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The single-cell landscape of kidney immune cells reveals transcriptional heterogeneity in early diabetic kidney disease

Although diabetic kidney disease (DKD) is generally considered non-inflammatory, there is abundant evidence for a role of tissue leukocytes in the progression of DKD. Fu et al. used single-cell RNA sequencing to evaluate gene expression changes of macrophage subsets in a mouse model of DKD over time. Compared with control kidneys, early DKD kidneys did not show a large shift in the proportion of intrarenal immune cells, but there were increases in specific subsets of macrophages. These included infiltrating, inflammatory, and high interferon-signature macrophages, along with macrophages that are involved in attenuation of inflammatory activity. Using pseudo-time analysis, kidney macrophages were shown to evolve down an M1-inflammatory pathway and an M2-anti-inflammatory pathway that also included cells with intermediate M1 and M2 phenotypes. The investigators raised the question of whether macrophage fates could be manipulated therapeutically to favor control of inflammation and thereby reduce kidney injury in DKD. See page 1291

Inhibition of the chemokine signal regulator FROUNT by disulfiram ameliorates crescentic glomerulonephritis

Disulfiram (DSF) is a drug used to discourage alcohol abuse. Toda et al. found that it can disrupt the interaction between the cytoplasmic protein FROUNT and chemokine receptors, thereby attenuating the ability of leukocytes to migrate into areas of inflammation. To test the utility of DSF in glomerular disease, the investigators treated anti-glomerular basement membrane nephritis (anti-GBM GN) in rats with oral DSF. When treatment was started before the induction of anti-GBM GN, albuminuria did not develop, crescent formation and necrosis were suppressed, but interestingly, blood urea nitrogen and serum creatinine were similar to untreated animals. When treatment was started the day after anti-GBM GN was induced, DSF was still effective in suppressing crescent formation and necrosis. Rats treated with DSF for 1 month developed less chronic glomerular and tubulointerstitial fibrosis. Future studies should look at whether DSF can protect against kidney dysfunction in models with more severe illness. Nonetheless, these data suggest DSF may be repurposed to treat glomerulonephritis, possibly with fewer adverse effects than conventional immunosuppression. See page 1276

Particulate matter of air pollution may increase risk of kidney failure in IgA nephropathy

Environmental pollution has been associated with progression of chronic kidney disease. Luo et al. examined the relationship between pollution with fine particulate matter of <2.5 μM (PM2.5) and progression of IgA nephropathy (IgAN) in China. PM2.5 exposure was assessed using satellite data. Severity of PM2.5 exposure regionally was associated with kidney failure prevalence. The investigators determined that each 10-μg/m² increase in average annual PM2.5 exposure was associated with a hazard ratio for kidney failure of 1.14 after adjusting for multiple potential confounders, including age, sex, Oxford classification, blood pressure, kidney function, and use of renin-angiotensin antagonists. These data support a strong interaction between the kidney and the external environment and suggest air pollution is an independent risk factor for progression of IgAN. See page 1382

Incidence of new onset glomerulonephritis after SARS-CoV-2 mRNA vaccination is not increased

There have been many case reports of new-onset glomerular disease after vaccination with mRNA severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) vaccines. To date, causality between vaccination and new-onset glomerular disease has not been established. To address this open question, Diebold et al. looked at data from all Swiss pathology groups who read native kidney biopsies from before the start of vaccination (2015–2019) and during the active vaccination period (January–August 2021). There was no difference in the observed incidence of IgAN, pauci-immune glomerulonephritis, minimal change disease, or membranous nephropathy during the period of vaccination and the expected incidence based on prevaccination data. During the interval between January and August 2021, 111 new cases of glomerulonephritis were diagnosed. There was no difference in the incidence of glomerulonephritis among vaccinated and unvaccinated people. The authors conclude that the association between coronavirus disease 2019 (COVID-19) vaccination and new-onset glomerulonephritis is coincidental. See page 1409