The Potential Pathophysiological Role of STING in the Development of Hypertensive and Diabetic Nephropathy

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Hypertension, a detriment linked to various risk factors, contributes to the development of renal and diabetic damage, increasing the risk for the development of cardiovascular disease, which is the leading cause of death in the world today. cGAS-STING is a newly discovered pathophysiological pathway involved in innate immunity. Although cGAS-STING has been categorized as a cellular defense mechanism, acting as a cytosolic DNA sensor, scientists hypothesize that activation of the cGAS-STING pathway can increase cellular damages in the form of hypertensive nephropathy. This study investigates the role of cGAS-STING in the development of hypertensive, diabetic, and renal diseases as well as the effects of inhibition of the pathway. To establish a link between cGAS-STING and the pathology of the aforementioned ailments, western blot analyses performed using kidney samples extracted from salt-sensitive and diabetic model organisms probed for various genes active in the cGAS-STING pathway. Additionally, histological and immunohistochemical imaging highlights the amplification of STING during various phases of renal damage as well as cellular infiltration by rogue DNA. Computational software was implemented to investigate the evolutionary transcendence of cGAS-STING in various human-animal model organisms. Finally, cGAS-STING was inhibited in salt-sensitive animals, showing drastic reductions in levels of hypertension as well as microalbuminuria excretion. This multidisciplinary study presents a novel approach to treating and preventing hypertensive and diabetic diseases in humans. Applications of this research span across various disciplines and show promising potential in effectively decreasing the morbidity and mortality of cardiovascular disease as a whole.