Time-Restricted Feeding Increases Renal Aquaporin-2 Expression Without Altering Sodium Transporters in Aged Male Mice

A primary role of the kidneys is to regulate electrolyte and water balance. Aging leads to decreased kidney function, including reduced solute handling. Time-restricted feeding (TRF) has potential anti-aging properties, but the effect on kidney health is unclear. This study will determine the impact of TRF on transport proteins important in sodium and water homeostasis in aged mice. Male 18-month-old C57BL/6 mice were placed on a high-salt diet (4.0% NaCl) and randomly assigned to either ad libitum (AL) or a TRF schedule (8-hour feeding window during the active period) for five weeks. Male 6-month-old mice on an AL high-salt diet were used for comparison. Immunohistochemistry was performed and ImageJ was used for analysis. Daily food intake and activity levels were similar between AL and TRF groups in aged mice.

TRF did not affect the expression of sodium transporters in aged mice. Aged AL mice had lower expression of sodium-potassium-2-chloride cotransporter (NKCC2) than young AL mice, but there was no effect of TRF. Aged AL mice had higher phosphorylated sodium-chloride cotransporter (p-NCC) expression than young AL mice, but there was no effect of TRF. There was no effect of age or TRF on γ-epithelial sodium channel (ENaC) expression. Aged TRF mice had higher expression of the water channel Aquaporin 2 compared to aged AL mice. These data support the idea that urine concentrating ability declines as we age. Additionally, these results indicate that TRF may improve renal sodium and water handling during aging. Future studies will determine the mechanism behind TRF-induced changes in Aquaporin 2 expression.