In This Issue

Dr. Sally Thurston recognized for Excellence in Postdoctoral Mentoring

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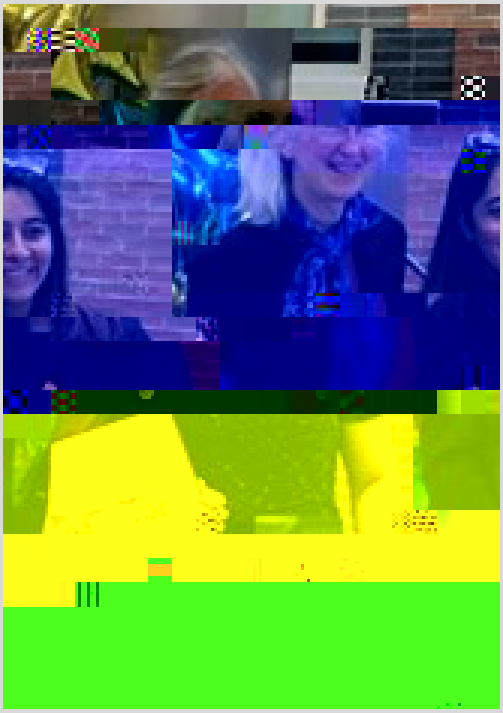

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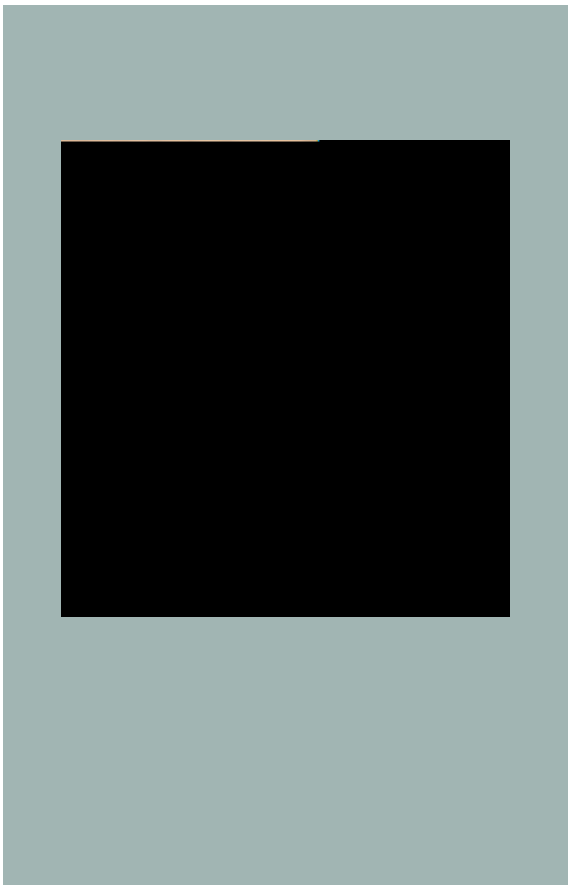

Dr. Wilson is th

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Collynn Woeller, PhD is an Assistant Professor of Ophthalmology with secondary appointments in the Department of Environmental Medicine and the Center for Visual Science. Dr. Woeller's research focuses on understanding the molecular mechanisms driving inflammation and tissue remodeling in and around the eye.

Currently, his laboratory is studying how sentinel cells called fibroblasts facilitate tissue remodeling in Thyroid Eye Disease (TED). TED occurs in up to half of all patients with Graves' disease, a common autoimmune disorder that leads to hyperthyroidism. It is not known why only half of Graves' patients exhibit eye disease; however, cigarette smoking increases the chances of developing TED by 8-fold.

The Woeller lab hypothesizes that smoke and other environmental exposures play a critical role in the development of TED by disrupting aryl hydrocarbon receptor (AhR) signaling. The AhR is a widely expressed protein that was originally identified as an environmental sensor that binds organic pollutants such as dioxin and other compounds found in cigarette smoke. The AhR also binds natural hydrocarbons generated in the body that help maintain the immune system and cell growth. The lab is trying to understand how changes in the timing and make-up of AhR activating compounds may contribute to TED. The lab also aims to target the AhR pathway therapeutically to limit excessive tissue remodeling in TED.

Woeller grew up in Skaneateles, New York and attended SUNY Geneseo and Cornell University before coming to the University of Rochester. During his PhD, he investigated the regulation of genes involved in folic acid metabolism and cell proliferation. Some of his work during his post-doctoral studies focused on how a brominated bisphenol-A derivative (TBBPA) used in plastics and as a flame retardant, altered microRNA expression in human stem cells to influence cell fate. Woeller is excited to continue studying how environmental exposures alter cell behavior and influence eye disease.

Continued from page 9

In the study, which was supported by a pilot grant from the URMC Environmental Health Science Center and a Career Development Award from the UR Clinical and Translational Science Institute, mice were exposed to diacetyl for one hour a day over five consecutive days at levels similar to what coffee roasters encounter at work. Mice were then exposed to influenza A, which typically causes seasonal flu in humans.

Within two weeks of exposure, more than half of the mice that received this one-two hit died, while all of the mice in the control groups (exposed to diacetyl alone, flu alone, or neither) survived. Lungs from mice exposed to the 'two-hits' showed significant impairment of lung function and airway repair compared to controls.
Researchers then switched the order of exposure, infecting another group of mice with flu first, allowing them to recover for nine days, then exposing them to diacetyl for five days. Whether the mice were exposed to diacetyl before or after flu, their lungs were unable to fully heal, again suggesting that exposure to both chemical and virus leads to abnormal airway repair.

"Our study shows that common environmental exposures that seem harmless on their own can have very serious impacts on lung function and long-term respiratory health when combined," McGraw said.

While further research is needed to understand the impacts of low levels of diacetyl on humans, this study could have implications for people who are exposed to diacetyl at work, like coffee roasters. Currently, McGraw's team is conducting a study in mice to see how long after a flu infection it is safe to be exposed to diacetyl, which could help inform when coffee roasters can safely return to work after having the flu.

McGraw shared this work with the EHSC Community Advisory board in December 2022, asking for input on how best to share this work with coffee roasters and interested others in our region. In the future, the research team hopes to collaborate with community partners to spread awareness of the risks of diacetyl exposure, assess existing exposures, and explore potential mitigation approaches.

This project was supported by a p=

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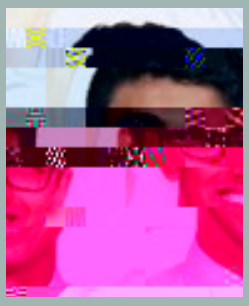

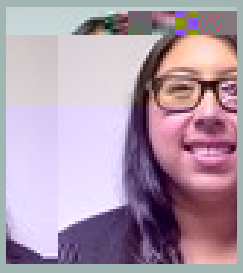

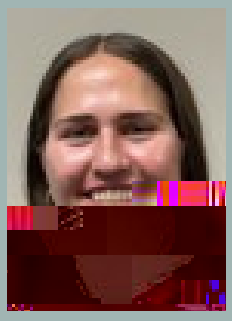

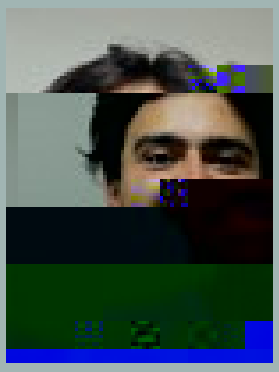

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