

## Scientists begin to fill in the gaps in understanding about fracking

By Eddy Ball

NIEHS-funded scientists are looking more closely at the impact of hydraulic fracturing on air and water quality in drilling-dense areas of Ohio and Colorado.

Offering the prospect of energy independence and new sources of income for landowners, hydraulic fracturing, or fracking, has spread many times faster than has research into the potential health effects of the chemicals used in the practice. Along with an upcoming seminar at the University of Pennsylvania, these new studies are helping raise awareness of the potential environmental public health impact of this unconventional natural gas drilling method.

### New studies build on ongoing research

In a [study](#)

(<http://press.endocrine.org/doi/abs/10.1210/en.2013-1697>)

published Dec. 16, 2013 in the journal *Endocrinology*, a team of scientists led by University of Missouri Associate Professor [Susan Nagel, Ph.D.](#),

(<http://medicine.missouri.edu/obgyn/susan-nagel-phd.html>)

identified, for the first time, dozens of chemicals used in hydraulic fracturing for natural gas that may have adverse effects on human health, by disrupting estrogen and androgen action.

### Linked Video

#### [Watch an RT news channel interview with Nagel on the implications of her new findings \(04:13\)"](#)

With a new grant from NIEHS, a team of researchers from the University of Cincinnati and Oregon State University is laying the foundation for a community-based participatory research pilot study of air quality and fracking in Carroll County, Ohio (see [story](#)).

### Trying to answer nagging questions about safety

"With fracking on the rise, populations may face greater health risks from increased endocrine-disrupting chemical exposure," Nagel was quoted as saying in a *Los Angeles Times* [article](#).

(<http://www.latimes.com/science/la-sci-fracking-health-20131217,0,5154343.story#axzz2o8ukTtkB>)

"I'm not an alarmist about this, but it is something the country should take seriously."

The researchers compared 39 water samples, from known incident sites, that had experienced some sort of spill or accident related to fracking in a drilling-dense region of Garfield County, Colo., with samples from drilling-sparse areas in Missouri and Colorado without spills. They found that drilling-dense region water samples showed as much as two times greater estrogenic, anti-estrogenic, or anti-androgenic activity than water from reference sites, where activity was dramatically lower.

Nagel received NIEHS [funding](#)

([http://projectreporter.nih.gov/project\\_info\\_description.cfm?aid=8331373&icde=18940657&ddparam=&ddvalue=&ddsub=&cr=6&csb=default&cs=ASC](http://projectreporter.nih.gov/project_info_description.cfm?aid=8331373&icde=18940657&ddparam=&ddvalue=&ddsub=&cr=6&csb=default&cs=ASC))

### Upcoming symposium on hydraulic fracturing

The University of Pennsylvania Center of Excellence in Environmental Toxicology (CEET) and the Center for Public Health Initiatives are co-hosting a [symposium](#) ([http://www.med.upenn.edu/ceet/documents\\_user/DraftSymposiumAgendaDec23.pdf](http://www.med.upenn.edu/ceet/documents_user/DraftSymposiumAgendaDec23.pdf)) Feb. 18 at the Smilow Center for Translational Research, exploring the impact of unconventional natural gas drilling operations on the environment and public health.

CEET is an environmental health sciences core center funded by NIEHS. The symposium is intended to engage many different stakeholders concerning hydraulic fracturing, and educate participants on the process and effects on the environment and public health. The meeting will also profile ongoing research on this topic, and end with a panel discussion on citizens' concerns. In addition to presentations by NIEHS grantees during the symposium, the program will conclude with remarks on future directions by NIEHS Senior Medical Advisor Aubrey Miller, M.D.

#### Registration

([http://www.med.upenn.edu/ceet/registration\\_form.shtml](http://www.med.upenn.edu/ceet/registration_form.shtml)) is free but required.

in 2011 to study the DNA methylation pattern in the endometrium of women with endometriosis. With a previous grant, she examined the effects of prenatal endocrine-disrupting chemical exposure and altered expression of endometriosis related genes in a mouse model. She said her ultimate goal is to link these two studies, by identifying markers of exposure in mice and connect them with markers in women.

As Nagel and her colleagues readily admit, the kind of early-stage research her group conducted in Colorado cannot produce conclusive results, and more studies are needed to fully understand the implications of their findings. In an interview with RT News following publication of the study, she said, "There is a real dearth of information on the health impacts of this entire process."

The team showed strong associations between fracking sites and the presence of chemicals with endocrine-disrupting effects in water, but not a clear-cut, cause-and-effect link, as critics were quick to point out in a statement from [Energy in Depth](http://energyindepth.org/national/new-inflammatory-study-fracking-endocrine-key-facts/), (<http://energyindepth.org/national/new-inflammatory-study-fracking-endocrine-key-facts/>) one of several defensive responses from industry groups.

Others, such as editors of the Raleigh (N.C.) News and Observer, in a Dec. 19, 2013 [editorial](http://www.newsobserver.com/2013/12/19/3473446/reports-show-need-for-caution.html), (<http://www.newsobserver.com/2013/12/19/3473446/reports-show-need-for-caution.html>) have cited Nagel's findings as one more reason to proceed with caution, in regard to regulations for proposed fracking operations in their state. "The state's Mining and Energy Commission should err on the side of disclosure and caution, as it writes the rules for North Carolina," they concluded.

*Citation:* [Kassotis CD, Tillitt DE, Wade Davis J, Hormann AM, Nagel SC.](#)

(<http://www.ncbi.nlm.nih.gov/pubmed/24424034>)

2013. Estrogen and Androgen Receptor Activities of Hydraulic Fracturing Chemicals and Surface and Ground Water in a Drilling-Dense Region. *Endocrinology*; doi.org/10.1210/en.2013-1697 [Online 16 December 2013].



*Nagel, a reproductive biologist specializing in estrogenic actions, reported finding moderate levels of endocrine-disrupting chemicals in samples from the Colorado River, the basin where the Garfield County fracking sites drain. The county has more than 10,000 active wells. (Photo courtesy of University of Missouri)*

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