

Public Abstract

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Department:Biological Sciences

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Title:Unconventional Oil and Gas Extraction as a Novel Source of Endocrine Disrupting Chemicals to Water and the Potential for Adverse Human and Animal Health Outcomes

My research focuses on the chemicals used in the process of hydraulic fracturing or “fracking”, an increasingly utilized method to produce natural gas and oil. This method involves the underground injection of water and chemicals under high pressure to release trapped natural gas or oil. Spills of wastewater from this process are well reported, with some impacting drinking water. There is an urgent need to assess the potential for health effects in regions where these techniques are used.

I have shown that fracking chemicals can inhibit the normal action of five classes of human hormones: estrogens (important for fertility, reproduction), androgens (fertility, masculinization), progestogens (pregnancy, breast development), glucocorticoids (immune function, metabolism), and thyroidogens (brain development). We measured similar responses in surface water from a drilling-dense region of Colorado, suggesting that fracking chemicals may contaminate drinking water. We then exposed pregnant mice to a mixture of these chemicals at environmentally relevant levels through their drinking water and assessed the health of their offspring. Male offspring displayed increased body weights, increased organ weights, and decreased sperm counts.

In total, this work highlights a previously unreported route of exposure to chemicals that can disrupt hormones and suggests a potential threat to human and animal health. More than fifteen million Americans live within a mile of a fracked well, many in rural or socioeconomically distressed areas. As such, it is critical to determine the health effects of these practices so that appropriate policy changes can be made to best protect human and animal health.