

# Rasavaha Srotas in Ayurveda: A Critical Integrative Review of Classical Concepts and Contemporary Cardiovascular Physiology

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**Abstract:** *Background: Ayurveda explains physiological organisation through the interrelated concepts of Dosha, Dhatu, Mala, Agni and Srotas. Rasavaha Srotas is associated with the movement and distribution of Rasa Dhatu, which has an important role in the Ayurvedic understanding of nourishment and tissue maintenance. Classical descriptions identify Hridaya and ten Dhamanis as the Moolasthanas of Rasavaha Srotas. These descriptions provide a basis for exploring functional relationships with contemporary cardiovascular physiology, particularly cardiac pumping, systemic circulation, microvascular exchange and tissue nourishment. However, the conceptual frameworks of Ayurveda and modern biomedicine differ, and their proposed relationships require critical examination.*

*Aim: To critically analyse the classical Ayurvedic concept of Rasavaha Srotas and examine its potential functional relationships with contemporary cardiovascular physiology, with particular emphasis on conceptual interpretation, physiological correlation and future research.*

*Materials and Methods: A narrative integrative review approach was adopted to organise classical Ayurvedic descriptions and contemporary biomedical concepts into relevant thematic categories. Classical sources included Charaka Samhita, Sushruta Samhita and Ashtanga Hridaya. Secondary literature concerning Srotas, Rasavaha Srotas, Rasa Dhatu and cardiovascular correlations was also considered. Contemporary physiological concepts included cardiac function, systemic circulation, vascular resistance, microcirculation, endothelial regulation and tissue perfusion. This article presents a conceptual synthesis rather than a systematic review. A final journal submission should document the actual databases searched, search dates, eligibility criteria and source-selection process.*

*Results: Classical Ayurvedic descriptions present Rasavaha Srotas within a broader framework of nourishment, transport and tissue maintenance. The association of Hridaya and Dash Dhamani with Rasavaha Srotas provides a basis for comparing selected functions with the heart and vascular pathways. Contemporary physiology explains the distribution of oxygen and nutrients through coordinated cardiac and vascular activity, while microcirculation facilitates exchange between blood and tissues. These functional similarities are useful for hypothesis generation but do not establish anatomical or mechanistic equivalence. The literature also highlights the need for standardised definitions, reproducible assessment methods and empirical evaluation of proposed clinical associations.*

*Conclusion: Rasavaha Srotas represents an important concept in Ayurvedic physiology for discussing transport and systemic nourishment. Its comparison with cardiovascular physiology is most scientifically defensible when classical descriptions, biomedical mechanisms and interpretive hypotheses are clearly distinguished. Future research should prioritise textual clarification, construct validity, interobserver reliability and clinically meaningful outcomes..*



**Keywords:** *Ayurveda; Rasavaha Srotas; Rasa Dhatu; Srotas; Hridaya; Dhamani*; cardiovascular physiology; microcirculation; tissue perfusion; integrative medicine.

## **I. INTRODUCTION**

Ayurveda is a traditional system of medicine that explains the maintenance of health and the development of disease through the coordinated functioning of *Dosha, Dhatu, Mala, Agni and Srotas*. These concepts form an interconnected physiological framework in which digestion, transformation, transport, tissue nourishment and elimination contribute to the maintenance of the organism. Among these concepts, *Srotas* is particularly important because it provides a framework for understanding the movement of substances and the functional organisation of bodily processes [1,2].

The term *Srotas* is associated with channels or pathways through which substances move. In classical Ayurvedic literature, *Srotas* is discussed in relation to the transport of bodily constituents, tissue nourishment and disturbances of physiological function. Charaka Samhita, particularly *Vimana Sthana* 5, provides an important account of *Srotas*, their *Moolasthanas*, characteristics and pathological disturbances [1]. The concept should not be restricted to the modern anatomical meaning of a hollow tube because its interpretation depends on the substance transported, the function described and the textual context.

*Rasavaha Srotas* is associated with *Rasa Dhatu*, which occupies a central position in the Ayurvedic explanation of nourishment and the maintenance of subsequent Dhatus. Classical descriptions identify *Hridaya* and *ten Dhamanis* as the *Moolasthanas* of *Rasavaha Srotas* [1]. This description has encouraged comparisons with the heart and major vascular pathways in contemporary physiology. A published thematic appraisal by Sharma has specifically examined the relationship between the *Moolasthanas* of *Rasavaha Srotas* and the cardiovascular system [3]. Subsequent reviews have also discussed its anatomical and physiological interpretation [4,5].

In contemporary biomedical science, the cardiovascular system consists of the heart, blood and blood vessels. The heart generates the pressure required to maintain pulmonary and systemic circulation. Arteries distribute blood, arterioles regulate resistance and regional flow, capillaries facilitate exchange, and venous vessels return blood to the heart. The cardiovascular system therefore supports oxygen delivery, nutrient distribution, fluid homeostasis and the removal of metabolic products [6,7].

At a broad functional level, the Ayurvedic emphasis on transport and nourishment may be compared with the role of the cardiovascular system in delivering substances to tissues. Nevertheless, the presence of a similar physiological theme does not demonstrate that the two systems possess identical anatomical structures or explanatory mechanisms. *Rasa Dhatu* cannot be reduced to plasma, serum or lymph alone, and *Rasavaha Srotas* cannot be conclusively equated with the entire cardiovascular system.

A critical integrative approach is therefore required. Such an approach should examine classical terminology in its original context, describe established biomedical mechanisms accurately and identify which relationships are interpretive rather than empirically demonstrated. It should also consider whether the concept of *Rasavaha Srotas* can generate meaningful and testable research questions without replacing established anatomical or clinical classifications. The present review examines the classical foundations of *Rasavaha Srotas*, its relationship with *Rasa Dhatu*, the significance of *Hridaya* and *Dhamani*, selected comparisons with cardiovascular physiology, and the methodological priorities for future research.

## **II. AIM AND OBJECTIVES**

### **2.1 Aim**

To critically review *Rasavaha Srotas* in classical Ayurvedic physiology and explore its potential functional correlations with contemporary cardiovascular physiology.

### **2.2 Objectives**

- To describe the Ayurvedic concept of *Srotas* and its physiological significance.



- To discuss cardiovascular mechanisms relevant to systemic transport and tissue nourishment.
- To identify research gaps and propose methods for future empirical investigation.

### **III. MATERIALS AND METHODS**

#### **3.1 Review design**

This article is structured as a critical integrative narrative review. It brings together classical Ayurvedic textual concepts and contemporary biomedical physiology to examine potential relationships between *Rasavaha Srotas* and cardiovascular function.

A narrative approach is appropriate for examining terminology, interpreting classical descriptions and comparing distinct explanatory frameworks. However, this review should not be interpreted as a systematic review, meta-analysis or report of original clinical research.

#### **3.2 Classical Ayurvedic literature**

The principal textual source was Charaka Samhita, with particular attention to *Vimana Sthana 5, Srotovimana Adhyaya*, which discusses the *Moolasthanas* and characteristics of different *Srotas* [1]. Sushruta Samhita was considered for its descriptions of *Dhamani* and related anatomical concepts [2]. *Ashtanga Hridaya* provides supplementary context for the Ayurvedic understanding of bodily organisation and physiological function.

#### **3.3 Secondary literature**

Secondary literature relevant to *Rasavaha Srotas*, its *Moolasthanas* and its proposed relationship with cardiovascular physiology was considered. These sources include a thematic appraisal of *Rasavaha Srotas* and cardiovascular correlations [3].

#### **3.4 Biomedical literature**

Contemporary physiological concepts were examined with reference to standard physiology textbooks and relevant peer-reviewed literature. The principal themes included cardiac output, vascular resistance, systemic circulation, microcirculation, endothelial function, tissue perfusion and nutrient exchange [6,7].

#### **3.5 Thematic synthesis**

The available literature was organised into five principal themes:

The concept and classification of *Srotas*.

Classical descriptions of *Rasavaha Srotas* and *Rasa Dhatu*.

Hridaya and Dhamani as *Moolasthanas*.

Cardiovascular circulation and tissue nourishment.

Conceptual limitations, evidence gaps and research priorities.

The synthesis distinguishes classical textual statements, established biomedical findings and proposed functional correlations.

### **IV. CLASSICAL AYURVEDIC CONCEPT OF SROTAS**

#### **4.1 Definition and significance**

*Srotas* is an important concept in Ayurvedic physiology that describes pathways associated with the movement and distribution of substances. Charaka Samhita discusses *Srotas* in the context of bodily organisation, tissue nourishment and pathological disturbances [1].

*Srotas* should not be understood exclusively as anatomical tubes. Depending on the passage, the concept refer to a pathway, a functional system or a structure associated with the transport of a particular substance. Its meaning is therefore dependent on context and cannot always be translated into a single modern anatomical term.



The classical framework recognises several categories of *Srotas* associated with different bodily constituents and physiological functions. *Rasavaha Srotas* is associated with *Rasa Dhatu*, whereas *Raktavaha Srotas* is associated with *Rakta Dhatu*. Other categories are concerned with the movement of food, water, respiratory substances, tissue-related constituents and excretory products [1,2].

This classification indicates that *Rasavaha Srotas* forms part of a broader conceptual system. Its interpretation requires consideration of the relationship between *Rasa Dhatu*, digestion, tissue nourishment and the functional organisation of the body.

#### 4.2 Srotomula

The term *Moolasthan* refers to the root or principal site associated with a *Srotas* in classical descriptions. The identification of a *Moolasthan* is important for understanding the classical organisation of physiological pathways.

In the context of *Rasavaha Srotas*, Charaka Samhita identifies *Hridaya* and ten *Dhamanis* as the *Moolasthan* [1]. Sushruta Samhita also provides descriptions of *Srotas* and related structures, although individual descriptions and interpretive traditions should be examined in their own textual context [2].

The concept of *Moolasthan* should not automatically be equated with the modern anatomical origin of a vessel or organ system. Its precise interpretation depends on the relevant classical passage and commentary.

For integrative research, *Moolasthan* may be examined as a classical concept identifying principal structures or functional centres associated with a pathway. Any proposed relationship with modern anatomical structures must then be justified independently.

### V. RASAVAHA SROTAS AND RASA DHATU

#### 5.1 Concept of Rasa Dhatu

*Rasa Dhatu* is an important component of Ayurvedic explanations of nourishment and tissue maintenance. Classical descriptions relate *Rasa* to the nutritive material formed following the processing of ingested food and to the nourishment of subsequent *Dhatu*s [1].

Within this framework, *Rasa Dhatu* is not simply a circulating fluid. It is understood through the broader relationships among digestion, transformation, tissue nourishment and the maintenance of physiological function.

Contemporary physiology explains nutrient availability through digestion, absorption, transport, tissue exchange and cellular utilisation. Water-soluble nutrients generally enter the portal circulation after intestinal absorption, while most long-chain dietary lipids initially enter lymphatic pathways before reaching the systemic circulation. Blood subsequently distributes nutrients, oxygen, hormones and other substances to tissues [6,7].

These biomedical processes provide relevant points of comparison with the Ayurvedic emphasis on nourishment. However, they do not establish that *Rasa Dhatu* is equivalent to any single biochemical or anatomical compartment.

#### 5.2 Functions attributed to Rasa Dhatu

The principal Ayurvedic themes associated with *Rasa Dhatu* include nourishment, support of subsequent *Dhatu*s and the maintenance of bodily functions [1]. These concepts place *Rasa* within a coordinated physiological framework rather than treating it as an isolated material substance.

In modern physiology, tissue maintenance depends on oxygen delivery, nutrient availability, cellular metabolism, hormonal regulation, fluid balance and the removal of metabolic waste. These processes are measurable through established physiological and biochemical methods [6,7].

The two frameworks can therefore be compared at the level of their concern with nourishment and systemic maintenance.

#### 5.3 Rasavaha Srotas as a pathway of nourishment

*Rasavaha Srotas* is associated with the movement and distribution of *Rasa Dhatu*. Its role in Ayurvedic physiology can be discussed in relation to the availability of nutritive material and the maintenance of tissues.



## **VI. HRIDAYA AS MOOLASTHANA OF RASAVAHA SROTAS**

### **6.1 Classical significance of Hridaya**

*Hridaya* is identified as a *Moolasthan* of *Rasavaha Srotas* in Charaka Samhita [1]. Its significance should be considered within the wider classical account of bodily organisation and physiological function.

The association between *Hridaya* and *Rasavaha Srotas* indicates the importance assigned to this structure in relation to the movement of *Rasa*. This provides a basis for comparison with the central role of the heart in contemporary cardiovascular physiology.

However, the classical understanding of *Hridaya* should not be reduced to a modern anatomical description without examining the relevant textual context.

### **6.2 Modern cardiac physiology**

In contemporary medicine, the heart is a muscular organ that generates the pressure gradients required for pulmonary and systemic circulation. The right side of the heart propels blood through the pulmonary circulation, while the left side supplies the systemic circulation.

Cardiac output is the product of heart rate and stroke volume. Its adequacy depends on venous return, myocardial contractility, heart rate and the loading conditions of the heart. Blood pressure and vascular resistance influence the distribution of blood to tissues [6,7].

The heart's function is coordinated with autonomic regulation, circulating hormones, local vascular responses and mechanisms that maintain fluid balance.

These established mechanisms offer a useful biomedical context for discussing the classical identification of *Hridaya* as a *Moolasthan*. Nevertheless, a functional comparison does not establish that the complete classical concept is identical to the modern physiological definition of the heart.

### **6.3 Critical interpretation**

The relationship between *Hridaya* and the heart is one of the more apparent points of comparison between the two frameworks. Yet three distinct claims must be separated:

The classical text identifies *Hridaya* as a *Moolasthan* of *Rasavaha Srotas*.

Modern physiology identifies the heart as the central pump of the cardiovascular system.

## **VII. DHAMANI AND SYSTEMIC TRANSPORT**

### **7.1 Classical description of Dhamani**

*Dhamani* appears in classical Ayurvedic anatomical and physiological descriptions. In the discussion of *Rasavaha Srotas*, ten *Dhamanis* are identified alongside *Hridaya* as *Moolasthan* [1].

Contemporary authors have interpreted this description in relation to the major vessels associated with systemic circulation [3,5]. Such interpretations are relevant to integrative discussion, but they should be recognised as scholarly interpretations rather than established one-to-one anatomical mappings.

### **7.2 Modern vascular physiology**

The modern vascular system consists of vessels with specialised structures and functions.

Arteries carry blood away from the heart. Arterioles regulate vascular resistance and distribute blood to local tissue beds. Capillaries provide a principal site for the exchange of gases, nutrients and fluid. Venules and veins collect blood from the microcirculation and return it to the heart [6,7].

Vascular function depends on pressure gradients, vessel diameter, blood viscosity, vessel compliance and local regulatory mechanisms. Endothelial cells contribute to vascular tone, permeability, inflammation and haemostatic regulation.

These mechanisms explain how the cardiovascular system distributes blood throughout the body.

### **7.3 Functional comparison**

The concept of *Dhamani* and the modern vascular system share a broad functional theme: pathways facilitate the distribution of substances within the body. This similarity can be useful for generating research questions.



However, a classical *Dhamani* should not automatically be equated with a particular artery, vein or vascular branch. A modern artery is defined by anatomical and histological characteristics, whereas the interpretation of *Dhamani* depends on classical textual context.

## VIII. CONTEMPORARY CARDIOVASCULAR PHYSIOLOGY

### 8.1 Systemic circulation

Systemic circulation delivers oxygenated blood from the left ventricle to the body's tissues and returns deoxygenated blood to the right atrium. Pulmonary circulation transports blood between the right heart and lungs, enabling gas exchange.

These circuits work together to maintain oxygen delivery, nutrient distribution and metabolic homeostasis. Cardiac output, arterial pressure and vascular resistance are important determinants of systemic perfusion [6,7].

The cardiovascular system is dynamic rather than a passive network of tubes. Regional blood flow changes in response to metabolic demand, autonomic activity, circulating mediators and local vascular regulation.

### 8.2 Microcirculation and nutrient exchange

The microcirculation includes small arteries, arterioles, capillaries and venules. It plays an essential role in the exchange of oxygen, nutrients, water and metabolic products between blood and tissues.

Capillary exchange is influenced by hydrostatic and oncotic pressure gradients, endothelial permeability, diffusion and local blood flow. The characteristics of the microvascular bed vary among organs according to their physiological requirements [6,7].

The lymphatic system contributes to fluid homeostasis by returning excess interstitial fluid and proteins to the circulation. It also supports immune-cell trafficking and the transport of certain absorbed lipids.

These processes are relevant to discussions of tissue nourishment, but the cardiovascular and lymphatic systems should not be collapsed into a single anatomical equivalent of *Rasavaha Srotas*.

### 8.3 Tissue perfusion and metabolic demand

Tissue perfusion is the delivery of blood to a tissue. Adequate perfusion supports oxygen availability and the delivery of nutrients needed for cellular function.

The relationship between blood flow and metabolic demand is especially evident during exercise, when skeletal muscle blood flow increases. Local metabolites, endothelial responses and changes in vascular resistance contribute to this adjustment.

The brain, heart and kidneys also have specialised mechanisms for regulating blood flow. These mechanisms help maintain organ function under varying physiological conditions, although they can be impaired by disease.

The Ayurvedic concept of nourishment can be discussed alongside these processes at a broad functional level. However, contemporary perfusion measurements do not directly measure *Rasavaha Srotas*, and no such equivalence should be implied without validation.

## IX. CRITICAL INTEGRATIVE COMPARISON

The proposed relationship between *Rasavaha Srotas* and cardiovascular physiology is best examined by comparing specific functions while retaining the distinctions between the two conceptual systems.

**Table 1. Functional comparison of Rasavaha Srotas and cardiovascular physiology**

| Ayurvedic concept | Classical or interpretive significance                        | Relevant biomedical concept     | Evidence status             |
|-------------------|---------------------------------------------------------------|---------------------------------|-----------------------------|
|                   | Pathways associated with transport and physiological function | Transport and exchange systems  | Broad conceptual comparison |
| Srotas            | Transport and physiological function                          | Transport and exchange systems  | Broad conceptual comparison |
| Rasavaha          | Movement and distribution                                     | Systemic transport and nutrient | Functional analogy; not     |



|               |                                              |                                                            |                                                               |
|---------------|----------------------------------------------|------------------------------------------------------------|---------------------------------------------------------------|
| Srotas        | Rasa Dhatu                                   | distribution                                               | anatomical identity                                           |
| Rasa Dhatu    | Nourishment and support of subsequent Dhatus | Nutrient availability and tissue metabolism                | Broad functional comparison                                   |
| Hridaya       | Moolasthan of Rasavaha Srotas                | Heart and cardiac pumping                                  | Functional correspondence requiring contextual interpretation |
| Dash Dhamani  | Channels associated with Rasavaha Srotas     | Major vascular pathways                                    | No established one-to-one mapping                             |
| Dhatu Poshana | Nourishment and maintenance of tissues       | Oxygen delivery, nutrient exchange and cellular metabolism | Conceptual comparison                                         |
| Srotodushti   | Disturbance of Srotas-related functions      | Pathophysiological disturbances                            | Requires operational definitions and validation               |

This comparison demonstrates that functional similarity is the most defensible starting point for interdisciplinary discussion. It does not demonstrate that the classical concepts and modern anatomical structures are identical.

## **X. SROTODUSHTI AND CARDIOVASCULAR PATHOPHYSIOLOGY**

### **10.1 Classical concept of Srotodushti**

*Srotodushti* refers to disturbances affecting *Srotas* related functions. Classical Ayurvedic discussions describe different patterns of disturbance, including *Atipravritti*, *Sanga*, *Siragranthi* and *Vimargagamana* [1].

These categories belong to a traditional explanatory framework. Their application to contemporary cardiovascular conditions requires careful interpretation and should not be based on superficial similarity between terms.

### **10.2 Potential points of comparison**

*Sanga* may be considered conceptually relevant to discussions of impaired passage or obstruction. However, it should not automatically be equated with atherosclerosis, thrombosis or embolism. These modern conditions have distinct mechanisms and diagnostic criteria.

Similarly, *Siragranthi* should not be assigned directly to an aneurysm, vascular malformation or neoplastic condition without specific evidence. A descriptive resemblance does not establish identity of pathology.

## **XI. CONCLUSION**

*Rasavaha Srotas* is an important concept in Ayurvedic physiology that connects the movement of *Rasa Dhatu* with nourishment and the maintenance of bodily tissues. Classical descriptions identify *Hridaya* and *Dash Dhamani* as its *Moolasthan*, providing a foundation for examining the role of transport and distribution within the Ayurvedic framework.

Contemporary cardiovascular physiology explains blood circulation, tissue perfusion and nutrient delivery through established mechanisms involving cardiac function, vascular resistance, microcirculation and tissue exchange. These mechanisms provide relevant points of functional comparison with selected aspects of *Rasavaha Srotas*, but they do not establish that the two systems are anatomically or mechanistically identical.

The principal contribution of a critical integrative approach is to distinguish classical description from biomedical evidence and from hypotheses proposed to connect the two. Future research should prioritise textual precision, reproducible operational definitions, reliability testing and clinically meaningful outcomes. Such work may strengthen interdisciplinary scholarship while preserving the conceptual integrity of Ayurveda and the evidentiary standards of contemporary biomedical science.



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