



ONE WORLD,

ONE MEDICINE,

ONE HEALTH

One Health Intellectual Exchange

Weekly Discussions / Course: Philosophy to Practical Integration of Human, Animal and Environmental Health

A weekly discussion series, sponsored by the **North Carolina One Health Collaborative** within the NCBC IEG Program to enhance collaborations between physicians, veterinarians, researchers and other local/global/environmental health professionals by increasing public awareness of the interconnectedness of people, animals and the environment.

(Available each spring for credit if desired)

10th 2013 Weekly Session - Tuesday, March 12
5:30 – 7:30 p.m.

One Health Issues in the News

Open Discussion Session

Air Pollution and Low Infant Birthweights

Pharmaceutical Pollution of Aquatic Environments

The Far Reaching Effects of Antibiotics

Meets Tuesdays, 5:30 – 7:30 p.m. at the North Carolina Biotechnology Center
15 T.W. Alexander Drive Research Triangle Park, NC 27709

Directions: www.ncbiotech.org/directions

Suggestions? Ideas? Contact Cheryl Stroud, Steering Comm. Chair cms7earth@gmail.com

Add yourself to the listserv with Listserv Manager Liz Selisker, liz_selisker@ncsu.edu

For Cancellation notices and additional background visit

<http://nconehealthcollaborative.weebly.com/index.htm>

<http://onehealtheducation.blogspot.com/>

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Tonight's session topics will be presented in 3 'vignettes' by students participating in the weekly One Health Intellectual Exchange series for credit. It is anticipated that the session public attendees will also bring their backgrounds and thoughts to add depth to these discussions.

Background and Suggested Readings:

A. Air Pollution and Low Infant Birth-weights - Jonathan Hodiak, Alton Russell, Chelsea Trull

Definitions:

PM10 – particles which pass through a size-selective inlet with a 50 % efficiency cut-off at 10 µm aerodynamic diameter.

PM2.5 – particles which pass through a size-selective inlet with a 50 % efficiency cut-off at 2.5 µm aerodynamic diameter.

While many studies have looked at a link between air pollution (concentration of PM10 and PM2.5) and low birth weight over the past 10 years, only this month has research been published that is able to link air pollution to low human birth weights at a significant level. The research was reported by a number of popular press organizations, including the Guardian, the San Francisco Chronicle, and Fox News. PM10 and PM2.5s are created largely by the use of fossil fuels, but large-scale meat production is also a significant source. Our presentation will first focus on the effects of air pollution from PM on human birth weights and then we will examine how animals generate PM as a source of air pollution for both themselves and surrounding humans. We will then suggest future areas of research that may be beneficial for human, animal, and environmental health.

1. Air pollution increases chances of low birth-weight babies, Popular Press Article:
<http://www.guardian.co.uk/environment/2013/feb/06/sooty-particles-air-pollution-baby-health>
2. Dadvand et al., Maternal Exposure to Particulate Air Pollution and Term Birth Weight: A Multi-Country Evaluation of Effect and Heterogeneity, Environmental Health Perspectives, publication of the NIEHS, published online February 6, 2013,
<http://dx.doi.org/10.1289/ehp.1205575>
<http://ehp.niehs.nih.gov/2013/03/1205575/>
3. Malmqvist et al, Maternal Exposure to Air Pollution and Birth Outcomes, Environmental Health Perspectives, volume 119, number 4, April 2011
<http://www.ncbi.nlm.nih.gov/pubmed/21212043>
4. McGinn et al., Coarse Particulate Matter Emissions from Cattle Feedlots in Australia. J. Environ. Qual. 39:791–798 (2010), Published online 17 Mar. 2010,
doi:10.2134/jeq2009.0240 <http://www.ncbi.nlm.nih.gov/pubmed/20400575>

B. Pharmaceutical Pollution of Aquatic Environments -Katie Oden, Vadim Mikhalyants, Amy Gatto

Pharmaceuticals are typically found in trace amounts in the aquatic environment, and while these concentrations are generally low, they can influence the health and behavior of the marine

animals which inhabit these waters. Benzodiazepine derivatives, commonly used to treat anxiety and related emotional and sleep disorders, are prescribed throughout the United States, Canada, and Europe. Throughout the years, it has become common practice for people to dispose of their unused medications through flushing them down drains and toilets. As a result, these drugs have made their ways into wastewater treatment centers where they are not removed during treatment. Ultimately, they enter the environment through rivers and streams, thus disrupting the delicate balance of the aquatic ecosystem. Once in the water, drugs such as benzodiazepine are capable of altering the behavior of the fish, and causing health problems in various aquatic organisms. In addition to affecting aquatic wildlife, these pharmaceuticals have also been detected in drinking water. Thus, implying that humans are also being exposed to trace amounts of medications. The long term exposure to these pharmaceuticals can be harmful to those who are drinking the contaminated waters. The contamination of water sources due to improper disposal of pharmaceuticals poses a large threat to the overall well being of those who are exposed to these waters on a regular basis.

1. Brodin T, Fick T, Jonsson M, Klaminder J, Dilute Concentrations of a Psychiatric Drug Alter Behavior of Fish from Natural Populations. *Science* 15 February 2013: 339 (6121), 2. 814-815. DOI:10.1126/science.1226850 <http://www.sciencemag.org/content/339/6121/814>
2. Kostich M, Lazochak J, Risks to Aquatic Organisms Posed by Human Pharmaceutical Use, *Science of the Total Environment*, 25 January 2008: 389 (2-3), 329-39. 3. <http://dx.doi.org/prox.lib.ncsu.edu/10.1016/j.bbr.2011.03.031>]
3. Valcarcela Y, Gonzalez Alonso S, Rodriguez-Gilb, Gila A, Catalac M, Detection of pharmaceutically active compounds in the rivers and tap water of the Madrid Region (Spain) and potential ecotoxicological risk. *Chemosphere* 10, Septmeber 2011: [84 \(10\)](#), 1336–1348. <http://dx.doi.org/prox.lib.ncsu.edu/10.1016/j.bbr.2011.03.031>
4. Mankesa RF, Silverc CD, Quantitative study of controlled substance bedside wasting, disposal and evaluation of potential ecologic effects. *Science of The Total Environment* 1, February 2013: 444, 289-310. <http://dx.doi.org/prox.lib.ncsu.edu/10.1016/j.bbr.2011.03.031>

C. The Far Reaching Effects of Antibiotics - Alexander Ortiz, Tiffanie White

Antibiotic use in humans, animals, and the aquatic environment has been a global common practice for decades. Antibiotics may be used to treat bacteria related illness and to prevent bacteria from proliferating. However researchers have identified resistant bacteria or “superbugs” that are believed to have developed due to the increased use of antibiotics. In the ABC news article, “Medical professionals concerned antibiotics creating ‘super’ bacteria”, doctors discovered a patient was resistant to antibiotics that were given to him to treat diverticulitis. “The more antibiotics people are exposed to the greater the risk that they are going acquire and keep the resistant bacteria resistant to bacteria” (Dador, 2013).

With developing country’s health systems improving, livestock needs growing and the increasing affordability of basic antibiotics, the issue of antibiotic overuse has gone from an industrialized world policy issue to a global policy issue. From the improper use of antibiotics by health practitioners, to the risks of overusing antibiotics in livestock, to the unregulated disposal of mass antibiotics, the effect of antibiotics is an issue that crosses both cultural and disciplinary lines. With complex global issues an innovative inter-specialty approach to solving them is needed. The One Health approach emphasizes the interconnectedness of human, veterinary and

environmental health and works within the cross-section of each of these areas to find real and practical results for solving health issues of today. The goal of this presentation is to reveal the importance of regulating antibiotic use and how a One Health approach can help us do that.

Lecture Objectives:

Present the effects and consequences of antibiotic overuse

Reveal how a One Health approach to this global issue will yield tangible results

Lead a discussion on the effects of antibiotics across human, veterinary, and environmental health and how public policy and a One Health approach can help mitigate these effects

Suggested Readings:

1. Costanzo SD, Murby J, and Bates J, Ecosystem Response to Antibiotics Entering the Aquatic Environment. *Marine Pollution Bulletin* 51.1-4 (2005): 218-23.
<http://www.ncbi.nlm.nih.gov/pubmed/15757723>
2. Dador D, Medical professionals concerned antibiotics creating 'super' bacteria, KABC-TV Los Angeles, California,
http://abclocal.go.com/kabc/story?section=news/health/your_health&id=8999101
3. Huttner B, Goossens H, Verheij T, Harbarth S, Characteristics and Outcomes of Public Campaigns Aimed at Improving the Use of Antibiotics in Outpatients in High-income Countries, *The Lancet Infectious Diseases* 10.1 (2010): 17-31.
<http://www.inrud.org/ICIUM/ConferenceMaterials/246-harbarth-a.pdf>
4. Levy SB, Marshall B. Antibacterial Resistance Worldwide: Causes, Challenges and Responses. *Nature Medicine* 10.12s (2004): S122-129.
http://www.tufts.edu/med/apua/about_us/publications_21_4024886989.pdf
5. Mathew AG, Cissell R, Liamthong S, Antibiotic Resistance in Bacteria Associated with Food Animals: A United States Perspective of Livestock Production." *Foodborne Pathogens and Disease* 4.2 (2007): 115-33.
<http://www.ncbi.nlm.nih.gov/pubmed/17600481>

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