



Food as Information: Integrating Ayurveda with Gut Microbiome Science and Multisensory Eating

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Abstract. For decades, nutrition science has reduced food to its measurable molecular components calories, macronutrients, and micronutrients while paying little attention to the sensory, contextual, and individual dimensions of eating. This article argues that a fuller understanding of food requires integrating this reductionist framework with the holistic principles of Ayurveda, which treats food as “information” decoded through taste, energetic quality, and individual constitution (dosha) rather than calorie content alone. Drawing on emerging research in personalized nutrition, the gut microbiome, and neuroscience, the article traces how individualized glycemic responses, the gut-brain axis, and multisensory eating (sight, smell, touch, sound, and taste) together shape digestion, satiety, mood, and long-term health. It further situates the body within two interacting ecosystems the internal microbiome and the external exposome and examines how adaptogenic herbs such as Ashwagandha may buffer this system by modulating stress physiology and gut microbial composition. The article concludes that the future of nutritional science lies not in more precise labelling but in a personalized, sensory-rich, and coherence-based model of eating that unites ancient holistic wisdom with modern precision medicine.

Keywords. Ayurveda; gut-brain axis; microbiome; personalized nutrition; exposome; adaptogens; multisensory eating

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Introduction

For decades, the conversation around food has been dominated by a reductionist framework, in which nutritional value is quantified primarily through calories, grams of fat, and milligrams of sodium. The nutritional facts panel became our oracle, guiding every choice. This narrow focus on molecular components may, however, obscure a fuller picture of what food is and how it functions in the body. A revolutionary new understanding of food is emerging, one that synthesizes ancient wisdom with innovative science. It suggests that the true power of a meal lies not just in its chemical makeup, but in the experience it creates: a symphony for our senses that speaks directly to our unique biology.

This new paradigm finds a powerful ally in one of the world's oldest holistic healing systems, Ayurveda. Translated as the "science of life," Ayurveda never had a concept of a calorie. Instead, it proposes that food is more than fuel; it is information. This information is decoded through its six tastes (sweet, sour, salty, pungent, bitter, astringent), its energetic qualities (heating or cooling, heavy or light), and its effect on our individual constitution, or dosha.

अन्नं ब्रह्मेति व्यजानात्। - तैत्तिरीय उपनिषद्, भृगुवल्ली (अध्याय 2, अनुवाक 2.1) ["Know that Food is Brahman (the ultimate reality)." *Taittiriya Upanishad, Bhṛigu Valli (Chapter 2, Anuvaka 2.1)*]

In the Ayurvedic tradition, a meal is treated as a therapeutic intervention: the guiding questions are not only what a food contains, but how it affects the individual, when it is eaten, and for whom it is suited. A person with a fiery Pitta constitution, for instance, might be aggravated by spicy, heating foods (like chili peppers) that another person thrives on. Here, the "information" of spiciness creates inflammation in one body and vitality in another [1]. This is not mysticism; it is a primitive, yet profound, form of precision medicine.

Modern precision medicine has arrived at a strikingly similar conclusion, albeit through the lens of genomics and microbiome science. We now know that our genetic makeup determines how we metabolize nutrients. A 2015 study in the *Journal Cell* demonstrated that people's blood glucose responses to the exact same food vary considerably and proposed that this variability is influenced by individual gut microbiome composition [2]. The one-size-fits-all dietary guideline is obsolete. Food is personal.

But the convergence goes deeper than biology. It extends to the very act of eating itself. Both Ayurveda and modern neuroscience agree that how we eat is as important as what we eat. This is where we must expand our concept of food to involve all our

senses (Figure 1).

The Multisensory Meal: A Recipe for Well-being

1. Sight (Rupa): Before a single bite touches our lips, our eyes have already sent signals to our brain and gut, initiating the cephalic phase of digestion [3]. A vibrant, visually varied plate of vegetables signals diverse phytonutrient content and helps trigger early digestive enzyme secretion, in contrast to the visually monotonous presentation typical of rapidly consumed, packaged convenience meals.

2. Smell (Gandha): The aroma of food is its volatile soul. The olfactory nerves are directly wired to the amygdala and hippocampus, brain regions central to memory and emotion. The smell of rosemary, coriander or dill does not just make food taste better; it can evoke a state of calm or alertness, preparing the body for nourishment.

3. Touch (Sparsha): This is twofold. First, the texture of food in our mouth creamy avocado, crunchy almond, sticky oatmeal-provides tactile feedback that influences satiety and satisfaction. Second, the act of touching food with our hands, as many traditions encourage, creates a physical connection and mindfulness that is absent when using a fork and screen.

4. Sound (Shabda): The crunch of an apple, the sizzle of a skillet, the quiet ambiance of a mindful meal these sounds matter. Research from the University of Oxford shows that our perception of taste is altered by the sounds we hear while eating [4]. Food is perceived as crisper and fresher in a quiet, natural setting than amid the chaotic noise of a television.

5. Taste (Rasa): Finally, we arrive at taste, but with a new appreciation. Ayurveda teaches that a balanced meal should include all six tastes to ensure nutritional completeness and satiety. The bitter taste of leafy greens, for example, is traditionally associated in Ayurveda with the stimulation of liver function. Contemporary modern dietary patterns, characterized by high intakes of free sugars and salt alongside insufficient vegetable consumption, offer comparatively limited representation of this taste [5].

When we eat mindfully, engaging all senses, we move from consumption to communion. We slow down. We chew thoroughly. We notice when we are full. This practice, known in Ayurveda as *sadhana*, transforms eating from a metabolic chore into a meditative, healing ritual. It combats the stress eating and distracted consumption that disrupts digestion and

contributes to chronic disease, and promotes holistic health.

Meaning “One whose doshas (bio energies) are in balance, whose digestive fire (agni) is balanced,

whose bodily tissues (dhatus) and waste elimination (mala kriya) are functioning normally, and whose soul, senses, and mind are in a state of bliss is called a healthy person.”

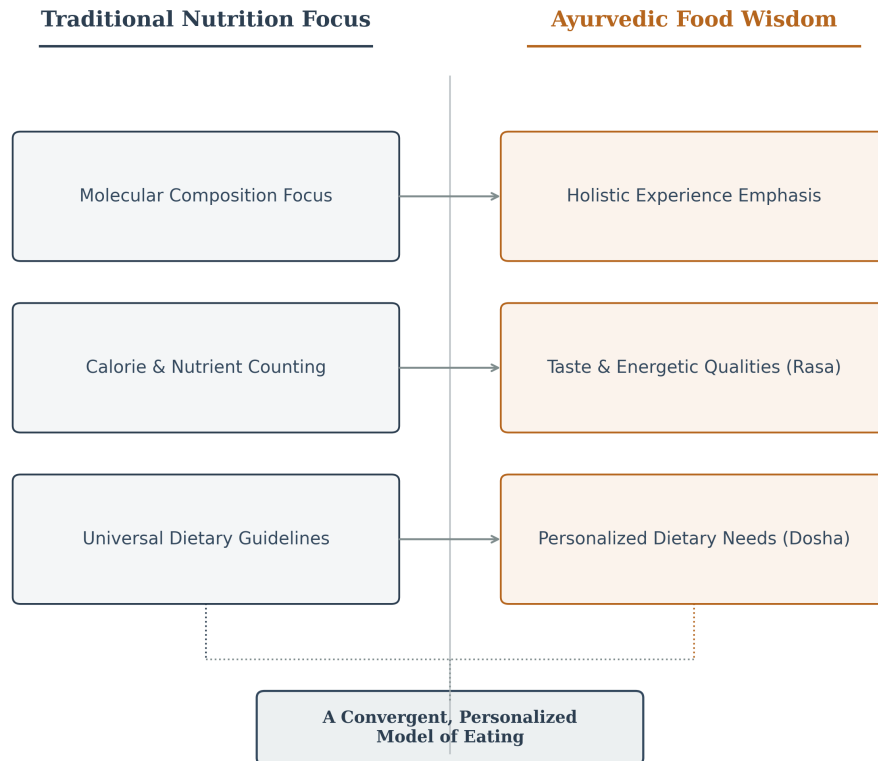


Figure 1: Converging paths in food understanding: contrasting traditional nutrition’s focus on molecular composition, calorie counting, and universal dietary guidelines with Ayurvedic food wisdom’s emphasis on holistic experience, taste and energetic qualities, and personalized dietary needs.

The Gut-Brain Conversation: The Missing Link in Holistic Health

The scientific bridge connecting this multisensory, mindful experience to our physical health is the gut-brain axis. This is a constant, two-way dialogue between your central nervous system and the enteric nervous system in your gut, mediated by your vagus nerve and, crucially, by your gut microbiome.

The trillions of microbes in our intestines are not passive passengers; they are active chemists. They digest fibres and polyphenols that we can’t, producing a plethora of postbiotics like short-chain fatty acids

(e.g., butyrate) that reduce inflammation, strengthen the gut barrier, and even influence our hunger and satiety signals [6, 7]. For instance, certain gut bacteria produce hormones that mimic our own appetite-regulating hormones (like GLP-1 and PYY), sending “I’m full” signals to the brain. An imbalance in the microbiome (dysbiosis), often caused by a poor diet, can disrupt this delicate communication, leading to blunted satiety signals and potential overeating [8].

Furthermore, this microbial conversation is fundamental to our mental and emotional state. Gut bacteria are primary producers of key neurotransmitters. Approximately 90% of the body’s serotonin (a key regulator of mood, sleep, and digestion) and a sub-

stantial amount of dopamine (involved in reward and motivation) are synthesized in the gut [9]. The types of food we eat directly shape the microbial populations that, in turn, influence the production of these critical brain chemicals. A diet rich in diverse plants fosters a diverse microbiome, which supports a stable and resilient mental state [10]. This is the biochemical basis for the Ayurvedic claim that a healthy digestive fire (agni) is the cornerstone of vitality (ojas) and clear mindedness (sattva).

The Internal and External Ecosystem: Microbiome, Exposome, and Adaptogens

To fully embrace the holistic future of food, we must view our body not as an isolated entity, but as a dynamic interface between two vast ecosystems: the internal microbiome and the external exposome.

The exposome, a concept introduced by Dr. Christopher Wild in 2005, encompasses the totality of environmental exposures an individual encounters from conception onward [11]. This includes the chemical environment (pesticides, pollutants, food additives), the physical environment (noise, light cycles, urban design), and the psychosocial environment (chronic stress, socioeconomic status). The exposome constantly dialogues with our microbiome, shaping its composition and function. For example, exposure to environmental pollutants like heavy metals and air particulates has been linked to gut microbiome dysbiosis and increased intestinal permeability (“leaky gut”), creating a state of chronic, low-grade inflammation [12]. Light at night and chronic psychological stress can alter microbial rhythms and diversity, further disrupting the gut-brain axis [13].

This is where the ancient wisdom of adaptogens finds its modern relevance. Adaptogens are a unique class of herbal remedies—such as Ashwagandha, Rhodiola, Holy Basil (Tulsi), and Schisandra—that non-specifically enhance the body’s resilience to physical, chemical, and biological stressors [14]. They help the body “adapt” and return to homeostasis. Their function aligns perfectly with the goal of achieving coherence in the face of a challenging exposome.

Modern research is beginning to validate their mechanisms. Studies show that adaptogens work in part by modulating the Hypothalamic-Pituitary-Adrenal (HPA) axis, our central stress response system, thereby regulating cortisol levels [15]. Crucially, a growing body of evidence suggests that a key mechanism of action is through the gut-brain axis. For instance, Ashwagandha supplementation has been

shown in animal models to improve gut microbial diversity and strengthen gut epithelial barrier function [16]. In human volunteers, Ashwagandha has also been associated with improvements in physical parameters such as muscle strength and sleep quality, pointing to broader physical and mental well-being benefits [17]. By mitigating the impact of stress and environmental toxins, adaptogens help create a more stable internal environment for a healthy microbiome to thrive, completing a virtuous cycle of resilience.

The Path Forward: From Calories to Coherence

The future of nutritional science is not in developing more fortified, processed foods with perfect labels. It is in embracing a holistic, personalized, and sensory-rich approach. Such a future may include dietary guidance derived not from generic guidelines, but from personalized models that account for an individual’s genetic profile, gut microbiome, metabolic type, and stress levels.

This new model views holistic health as a state of coherence, where the food we eat, the way we eat it, and the signals from our environment are in alignment. It acknowledges that a meal eaten in a state of stress, even if it is a “perfect” salad, can trigger a stress response that impairs digestion and alters the gut microbiome. Conversely, a simple, home-cooked meal eaten with joy and mindfulness can be profoundly nourishing on every level.

Practically, this reorientation invites individuals to move beyond calorie counting toward sensory engagement with food: attending to colour, aroma, texture, and taste, and eating in a calm environment suited to one’s individual constitution. Reenchanting the experience of eating in this way nourishes not only the body but also the mind, restoring food to its ancient role as a profound and daily form of medicine.

हिताहारोपयोग एक आयुष्यः प्राणिनां विधिः।

अहिताहारसेवी तु व्याधिसंसेवी च कथ्यते॥

(चरक संहिता, सूत्रस्थानम्, अध्याय 27, श्लोक 231)

“The proper use of *hita ahara* (wholesome, suitable food) is the sole foundational principle for the longevity of living beings. One who indulges in *ahit ahara* (unwholesome, unsuitable food) is said to be inviting disease.”

COMPLIANCE Not required.

CONFLICT OF INTEREST None.

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