

Intelligible Crosstalk Between our Kidneys and other Body Organs

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Abstract

Chronic kidney disease affects millions of people around the world; many of whom are unaware they have it. It is known as the "silent disease" because it usually develops without obvious symptoms; so it is often diagnosed late, increasing the risk of serious complications. Our aim is to show the new generations that organ deserves respect and awareness of its importance and demonstrates the crosstalk between the Kidney and other body organs.

Keywords: kidney; disease; chronic; renal; eye

Introduction

Chronic kidney disease (CKD) affects millions of people around the world; many of whom are unaware they have it. It is known as the "silent disease" because it usually develops without obvious symptoms; so it is often diagnosed late, increasing the risk of serious complications. [1]

Viewpoints:

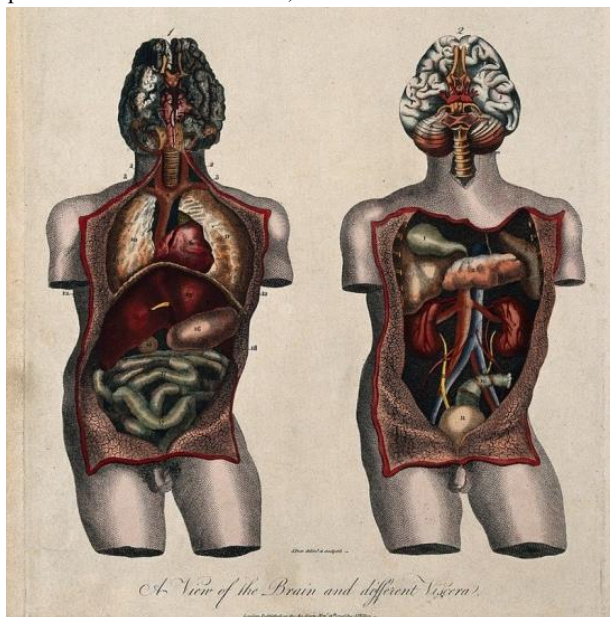
Many body organs seen in the two pictures [2] are affected by the kidneys

Loss of kidney function causes oral manifestations and multiple complications that have implications for dental treatment and patients' systemic conditions. [3] Evidence underscores the relationship between oral health, diabetes mellitus DM and chronic kidney disease CKD, highlighting oral inflammation as both a possible cause and consequence of systemic disease. Periodontal therapy lowers HbA1c by 0.43%-0.50%, reduce systemic inflammation and slow CKD progression, effects comparable to adding a second hypoglycaemic agent. Recent policy directives signal a pivotal shift towards integrating oral health into chronic disease management. These reforms recognise preventive and therapeutic dental care as medically necessary for individuals with DM and CKD, especially who awaiting kidney transplantation. Despite such progress, Medicare coverage for comprehensive dental services remains fragmented, perpetuating inequities among racial and socio-economic groups disproportionately affected by CKD. [4] Individuals with severe mental illness, including conditions such as schizophrenia and bipolar disorder, are at a higher risk of developing CKD. Higher incidences of

CKD in this population can be partially explained by known risk factors, such as the use of lithium treatment and higher rates of cardiovascular disease. Limited research suggests that care might be improved through educating kidney health care staff regarding the needs of patients with severe mental illness and by facilitating closer collaboration with psychiatry [5] Multisystem effects of CKD including hypertension, acidosis, anemia, proteinuria, and uremic milieu exert a detrimental effect on the brain. Quantitative neuroimaging modalities, such as magnetic resonance imaging (MRI), provide a non-invasive way to understand the neurobiological underpinnings of cognitive dysfunction in CKD. Adult patients with CKD show differences in brain structure; however, much less is known about the impact of CKD on neurodevelopment in pediatric patients [6]. The eyes and kidneys are the targets for end-organ damage. Both these organs develop during the same embryonic stage around the fourth to sixth week of gestation, thus sharing a strong correlation between both eye and kidney diseases. Both the eyes and kidneys can be the target of the systemic disease process; however, the eyes can also be affected as a consequence of renal disease or its treatment. Risk factors such as diabetes, hypertension, and smoking are commonly shared between kidney and eye diseases. Ocular manifestations can be predictive of renal disease, and/or patients with renal disease are at higher risk for developing ocular manifestations. Various congenital anomalies of the eyes and kidneys can also present as an oculorenal syndrome. [7] The kidney has multiple endocrine roles; it secretes various hormones and humoral factors: the hormones of the renin- angiotensin system (RAS), erythropoietin (EPO), and 1,25 dihydroxy vitamin D3. It also produces

enzymes, such as kallikreins, which produce hormones in other, distant sites. The kidney produces prostaglandins, endothelins, and adrenomedullin and also it is the primary target organ for various hormones like aldosterone, angiotensin, and the natriuretic peptides. Nephropathy is well characterized in acromegaly, hyperparathyroidism, and diabetes, to name a few. Endocrinology and nephrology overlap in many other diseases, such as urolithiasis and certain genetic disorders. As chronic renal failure develops, erythropoietin production falls, and “renal anemia” develops. Vitamin D is synthesized in the skin, upon exposure to near-ultraviolet light. The active form is synthesized in the renal proximal tubules [8] Finally, the failure of the kidney to clear toxins from the body can result in alteration as hemostasis, and leukocyte function survival. [9] Onconeurology takes many forms and includes drug-induced nephrotoxicity, electrolyte disorders, paraneoplastic glomerulonephritis, and the interactions of chronic kidney disease with cancer. [10]. Multi-organ dysfunction in critical illness is common and frequently involves the lungs and kidneys [11] The connection between cardiology and nephrology necessitates the importance of a holistic approach to healthcare. Healthcare professionals, including cardiologists and nephrologists, play a crucial role in guiding patients toward healthier lifestyles and providing tailored treatments.[12] Too much (trimethylamine-N-oxide) TMAO may lead to chronic kidney disease and can lead to heart disease. [13]. The liver, considered the centre of life, was examined by well trained “religious experts” [14]. Many systemic conditions affect both the liver and the kidneys. Certain liver diseases are also common in patients with chronic renal disease, especially viral hepatitis, either because the renal disease occurs as a complication of viral hepatitis, or the viral hepatitis is acquired as a result of dialysis. Renal tubular dysfunction is also frequently observed with cholestasis. However, liver complications of renal diseases are extremely uncommon as nephrogenic ascites and nephrogenic hepatic dysfunction. Nephrogenic ascites can mimic liver cirrhosis with ascites, and it improves with renal transplantation. Nephrogenic hepatic dysfunction is a manifestation of renal cell carcinoma, which settles with the removal of the renal cell carcinoma. Viral hepatitis should be treated, if possible, before renal transplant. If cirrhosis is present, renal transplant alone is contraindicated;

combined liver and kidney transplantation is indicated in patients with end-stage renal disease and advanced cirrhosis[15] Hepatorenal syndrome HRS-1 is a form of acute kidney injury AKI unique to the state of cirrhosis and portal hypertension. Although HRS-1 is a condition primarily characterized by marked renal vasoconstriction and kidney hypoperfusion, other pathogenic processes, such as acute tubular injury and renal vein congestion, can overlap and further complicate the course of HRS-1. Acute liver failure can lead to AKI through mechanisms that involve systemic inflammation, direct drug toxicity, or bile acid-induced tubulopathy. Moreover, the growing prevalence of nonalcoholic steatohepatitis is changing the spectrum of chronic kidney disease in cirrhosis [16] There was a correlation between recurrent urinary tract infection UTI and primary biliary cirrhosis PBC. Autoimmune hepatitis AIH has not been linked to recurrent UTI, however treatment of UTI with nitrofurantoin can induce AIH. As *Escherichia coli* is the most prevalent organism isolated in women with UTI, it has been suggested that molecular mimicry between microbial and human pyruvate dehydrogenase E2subunit (the main autoantigenic target in PBC epitopes may explain the link between UTI and PBC. [17] Untreated UTI can spread and lead to liver abscesses, Drug-Induced Liver Injury: Medications for urological disorders, pass through the liver for metabolism. Overuse or misuse of these drugs can sometimes lead to drug-induced liver injury, a condition where the liver gets damaged due to medication toxicity. [18] Skin disorders occur commonly in patients with chronic kidney disease CKD and may greatly impact their quality of life. These skin disorders have varying underlying pathophysiologies, but there are a few common mechanisms including the accumulation of uremic solutes, metabolic disturbances, and inflammation. Pruritus in the setting of CKD acquired perforating disorder (APD), calcinosis cutis, calciphylaxis, cutaneous lupus, and vasculitis are skin disorders often occurring in association with kidney disease. [19] Your kidneys do a lot for you. Simple habits, like drinking enough water, eating well, moving often at least 150 minutes of moderate exercise a week, stop smoking and reduce alcohol consumption, use medication wisely and getting checked, help them last longer and you’re investing in your health.[20]



Picture 1 (reference2): Brain and viscera

Discussion and conclusion:

Your kidneys may work quietly behind the scenes, from filtering waste to balancing essential nutrients and hormones, they are true silent heroes. Given how subtly kidney disease can progress, awareness and proactive screening are your best defense. Taking steps now not only to adopt healthier habits but also to consult specialized care when needed can help protect your kidneys for years.[21]. The kidney has many functions and as Dr. Fleming said “ Nature did that. I only discovered it by accident.” [22] Nowadays, it deserves awareness of its importance by the new generations and listening to its crosstalk.

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