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Review Article

ASSOCIATION OF *PRAKRITI* WITH STRESS-INDUCED PHYSIOLOGICAL CHANGES: AN AYURVEDIC PERSPECTIVE AND CONTEMPORARY UNDERSTANDING

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ABSTRACT

Prakriti, the Ayurvedic concept of individual constitution determined by the relative predominance of *Vata*, *Pitta*, and *Kapha doshas*, provides a comprehensive framework for understanding inter-individual variability in health, disease susceptibility, and physiological responses to environmental and psychological challenges. Classical Ayurvedic texts systematically link *Doshic* imbalance (*Dosha prakopa*) and mental causative factors (*Manasika nidana*) to a wide spectrum of stress-related disorders, while contemporary research increasingly demonstrates *Prakriti*-specific patterns in autonomic reactivity, HRV responses to orthostatic and cognitive stress, perceived stress levels, sleep architecture, and predisposition to anxiety, metabolic, and inflammatory conditions. *Vata*-predominant individuals characteristically exhibit heightened sympathetic reactivity, greater parasympathetic withdrawal under challenge, and elevated vulnerability to anxiety, insomnia, and irregular physiological rhythms. *Pitta* types tend to display intense metabolic activation, stronger inflammatory responses, and a propensity toward irritability and burnout. *Kapha* types generally show relative physiological stability, higher baseline parasympathetic tone, and delayed or sustained effects under prolonged stress, with greater resilience to acute fluctuations yet susceptibility to inertia and depressive withdrawal. This review integrates classical concepts drawn from *Charaka Samhita*, *Sushruta Samhita*, and *Ashtanga Hridaya* with contemporary findings from autonomic physiology, psychoneuro-endocrinology, and Ayurgenomics. *Prakriti* assessment emerges as a potentially valuable translational tool for personalized stress risk stratification and the design of individualized lifestyle (*Dinacharya*, *Ritucharya*), yoga-based, and adaptogenic interventions. Further standardized, longitudinal, multi-omics, and interventional studies are essential to validate and operationalize these associations within the framework of precision medicine.

INTRODUCTION

Stress represents a complex psychophysiological response that arises when perceived environmental or internal demands exceed an individual's adaptive capacity.[1] In contemporary society, chronic stress has emerged as a pervasive determinant of health, contributing substantially to the global burden of non-communicable diseases including cardiovascular disorders, type 2 diabetes, anxiety, depression, and autoimmune conditions.

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The World Health Organization has repeatedly highlighted stress-related illness as a major public health challenge of the twenty-first century. Acute stress mobilizes adaptive resources through coordinated activation of the hypothalamic–pituitary–adrenal (HPA) axis and the sympathoadrenal system. This response elevates circulating cortisol and catecholamines, increases heart rate and blood pressure, redistributes blood flow toward skeletal muscle and brain, elevates blood glucose via glycogenolysis and gluconeogenesis, and modulates both innate and adaptive immunity.[2] When activation becomes chronic or is repeatedly triggered without adequate recovery, the cumulative physiological cost-termed allostatic load- predisposes individuals to hypertension, metabolic syndrome, visceral adiposity,

anxiety disorders, depression, sleep disruption, endothelial dysfunction, and low-grade systemic inflammation.[3]

Despite extensive research into the biology of stress, marked inter-individual differences in stress reactivity, recovery capacity, and clinical vulnerability remain incompletely explained by genetic polymorphisms, personality traits, early-life adversity, or environmental exposures alone. Two individuals exposed to identical occupational or psychosocial stressors may exhibit dramatically different cortisol trajectories, autonomic responses, inflammatory profiles, and long-term health outcomes. These differences suggest the existence of deeper constitutional factors that shape baseline autonomic tone, neuroendocrine set-points, inflammatory readiness, and psychological appraisal styles. Identifying such constitutional determinants is essential for moving beyond one-size-fits-all approaches toward truly personalized prevention and treatment strategies.

Ayurveda, the traditional medical system of India with a continuous textual tradition spanning more than two millennia, offers a sophisticated constitutional framework known as *Prakriti* that addresses precisely this dimension of biological individuality.[4] *Prakriti* is defined as the unique psychosomatic constitution of an individual, established at the time of conception by the relative dominance of the three fundamental biological energies or *Doshas*-*Vata*, *Pitta*, and *Kapha*. Once fixed, *Prakriti* remains relatively stable throughout life and influences physical morphology, digestive capacity (*Agni*), metabolic tendencies, psychological predispositions, immune responsiveness, sleep patterns, and susceptibility to specific disease patterns.[5] Classical Ayurvedic literature repeatedly emphasizes that identical external stressors produce divergent physiological and psychological outcomes according to an individual's constitutional type. This principle of constitutional specificity constitutes one of the foundational pillars of Ayurvedic diagnosis and therapeutics.

Modern interdisciplinary research under the rubric of Ayurgenomics has begun to correlate extreme *prakriti* phenotypes with distinct genomic expression signatures, biochemical profiles, autonomic function patterns, and differential stress responses, thereby providing an empirical bridge between traditional typology and contemporary systems biology.[6] Studies have demonstrated *Prakriti*-related differences in gene expression related to immune function, lipid metabolism, and oxidative stress, as well as measurable variations in heart rate variability, blood pressure reactivity, and inflammatory markers. These findings suggest that *Prakriti* may serve as a clinically useful intermediate phenotype linking genotype, environment, and disease risk.

The present review synthesizes classical Ayurvedic understanding of *Prakriti* and stress with emerging physiological, neuroendocrine, and clinical evidence. Particular attention is given to associations between constitutional types and stress-induced changes in autonomic nervous system activity, HPA-axis dynamics, inflammatory markers, sleep quality, and psychological outcomes. The overarching aim is to highlight the translational potential of *Prakriti*-based stratification for individualized prevention, risk assessment, and integrative management of stress-related disorders in both clinical and public-health settings.

Ayurvedic Concept of *Prakriti*

According to the foundational texts- *Charaka Samhita*, *Sushruta Samhita*, and *Ashtanga Hridaya*-*Prakriti* arises from the relative predominance of one or more *Doshas* at the moment of fertilization, further modulated by parental *Doshic* status, season of conception, maternal diet and lifestyle during pregnancy, and the qualitative state of the reproductive tissues (*Shukra* and *Artava*).[7] Seven primary constitutional types are recognized: three single-*Dosha* types (*Vata*, *Pitta*, *Kapha*), three dual-*dosha* combinations (*Vata-Pitta*, *Pitta-Kapha*, *Vata-Kapha*), and one balanced or *Sama prakriti* in which all three *Doshas* exist in near-equilibrium. Extreme single-*Dosha* phenotypes are relatively uncommon in the general population; the majority of individuals exhibit dual-*Dosha* predominance. Assessment of *Prakriti* traditionally involves a detailed clinical evaluation of physical characteristics (body frame, skin, hair, eyes, teeth, voice), physiological patterns (appetite, digestion, elimination, sleep, temperature preference), and psychological traits (temperament, memory, emotional reactivity, speech patterns).

Vata is characterized by the qualities of *Laghu* (light), *Ruksha* (dry), *Chala* (mobile), *Sheeta* (cold), and subtlety. It governs all forms of movement within the body, including nervous system activity, respiration, circulation of blood and lymph, and the process of elimination. Individuals of *Vata prakriti* typically possess a thin, light frame with prominent joints and tendons, dry or rough skin, variable appetite and digestion that fluctuates with mental state, quick physical and mental movements, light and frequently interrupted sleep, and marked sensitivity to cold, wind, dry weather, and rapid environmental change. Psychologically they are creative, enthusiastic, adaptable, imaginative, and quick to learn, yet they are equally prone to anxiety, restlessness, fearfulness, indecisiveness, and irregularity of routine when under stress.[8] Their nervous systems tend toward hyper-

reactivity, and they often experience stress as a sense of being overwhelmed or scattered.

Pitta embodies the qualities of *Ushna* (hot), *Tikshna* (sharp), *Laghu* (light), and *Snigdha* (unctuous). It is responsible for all transformative and metabolic processes- digestion of food, transformation of tissues, thermoregulation, visual perception, and higher cognitive functions such as discrimination, judgment, and intellect. *Pitta*-predominant individuals generally exhibit a moderate, well-proportioned, muscular build, warm skin that may flush easily, strong and regular appetite with robust digestive capacity, intense drive and ambition, sharp intellect, and a tendency toward warmth or mild inflammatory conditions. They are courageous, focused, leadership-oriented, articulate, and efficient, yet under stress they readily manifest irritability, anger, impatience, critical or judgmental attitudes, perfectionism, and a propensity toward inflammatory, acidic, or burnout-related conditions.[9] Stress for *Pitta* types are often experienced as frustration when goals are obstructed or when control is threatened.

Kapha is defined by the qualities of *Guru* (heavy), *Snigdha* (oily), *Sheeta* (cold), *Manda* (slow), and *Sthira* (stable). It provides the structural integrity, lubrication, cohesion, and anabolic force of the body. *Kapha* individuals characteristically possess a solid, well-built, often large frame with good muscle and fat development, smooth and oily skin, steady energy levels, slow but sustained digestion, deep and prolonged sleep, and a calm, patient, and methodical disposition. They are enduring, compassionate, loyal, and slow to anger, yet under prolonged stress they may develop lethargy, excessive attachment, possessiveness, weight gain, fluid retention, and a tendency toward depressive withdrawal or metabolic inertia.[10] *Kapha* types often experience stress as a heavy, stagnant, or overwhelming burden that is difficult to discharge.

In addition to physical (*Deha*) *Prakriti*, Ayurveda recognizes *Manas prakriti*, determined by the relative predominance of the three mental qualities or *Gunas*: *Sattva* (clarity, balance, harmony, and discriminative wisdom), *Rajas* (activity, passion, restlessness, and desire), and *Tamas* (inertia, dullness, obscuration, and resistance to change). *Rajas* intensifies mental activity, emotional reactivity, and the drive to act; *Tamas* promotes withdrawal, heaviness, and reduced initiative; *Sattva* supports balanced appraisal, emotional regulation, resilience, and efficient recovery after challenge. The interplay between *Deha prakriti* and *Manas prakriti* establishes the individual's baseline autonomic and psychological set-point, thereby shaping both the intensity and the qualitative pattern of the stress response.[11] Classical descriptions explicitly note that *Kapha* types are less easily provoked to anger or despondency and recover more readily, whereas *Vata* types display greater emotional and physiological lability and slower restoration of equilibrium after disturbance.

Contemporary Understanding of Stress-Induced Physiological Changes

Modern stress physiology begins with cognitive and emotional appraisal mediated by interconnected cortical and limbic circuits, particularly the amygdala, prefrontal cortex, hippocampus, and insula. When a stimulus is appraised as threatening, unpredictable, or overwhelming, the paraventricular nucleus of the hypothalamus secretes corticotropin-releasing hormone (CRH), which stimulates pituitary release of adrenocorticotropic hormone (ACTH) and subsequent adrenal cortical secretion of cortisol.[12] Concurrently, the locus coeruleus–noradrenergic system and the sympathetic preganglionic neurons are activated, resulting in rapid release of noradrenaline and adrenaline from sympathetic nerve terminals and the adrenal medulla. Acute physiological consequences include tachycardia, increased cardiac contractility, peripheral vasoconstriction in some vascular beds and vasodilation in others, redistribution of blood flow toward skeletal muscle and brain, elevated blood glucose via glycogenolysis and gluconeogenesis, bronchodilation, and rapid enhancement of innate immune surveillance.[13]

Heart rate variability (HRV) has emerged as one of the most sensitive and widely used non-invasive markers of autonomic balance and stress reactivity. High-frequency (HF) power in the respiratory frequency range and the root mean square of successive differences (RMSSD) predominantly reflect parasympathetic (vagal) modulation of the heart. An elevated low-frequency/high-frequency (LF/HF) ratio is commonly interpreted as indicating relative sympathetic dominance or reduced vagal tone, although the precise physiological interpretation of LF power remains nuanced. Orthostatic challenges such as passive head-up tilt (HUT), active standing, or lower-body negative pressure reliably provoke characteristic shifts: acceleration of heart rate, reduction in parasympathetic time- and frequency-domain indices, and relative sympathetic activation. Individuals who exhibit low baseline HRV or exaggerated withdrawal of parasympathetic control under such challenges demonstrate greater vulnerability to a range of stress-related pathologies, including hypertension, arrhythmias, depression, and impaired cognitive performance under pressure.[14]

Chronic or repeated stress exposure leads to progressive dysregulation of multiple physiological systems. The normal diurnal cortisol rhythm-characterized by a sharp rise upon awakening (the cortisol awakening response) followed by a gradual

decline across the day- may become flattened, with elevated evening levels or blunted morning peaks. Sustained low-grade elevation of pro-inflammatory cytokines (interleukin-6, tumor necrosis factor-α, C-reactive protein) occurs even in the absence of overt infection. Sleep architecture is disrupted, with reductions in slow-wave sleep and increased nocturnal arousals. Insulin sensitivity declines, visceral adiposity increases, endothelial function deteriorates, and markers of cellular aging such as telomere shortening accelerate. The capacity for efficient recovery- rapid restoration of parasympathetic tone, timely normalization of cortisol, resolution of inflammation, and return to restorative sleep- appears to be a critical determinant of long-term resilience versus cumulative allostatic load. Baseline differences in autonomic balance, HPA-axis reactivity and feedback sensitivity, and inflammatory set-points therefore constitute key intermediate phenotypes that may link constitutional factors such as *Prakriti* to divergent clinical outcomes under chronic stress.[15]

Association of *Prakriti* with Stress Responses: Classical and Empirical Evidence

Ayurveda conceptualizes the pathogenesis of stress-related disorders primarily through *Manasika nidana*- mental causative factors such as excessive worry (*Chinta*), fear (*Bhaya*), anger (*Krodha*), grief (*Shoka*), and prolonged mental strain- which provoke *Dosha prakopa* and subsequent disruption of both bodily and mental homeostasis.[16] The acute surge of catecholamines and the associated clinical picture of anxiety, restlessness, palpitations, dry mouth, irregular digestion, and sleep onset insomnia closely parallel classical descriptions of *Vata* aggravation. Subacute elevations of cortisol and the accompanying drive toward internal heat, irritability, facial flushing, acid-related symptoms, and inflammatory activation align with *Pitta* aggravation. Chronic dysregulation characterized by metabolic slowing, weight gain, fluid retention, lethargy, and depressive inertia corresponds to *Kapha* imbalance. Thus, *Prakriti* is understood to determine both the baseline susceptibility of the individual and the dominant qualitative pattern of imbalance that emerges when adaptive capacity is exceeded.[17,18]

Empirical investigations conducted over the past decade and a half have begun to substantiate these classical correlations with objective physiological data. In a carefully phenotyped cohort of healthy adults subjected to standardized head-up tilt testing, *Kapha*-predominant individuals exhibited lower baseline HRV yet demonstrated minimal relative change in HRV parameters (heart rate, LF normalized units, HF normalized units, and LF/HF ratio) compared with *Pitta* and *Vata* types. In contrast, *Vata* individuals showed the most pronounced drop in parasympathetic indices (RMSSD, HF power, and Poincaré plot SD1), consistent with greater vulnerability to early and exaggerated autonomic dysregulation under orthostatic challenge.[19] These findings suggest that the classical description of *Vata* as mobile and changeable finds a measurable counterpart in greater autonomic lability, while the stability attributed to *Kapha* is reflected in more buffered autonomic responses.

Complementary autonomic function tests- including the cold pressor test, Valsalva maneuver, standing-to-lying ratio, and pupillary light responses- have similarly indicated relatively higher parasympathetic or lower sympathetic cardiovascular reactivity in *Kapha*-dominant subjects relative to *Pitta* or *Vata* counterparts.[20] Such differences are observable even in young, healthy individuals and therefore appear to represent constitutional traits rather than secondary consequences of established disease. Cross-sectional studies conducted among university students and working populations further reveal that *Vata* or *Vata–Pitta* predominance is statistically associated with higher scores on validated perceived stress scales, greater insomnia severity indices, and poorer subjective sleep quality, whereas balanced or *Kapha*-influenced constitutions appear relatively protective against these outcomes. Surveys assessing self-reported stress-handling capacity have found fewer individuals rated as excellent stress handlers among pure *Vata* types and comparatively better capacity among *Kapha*-dominant or dual *Kapha* combinations.[21]

Psychological state inventories and symptom checklists corroborate these physiological patterns. *Vata* imbalance correlates robustly with anxiety, racing thoughts, and rumination; *Pitta* imbalance with irritability, hostility, and poorer mood under evaluative pressure; and *Kapha* imbalance with certain forms of stress-related withdrawal, anhedonia, and rumination focused on loss or stagnation. These psychometric findings map closely onto classical textual descriptions of the mental sequelae of each *dosha* when aggravated.[22] Neuroendocrine hypotheses advanced by several research groups propose that *Vata* constitution corresponds to rapid HPA-axis and catecholamine dynamics with brisk on–off characteristics, *Pitta* to intense metabolic and thyroid-linked activation with high peak responses, and *Kapha* to more anabolic, fluid-homeostatic, and slower-reacting physiology with prolonged recovery phases. Limited pilot data examining salivary cortisol under standardized cognitive stressors have suggested differential acute rises, with greater reactivity observed in *Vata*-predominant participants, although larger and more rigorously controlled studies are still required.[23]

Genomic and biochemical profiling of extreme *Prakriti* types has revealed systematic differences in gene expression modules related to inflammation, lipid metabolism, oxidative stress handling, and drug metabolism, as well as divergent baseline lipid profiles, adipokine levels, and inflammatory marker concentrations. These molecular signatures provide a plausible biological substrate for the observed divergence in stress trajectories and differential disease predisposition across constitutional groups, and they strengthen the rationale for considering *Prakriti* as a clinically meaningful stratifying variable in both research and practice.

Mechanistic Integration

From a systems-biology perspective, *Prakriti* may be conceptualized as encoding a relatively stable, multi-level baseline phenotype that spans autonomic, metabolic, immune, and psychological domains. The mobile, light, dry, and changeable qualities classically attributed to *Vata* map onto higher intrinsic physiological variability, lower thresholds for sympathetic activation, and more pronounced parasympathetic withdrawal under challenge. These features facilitate rapid mobilization of cognitive and physical resources in novel or threatening situations but simultaneously predispose the individual to exhaustion, anxiety, sleep fragmentation, and irregular autonomic rhythms when stress is intense or prolonged. The sharp, hot, intense, and transformative nature of *Pitta* aligns with robust metabolic activation, efficient but potentially excessive inflammatory responsiveness, high achievement orientation, and a propensity for high-arousal negative emotional states when goals are blocked. The stable, heavy, cohesive, and anabolic qualities of *Kapha* correspond to higher resting parasympathetic tone, slower reactivity kinetics, greater physiological buffering against acute fluctuations, and a tendency toward energy conservation- conferring short-term resilience to transient stressors at the cost of vulnerability to inertia, weight gain, and prolonged recovery when stress becomes chronic.[24]

Manas prakriti further modulates the cognitive and emotional filters through which environmental demands are appraised and coping responses are selected. Predominance of *Rajas* intensifies drive, ambition, sensory engagement, and emotional reactivity, amplifying both the physiological stress response and the subjective sense of urgency. Predominance of *Tamas* promotes psychological withdrawal, reduced initiative, and a sense of heaviness or futility, which may blunt acute reactivity while prolonging recovery and increasing risk of depressive sequelae. Predominance of *Sattva* supports balanced, realistic appraisal, effective emotion regulation, and efficient physiological recovery after challenge. The dynamic interaction of *Deha prakriti* and *Manas prakriti* therefore shapes both the physiological set-points of the HPA axis and autonomic nervous system and the psychological processes of threat appraisal, coping selection, and meaning-making. This multi-level interaction helps explain why identical external demands can generate markedly different physiological trajectories, symptom profiles, and clinical syndromes across individuals of differing constitutional types.[25]

Clinical and Translational Implications

Accurate assessment of *Prakriti*- whether performed by experienced clinicians using traditional methods, by means of validated questionnaires that have undergone reliability and validity testing, or increasingly by software-supported decision-support tools that integrate physical, physiological, and psychological data- offers a practical and low-cost means of stratifying individuals for stress-related risk and of tailoring preventive and therapeutic strategies.[26] Because *Prakriti* is regarded as relatively stable after early development, a single careful assessment can inform long-term lifestyle guidance and risk communication.

Vata-predominant persons are likely to benefit most from interventions that emphasize regularity, grounding, and nervous-system stabilization. These include consistent daily routines (*Dinacharya*), warm and nourishing dietary patterns with adequate healthy fats and cooked foods, regular application of warm oil to the body (*Abhyanga*), protection from excessive cold and wind, and mind–body practices specifically shown to enhance vagal tone and reduce hyperarousal- such as slow-paced breathing (approximately six breaths per minute), *Yoga nidra*, restorative yoga, and gentle, rhythmic forms of movement.[27] *Pitta* types generally require measures that reduce internal heat and intensity: cooling dietary choices, moderation of highly competitive or time-pressured activities, deliberate scheduling of recovery intervals, avoidance of excessive sun and spicy foods, and cultivation of non-striving forms of meditation or compassion-based practices. Anti-inflammatory dietary patterns and selected cooling herbs may provide additional support.[28] *Kapha* types typically respond well to stimulating and mobilizing interventions: vigorous physical activity, lighter and warmer foods, early rising, reduced daytime sleep, and practices that counteract inertia and promote metabolic activation, such as dynamic yoga sequences, brisk walking, and invigorating breathing techniques.[29]

Integrative protocols that systematically combine the classical regimens of *Dinacharya* (daily routine) and *Ritucharya* (seasonal adaptation) with contemporary evidence-based yoga, *Pranayama*, meditation, and selected adaptogenic herbs- most

notably *Withania somnifera (Ashwagandha),* which has demonstrated anxiolytic and cortisol-modulating effects in randomized trials- can be individualized according to constitutional type with a high degree of specificity.[30] In high-stress clinical contexts, including perioperative care, intensive academic or occupational environments, management of anxiety and insomnia disorders, and rehabilitation after major illness, knowledge of an individual's *Prakriti* may help clinicians anticipate patterns of hemodynamic variability, anxiety intensity, sleep disruption, gastrointestinal reactivity, and recovery trajectory. Such anticipation can refine both the choice and the timing of pharmacological and non-pharmacological interventions and can improve patient education and engagement by aligning recommendations with the person's constitutional strengths and vulnerabilities.

Limitations and Future Directions

Despite the promising convergences between classical Ayurvedic theory and modern physiological data, several important methodological limitations currently constrain the strength of the evidence base. The majority of available studies are cross-sectional in design, rely on modest sample sizes, and focus predominantly on extreme single-*Dosha prakriti* types that are relatively rare in the general population. Dual-*Dosha* and mixed constitutions, which predominate in real-world settings, remain substantially under-studied, limiting the generalizability of existing findings. Heterogeneity in the instruments used for *prakriti* assessment- ranging from traditional clinical evaluation to various questionnaires of differing length and validation status- further complicates comparison and meta-analysis across investigations. Few studies have employed blinded outcome assessment or adequately controlled for potential confounding variables such as age, sex, body-mass index, physical activity, and baseline psychological distress.

Future research priorities include large-scale longitudinal cohort studies that track stress biomarkers (diurnal cortisol curves, continuous or ambulatory HRV, inflammatory cytokine panels, and metabolic indices) stratified by carefully assessed *Prakriti*; multi-omics investigations that integrate genomic, transcriptomic, metabolomic, and microbiome data with constitutional classification; and rigorously designed randomized interventional trials testing the efficacy of *Prakriti*-guided lifestyle, yoga, and adaptogen regimens against generic stress-management programs. Standardization of *Prakriti* phenotyping protocols, development of consensus diagnostic criteria, and the use of pre-registered analysis plans and blinded outcome evaluation will be essential to elevate the quality of evidence and to move *Prakriti* from a traditional classification system toward a validated, clinically actionable biomarker for precision health and personalized stress medicine.

CONCLUSION

The association between *Prakriti* and stress-induced physiological changes offers a coherent and clinically relevant bridge between classical Ayurvedic phenomenology and contemporary psychoneuro-endocrinology, autonomic physiology, and systems biology. *Vata*, *Pitta*, and *Kapha* constitutions display distinct and increasingly reproducible patterns of autonomic reactivity, neuroendocrine response, inflammatory tendency, sleep vulnerability, and psychological coping that align closely with traditional descriptions and are progressively supported by empirical data from HRV studies, autonomic function testing, psychometric surveys, and molecular profiling. Recognition of these constitutional differences enables a more nuanced and personalized approach to stress-risk stratification, preventive lifestyle prescription, and integrative clinical care. With continued investment in standardized phenotyping, longitudinal biomarker studies, and high-quality interventional research, *Prakriti* holds substantial potential to evolve from a traditional diagnostic concept into a practical, scientifically grounded tool that can enrich the emerging field of precision medicine and improve outcomes for individuals facing the pervasive challenge of chronic stress.

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