Review

Kidneys in Oriental and Occidental Medicine

Tetsuya Kondo

Kansai University of Health Sciences, Kumatori-cho, Japan

Key Words

Aging · Adrenal gland · Calcium metabolism · Alopecia · Inflammation · Diabetes mellitus · Osteoporosis · Alzheimer disease · Bio-mechanism · Brain · Emotion · High blood pressure · Traditional Chinese medicine

Abstract

Background: Oriental medicine is based on the 5-phase theory, in which the balance among the 5 viscera – the liver, the heart, the spleen, the lung and the kidney – is important. It is confusing that the viscera in Oriental and Occidental medicine have the same name. Out of the 5 viscera in Oriental medicine, it is the spleen that differs most from that in Occidental medicine. It mainly corresponds to the digestive organs and pancreas and has no relation to the spleen in Occidental medicine, a kind of lymph tissue. On the other hand, the concept of each of the other Oriental viscera includes the corresponding viscus in Occidental medicine. **Key Messages:** The 11 aspects of the kidney in Oriental medicine correspond to three kinds of endocrine and metabolic systems, all of which are associated with aging.

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According to traditional Chinese theory, the kidney is a comprehensive system which regulates not only water-electrolysis metabolism but also glucose metabolism, food intake, emotion, especially fear, motivation, cognitive function, genital function, bone, hair and heat production (fig. 1).

Out of these functions, glucose metabolism, water-electrolysis metabolism and genital function are basic adrenocortical functions. According to traditional Chinese theory, diseases result from the imbalance among the 5 elements wood, fire, earth, metal and water. The kidney has the nature of water needed to extinguish the fire. Fire not only stands for inflammation but also for excitement of the central nervous system such as heat of anger. These functions are consistent with the role of glucocorticoids as the anti-inflammatory and anti-stress hormone.

Dr. Tetsuya Kondo
Kansai University of Health Sciences
2-11-1, Wakaba
Kumatori-cho, Sennan-gun 590-0482 (Japan)
E-Mail kondo0724538409@kansai.ac.jp

Fig. 1. Correspondence between the Occidental functions (left column) and the Oriental functions (median column) of the kidney. All the functions are associated with aging. CRP = C-reactive protein.

In our previous, large case-control study, a kind of kidney deficiency pattern according to traditional Chinese medicine was associated with eating disorder not otherwise specified [1]. It is possible that this disorder is a kind of chronic mild adrenocortical dysfunction, since anorexia can result from chronic adrenocortical dysfunction.

Recently, it has been reported that hippocampal atrophy and disturbed negative feedback in the hypothalamic-pituitary-adrenal (HPA) axis are associated with specific cognitive impairment in Alzheimer disease [2]. It was also reported that glucocorticoid sensitivity of the cognitive system is decreased in depression [3], which is a kind of emotional and cognitive disorder with decreased motivation. These indicate that the HPA axis is involved in emotion, motivation and cognitive function, and therefore, it is considered as the most important function of the kidney in Oriental medicine.

Out of the biological functions of the kidney in Oriental medicine, some are considered to be regulated by vitamin D and calcium metabolism. According to traditional Chinese theory, kidney dysfunction results in the dysfunction of what is generically named ‘the medullas’,

which corresponds to bone marrow and brain medulla. This is consistent with the recent report that lower vitamin D concentrations are associated with poorer cognitive function and a higher risk of Alzheimer disease [4]. Hachimijiogan (Ba-Wei-Di-Huang-Wan) is a typical Kampo formula used to reinforce the function of the kidney in Oriental medicine and to prevent aging. This formula is effective not only in kidney patterns according to traditional Chinese medicine but also in renal dysfunction in Occidental medicine, whose serum creatinine is less than 3 mg/dl [5]. This indicates that the concepts of the kidney in Oriental and Occidental medicine are not very different from each other. It was reported that this formula improved the increase in urinary calcium excretion and the elevation of serum parathyroid hormone levels in aged rats [6]. These effects strengthen the bones throughout the body, which are administered by the kidney in Oriental medicine.

In addition to the medullas, the erythrocyte function is regulated by calcium. It was reported that calcium affects the membrane fluidity of the erythrocytes [7–9] through the intermediary of nitric monoxide or insulin [10]. Erythrocytes with decreased membrane fluidity would tend to grow stagnant inside the capillaries. This state is called blood stagnation. In fact, Terasawa [11] observed that the membrane fluidity of the erythrocytes was decreased in patients with blood stagnation, indicating that calcium metabolism may be associated with blood stasis. Assuming that the kidney is a calcium regulation system, this is consistent with the traditional Chinese theory that blood stagnation can result from a kidney deficiency pattern [12].

The calcium-dependent regulation of the erythrocyte membrane fluidity was disturbed in patients with essential hypertension [13]. For hypertension, especially in perimenopausal and postmenopausal women, a typical Kampo formula for blood stasis, Keishibukuryogan, was effective [14, 15]. In addition, there is direct evidence for the involvement of the Oriental kidney in hypertension. Hachimijiogan mentioned above exhibited hypotensive effects [16].

According to traditional Chinese theory, 12 meridians run vertically between the head and the extremities under or on the body surface and regulate the function of the organs and the skeletal muscles on their way. For example, the kidney meridian runs from the feet to the tongue beside and most close to the ventral median line. On the way, this meridian runs through the thyroid gland and the parathyroid gland. Therefore, these two endocrine organs are administered by the kidney. Out of the elements administered by the kidney mentioned above, heat production is a fundamental function of the thyroid gland. The two elements of the kidney in Oriental medicine, bones and hair, are reported to be regulated by thyroid function. It was reported that subclinical hyperthyroidism is associated with fracture risk in women [17–19]. In addition, some alopecia derives from hyperthyroidism or Hashimoto's disease [20, 21].

According to traditional Chinese theory, the kidney is the organ most closely associated with aging. Aging is considered as kidney deficiency. In other words, aging is characterized by the immune, neural and endocrine dysfunctions mentioned above, such as diabetes mellitus, anorexia, hypobulia [22], cognitive dysfunction [23–25], hypertension [26], osteoporosis [25], alopecia [27] and chill [28], in addition to arteriosclerosis [29] resulting from slight inflammation [30]. In summary, the concept of the kidney in Oriental medicine is broader than that in Occidental medicine.

Summary

Of the 5 viscera, in Oriental medicine, the function of the kidney is the most complicated. However, its function is easily comprehensible in Occidental medicine.

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