Cooperative metabolic regulation of TFEB and autophagy against kidney aging

Primary Researcher: Takeshi Yamamoto
Specially Appointed Assistant Professor (Full time), Department of Nephrology, Osaka University Graduate School of Medicine

Co-researchers: Yoshitaka Isaka
Professor, Department of Nephrology, Osaka University Graduate School of Medicine
Jun Nakamura
Clinical Fellow, Department of Nephrology, Osaka University Graduate School of Medicine

With aging, various organ dysfunctions occur. The kidneys are no exception, as renal function declines with aging in almost all humans. With the increase and prolongation of aging and lifestyle-related diseases, the number of patients with chronic kidney disease and those requiring dialysis is increasing every year, becoming a medical and societal concern. In recent years, aging has been revealed to be a biologically regulated process with an orderly control mechanism. The authors have conducted research on autophagy in the kidneys in aging and lifestyle-related diseases. It has been elucidated that autophagy stagnation due to lysosomal dysfunction is a common pathophysiology in aging and obesity. Under such stresses, inadequate activation of autophagy leads to vulnerability to injury. On the other hand, the transcription factor TFEB, which controls lysosome biosynthesis and metabolism, has gained significant attention recently. However, the activity and role of TFEB in kidney aging have not been investigated. In this study, we hypothesize that TFEB and autophagy cooperatively regulate cellular metabolism and delay kidney aging. The objectives include exploring: 1) changes in TFEB activity associated with aging, 2) the physiological significance and anti-aging effects of TFEB, and 3) elucidating the mechanisms by which metabolic abnormalities accelerate kidney aging using single-cell analysis.