

Adriamycin-induced nephropathy: a preclinical model of chronic proteinuric renal disease

Background

Adriamycin nephropathy (AN) is a rodent model of chronic kidney disease that has been studied extensively and has enabled a greater understanding of the processes underlying the progression of chronic proteinuric renal disease. AN is characterized by podocyte injury followed by glomerulosclerosis, tubulointerstitial inflammation and fibrosis.

Following a single intravenous injection of adriamycin, susceptible mouse strains, such as BALB/c, develop rapid and selective injury to podocytes, the specialized epithelial cells essential for maintaining the glomerular filtration barrier. Early podocyte damage is characterized by foot process effacement, cytoskeletal disruption, loss of slit diaphragm proteins (nephrin, podocin), and eventual podocyte apoptosis or detachment. These changes lead to marked proteinuria, which appears within days and drives downstream tubular injury and interstitial inflammation. As podocytes are lost, segmental scarring develops within glomeruli, mirroring human FSGS both structurally and mechanistically. The model progresses to glomerulosclerosis, tubulointerstitial fibrosis, and progressive renal dysfunction. Because AN is reproducible, podocyte-centric, and responsive to candidate therapeutics, it remains an important platform for studying mechanisms of podocyte injury, testing antifibrotic and podocyte-protective agents, and evaluating potential disease-modifying therapies for chronic proteinuric renal disease/FSGS.

Standard protocol

Alvolab uses a protocol similar to the one published by Wang et al, *Kidney Int* . 2000 Oct. <https://pubmed.ncbi.nlm.nih.gov/11012915/>

Male or female BALB/c mice aged 8-10 weeks receive a single intravenous injection of 10-11 mg/kg body weight Adriamycin (Sigma) diluted to 2 mg/mL in 0.9% NaCl. C57BL/6 mice are less susceptible to Adriamycin, even at a higher dose and with repeated dosing (Figure 1).

Adriamycin-induced nephropathy: Balb/c vs C57BL/6N

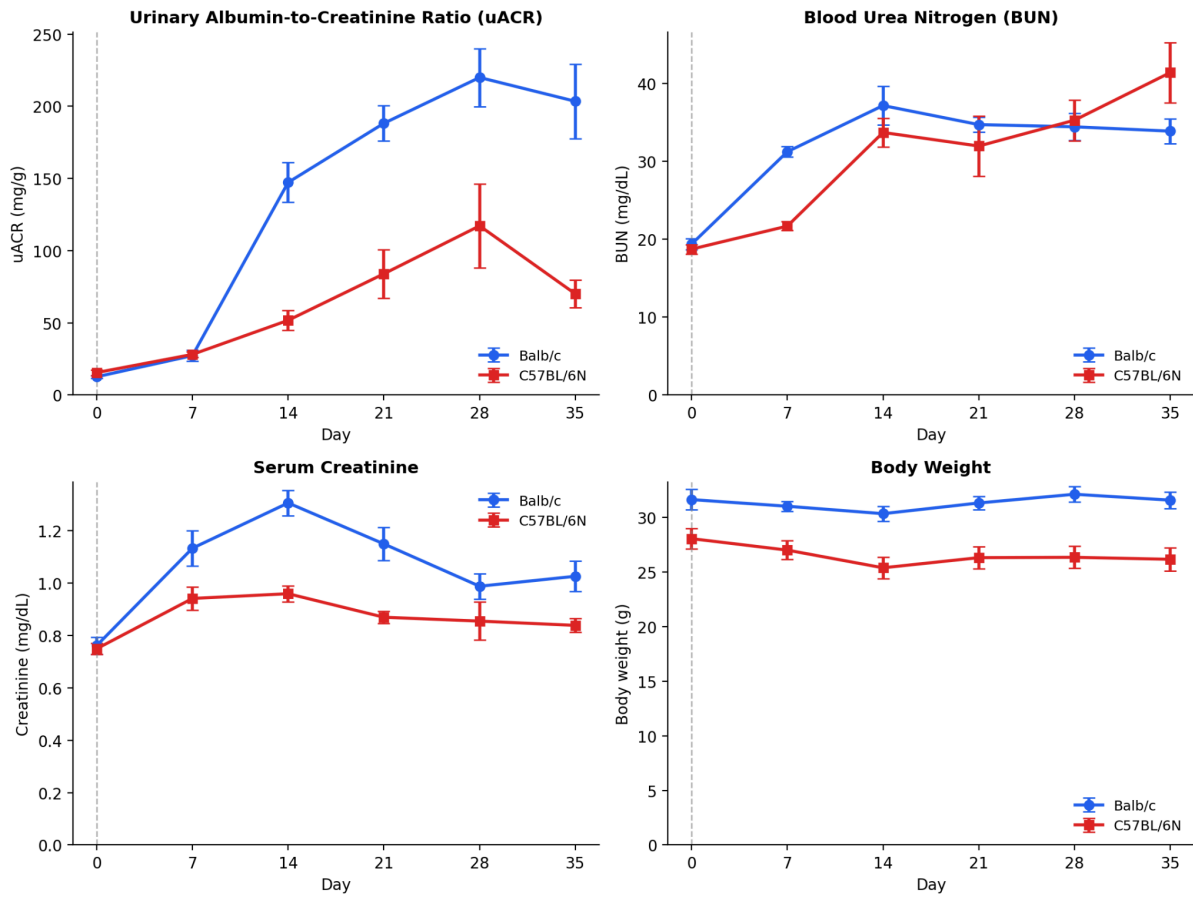


Figure 1. Strain-dependent susceptibility to adriamycin-induced nephropathy in Balb/c and C57BL/6N mice. Male Balb/c mice ($n = 10$) received a single intravenous injection of adriamycin (10.5 mg/kg) on day 0, while male C57BL/6N mice ($n = 10$) received intravenous adriamycin (15 mg/kg) on day 0 with an additional 15 mg/kg dose on day 9. (A) Urinary albumin-to-creatinine ratio (uACR), (B) blood urea nitrogen (BUN), (C) serum creatinine, and (D) body weight were measured on days 0, 7, 14, 21, 28, and 35. Data are presented as mean $\pm$ SEM. Dashed vertical line indicates the day of initial adriamycin injection.