*, containing all five elements, with certain elements simply predominant enough to define its characteristic behavior. The present review is built on that corrective, tracing all five elements — not one at a time — through every tier considered.

RESULTS AND DISCUSSION

The Atomic Level

At the smallest structural scale, matter reduces to atoms and subatomic particles. Ayurvedic theory frames this as the transition from *Tanmatra* (subtle sensory potential) to *Paramanu* (physical atom). Modern physics no longer treats the atom as a solid particle; it is understood instead as a largely empty, dynamically maintained structure held together by quantum-mechanical forces.

Akasha corresponds to the spatial volume within the atom — the vast separation, relative to particle size, between the dense nucleus and the surrounding electron shells, without which stable orbital structure could not exist. *Vayu* corresponds to the continuous kinetic motion of electrons within their probability distributions. *Tejas* corresponds to the strong and weak nuclear forces binding the nucleus together, together with the electromagnetic attraction between protons and electrons, preventing the atom from either collapsing or dispersing. *Aap* corresponds to the gravitational and electrostatic interactions that allow atoms to approach and bond with one another. *Prithvi* corresponds to the mass and inertia concentrated in the nucleus, providing the atom's physical substance.

The Molecular Level

Molecules arise when atoms share or exchange valence electrons to form stable bonds, ranging from simple water to complex macromolecules such as nucleic acids, proteins, lipids and carbohydrates. Water exemplifies *Aap* most directly: its polarity permits hydrogen bonding, making it the universal biological solvent and the medium of cellular cohesion and lubrication. The DNA double helix illustrates a *Prithvi–Akasha* combination — a stable structural blueprint (*Prithvi*) whose base sequence is read across the spatial grooves of the helix (*Akasha*), permitting transcription-factor binding. Proteins combine *Prithvi* and *Tejas*: their folded conformation provides structural stability, while catalytically active enzymes carry out the rapid transformations characteristic of *Tejas*. Membrane lipids combine *Prithvi* and *Aap*, with hydrophobic tails forming a stable bilayer boundary while retaining the lateral fluidity that *Aap* confers. Table 2 summarizes these molecular correspondences.

Biological molecule	Dominant <i>Mahabhuta</i>	Primary biological function	Ayurvedic physiological analogue
Water (H ₂ O)	<i>Aap</i>	Universal solvent; hydrogen bonding; hydration	<i>Kleda</i> (moisture, fluidity)

Enzymes	<i>Tejas</i>	Catalysis of biochemical reactions; ATP hydrolysis	<i>Agni</i> (transformative fire)
Structural collagen	<i>Prithvi</i>	Tensile strength; extracellular matrix support	<i>Dridhatva</i> (rigidity, stability)
Hormones / neurotransmitters	<i>Vayu</i>	Rapid systemic signaling; kinetic activation	<i>Prana</i> (neurological drive)
Macromolecular cavities	<i>Akasha</i>	Binding pockets; channel pores; transport space	<i>Sushiratva</i> (porosity)

The Organelle Level

Organelles are membrane-bound compartments that carry out discrete metabolic tasks, functioning as the cell's internal transformation sites. The nucleus corresponds to *Prithvi*, anchoring the genetic material and maintaining structural heredity. Mitochondria correspond to *Tejas*, converting glucose and oxygen into ATP through the electron transport chain and generating cellular heat (*Ushma*). Lysosomes and peroxisomes likewise express *Tejas* through their hydrolytic, acid-mediated breakdown of cellular waste, functioning as intracellular digestion (*Pachana*). The endoplasmic reticulum and Golgi apparatus jointly express *Akasha* and *Vayu*: the reticulum provides a physical channel network for protein transit (*Akasha*), while the Golgi apparatus directs and moves this cargo using motor proteins (*Vayu*). The cytoskeleton reflects a *Prithvi–Vayu* combination, maintaining cell shape while enabling intracellular transport and division.

Cellular Level

The cell is the elementary unit of life. The phospholipid bilayer expresses *Prithvi* and *Aap* together — a physical boundary that nonetheless remains fluid and self-sealing. The cytoplasm expresses *Aap*, suspending organelles and enabling diffusion. Ion channels and the resulting action potentials express *Vayu* and *Akasha* jointly, with ionic flux through channel pores generating the membrane potentials that constitute the cellular basis of *Prana Vata*. Receptor-triggered phosphorylation cascades, converting an extracellular signal into a nuclear response, express *Tejas*.

Tissue Level

A tissue (*Dhatu*) is a cooperating population of similar cells performing a shared function; the four histological tissue types recognized by modern histology map closely onto the properties associated with the seven *Sapta Dhatus*. Epithelial tissue expresses *Akasha* and *Aap*, lining surfaces and cavities while producing protective, moist secretions. Connective tissue divides

along elemental lines: dense connective tissue (bone, cartilage) is *Prithvi*-dominant, providing rigidity, while fluid connective tissue (blood, lymph) is *Aap*-dominant, sustaining circulation and hydration. Muscle tissue expresses *Vayu* through the contractile, sliding-filament mechanism of actin and myosin. Nervous tissue expresses *Vayu* and *Akasha* together, with electrical impulses (*Vayu*) crossing synaptic clefts (*Akasha*) to coordinate systemic responses.

Organ Level

An organ (*Avayava*) is a structural union of tissues serving one common purpose, classically understood to be shaped during gestation by the combined action of *Tridosha* and *Mahabhuta*. The heart (*Hridaya*) combines *Vayu*, as the contractile muscular pump, and *Aap*, as the circulating blood it moves, with its chambers and valves supplying the *Akasha* needed to direct flow. The brain reflects *Akasha*, *Vayu* and *Aap* together — lipid-rich myelin (*Aap*), fluid-filled ventricles (*Akasha*), and rapidly conducted electrical impulses across neural networks (*Vayu*). The liver (*Yakrit*) is the principal somatic seat of *Tejas*, hosting the great majority of the body's enzymatic transformation and corresponding to *Ranjaka Pitta*. The lungs express *Akasha* and *Vayu* jointly, with millions of hollow alveolar spaces (*Akasha*) expanding and contracting to drive gas exchange (*Vayu*).

The Organ-System Level

Organ systems bring several organs together into coordinated physiological networks, described in *Ayurveda* as *Srotamsi*. The digestive system (*Annavaha Srotas*) combines the mechanical churning supplied by *Samana Vata* (*Vayu*) with the chemical breakdown supplied by *Pachaka Pitta* (*Tejas*). The circulatory system (*Rasavaha Srotas*) combines fluid volume (*Aap*) with the hydrostatic pressure of *Vyana Vata* (*Vayu*) to distribute oxygen and nutrients. The respiratory system (*Pranavaha Srotas*) combines the physical expansion of the thoracic cavity (*Akasha*) with the active airflow of *Prana Vata* (*Vayu*). The nervous system (*Manovaha Srotas*) is predominantly a *Vayu*-governed network, coordinating rapid electrochemical communication across the organism.

The Whole-Organism Level

At the level of the intact organism, all structural and functional tiers converge into a self-regulating living being, described classically as *Panchabhautika Purusha*. Modern physiology defines this integrated state as homeostasis; *Ayurveda* describes the corresponding state as *Dhatu Samya*. The *Tridoshas*, built from paired *Mahabhutas*, govern this systemic

regulation: *Vata (Akasha and Vayu)* governs movement, neural transmission and transport; *Pitta (Tejas and Aap)* governs digestion, thermoregulation and metabolic transformation; *Kapha (Prithvi and Aap)* governs structural integrity, fluid balance, lubrication and immune resilience.

Summary Matrix

Given table consolidates the correspondences developed above across all eight tiers of organization.

Level	Akasha	Vayu	Tejas	Aap	Prithvi
1.Atom	Intra-atomic volume	Electron orbital motion	Nuclear binding energy	Inter-atomic forces	Nuclear mass/density
2.Molecule	Atomic spacing	Kinetic vibration	Covalent/ionic bonds	Hydrogen bonding	Rigid molecular backbones
3.Organelle	Endoplasmic reticulum	Vesicular transport	Mitochondria	Cytosol/matrix	Nucleus/cytoskeleton
4. Cell	Membrane pore channels	Ion flux/action potential	Enzymatic cascades	Intracellular fluid	Outer membrane boundary
5. Tissue	Epithelial cavities	Muscular contraction	Metabolic activity	Blood plasma/lymph	Bone osteoid matrix
6. Organ	Heart chambers	Diaphragmatic motion	Hepatic metabolic core	Cerebrospinal fluid	Skeletal frame
7. Organ system	GI tract lumen	Nervous communication	Digestive system	Circulatory system	Musculoskeletal system
8. Organism	Internal cavities	Neurological network	Thermoregulation	Fluid homeostasis	Body weight/stature

Synthesis: Reductionist and Systems-Based Paradigms

Modern medicine has drawn much of its explanatory power from reductionism — isolating a single gene, receptor or pathway — but this approach can lose sight of how such components behave within the larger network they belong to. Ayurveda has, from its outset, favored a systems-oriented description of the body as a set of interacting functional relationships. The two paradigms are better viewed as complementary than as competing: modern biology supplies precise, quantitative detail at each tier, while *Panchamahabhuta* theory supplies a qualitative account of how those tiers cohere into a functioning whole.

This complementarity is echoed in the modern field of network physiology, which studies how organ systems coordinate activity across different physical scales — for instance, how a stressor engages the nervous, endocrine and immune systems simultaneously rather than in isolation. *Ayurveda* frames the same phenomenon through *Tridosha* and *Mahabhuta*

interaction, describing how an elevation of Vayu under stress can, in turn, disturb Tejas-governed digestion and Aap-governed fluid balance.

Translational and Clinical Relevance

Constitution-based (Prakriti) medicine: characterizing an individual's elemental constitution may help anticipate disease susceptibility and guide personalized dietary and lifestyle recommendations.

Pharmacology (Dravyaguna): classifying herbal substances by their elemental and pharmacological attributes (Rasa, Guna, Virya, Vipaka) may assist in identifying combinations that act on multiple biological pathways at once.

Chronobiology (Ritucharya): daily and seasonal Ayurvedic regimens align internal elemental balance with environmental rhythm, offering a practical framework for preventive and lifestyle-based care.

Limitations and Future Directions

Terminological translation remains a major obstacle to integrative work: rendering Agni simply as digestion, for example, understates its broader role in cellular-level metabolism (*Tejas*). A shared, bidirectional vocabulary linking Ayurvedic and biomedical terms is a necessary next step for collaborative research. Standard randomized controlled trial designs, built to test one active ingredient against one disease, also sit awkwardly with Ayurvedic interventions, which are typically multi-component, personalized and lifestyle-integrated; adaptive trial designs and systems-biology methodologies are likely to be better suited to evaluating them. Emerging tools — Ayurgenomic profiling of Prakriti types, machine-learning analysis of diagnostic patterns such as Nadi Pariksha, and network pharmacology modelling of multi-target herbal formulations — offer promising directions for future work, though none has yet been validated at scale.

CONCLUSION

Panchamahabhuta Siddhanta, read against the modern hierarchy of biological organization, functions less as historical philosophy and more as an early systems-level model of the body. Traced from the kinetic behavior of subatomic particles to the homeostatic regulation of the whole organism, the five elements offer a consistent qualitative account that runs parallel to the quantitative detail furnished by modern biology. Neither framework need concede ground

to the other: integrating the two may instead enrich Ayurvedic and biomedical education alike and inform a more personalized, preventive style of clinical practice.

REFERENCES

1. Astanga Samgraha, Hindi Commentary, by Ravidutta Tripathi, Chaukhmba Sanskrita Sansthana, Varanasi, print; 2006, Sharirsthana, chapter-5, Verse 72.
2. Vaidya Vijay Shankar Kale, Charak Samhita, Marathi Commentary Chaukhmba Prakashan Delhi 110002, Reprinted 2020, Vol-1, Sharirstan, Chapter No.27, Verse No.16.
3. Kaviraja Ambikadutta Shastri, Susruta Samhita With Ayurveda-Tatva-Sandipika Hindi Commentary, Chaukhmbha Sanskrit Sansthan, Varanasi; Reprinted 2021, Sharirsthan, Chapter 1, Verse No. 19.
4. Dr. Ganesh Krushn Garde, Sarth Vagbhat, Marathi Commentary Chaukhmba Prakashan Varanasi 221001, Reprinted 2025, Sharirsthan, Chapter No.3, Verse No.3-4.
5. Vaidya Vijay Shankar Kale, Charak Samhita, Marathi Commentary Chaukhmba Prakashan Delhi 110002, Reprinted 2020, Vol-1, Sutrasthan, Chapter No.8, Verse No.3,7-11.
6. Kaviraja Ambikadutta Shastri, Susruta Samhita With Ayurveda-Tatva-Sandipika Hindi Commentary, Chaukhmbha Sanskrit Sansthan, Varanasi; Reprinted 2021, Sharirsthan, Chapter 1, Verse No. 14-15.
7. Kaviraja Ambikadutta Shastri, Susruta Samhita With Ayurveda-Tatva-Sandipika Hindi Commentary, Chaukhmbha Sanskrit Sansthan, Varanasi; Reprinted 2021, Sharirsthan, Chapter 1, Verse No. 12.
8. Astanga Samgraha, Hindi Commentary, by Ravidutta Tripathi, Chaukhmba Sanskrita Sansthana, Varanasi, print; 2006, Sutrasthana, chapter 20, Verse 1.
9. C. Guyton and J. E. Hall, Textbook of Medical Physiology, 14th ed. Philadelphia, PA, USA: Elsevier, 2021.
10. G. J. Tortora and B. Derrickson, Principles of Anatomy and Physiology, 16th ed. Hoboken, NJ, USA: Wiley, 2020.