

**Integration of epidemiology,
toxicology, and geochemistry to
evaluate the lignite-water hypothesis
in the Gulf Coast**

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Balkan endemic nephropathy (BEN) is an irreversible, lethal disease that is confined to regions of the Balkans where residents depend on untreated well water. A key factor to the disease may be consumption of dissolved organic matter that leaches from low-rank coal in the aquifer supplying the well water. Although the lignite-water hypothesis was first posed for areas of the Balkans, a similar geologic framework exists in the Gulf Coast. It is possible that BEN-like conditions exist in states like Arkansas, Texas and Louisiana that rely heavily on groundwater from aquifers that contain lignite coal. We are using an integrated approach that combines epidemiology, toxicology, and geochemistry to examine possible environmental and health impacts related to these lignite deposits. Gulf Coast lignite was extracted with water at high temperatures to generate a water-soluble extract (WSE), and a lyophilized fraction of the WSE was exposed to kidney cells to elicit a dose-response relationship. We relate the toxicity results to the geochemical parameters like aromaticity and oxygen-content to further explore the plausibility of the lignite-water hypothesis.