



# Nephroprotective Drugs In Unani Medicine: A Conceptual And Pharmacological Review

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## Abstract

The increasing prevalence of chronic kidney disease (CKD) and drug-induced nephrotoxicity has created a need for safe and effective therapeutic alternatives. Unani medicine provides a holistic approach to renal protection through the concept of *Muhafiz-e-Kulya*, which focuses on maintaining *Mizaj* (temperament), proper functioning of *Quwa* (faculties), and elimination of *fasid maddah* (morbid matter). This review aims to explore the conceptual framework of kidney function in Unani medicine and to evaluate the nephroprotective potential of Unani drugs in the light of modern scientific evidence. A comprehensive analysis of classical Unani texts along with recent pharmacological studies was carried out.

The Unani system describes the kidney (*Kulya*) as an active organ governed by five faculties responsible for absorption, retention, transformation, discrimination, and elimination. Several drugs such as *Kasni* (*Cichorium intybus*), *Gokhru* (*Tribulus terrestris*), *Biskhapra* (*Boerhavia diffusa*), and *Karafs* (*Apium graveolens*) have shown significant nephroprotective effects through antioxidant, anti-inflammatory, and diuretic mechanisms. Compound formulations like *Jawarish Zarooni Sada* and *Sharbat-e-Bazoori* further enhance renal protection by improving detoxification and organ strength.

Modern experimental studies support these traditional claims by demonstrating reduction in serum creatinine, urea levels, and renal tissue damage. The review suggests that Unani nephroprotective drugs offer a multi-targeted approach in the management of renal disorders. However, further clinical studies and standardization are required for their wider acceptance in modern medicine.

**Keywords:** Unani Medicine, Nephroprotection, *Muqawwiyat-e-Kulya*, Chronic Kidney Disease.

## Introduction

The escalating global burden of renal disorders represents one of the most significant public health challenges of the 21st century. Chronic kidney disease (CKD) currently affects approximately 9.1% of the global population, with mortality rates having increased by over 40% in recent decades.<sup>30</sup> Epidemiological data from the SEEK-India cohort highlights a prevalence of 17.2% in the Indian subcontinent, with many patients unaware of their deteriorating renal status until reaching advanced stages.<sup>29</sup> Concurrent with the rise of metabolic syndromes like diabetes and hypertension, the inherent nephrotoxicity of modern pharmaceuticals—such as aminoglycosides (gentamicin), chemotherapeutic agents (cisplatin), and NSAIDs—has prompted a critical re-evaluation of traditional reno-protective strategies.<sup>31,33</sup>

Unani medicine, a system with roots in Greek, Persian, and Arabic traditions, offers a holistic approach to renal health categorized under *Amrāḍ-i-Kulya*.<sup>31</sup> Unlike the often reductionist approach of conventional medicine, the Unani system views the kidney as a vital organ whose functional integrity depends on the maintenance of a specific temperament (*Mizaj*) and the optimal performance of its innate faculties (*Quwa*).<sup>11,14</sup> Nephroprotection in this context, known as *Muhafiz-e-Kulya*, involves the use of tonifying agents to enhance the organ's resilience against morbid humors and environmental toxins.<sup>14,33</sup> This review examines the conceptual depth of Unani nephrology and the scientific rationale behind its extensive pharmacopeia.

## Objectives of the Review

1. To trace the historical evolution of renal medicine within the Unani tradition from antiquity to the medieval era.
2. To elucidate the physiological and pathological framework of the kidney as described in classical Unani literature.
3. To synthesize modern pharmacological evidence for single and compound Unani drugs used for nephroprotection.
4. To identify gaps in existing literature and suggest future research directions for the integration of Unani Pathy into modern renal care.

## Methodology of the Review

This narrative review utilized a chronological search strategy to identify authentic sources. Primary classical texts were consulted, including works by Hippocrates, Galen, Al-Razi, Al-Majus, and Ibn Sina, alongside medieval and early modern compendiums by Ibn Rushd, Ibn al-Baydar, Aghili Khorasani, and Hakim Kabiruddin. For modern pharmacological data, databases including PubMed, Scopus, and Google Scholar were searched using terms such as "Unani nephroprotective drugs," "gentamicin-induced nephrotoxicity," and "Cichorium intybus renal health." A total of 43 authentic references were selected, spanning historical manuscripts to recent experimental studies (2011–2024), to ensure a comprehensive synthesis of traditional wisdom and contemporary science.

## Overview of Existing Literature

### Historical Evolution from Antiquity to the Golden Age

Nephroprotection encompasses the preservation of renal structure and function against pathological insults including toxins, oxidative stress, inflammation, and metabolic disturbances. The kidneys (*Kulya*) play a vital role in filtration, fluid balance, and elimination of waste products. In Unani medicine, renal diseases are often associated with imbalance in *Mizan* (temperament), accumulation of morbid matter (*Madda Farida*), and obstruction (*Sudadi*). Classical Unani physicians like **Ibn Sina**, **Al-Razi**, and **Ali ibn Abbas al-Majus** described multiple drugs that protect and strengthen renal function.

The conceptualization of renal health in the Unani system is the product of millennia of intellectual continuity. Sumerian and Babylonian records (ca. 4000 BCE) represent the earliest documented

observations of renal pain and haematuria inscribed on clay.<sup>1</sup> Ancient Egyptian medicine, as preserved in the Ebers Papyrus (ca. 1550 BCE), identified haematuria through the description of "worm-shaped blood clots," providing a foundation for early diagnostic uroscopy.<sup>2</sup>

The scientific era began with Hippocrates (460–370 BCE), who discarded supernatural aetiologies in favour of biological explanations for renal abscesses and stones.<sup>3</sup> Galen (131–210 CE) later established the humoral doctrine, viewing the kidneys as essential filters that clear the blood of "aqueous humor" to maintain systemic balance.<sup>4</sup> This Greco-Roman foundation was later refined by the polymaths of the Islamic Golden Age. Ali ibn Sahl Rabban al-Tabari (ca. 860 CE) authored the first Arabic medical encyclopaedia, *Firdous al-Hikmah*, which detailed renal development and systemic metabolic interactions.<sup>5</sup>

Abu Bakr Muhammad ibn Zakariya al-Razi (Rhazes, 865–925 CE) introduced empirical clinical rigor through his 23-volume *Kitab al-Hawi*, where he meticulously differentiated between renal and bladder pain.<sup>6,8</sup> His specialized treatise on stones, *Kitab al-Hasa fi al-Kula wa al-Mathana*, remains a landmark in lithotriptic therapy.<sup>9</sup> Ali ibn al-Abbas al-Majusi (d. 994 CE) further advanced surgical anatomy and the understanding of renal vascularity in *Kamil al-Sina'a*.<sup>10</sup> The synthesis reached its zenith with Ibn Sina (980–1037 CE), whose *Al-Qanun fi al-Tibb* provided the most exhaustive classification of renal diseases and pioneered the design of malleable catheters for urinary obstruction.<sup>11,13</sup>

### Concept of Kidney (Kulya) in Unani Medicine – Anatomical and Functional View

In Unani medicine, the understanding of the kidney (*Kulya*) goes far beyond a simple filtering organ. Classical scholars, especially Ibn Sina, described the kidneys as dynamic organs that actively participate in maintaining the internal balance of the body. Their role is deeply connected with the broader Unani principles of *Mizaj* (temperament), *Akhlat* (humors), and the governing power of *Tabi'at* (physis or natural healing force).

According to Ibn Sina, the kidneys are primarily responsible for filtering waste materials from the blood, but this process is not merely mechanical. He viewed it as a selective and intelligent function, where the kidneys separate useful components from harmful or excess substances. The blood reaching the kidneys carries both nutrients and waste products formed during metabolism. The kidneys, under the influence of *Tabi'at*, retain what is beneficial for the body and expel what is unnecessary in the form of urine. This reflects a purposeful, almost discerning activity, rather than passive filtration.

In addition to waste removal, the kidneys play a crucial role in regulating fluid balance within the body. Unani scholars emphasized that proper distribution and elimination of fluids are essential for maintaining health. If the kidneys fail to regulate this balance, it leads to either retention of fluids, resulting in conditions like edema, or excessive loss, causing dryness and weakness. Thus, the kidneys act as regulators that maintain harmony between *Ruṭūbat* (moisture) and *Yubūsat* (dryness), ensuring that neither excess nor deficiency disturbs the internal environment.

Another important function attributed to the kidneys is the maintenance of equilibrium among the four humors—*Dam* (blood), *Balgham* (phlegm), *Safra* (yellow bile), and *Sauda* (black bile). Ibn Sina explained that improper elimination of waste can lead to the accumulation of abnormal humors, which then become the root cause of disease. By efficiently removing excess and morbid materials, the kidneys help preserve the qualitative and quantitative balance of these humors, which is central to health in Unani philosophy.

From a temperamental perspective, Ibn Sina described the kidneys as having a moderately hot and moist *Mizaj*. This is a very meaningful description. The moderate heat (*Harārat*) is necessary to facilitate metabolic activity and enable the separation of waste from blood, while the moisture (*Ruṭūbat*) supports smooth filtration and prevents dryness that could impair function. If the kidneys become excessively hot, it may lead to inflammation and burning sensations, whereas excessive coldness can slow down filtration and result in accumulation of waste. Similarly, imbalance in moisture can either cause obstruction (due to excess viscosity) or degeneration (due to dryness).

Therefore, in Unani thought, the kidneys are not isolated organs but part of a finely tuned system governed by temperament, humoral balance, and the innate wisdom of *Tabi'yat*. Their function reflects a harmonious interaction between structure and quality, where physical processes are guided by deeper principles of balance and regulation.

## Physiological and Functional Framework

In Unani physiology, the kidney (*Kulya*) is described as an active and functionally intelligent organ governed by a set of intrinsic faculties known as *Quwa (faculties)*. Classical scholars, particularly Ibn Sina, emphasized that renal function is not merely passive filtration but a coordinated physiological process regulated by *Tabi'yat (physis or innate governing power)*. Each faculty contributes to maintaining internal homeostasis through a sequence of absorption, retention, transformation, discrimination, and elimination. In Unani physiology, the kidney is not a passive filter but a muscular organ governed by five distinct faculties (*Quwa*):<sup>12,14</sup>

1. **Quwwat-e-Jazibah (Absorptive):** is responsible for attracting the *Watery part* of blood toward the kidney. This corresponds to the initial phase of filtration, where fluid containing dissolved metabolic waste is drawn into the renal system. A defect in *Quwwat-e-Jazibah* leads to reduced absorption, resulting in decreased urine formation and accumulation of *fasid maddah (morbid matter)* in circulation.<sup>12</sup>
2. **Quwwat-e-Masikah (Retentive):** ensures the *ihtibas (retention)* of absorbed fluid within the renal tissue for adequate processing. This phase is essential to prevent premature elimination of unprocessed material. Weakness of *Quwwat-e-Masikah* may cause loss of essential *ajza-e-lateefa (subtle nutrients)* through urine, contributing to systemic weakness and nutritional depletion.<sup>14</sup>
3. **Quwwat-e-Hazimah (Transformative):** represents *hazm-e-udwi (organ-level digestion)*. At this stage, the kidney metabolically processes the retained fluid, refining useful components and preparing waste for excretion. This aligns with the broader Unani concept that every organ possesses its own digestive capability, essential for maintaining its structural and functional integrity.<sup>26</sup>
4. **Quwwat-e-Dafiah (Eliminative):** is responsible for *excretion* of waste products in the form of urine toward the *masana (urinary bladder)*. Efficient functioning of this faculty ensures timely elimination of *fazlat (metabolic waste)*. Impairment leads to *ihtibas-e-fazlat (retention of waste)*, contributing to systemic toxicity and progression of disease.<sup>14</sup>
5. **Quwwat-e-Momaiyazah (Discriminative):** plays a critical role in *tamyeez (selective differentiation)*. It distinguishes between *nafi' ajza (beneficial substances)* and *muzir maddah (harmful waste)*. This faculty ensures that essential components are reabsorbed into circulation, while toxic and excess materials are directed toward elimination. This concept closely parallels selective filtration and reabsorption in modern renal physiology, though framed in qualitative functional terms.<sup>12,31</sup>

The functional integrity of all these faculties depends upon the kidney's inherent *Mizaj (temperament)*, described as **Har Ratab (hot and moist)**.<sup>11,18</sup> The *Hararat (heat)* provides the necessary metabolic energy (*quwwat-e-fa'ilah*) required for filtration, transformation, and elimination, while *Ruṭūbat (moisture)* maintains *latafat (softness)* and *sailaniyat (fluidity)* of renal tissues, ensuring smooth flow and preventing *tasallub (hardening)*.<sup>11</sup>

Deviation from this balanced temperament (*i'tidal-e-mizaj*) results in functional disturbances. For example, dominance of *Barudat (coldness)* reduces metabolic activity and weakens *Quwwat-e-Jazibah* and *Quwwat-e-Hazimah*, leading to fluid retention and clinical manifestations such as *waram (edema)* and *baul abyad (pale/white urine)*, which resemble nephrotic conditions in modern medicine. Similarly, excess *Yubusat (dryness)* may cause rigidity of renal tissues, impairing both filtration and elimination.<sup>31</sup>

## Thematic Analysis and Critical Discussion

### Classification of Renal Diseases (*Amrād-i Kulya*)

Unani pathology divides renal ailments into simple (*Mufrada*) and compound (*Murakkaba*) diseases. Simple diseases include *Sū'-i-Mizāj* (impaired temperament), which can occur without structural changes, and *Tafarruq al-Ittiṣāl* (loss of continuity), such as tubules ruptured by corrosive waste or stones.<sup>11,18</sup> Compound diseases involve both structural and functional derangements, most notably *Sudad* (obstruction) caused by calculi (*Hasaat*).<sup>11,31</sup>

Renal stones are theorized to form when viscous humors—phlegm (*Balgham*) or thick blood—stagnate in the renal calyces and are "baked" by intense metabolic heat.<sup>10,13</sup> Classical authors distinguish renal stones (smaller, reddish) from bladder stones (larger, darker), a distinction later confirmed by modern stone analysis.<sup>13,10</sup>

### Pharmacological Profile of Nephroprotective Drugs

The Unani pharmacopeia utilizes "kidney tonics" (*Muqawwiyat-e-Kulya*) to moderate temperament and resist the accumulation of superfluous matter.<sup>21,33</sup>

- Kasni (*Cichorium intybus*):** is classified as a *Musaffi-e-Dam* (blood purifier) and *Mudirr-e-Baul* (diuretic) in Unani medicine. It plays a key role in eliminating toxins from the bloodstream and supporting renal excretion. Classical physicians prescribed it in conditions associated with *hararat* and *fasad-e-dam* (blood impurity). Pharmacological studies suggest that *Cichorium intybus* reduces inflammatory mediators such as cytokines and helps in controlling oxidative stress. This contributes to its protective effect on renal tissues, especially in inflammatory and metabolic renal disorders. Classified as cold and moist, it is the primary drug for renal inflammation.<sup>17,18,21</sup> Modern studies show its root extract attenuates TNF-alpha and IL-6 while restoring catalase (CAT) and glutathione peroxidase in gentamicin-induced models.<sup>33,35,38</sup>
- Gokhru (*Tribulus terrestris*):** is another well-known Unani drug, primarily recognized for its *Mufattit-e-Hisat* (lithotriptic) and *Mudirr-e-Baul* (diuretic) properties. It is traditionally used in *Hisat-e-Kulya* (renal calculi) and urinary tract disorders. The drug acts by breaking and expelling stones, while also preventing their recurrence. Modern studies have shown that *Tribulus terrestris* inhibits calcium oxalate crystallization, which is the primary cause of kidney stone formation. Additionally, it exhibits antioxidant properties that reduce oxidative stress in renal tissues, thereby protecting the nephron from injury. Its dual action of stone dissolution and renal protection makes it particularly valuable in urolithiasis. A potent diuretic (*Mudir*) and lithotriptic.<sup>24</sup> It inhibits calcium oxalate crystallization and restores renal antioxidant enzymes, showing efficacy comparable to the calcium channel blocker Verapamil.<sup>18,32,35,40</sup>
- Karafs (*Apium graveolens*):** Used to balance Kapha/Vata renal disorders and clear obstructions.<sup>22,41</sup> Clinical evidence confirms it significantly lowers serum creatinine and urea by improving toxin clearance from tubules.<sup>31,32</sup>
- Biskhapra (*Boerhaavia diffusa*):** is one of the most important nephroprotective drugs in Unani medicine. It is characterized by a *Mizaj* (temperament) of Haar Yabis (moderately hot and dry) and is widely used for its *Mudirr-e-Baul* (diuretic), *Muhallil-e-Waram* (anti-inflammatory), and *Musaffi-e-Dam* (blood purifying) actions. In classical texts, it is indicated in conditions involving *Waram-e-Kulya* (renal inflammation), *Istisqa* (edema), and urinary obstruction. From a modern perspective, *Boerhavia diffusa* contains bioactive compounds such as flavonoids, alkaloids, and phenolic constituents, which contribute to its strong antioxidant activity. These compounds neutralize reactive oxygen species and reduce oxidative stress within renal tissues. Experimental studies have demonstrated that it significantly lowers serum creatinine and blood urea levels, indicating improved renal function. Furthermore, it shows dose-dependent nephroprotective effects and promotes repair of damaged nephrons. Its efficacy has been observed in acute kidney injury, chronic kidney disease, and drug-induced nephrotoxicity, highlighting its broad therapeutic potential. Highly valued for treating proteinuria and edema associated with nephritic

syndrome.<sup>18,21</sup> It has been shown to normalize serum protein levels and reverse histopathological necrosis in toxicant models.<sup>31,39</sup>

- **Tukhm-e-Kharpaza (*Cucumis melo seeds*)** is described as a *Barid Ratab (cold and moist)* drug with prominent *Mudirr-e-Baul* activity. It is particularly useful in conditions characterized by excess heat and irritation in the urinary tract. It soothes the mucosal lining, reduces burning micturition, and facilitates smooth urine flow. Its cooling effect helps in balancing *hararat* and protecting renal tissues from inflammatory damage. Though mild in action, it plays an important supportive role in renal disorders associated with irritation and dehydration.<sup>31,41.</sup>

## UNANI DRUGS AND MODERN MECHANISMS (RENAL/METABOLIC)

Unani Name	Botanical Name	Action	Modern Mechanism
Kasni	Cichorium intybus	Diuretic; Resolvent	Cytokine inhibition (TNF-alpha, IL-6)
Gokhru	Tribulus terrestris	Lithotriptic	Anti-crystallization; GSH restoration
Karafs	Apium graveolens	Deobstruent	Na+/K+-ATPase inhibition
Biskhapra	Boerhaavia diffusa	Diuretic	Increases serum protein; anti-edema
Amaltas	Cassia fistula	Detergent	Nitric oxide free radical scavenging
Kulthi	Dolichos biflorus	Lithotriptic	Reduces oxalate nucleation
Khas	Vetiveria zizanioides	Cooling	Anti-fibrotic; sesquiterpene activity
Kharpazah	Cucumis melo	Detergent	SOD and CAT restoration

## Compound Unani Formulations (Murakkabat): Nephroprotective Perspective with Vancouver Citations

In Unani therapeutics, compound formulations (*Murakkabat*) are considered more balanced and clinically effective than single drugs because they integrate multiple pharmacological actions within a single preparation. These formulations are designed not only to eliminate *fasid maddah (morbid matter)* but also to strengthen the kidney (*Taqwiyat-e-Kulya*), correct *Mizaj (temperament)*, and restore systemic harmony under the regulation of *Tabi'at (physis)*. Their nephroprotective potential has increasingly been supported by experimental and clinical studies<sup>27,43</sup>.

**Jawarish Zarooni Sada** is a classical polyherbal formulation described in Unani literature as *Mudirr-e-Baul (diuretic)* and *Muqawwi-e-Kulya (renal tonic)*. Experimental studies have demonstrated that it significantly increases urine output and electrolyte excretion, confirming its diuretic effect. More importantly, it exhibits protective activity against *gentamicin-induced nephrotoxicity*, a widely accepted experimental model of renal injury. Administration of this formulation has been shown to significantly reduce elevated serum urea and creatinine levels, indicating preservation of nephron structure and function<sup>41</sup>. These findings support the classical Unani claim that Jawarish Zarooni Sada facilitates *Tanqiya-e-Kulya (renal detoxification)* while protecting renal tissue from toxic insults.<sup>41</sup>

**Sharbat-e-Bazoori** is widely used in urinary and renal disorders, particularly those associated with *Hararat (heat)* and *Iltihab (inflammation)*. Traditionally classified as a *Mudirr-e-Baul* and *Musaffi-e-Dam (blood purifier)*, it promotes elimination of toxins through urine. Modern studies have demonstrated its nephroprotective potential in *cisplatin-induced nephrotoxicity*, where it reduces oxidative stress and prevents cellular damage in renal tissues<sup>3</sup>. This validates its classical use in burning micturition, urinary

irritation, and inflammatory renal conditions, highlighting its dual role in *Tanqiya* (detoxification) and tissue protection.<sup>43</sup>

**Majoon-e-Dabeedul Ward** is recognized in Unani medicine as a *Muqawwi-e-Kulya* (renal tonic) and *Muqawwi-e-Kabid* (hepatic tonic). Classical texts describe its role in improving *Islah-e-Dam* (blood quality) and reducing the burden of *fasid akhlat* (morbid humors)<sup>27</sup>. Although modern experimental evidence on this specific formulation is limited, its therapeutic rationale is strongly supported by the Unani concept of liver–kidney interdependence, where strengthening hepatic function indirectly enhances renal performance. It is therefore particularly useful in chronic conditions involving *Zo'f-e-Kulya* (renal weakness).<sup>27</sup>

Overall, these *Murakkabat* demonstrate a multi-dimensional nephroprotective approach by combining *Idrar* (diuresis), *Tahleel* (anti-inflammatory action), *Tanqiya* (detoxification), and *Taqwiyat* (organ strengthening). The integration of classical Unani principles with emerging scientific evidence highlights their potential as effective therapeutic agents in the management of renal disorders.

### Emerging Insights and Conceptual Synthesis

A critical insight from Unani literature is the unique challenge of renal healing. Scholars like Ghulam Jilani noted that the kidney is a constant passage for corrosive waste, possesses a hard matrix that hampers drug diffusion, and cannot benefit from metabolic rest because filtration is continuous.<sup>21,33</sup> To address this, the Unani system advocates for "Regimenal Therapy" (*Ilaj-bil-Tadbeer*), such as *Hammam* (medicated baths) and *Huqna* (enema), to divert morbid humors away from the kidneys, effectively providing the organ with a "functional rest" required for tissue restoration.<sup>28</sup>

Modern scientific rationale supports this holistic approach. Many Unani drugs act as sophisticated metabolic modulators rather than simple diuretics. Their efficacy is linked to:

1. **Antioxidant Defense:** Scavenging reactive oxygen species (ROS) that drive acute kidney injury (AKI).<sup>32,33</sup>
2. **Histopathological Restoration:** Reversing necrotic changes in tubular epithelium.<sup>33,37,38</sup>
3. **Synergistic Formulations:** Polyherbal compounds like *Jawarish Zarooni Sada* achieve a multi-targeted effect that single-agent therapy often lacks.<sup>20,25,33</sup>

### Limitations of Existing Literature

Despite centuries of clinical use, the existing literature on Unani nephroprotection is primarily composed of animal models. While studies using gentamicin or cisplatin to induce toxicity have yielded promising results, there is a distinct lack of large-scale, multicenter human clinical trials to validate these findings in CKD patients.<sup>31,33</sup> Furthermore, many classical manuscripts remain untranslated or dispersed, making it difficult for the modern medical community to access the full depth of traditional renal therapeutics.<sup>31,41</sup>

### Future Research Directions

The path forward requires the standardization of these traditional drugs to ensure predictable efficacy. Identifying active constituents, such as quercetin in *Cucumis melo* or nootkatone in *Vetiveria zizanioides*, will facilitate the development of targeted herbal therapeutics.<sup>37,41</sup> Integration of Unani *Muqawwiyat-e-Kulya* as adjuvant therapy with nephrotoxic modern drugs (e.g., chemotherapeutic protocols) represents a significant opportunity for integrative medicine.<sup>14,34</sup>

### Conclusion

Unani medicine offers a profound, multi-dimensional framework for understanding and treating renal diseases. By focusing on the preservation of functional faculties (*Quwa*) and the regulation of temperament (*Mizaj*), it provides therapeutic options that address both the symptoms and the root causes of renal decay. Centuries of clinical practice, supported by an increasing volume of modern pharmacological evidence, suggest that drugs such as Kasni, Gokhru, and Karafs can significantly

mitigate oxidative stress and inflammation in the kidneys. As global health systems struggle with the rising prevalence of chronic kidney disease, the synthesis of ancient Unani wisdom with modern scientific rigor offers a promising pathway toward holistic, patient-centered renal care.

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