

**INFORMING THE COMMUNITY ON SUBSTANCE ABUSE AND HEALTH DAMAGE: A
“DEEP THINKER” IN NEPHROLOGY****Rahul Ravilla***

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Stepping out from the realm of care of the hospitalized patients or in the dialysis unit, an "above and beyond" unique approach has been adapted by an innovative thought leader in nephrology. Dr. Girish Singhanian's accomplishments are multifaceted and go much beyond in excellence of care of his patients admitted in the hospital with multiple life-threatening illnesses, many of which also compromise the functioning of kidneys on an acute or chronic basis. After serving a fellowship in nephrology at the University of Florida, Dr. Singhanian served as an Assistant Professor of Medicine at the University of Utah. Dr. Singhanian was Medical Director of Bonneville dialysis unit and Farmington Bay dialysis unit in Utah. His polynomial accomplishments in patient care include several scholarly academic publications, which clearly demonstrate an influence on medical sciences on a very wide basis. His books chapters have appeared from the Oxford University Press as well as in standard textbooks published by leading societies like the American Society of Addiction Medicine (ASAM). Dr. Singhanian has published on vascular damage to the kidneys in the prestigious Journal of Hospital Medicine. As we discuss below, there is significant overlap in kidney changes seen in HIV infection and opioid overuse. This significant observation of disease pathophysiology overlap was reported in Dr. Singhanian's original study of oxymorphone-induced thrombotic microangiopathy and was presented at the American Society of Nephrology annual meeting in San Diego in 2015. Pain control is an important component in management of my cancer patients, which motivated me to take an interest in Dr. Singhanian's work. Certain cancers like multiple myeloma cause significant kidney dysfunction, where Dr. Singhanian and his colleagues have made important clinical observations. Importantly, Dr. Singhanian is a robust contributor to social medicine, utilizing the World Health Organization (WHO) recommended policies of mHealth to enhance health literacy. Utilizing the web, Dr. Singhanian has made special efforts to enhance and engage audience for cessation of use of illicit drugs. He has relied on managerial principles of nuanced persuasion to hit at the root of problems resulting in the current widespread use of illicit drugs. Digital methodologies are increasingly being utilized for patient empowerment, being feasible due to thought leaders like Dr. Singhanian. Dr. Singhanian is a Fellow of the American Society of Nephrology ((FASN). In a candid interview, Dr. Singhanian has expressed a crystalline vision of the medical issues, especially those related to the malfunctioning of the renal system and the facets of care when the subject presents to the hospital or the emergency room with substance abuse and acute mental confusion. Currently, Dr. Singhanian is an attending nephrologist and hospitalist at the Catholic Health Initiative (CHI) St. Vincent Infirmary in Little Rock, Arkansas. He dawns upon us the highly important take-home message that not always dialysis is the panacea for the patient presenting in the ED (emergency department) with drug overdose and in fact, it may be difficult to flush out the dangerous excess of the toxic chemicals from the body. The discussion follows below.

Q: Welcome Dr. Singhanian. Please describe the pattern(s) of presentation of kidney diseases in individuals with substance abuse, especially heroin.

GS: Modern societies are increasingly facing the challenge of substance abuse. It has acquired the pervasive dimension and infiltrated global societies. The opioid epidemic the nation is currently facing is well known for its escalating proportions. In the United States, the problems with drugs of abuse are seen at multiple levels, including inner city populations, club scenario, multiple races and sexual orientation. One of the commonest drugs that is abused is heroin, which is chemically related to morphine. Heroin associated

nephropathy (HAN) causes numerous kidney injuries and can eventually lead to end stage kidney disease, also sometimes called ESRD. Heroin can be taken in many forms, including injecting under the skin (*skin popping*) or maybe injected directly in the veins (*mainlining*). It may also be taken with other adulterants like cocaine to enhance the effects (*speed balling*).

Q: How significant and prevalent is the problem of heroin induced kidney damage across the globe?

GS: The incidence of global HAN is decreasing. However, an interesting pattern of change of the demography of the kidney damage is related to the

microscopic alterations resulting from overlap of HAN with viral and bacterial infections. Skin infections in chronic drug users may turn systemic and can lead to multi-organ damage. Apart from endocarditis (infection of the heart valves), viral infections like Hepatitis B, Hepatitis C and HIV, acquired during parenteral administration of these drugs of abuse are emerging as significant agents of kidney damage. HIV causes a condition called collapsing glomerulopathy or HIV associated nephropathy (HIVAN). A set of proteins called cryoglobulins may be abnormally present in Hepatitis C viral infection, causing damage to the kidney units. Amyloidosis, a condition involving extracellular deposition of abnormal proteins maybe seen in chronic parenteral drug users, which leads to end stage renal failure. Inner city individuals with HIV associated kidney disease can present with nephrotic syndrome (protein leaking through the urine) and forms a sizable proportion of individuals with kidney malfunction. I take special interest to communicate this information, with an aim to screen, diagnose, treat and rehabilitate these individuals. One of the advantages of educating the patients through the web relates to respecting the patient's autonomy, which is important to motivate the individuals to maintain a state of abstinence and individualize for cessation of drug use/abuse. The self-help tools are always highly appreciated by the patients

Q: As we know, alcohol is the most commonly abused substance. So that affects the kidney as well?

GS: The pattern of kidney disease in alcohol overuse can remain silent. There can be mild proteinuria but even red blood cells can leak out in the urine. The kidney disease in alcohol abuse carries a very interesting pattern. Due to poor functioning of the liver, many of the food and bacterial antigens bypasses the immune surveillance cells (these cells are called Kupffer cells). As a result, these antigens stimulate the body's immunity to synthesize different immunoglobulins like IgA in excess. IgA immune complexes get deposited in the kidneys resulting in IgA nephropathy. A prominent electrolyte defect seen in chronic heavy drinkers relates to decrease in serum magnesium.

Q: Health promotion messages are obviously an important tool in your armamentarium for patient care.

GS: Obviously. Patients present to the hospital with a number of manifestations. For example, cocaine can cause muscle damage, which in turn can precipitate renal failure. African-Americans with abuse of cocaine can develop hypertensive end stage renal failure. Hypertension in an independent risk factor for kidney damage. These drugs of abuse can exacerbate pre-existing kidney conditions. The drugs and their metabolites may be excreted through the kidneys. They may also cross the brain and may be difficult to filter out by dialysis. Thus, educational measures and enhancing health literacy drive remains my definite tools to enhance awareness at a societal scale. With increasing use of

smartphones, even among the homeless individuals, vigorous web campaign is an important aspect in the spectrum of management of these conditions and motivating for staying away from illicit drugs.

Q: Please briefly tell us about other drugs of abuse and how they may affect kidney function.

GS: The list is exhaustive and is beyond the scope of discussion here. In rave parties, individuals use amphetamines like Ecstasy to stay awake for hours. Vigorous activities like dancing after consumption of these drugs leads to elevated body temperature. The individuals drink a lot of water, resulting in abnormal serum electrolyte concentrations and alteration of kidney function. Sometimes, fatal heart rhythm disturbances can occur. Because of sympathetic nerve stimulation, the bladder neck may close leading to urinary retention and further exacerbating the problems. Similarly, sleeping pills may be abused in a "cocktail" of drugs. Toxic mushroom can cause oliguria or irreversible renal failure. People can sniff volatile solvents (glue sniffing): they may include fuels at gas stations, paints, adhesive cement, adhesives, nail polish remover and lacquer thinner. Nail salon workers may have kidney damage and may also have reproductive and pulmonary health issues. Other toxic chemicals like toluene can cause a wide range of kidney diseases and may even cause sudden death.

Q: How does tobacco harm the kidneys?

GS: Tobacco harms the kidneys significantly. It causes protein leaking (microalbuminuria). It accelerates the development of diabetic kidney disease. Smokers are often hypertensive and diabetic, which are independent risk factors for kidney disease. Smoking can cause many other additional injuries to the kidney. It can decrease the caliber of the blood vessels supplying the kidneys. It can even cause bleeding in the lungs in the condition called Goodpasture syndrome (GPS), which affects both lungs and kidneys. Straightforward discussion for smoking cessation is very important in the holistic mode of care for the patient with renal and cardiac morbidities.

Q: Does marijuana impact the function of the kidneys?

GS: The impact of marijuana on kidneys is only recently being appreciated. However, we need to take cognizance of these issues as increasingly individuals are self-medicating on marijuana and its products. Additionally, a lot of biased literature is out there. Marijuana can cause infarction of the kidneys. The active ingredients of marijuana causes dilatation of the peripheral blood vessels, which combined with poor nutritional status of these individuals and anemia, can cause overstimulation of the sympathetic nervous system and its consequent harmful effects on the kidney. Synthetic marijuana like K2/spice are also associated with severe kidney disease.

Q: Thank you for this informative discussion Dr. Singhania.

GS: Community level engagement and awareness is highly necessary. It cannot be over emphasized that kidneys are one of the most important organs for waste processing. High quality kidney function is at the helm of maintaining high quality heart health. For example, chronic cocaine use causes premature coronary artery disease. Whenever a set pattern of disease cannot be identified upon presentation with kidney dysfunction to the ED or hospital, a high index of suspicion should be kept for drug abuse and whether it is the culprit of the clinical manifestation. The simple message to spread is that to protect the kidneys, avoiding drugs of abuse is key.



Figure 1: Dr. Girish Singhania.