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Title:
Comments: packet #15: Fracking chemicals and breast tissue: Research 2016, 2018

Please acknowledge receipt.

The following research must be assessed in the Wayne's consideration whether to include fracking in its activities under a new Plan. Fracking has never been assessed by the Wayne in a NEPA-based analysis as it must now be, which means thorough, up-to-date science and quantification of all costs to human health, economic well-being of affected families, water and health infrastructure, and community health, with all cumulative and long-term impacts assessed.

1) Endocrinology (2018). DOI: 10.1210/en.2017-00866

Prenatal exposure to unconventional oil and gas operation chemical mixtures altered mammary gland development in adult female mice

Sarah A Sapouckey, Christopher D Kassotis, Susan C Nagel, Laura N Vandenberg

https://academic.oup.com/endo/advance-article-abstract/doi/10.1210/en.2017-00866/4841948?redirectedFrom=fulltext

Discussed by

Kim Schultz <kim@tedx.org>

Date: Wed, Feb 7, 2018 at 12:17 PM

Subject: [COG] Fracking chemical mix causes disturbing changes in breast tissue: Study

Fracking chemical mix causes disturbing changes in breast tissue: Study

Female mice exposed to a mixture of 23 chemicals used in oil and gas fracking developed mammary lesions and enlarged tissues-suggesting the chemicals may leave breast tissues more prone to cancer, according to a new study.

The study is the first to examine the potential impact of chemicals used in unconventional oil and gas extraction-such as hydraulic fracturing and directional drilling-on mammary glands and suggests that low levels of the chemical cocktail commonly found near frack sites may spur abnormal development in women's breast tissue.

"The mammary gland is a hormone-sensitive organ that is responsive to multiple endocrine inputs during development," the authors wrote in the study published today in the Endocrinology journal.

It's the latest potential health impact linked to fracking chemicals, which have been associated with low birth weights, birth defects and reduced brain function in children.

The findings are important as more than 17 million people in the U.S live within a mile of an oil or gas well. Hydraulic fractured wells now account for about half of U.S. oil, and two-thirds of the nation's natural gas,

according to the U.S. Energy Information Administration.

In addition, health impacts were seen after exposure to levels of chemicals well within what is found near frack sites. The mixture was just a fraction of the more than 1,000 chemicals used during oil and gas fracking.

Scientists exposed female mice-while in their mothers' womb-to different levels of 23 chemicals. There were no effects on the mammary glands prior to puberty, but when the exposed mice were adults they developed lesions and a condition called hyperplasia, which causes enlarged organs or tissues.

The researchers "chose varying amounts of the [chemical] mixture in order to mimic a range of human exposures to these chemicals," said Susan Nagel, a researcher and associate professor of obstetrics, gynecology and women's health at the University of Missouri School of Medicine, and study co-author.

Nagel and colleagues used four different doses - the two lowest doses were similar to what you might find in drinking water in areas near oil and gas operations, and the higher doses were comparable to wastewater puddles on work sites near fracking, said senior author Laura Vandenberg, a researcher and assistant professor at the University of Massachusetts-Amherst School of Public Health & Health Sciences.

They saw effects on all exposed mice. "Even at low doses we're seeing lesions in the mammary gland," Vandenberg said.

Vandenberg said this "suggests the mammary gland is getting misinformation about where in development it is." The 23 chemicals in the mixture are all known endocrine disruptors and have previously been show to either mimic or interfere with certain hormones.

Scientists have for years warned that certain fracking chemicals are hormone disruptors: In 2016, a large review of 45 studies [#2: also attached and to be fully assessed by Wayne team - HC] on oil and gas chemicals concluded, "there is ample evidence for disruption of the estrogen, androgen, and progesterone receptors by oil and gas chemicals."

Nagel and colleagues had previously tested the chemicals used on the female mice on their mouse brothers-and found the mixture caused "decreased sperm counts and increased testes, body, heart, and thymus weights and increased serum testosterone in male mice, suggesting multiple organ system impacts."

Nagel said they would next analyze how these breast tissue changes may affect function, such as lactation.

The impact on mice doesn't necessarily mean the same is true for humans-the mouse mammary gland has some similarities and some differences. However, there are "important parallels" between mice and humans," Vandenberg said.

"We use mice to test drugs before we give them to people [hellip] they're similar enough that if there is a problem in mice, we're not giving it [the drug] to people," she said.

"If we used the same standard for environmental chemicals, I would say this is a problem."

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#2: Fertil Steril. 2016 Sep 15;106(4):795-819. doi: 10.1016/j.fertnstert.2016.07.1099. Epub 2016 Aug 25.

Systematic review of the association between oil and natural gas extraction processes and human reproduction

Victoria D. Balise, B.S., Chun-Xia Meng, M.D., Ph.D., Jennifer N. Cornelius-Green, M.S., Christopher D. Kassotis, Ph.D., Rana Kennedy, B.S., Susan C. Nagel, Ph.D.Correspondence information about the author Ph.D. Susan C. Nagel <mailto:nagels@health.missouri.edu> Email the author Ph.D. Susan C. Nagel

DOI: https://doi.org/10.1016/j.fertnstert.2016.07.1099

(www.fertstert.org/article/S0015-0282(16)62529-3/fulltext)

also attached and must be assessed.

#3: And the Wayne must fully assess the implications for the communities and waters that receive Wayne's frack waste as reported in

Akob, D.M, et al, Wastewater Disposal from Unconventional Oil and Gas Development Degrades Stream Quality at a West Virginia Injection Facility, Environ. Sci. Technol., DOI: 10.1021/acs.est.6b00428 * Publication Date (Web): 09 May 2016 (also attached)

From the abstract: "In June 2014, waters collected downstream from the site had elevated specific conductance (416 CS/cm) and Na, Cl, Ba, Br, Sr and Li concentrations, compared to upstream, background waters (conductivity, 74 CS/cm). Elevated TDS, a marker of UOG wastewater, provided an early indication of impacts in the stream. Wastewater inputs are also evident by changes in

87Sr/8633 Sr in stream water adjacent to the disposal facility. Sediments downstream from the facility were enriched in Ra and had high bioavailable Fe(III) concentrations relative to upstream sediments. Microbial communities in downstream sediments had lower diversity and shifts in composition. Although the hydrologic pathways were not able to be assessed, these data provide evidence demonstrating that activities at the disposal facility are impacting a nearby stream and altering the biogeochemistry of nearby ecosystems.

#4: and another study on the endocrine disrupting chemicals found at this site:

Christopher D. Kassotis a, Luke R. Iwanowicz b, Denise M. Akobc, Isabelle M. Cozzarelli c, Adam C. Mumfordc, William H. Oremd, Susan C. Nagel, Endocrine disrupting activities of surface water associated with a West Virginia oil and gas industry wastewater disposal site Science of the Total Environment 557-558 (2016) 901-910.

Research highlights:

* Oil and gas wastewater disposal may

increase endocrine disrupting activity

in water.

* Tested EDC activity in surface water

near oil and gas wastewater injection

site.

* Water downstream had significantly

more EDC activity than reference water

upstream.

* Downstream surface water antagonized

five different nuclear hormone receptors.

* EDC activity downstream was above

levels known to result in adverse

health effects.

Sincerely,

Heather Cantino, Steering Committee Chair,

Athens County Fracking Action Network, acfanohio@gmail.com

on behalf of

Athens County Fracking Action Network, acfan.org, acfanohio@gmail.com

Buckeye Environmental Network (formerly Buckeye Forest Council), Roxanne Groff, board chair

Jean Andrews, Documentary Video Producer,"A Forest Returns: The Success Story of Ohio's Only National Forest as Told by Ora Anderson"

Concerned Citizens of New Concord Muskingum County, OH 43762

Meghan Wynne, Organizer