

## CONCEPT OF AGNI IN AYURVEDA AND ITS PHYSIOLOGICAL CORRELATES: A COMPREHENSIVE REVIEW

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### ABSTRACT:

**Background-** The principal of *Ayurveda* has remained intact in spite of heavy wind changes. One among such principal is the concept of *agni*. *Ayurveda* considers that no disease can develop without the derangement of *agni*. Therefore, the understanding the concept of *agni* is utmost important. **Objective-** To understand the concept of *agni*, its classifications mainly *Jatharagni*, *bhutagni* and *dhatwagni* and physiological correlates in modern physiology. **Methods-** We have systematically examined classical Ayurvedic descriptions (from *Charaka*, *Sushruta*, *Vagbhata* and authoritative commentaries) and correlated them with current biomedical understanding of digestion and metabolism. **Results-** *Jatharagni*, the digestive fire located in the duodenum (*grahani*), was correlated with gastric acid secretion, pancreatic enzymes, bile salts, and brush-border enzymes responsible for macronutrient digestion. *Bhutagni*, elemental metabolism at the hepatic level, was associated with hepatic enzymatic pathways of carbohydrate, protein, and lipid metabolism, supported by micronutrients and cofactors. *Dhatvagni*, the tissue-specific fires, consists of anabolic and catabolic processes across plasma, blood, muscle, adipose, bone, marrow, and reproductive systems, with strong parallels to endocrine and enzymatic regulation. **Conclusion-** Despite these parallels, key differences exist. *Agni* is a qualitative and all-encompassing principle, not a discrete chemical compound. It conflates mechanical (stomach churning), chemical (enzymes), thermal and even subtle (electromagnetic/biophotonic) processes in one term.

**Keywords-** *Agni*, *Jatharagni*, *Bhutagni*, *Dhatwagni*

### INTRODUCTION

The concept of *Agni* is the core of *Ayurvedic* physiology, broadly corresponding to the body's metabolic and digestive fire. Classical texts describe *Agni* as the principle responsible for digestion, metabolism and transformation of all substances (food,

tissues, waste) within the body. As *Charaka Samhita* states, the *Agni* is responsible for longevity (*Ayu*), growth (*Upachaya*), strength (*Bala*), complexion (*Varna*), vitality (*Tejas*), immunity (*Ojas*), health (*Swasthya*), motivation (*Utsaha*) and life force (*Prana*)[1]. In practical terms, *Agni* governs digestion of



food and assimilation of nutrients into body tissues, thereby determining health or disease. As per *Acharya Vagbhata* imbalance of *Agni* is considered a root cause of any disease[2]. Thus, *Agni* is seen as the mediator of homeostasis and health in Ayurveda, and its maintenance is emphasized for optimal well-being.

*Ayurveda* classifies *Agni* into multiple categories based on location and function. At the gross level, it is classified into as 3 main types i.e., *Jatharagni* (digestive fire in duodenum), *Bhutagni* (elemental fires in the liver responsible for processing the *Panchamahabhutas*), and *Dhatwagni* (tissue fires in each of the seven tissues/*dhatu*s).

## METHODS

We have systematically examined classical Ayurvedic descriptions (from Charaka, Sushruta, Vagbhata and authoritative commentaries) and correlated them with current biomedical understanding of digestion and metabolism.

## RESULTS

### Jatharagni (Digestive Fire)

In *Ayurveda*, *jatharagni* is also called *Kayagni* or *Pachakagni*. It is said to reside in the *Grahani* (duodenum) and governs the breakdown of ingested food into nutritive essence (*Sara*) and waste (*Kitta*). *Acharya Chakrapani* mentions that all nutrients first encounter *Jatharagni*[3], which transforms

Importantly, *Jatharagni* (present in *Grahani*/duodenum) is regarded as the “supreme” among all 3 types of *agni* - as it ignites all other *Agnis* and sets the baseline for metabolism.

The purpose of this review is to bridge these *Ayurvedic* concepts of *Agni* with modern physiological processes. Particular emphasis is placed on mapping *Jatharagni* to gastrointestinal enzymes and motility, *Bhutagni* to hepatic metabolic pathways, *Dhatwagni* to tissue-specific metabolism and endocrine regulation. The aim is to provide a coherent conceptual and clinical framework that integrates *Ayurveda*'s fire-of-life metaphor with physiology and biochemistry.

them for use by the body. Thus *Jatharagni* is considered the chief metabolic fire (said as *Bhagavan*) and directly influences the activity of all other *Agnis* (*Bhuta- and Dhatvagni*).

Modern Correlates: The actions of *Jatharagni* correspond to the biochemical processes of gastrointestinal digestion and early assimilation. In contemporary physiology, this can be assumed as gastric acid secretion, digestive enzymes from stomach and pancreas, bile-mediated emulsification, and intestinal brush-border enzymes.

1. Stomach acid (HCl from parietal cells) and pepsin begin protein



digestion, while pancreatic secretions (alkaline pancreatic juice) provide a suite of enzymes: proteases (trypsin, chymotrypsin, carboxypeptidases, elastase, collagenase), lipases (pancreatic lipase, phospholipase A/B, cholesterol esterase) and amylase.[4]

2. Bile (from liver) has an alkaline pH (8-8.6) and contains bile salts that emulsify fats for digestion. [5]
3. The small intestine produces succus entericus (intestinal juice from crypts of Lieberkühn, Brunner's glands) containing additional enzymes (dipeptidases, nucleases, lactase, sucrase, etc). In sum, these agents collectively achieve the chemical "fire" of digestion in the duodenum and jejunum.[6]

Notably, these enzymes operate optimally in a regulated pH and are released in response to neural and hormonal signals (gastrin, secretin, CCK), akin to the "kindling" of *Jatharagni*.

**Bhutagni (Elemental Fires in the Liver)**

*Bhutagni* are described as five "elemental fires" located in the liver (*Yakrit*). Each *bhutagni* corresponds to one of the five *mahabhutas* (earth, water, fire, air, space) and acts on those components in food. After *Jatharagni* has produced the fundamental food juice (*Ahar Rasa*), *Bhutagni* is said to

"digest" this at an atomic as well as cellular level, converting exogenous (*Vijatiya*) elements into endogenous (*Sajatiya*) forms suitable for tissue building. This can be illustrated with examples of starches, fat and proteins of the food which by the process of digestion are rendered fit to be resynthesized as organism specific carbohydrate, fat and proteins. In other words, the five *Bhutagni* finish processing the digestate into a homogeneous, absorbable biochemical mixture (*Vipaka* often refers to the resulting post-digestive product). Traditional scholars liken *Bhutagni* to a secondary, subtler digestion stage that helps to assimilate the nutrition to further *dhatu*s.

**Modern Correlates:** In contemporary physiology, *Bhutagni* may be viewed as the combinations of the hepatic and metabolic pathways that transform and synthesize nutrients. The liver is the site where absorbed monosaccharides, amino acids, fatty acids and other molecules are interconverted, stored, or repackaged. For example, glucose from the intestine enters hepatocytes and is phosphorylated (via glucokinase/hexokinase) to glucose-6-phosphate, then converted to glycogen (through phosphoglucomutase, glycogen synthase, branching enzymes). Excess glucose can be further processed into acetyl-CoA and triglycerides via glycolysis



and lipogenesis pathways[7]. Likewise, amino acids entering the liver undergo transamination, deamination and gluconeogenesis to form new glucose or plasma proteins (e.g. albumin, clotting factors)[8]. Lipids delivered as chylomicron remnants are assembled into VLDL particles or broken down by hepatic lipase[9]. All of these processes involve *Bhutagni*-like factors: hepatic enzymes and micronutrients that catalyse molecular transformations. Indeed, the *Bhutagni* present in the body can be considered as different enzymes in the liver responsible for interconversion once *ahara rasa* reaches the liver. Vitamins also cast as *Bhutagni* catalysts - e.g. fat-soluble vitamins (A, D, E, K) and cofactors (B vitamins) facilitate energy metabolism and biosynthesis. Without these enzymatic and cofactor fires, nutrients would remain intransigent and unusable.

### Dhatwagni (Tissue Fires)

Each of the seven *dhatu*s (tissues) has its own *Agni* - the *Dhatwagni* - which enables the tissue-specific metabolism and nourishment. These are: *Rasagni* (agni in *rasa* i.e., plasma), *Raktagni* (agni in *rakta* i.e., blood), *Mamsagni* (agni in *mamsa* i.e., muscle), *Medoagni* (agni in *medo* i.e., fat), *Asthiagni* (agni in *asthi* i.e., bone), *Majjagni* (agni in *majja* i.e., bone marrow), and *Shukragni* (agni in *shukra* i.e., reproductive

tissues). After food is digested and assimilated at the *Jathara* and *Bhuta* levels, the resulting *Sara* (essence) which is distributed to each *dhatu*. Each *dhatwagni* then “digests” its appropriate precursor into that tissue’s essence. For example, *rasagni* refines chyle into *rasa dhatu* (nutritive fluid), *raktagni* forms blood cells from plasma precursors, *Mamsagni* builds muscle fibers, and so on. This view gives a hierarchical series of metabolic fires culminating in tissue formation.

**Modern Correlates:** In modern physiology view, *dhatwagni* correlates with endocrine and local metabolic factors governing tissue growth, differentiation and energy utilization. Hormones, growth factors, vitamins and tissue-specific enzymes serve as the “heat” or catalysts within each tissue. For instance:

***Rasagni* (Plasma):** *Ayurveda* describes *Rasagni* as the *Agni* in plasma/lymph, containing vitamins and enzymes that enable nutrient transformations. Physiologically, this is parallel to circulating hormones and plasma enzymes that regulate baseline metabolism. It also includes insulin and pituitary trophic hormones (which influence overall substrate usage), and immune mediators. Vitamins A, C, E, B-group (biotin, pantothenic acid) function in plasma/lymph biochemistry and can be viewed as part of *rasagni*, many endocrine secretions (from pancreas, pituitary, thyroid, adrenals) are



encompassed by *rasagni* because they act broadly on nutrient uptake and metabolism.[10,13]

**Raktagni (Blood):** The *raktagni* corresponds to hematopoietic processes. Ayurvedic commentary identifies intrinsic factor and nutrients like vitamin B12 and folic acid as components of *raktagni* (since they are crucial for erythropoiesis). In modern physiology, erythropoietin (a kidney hormone) and bone marrow growth factors enable red blood cell production from precursors, which can be regarded as the *raktagni* function. The breakdown products from *raktagni* (macro-Kitta) can be said as bile, aligning with the idea that heme catabolism (bilirubin in bile) is coupled with blood cell metabolism.[11,15]

**Mamsagni (Muscle):** Agni of the muscle tissue enables the muscle metabolism. Vitamins (thiamine, ascorbate) and enzymes (myokinase, CPK isoforms) can be said as contributors to *mamsagni*. **IGF-1 and growth hormone** drive muscle growth, while local calcium-handling proteins (troponin, myosin, actin) mediate contraction and adaptation. The breakdown of protein/energy in muscle (e.g. during exercise) involves mitochondria and ATP generation (Krebs cycle enzymes) - which states are part of *dhatwagni* in every cell. In short, *mamsagni* can be viewed as muscle anabolism/catabolism homeostasis under hormonal control.[12,13]

**Medoagni (Adipose/Fat):** The *medoagni* manages lipid metabolism and storage. The *medoagni* can be correlated with thyroid (thyroxine) and adrenal (glucocorticoid) activity, reflecting modern endocrinology: thyroid hormones upregulate basal metabolic rate (burning fat), while cortisol influences fat distribution. Insulin and leptin also regulate adipose tissue. Thus, hormones controlling appetite and fat deposition (insulin, leptin, thyroid hormone, growth hormone) function as components of *medoagni*. Thyroid (iodine-rich *Tejas dravya*) and glucocorticoids can also be correlated with *medoagni*. Abnormal *medoagni* manifests as obesity (*Meda Vriddhi*) or wasting (*Meda Kshaya*).[13]

**Asthiagni (Bone/Connective Tissue):** *Asthiagni* underlies bone and skeletal tissue metabolism. Key physiological factors include vitamin D<sub>3</sub>, parathyroid hormone (PTH) and calcitonin for calcium/phosphate balance, and growth hormone, estrogen for skeletal maturation. Alkaline phosphatase (a bone enzyme) is another marker of bone formation.[14]

**Majjagni (Marrow/Nervous Tissue):** The *majjagni* is responsible for bone marrow and nervous tissue nourishment. Bone marrow activity is heavily driven by factors like interleukins, colony-stimulating factors (e.g. GM-CSF), and EPO (for erythropoiesis), which can be seen as *majjagni* components.

The vitamin B12's role in nerve myelination can also be correlated as a part of *majjagni*. Pituitary and adrenal secretions (e.g. growth hormone, ACTH) are said to constitute *majjagni*, reflecting their broad role in bone marrow stimulation and CNS support. Overall, *majjagni* integrates neuro-hematopoietic metabolism via endocrine signalling. [11, 15]

**Shukragni (Reproductive Tissue):** Finally, *shukragni* governs fertility and reproductive tissue maintenance. Shukragni can be

correlated with vitamins E and H (biotin) and the whole axis of gonadotropic hormones. In modern physiology, this includes GnRH, FSH, LH from the pituitary, and sex steroids (testosterone, estrogen, progesterone) from the gonads. These hormonal signals effect gametogenesis and secondary sexual characteristics. We can also mention sertoli cell, estrogen and LH as part of Shukragni. In sum, Shukragni corresponds to the hypothalamo-pituitary-gonadal endocrine circuit.[16]

**Table No.1: *Dhatwagni* and its modern correlates**

Agni (Dhatwagni)	Primary Tissue (Dhatu)	Physiological Analogues
1. <b>Rasagni</b>	Rasa (plasma/lymph)	Plasma enzymes, vitamins A/C/E/B; insulin, pituitary hormones, cytokines
2. <b>Raktagni</b>	Rakta (blood)	Vitamin B <sub>12</sub> , folate; erythropoietin, bone marrow growth factors (CSFs)
3. <b>Mamsagni</b>	Mamsa (muscle)	IGF-1, GH, thyroid; muscle enzymes (creatine kinase, myokinase), calcium-handling proteins (troponin, tropomyosin)
4. <b>Medoagni</b>	Meda (adipose)	Insulin, leptin, thyroid hormones, cortisol; adipocyte lipases
5. <b>Asthiagni</b>	Asthi (bone/cartilage)	PTH, calcitonin, vitamin D <sub>3</sub> ; estrogen/androgens, alkaline phosphatase
6. <b>Majjagni</b>	Majja (bone marrow)	Interleukins (IL-3, IL-6), EPO; pituitary (GH, ACTH) and adrenal (cortisol) hormones
7. <b>Shukragni</b>	Shukra (sperm/ova)	GnRH, FSH, LH; sex steroids (testosterone, estrogen, progesterone) and vitamin E/H

## DISCUSSION

This review shows that the *Ayurvedic* concept of *Agni* has clear parallels in modern physiology and biochemistry. At the conceptual level, *Agni* represents any system that transforms and metabolizes

substances, whether the fiery element of digestion or the subtle enzymatic processes of the tissues. The tripartite division (*Jathara, Bhuta, Dhatu Agni*) can be the sequential stages of nutrient handling: gastrointestinal digestion (mechanical and



chemical breakdown), hepatic conversion and distribution (intermediary metabolism), and tissue-level assimilation (cellular metabolism and anabolism).

Clinically, bridging these paradigms can enhance understanding. *Ayurvedic* treatments aimed at *agni* (e.g. digestive tonics, *Pachana* herbs, agni-nurturing diets) can be interpreted in light of their effect on modern physiology (e.g. stimulants of enzyme secretion, prokinetics, regulatory peptides). For example, the *Trikatu* (combination of ginger, black pepper, long pepper) has been shown in studies to increase gastric secretion and gut motility, which corresponds to its traditional use in *Mandagni*[17].

Integrating Agni with physiology also invites novel perspectives. For instance, the emerging field of **biophotonics** has been mentioned as a way to “decipher Agni” at the subatomic level[18]. Similarly, Ayurveda’s emphasis on digestive timing and qualities of food (Laghu and Ushna diet enhancing Agni) resonates with chrononutrition and the thermic effect of food in metabolic research. The concept that each tissue has its own “digestive fire” is akin to recognizing tissue-specific metabolism - for example, muscle’s

voracious ATP use or bone’s continual remodeling. These ideas may inspire interdisciplinary research on bioenergetics from a ayurvedic point of view.

## CONCLUSION

Despite these parallels, key differences exist. *Agni* is a qualitative and all-encompassing principle, not a discrete chemical compound. It conflates mechanical (stomach churning), chemical (enzymes), thermal and even subtle (electromagnetic/biophotonic) processes under one term. Modern physiology parses these into specific factors. Care must be taken not to oversimplify or force equivalences where they are conceptual.

So, the concept of *agni* is necessary for understanding metabolism and health. By systematically correlating *agni* categories with digestive enzymes, metabolic pathways and hormones, we have shown that *agni* is not merely metaphorical but reflects observable biological processes. Such bridging holds promise for integrative medicine: preserving the wisdom of *ayurveda* while anchoring it in the rigor of physiology.

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