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REVIEW ARTICLE

Hridaya Basti and Heart-Brain Interactions in Ayurveda and Contemporary Cardiovascular Science

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Abstract

Background: Cardiovascular diseases (CVDs) remain a major cause of global mortality, while chronic stress, autonomic dysregulation, and inflammation are increasingly recognized as contributors to cardiovascular risk. Ayurveda conceptualizes *Hridaya* as a multidimensional regulatory locus associated with circulation, vitality, cognition, and emotional processes. **Objective:** To examine conceptual links between classical Ayurvedic cardiophysiology and contemporary heart-brain science and to assess the biological plausibility and current clinical evidence concerning *Hridaya Basti*. **Methods:** A structured narrative synthesis was undertaken using classical Ayurvedic sources and contemporary biomedical literature relevant to autonomic regulation, heart rate variability, endothelial function, thermal interventions, inflammation, and cardiovascular disease. Published clinical reports involving *Hridaya Basti* were interpreted as hypothesis-generating evidence because the intervention was generally delivered as part of multimodal care. **Evidence synthesis:** *Hridaya Basti* involves localized retention of warmed medicated oil over the precordial region. Thermal, tactile, autonomic and topical phytochemical pathways provide testable hypotheses, but direct mechanistic evidence specific to *Hridaya Basti* is currently lacking. Published case-based observations report changes in symptoms and cardiovascular parameters during multimodal Ayurvedic treatment; these reports cannot establish an independent treatment effect of *Hridaya Basti*. **Conclusion:** *Hridaya Basti* is a candidate for systematic investigation at the interface of Ayurveda and contemporary cardiovascular science. Future controlled studies should standardize the intervention, preserve conventional cardiac care, and incorporate objective autonomic, vascular, inflammatory, functional, and safety outcomes.

Keywords: Autonomic Nervous System, Ayurveda, Cardiovascular Diseases, Heart-Brain Interaction, Heart Rate Variability.

Introduction

Cardiovascular diseases (CVDs) remain a major global health burden. In addition to established metabolic and behavioral risk factors, chronic psychological stress, autonomic imbalance, and inflammatory processes contribute to cardiovascular morbidity.[1-3] Heart-brain interactions are therefore increasingly relevant to contemporary cardiovascular research, particularly through autonomic pathways and heart rate variability (HRV).[4,5] Ayurveda conceptualizes *Hridaya* as more than a mechanical pump. Classical sources describe it in relation to vital structures, consciousness, *Prana*, circulation and functional entities including *Vyana Vayu* and *Sadhaka Pitta*.[6,7] These descriptions arise from a distinct medical epistemology and should not be treated as direct equivalents of modern anatomical or physiological constructs.

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Hridaya Basti (also termed *Uro Basti* in contemporary practice) involves localized retention of warmed medicated oil over the precordial region. Its contemporary rationale commonly invokes localized warmth, tactile stimulation, Ayurvedic principles of *Swedana* and *Dosha* regulation, and the properties of medicated oils. Direct mechanistic evidence specific to *Hridaya Basti*, however, remains limited. This review therefore examines *Hridaya Basti* as a hypothesis-generating interface between Ayurvedic concepts of *Hridaya* and contemporary cardiovascular science, with particular attention to thermal, autonomic, inflammatory and heart-brain pathways. It also evaluates the limitations of the available clinical literature and proposes priorities for future investigation.

Review Methodology

A structured narrative synthesis was conducted to evaluate conceptual links between Ayurvedic cardiophysiology and contemporary neurocardiology. Primary Ayurvedic classical treatises (*Charaka Samhita*, *Sushruta Samhita* and *Ashtanga Hridaya*) were examined for foundational descriptions of *Hridaya*, *Prana*, *Vyana Vayu*, *Sadhaka Pitta*, *Ojas* and external *Snehana/Swedana* principles. Parallel searches were performed using combinations of terms including "*Hridaya Basti*", "*Uro Basti*", "heart-brain interaction", "neurovisceral integration", "heart rate variability", "thermal therapy", "cholinergic anti-inflammatory pathway" and *"Terminalia arjuna"*. Peer-reviewed physiological reviews, clinical studies, and published case reports/series involving *Hridaya Basti* were included to assess biological plausibility and characterize the current clinical evidence base.

Ayurvedic Conceptualization of *Hridaya*

Classical Ayurvedic literature presents *Hridaya* as a central regulatory locus associated with vital function, circulation, cognition, and emotional processes. *Sushruta* enumerates *Hridaya* among the vital *Marmas* and discusses it within *Marma Sharira*. *Charaka* associates *Hridaya* with *Chetana Prana* and *Ojas* and describes its relationship to *Pranavaha Srotas*.

Vyana Vayu is described in relation to systemic movement and circulation, while *Sadhaka Pitta* is associated with functions involving intellect, purpose, and emotional processing.[8,9] These concepts belong to Ayurvedic physiology and should be interpreted within that framework. Their juxtaposition with modern autonomic or neurocardiac concepts is useful for generating research questions, not for asserting physiological identity.

Accordingly, the present review treats *Hridaya* as an Ayurvedic integrative construct that can inform contemporary hypotheses about cardiovascular regulation while preserving the conceptual boundaries between the two knowledge systems.

Translational Framework for *Hridaya Basti*

Hridaya Basti may be examined through several testable domains. First, localized warmth can alter cutaneous blood flow and vascular responses; thermal interventions in cardiovascular populations provide indirect biological plausibility for investigating this component, although such evidence cannot be transferred directly to *Hridaya Basti*.[10]

Second, tactile and thermal stimulation over the thoracic region may interact with autonomic regulation. Vagal activity, HRV, and inflammatory reflex pathways are relevant to cardiovascular physiology,[11] but direct evidence that *Hridaya Basti* activates vagal afferents or improves HRV has not yet been established. Such effects should therefore be treated as hypotheses requiring physiological measurement.

Third, medicated oils may contribute local or systemic effects depending on formulation and exposure. *Terminalia arjuna* has documented cardiovascular pharmacology when studied as an extract or internally administered preparation.[12] However, evidence of clinically meaningful transdermal delivery during *Hridaya Basti* is lacking; topical phytopharmacologic effects remain an empirical question rather than an established mechanism.

Thermal vasodilation can involve endothelial nitric-oxide signaling and altered microvascular perfusion, while vagal anti-inflammatory pathways can influence cytokine signaling. These established physiological pathways justify measuring nitric-oxide related endothelial outcomes and inflammatory markers in future *Hridaya Basti* studies, but they do not demonstrate that *Hridaya Basti* itself produces these effects. The proposed thermal, neuroautonomic, and inflammatory pathways are summarized as a hypothesis generating framework in Figure 1.

Evidence Synthesis

The direct clinical evidence for *Hridaya Basti* remains sparse and is dominated by case-based, multimodal treatment reports, outlined in Table 1. These publications are useful for identifying feasibility signals and candidate outcomes, but they cannot establish efficacy or isolate the contribution of *Hridaya Basti*.

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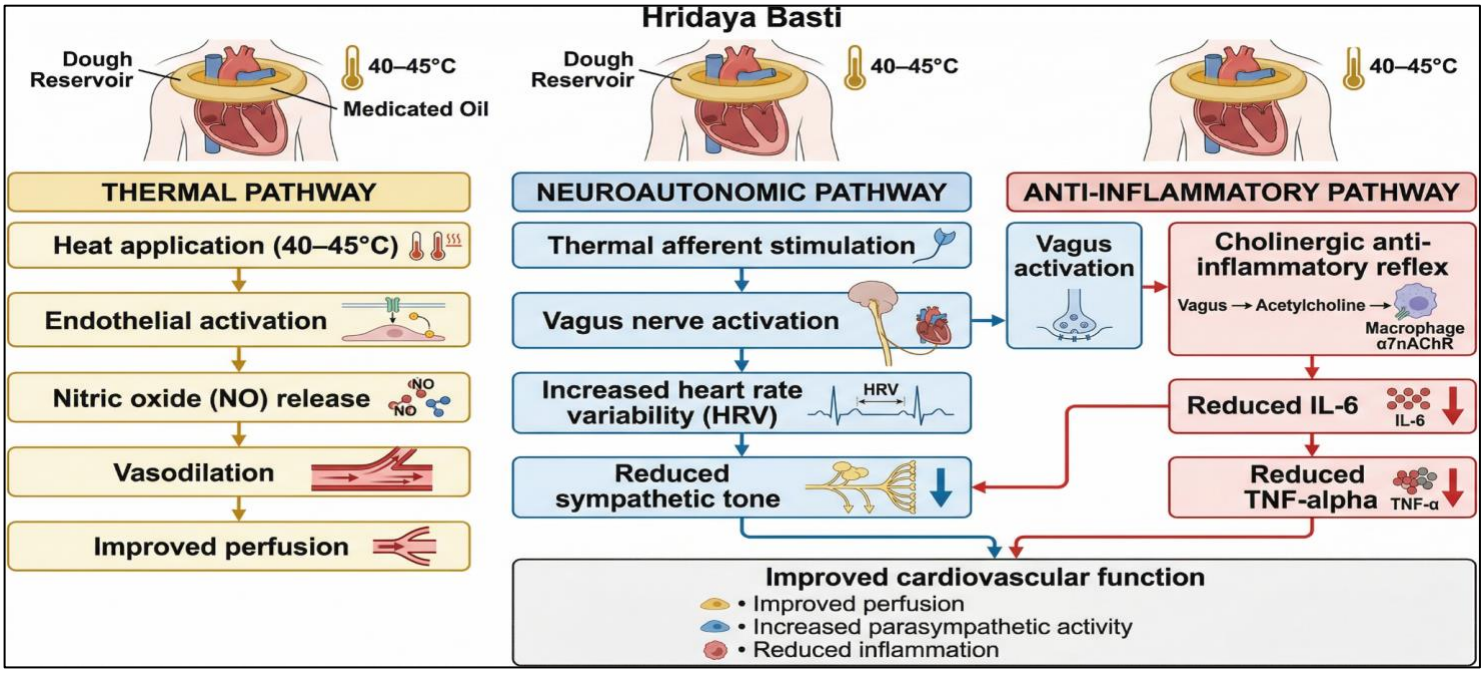

Figure 1: Proposed mechanistic pathways for investigation of *Hridaya Basti*.

Evidence Synthesis (continued)

A 2025 case report described a 35-year-old man with heart failure after myocardial infarction who continued conventional medication while receiving multiple Ayurvedic internal medicines and procedures, including *Hridaya Basti* with *Bala* oil for 20 minutes daily over 40 days. The report documented an increase in LVEF from 30-35% to 45-50%, improvement from NYHA class III to II, and reductions in fatigue measures. Because *Hridaya Basti* was only one component of an extensive regimen, the observed changes cannot be attributed independently to *Hridaya Basti*.[13]

A 2022 clinical and analytical report on *Hridaya Basti* presented case observations across cardiopulmonary conditions and proposed mechanisms related to localized heat and Ayurvedic concepts. The report provides descriptive clinical context but does not supply controlled evidence for efficacy.[14]

A 2025 case series involving coronary artery disease, hypertension and post myocardial infarction patients similarly reported symptomatic changes during *Hridaya Basti*-based management, but its small uncontrolled design limits causal interpretation.[15] Taken together, these reports support feasibility and hypothesis generation rather than therapeutic conclusions. No controlled study identified in the current evidence base isolates, the independent effect of *Hridaya Basti*. An integrative physiological representation of the domains and pathways discussed in this review is referred to in Figure 2.

Methodological Considerations for Future Clinical Investigation

Future studies should first standardize the intervention: formulation, temperature, retention time, treatment frequency, number of sessions, co-interventions and safety monitoring should be prespecified. The temperature range used in a trial should be protocol-defined and justified rather than assumed to represent a universally established *Hridaya Basti* standard.

Early mechanistic studies could use randomized or controlled designs comparing standardized *Hridaya Basti* with an appropriate control condition, while maintaining conventional cardiovascular treatment. Depending on the research question, controls might distinguish thermal/tactile effects from medicament-specific effects. Blinding of participants is difficult for procedural interventions, but blinded outcome assessment and prespecified analysis can reduce bias.

Candidate outcomes include HRV, blood pressure and blood-pressure variability, endothelial-function measures, echocardiographic parameters when clinically appropriate, inflammatory biomarkers such as C-reactive protein and interleukin-6, validated stress/anxiety measures, quality of life, functional capacity and adverse events. Trials should be prospectively registered and adequately powered for their primary endpoint. Safety is central; therefore, *Hridaya Basti* should not substitute for evidence-based acute cardiovascular management. Studies should define exclusions for unstable or decompensated cardiovascular disease and clearly document concurrent medication and standard-of-care therapy.

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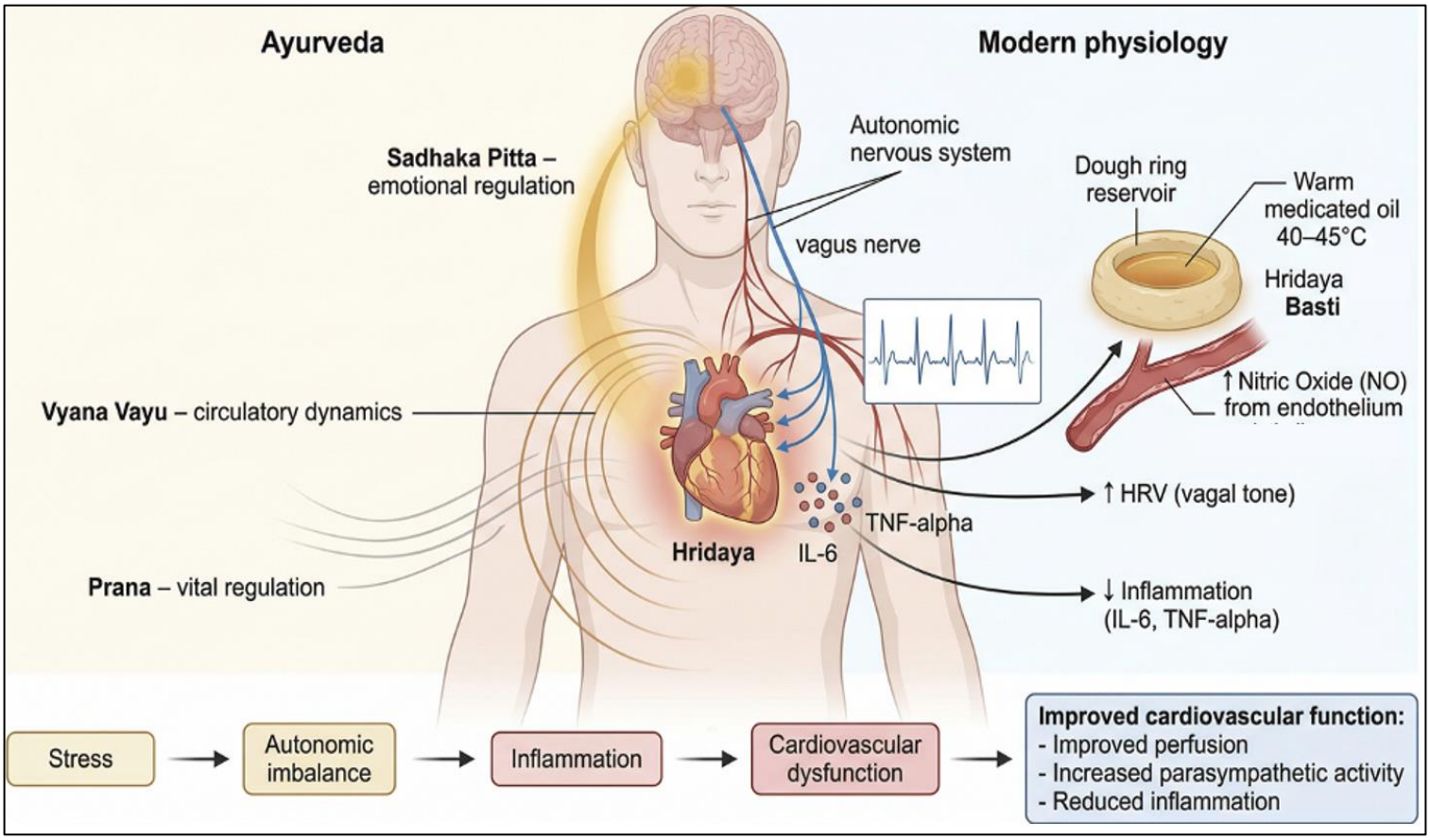

Figure 2: Conceptual stress-autonomic-immune-endothelial network relevant to cardiovascular regulation.

Research Gaps and Strategic Future Directions

The principal gaps are the absence of controlled trials, direct autonomic measurements, validated vascular and inflammatory endpoints, standardized *Hridaya Basti* protocols, and studies designed to separate the procedure from accompanying Ayurvedic therapies. Evidence relating *Prakriti* or other Ayurvedic phenotypes to cardiovascular treatment response also remains exploratory. Research should proceed sequentially: protocol standardization and safety assessment, mechanistic feasibility studies, controlled efficacy trials, and only then larger pragmatic or multicenter investigations. Collaboration among Ayurveda clinicians, cardiologists, autonomic physiologists, trial methodologists and biostatisticians would allow traditional diagnostic reasoning to be studied without sacrificing biomedical rigor.

Discussion

This review positions *Hridaya Basti* as a subject for translational investigation rather than as an established cardiovascular therapy. Ayurveda conceptualizes *Hridaya* as an integrated locus of vital, circulatory, cognitive and emotional functions, whereas contemporary cardiovascular science describes heart–brain interactions through autonomic, neuroendocrine, immune, and vascular pathways. Juxtaposing these perspectives can generate experimentally tractable questions. The interpretive correlations presented herein should not be construed as direct physiological equivalence, but rather as heuristic mappings intended for hypothesis generation. The strongest current rationale for investigation lies not in the case literature but in the possibility of decomposing *Hridaya Basti* into measurable components: localized thermal exposure, tactile stimulation, autonomic responses and formulation specific topical effects. Each component requires direct testing. Evidence from sauna, vagal biology, HRV, or orally administered phytochemicals can support biological plausibility but cannot substitute for intervention-specific evidence. The clinical reports reviewed here are confounded by concomitant conventional treatment, internal Ayurvedic medicines, and additional Panchakarma procedures. Their reported improvements therefore cannot establish causality. This limitation is especially important when interpreting changes in LVEF or symptoms in cardiovascular patients.

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Study & Design	Clinical Population	*Hridaya Basti* Protocol	Concomitant Therapies	Reported Outcomes	Key Limitations
J Clin Diagn Res (2025) [13] Case Report	35-year-old male with post-MI heart failure (LVEF 30–35%, NYHA class III)	*Bala* oil; 20 min/day for 40 days	Conventional cardiac medications + multimodal internal Ayurvedic medicines and procedures	LVEF increased to 45–50%; improved from NYHA class III to II; reduced fatigue scores	Single case; confounded by multimodal internal and external therapies
Yadav et al. (2022)[14] Clinical & Analytical Report	Patients with cardiopulmonary conditions	Precordial retention of warmed medicated oil	Multimodal Ayurvedic management	Symptomatic improvement; proposed localized thermal and *Dosha*-pacifying mechanisms	Descriptive, uncontrolled report; lacks isolated objective endpoints
Thakur et al. (2025)[15] Case Series	Patients with CAD, hypertension, and post-MI status	*Hridaya Basti*-based management regimen	Concomitant Ayurvedic formulations and supportive care	Symptomatic and clinical parameter improvements	Small sample size; uncontrolled design limits causal attribution

Table 1: Summary of published clinical reports involving *Hridaya Basti* in cardiovascular conditions.

Discussion (continued)

The conceptual correspondences discussed within the broader stress-autonomic-immune-endothelial framework are summarized in Figure 3. Its purpose is to identify measurable pathways for future studies, not to imply that all depicted pathways have been demonstrated during *Hridaya Basti*.

Conclusion

Hridaya Basti occupies an interesting interface between classical Ayurvedic concepts of *Hridaya* and contemporary research on cardiovascular regulation and heart-brain interactions. At present, however, the direct evidence base is insufficient to infer therapeutic efficacy or specific autonomic, vascular, inflammatory, or phytopharmacologic mechanisms.

The appropriate next step is rigorous investigation rather than clinical extrapolation. Standardized protocols, controlled comparisons, objective physiological endpoints, safety monitoring, and transparent reporting can determine whether the conceptual correspondences outlined in this review translate into reproducible biological or clinical effects. Such work could provide a scientifically defensible basis for dialogue between Ayurveda and contemporary cardiovascular research.

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Conflict of Interest

The authors declare that there is no conflict of interest.

Author Contributions

A.A.N.: Conceptualization, Methodology, acquisition of data and interpretation of data, Writing original draft. F.M.: Conceptualization, Methodology, Supervision, Writing review and editing. G.M.: Supervision, Writing review and editing.

AI Usage Disclosure

AI-assisted tools were used for language editing during manuscript preparation and image generation. The authors take responsibility for the accuracy, originality, integrity and scientific content of the final manuscript.

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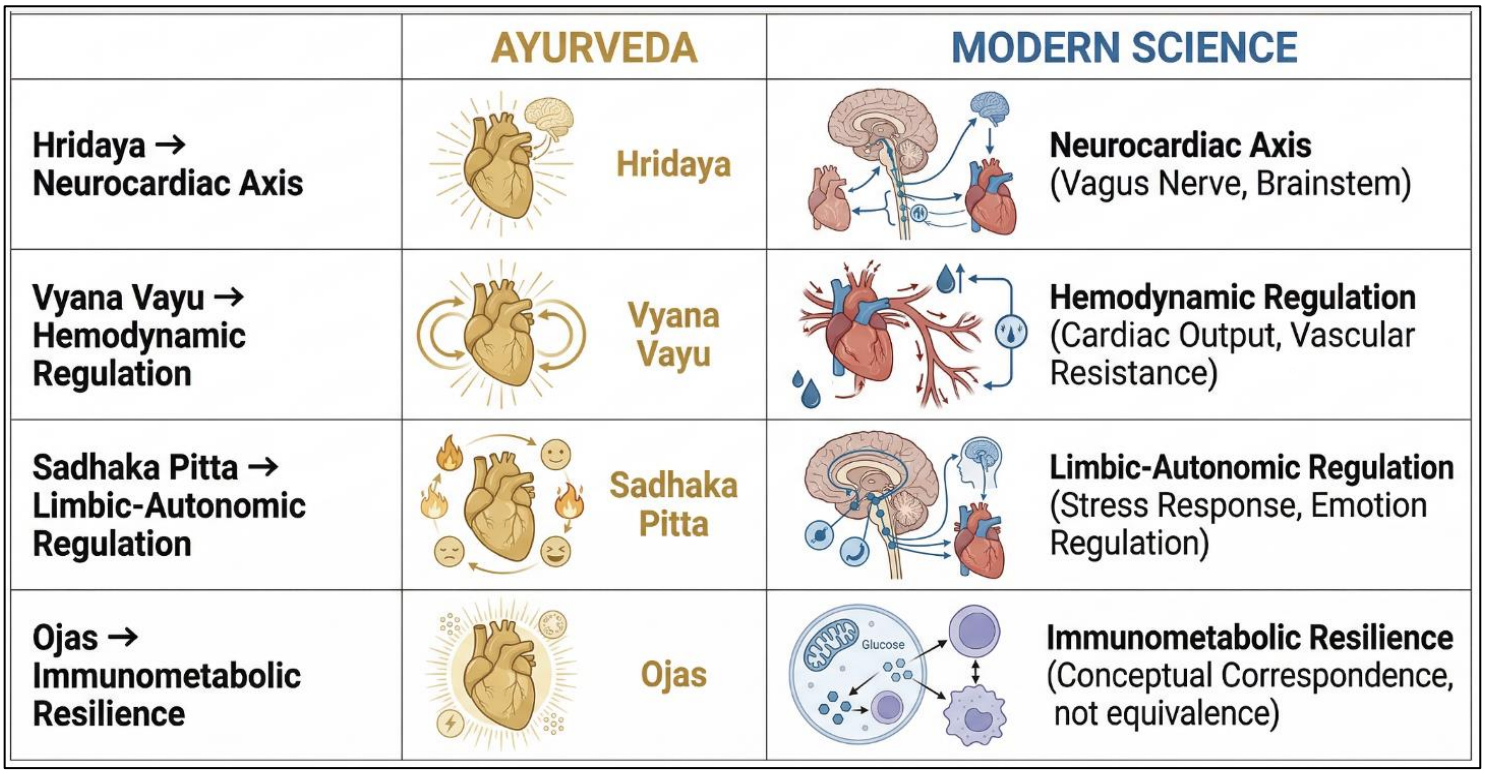

Figure 3: Conceptual correspondence between selected Ayurvedic constructs and contemporary physiological domains.

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