Chronic kidney disease is accompanied by behavioral deficits in rodents

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Clinical reports indicate a bidirectional relationship between mental illness and chronic systemic disease. Kidney injury and inflammation have been linked to brain dysfunction and alterations in learning and memory, as well as development of anxiety and depression, however, the underlying neurophysiological mechanisms remain elusive. In the current study, we investigated whether a chronic kidney disease (CKD) state is sufficient to produce deficits in rodent stress behaviors using a mild or severe model of CKD. Male rats were exposed to either 21 days of 0.75% adenine diet (AD) (model of mild CKD), or a combination of AD with unilateral nephrectomy (AD/Unx), prior to the start of AD (model of severe CKD). Control rats received sham surgery and remained on normal diet/chow throughout the experimental paradigm. CKD development in the rat models was determined by an increase in serum creatinine used as index for kidney function. Behavioral testing results demonstrate that mild CKD, especially in combination with unilateral nephrectomy (severe CKD), is accompanied by anhedonia (i.e., decreased sucrose preference) and anxiogenic effects evident from increased latency to feed in the novelty-suppressed feeding test. These findings suggest that impairment of kidney functionally is adequate to evoke behavioral deficits in rodents consistent with elevated behavioral emotionality (i.e., development of depression- and anxiety-related behaviors). Ongoing studies are focused on identifying neurophysiological mechanisms linking renal disease with neurological abnormalities. Furthering our understanding of these mechanisms may aid in the development of improved treatments and prevention strategies for management of mental health comorbidities associated with kidney disease.

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