

Wetterhahn seminar highlights research on PCBs and type 2 diabetes

By Sara Mishamandani

The Superfund Research Program (SRP) Karen Wetterhahn Memorial Award seminar at NIEHS April 3 featured [Nicki Baker, Ph.D.](#), professor of health sciences at Baker College. A former NIEHS-funded University of Kentucky SRP grantee, Baker received the 2012 Wetterhahn Memorial Award for her doctoral work on how coplanar polychlorinated biphenyls (PCBs) can affect the development and severity of type 2 diabetes.

Exposure to PCBs and Diet

Epidemiological studies have noted a link between PCB exposure and type 2 diabetes. Baker discussed how she explored potential mechanisms for that link by measuring glucose and insulin intolerance in mice exposed to PCB-77, a form of PCB present in the environment. In mice fed a low-fat diet, PCB-77 exposure resulted in glucose and insulin intolerance. When mice were fed a high-fat diet, however, scientists observed no PCB-77 effect on glucose and insulin intolerance.

Because of the discrepancy between mice fed different diets, Baker explored how PCB exposure affected mice experiencing weight loss. She found that when obese mice lost weight, those exposed previously to PCB-77 lost the ability to maintain stable blood glucose levels, known as glucose homeostasis, that is generally seen with weight loss. Thus, for the exposed mice, weight loss was not as effective in preventing type 2 diabetes.

Understanding the mechanism

Baker and her team also wanted to see how PCBs interact with the aryl hydrocarbon receptor (AhR), a protein involved in the regulation of a number of biological responses. In particular, they were interested in its connection to glucose and insulin resistance in adipocytes, or fat cells. Using mice deficient in adipocyte AhR, Baker's team observed that the mice did not develop the glucose and insulin intolerance usually induced by PCB-77, suggesting that adipocyte AhRs may be responsible for the ability of PCB-77 to impair glucose homeostasis during weight loss.

They next tested the antioxidant resveratrol, a compound found in wine, peanuts, chocolate, and other foods, to determine if it helps protect against diabetes induced by PCB-77. In mice fed low-fat diets and levels of resveratrol similar to those found in dietary supplements, scientists observed that PCB-77 did not impair glucose and insulin tolerance.

According to Baker, these studies suggest the adipocyte AhR plays a potentially significant role in the development of diabetes and obesity, and that resveratrol may represent a novel therapeutic approach for PCB-exposed populations.

Celebrating Karen Wetterhahn

SRP Director Bill Suk, Ph.D., began the seminar with a tribute to [Karen Wetterhahn, Ph.D.](#), an expert in the mechanisms of metal toxicity and founding member of the Dartmouth SRP center. She died tragically in 1997 from dimethylmercury poisoning, caused by the accidental spill of a few drops of the chemical on her latex glove-covered hand.

"The recipients of the Wetterhahn Award are not only doing outstanding science, they also work with the community at large, and they are mentors to other students," said Suk. "That is the purpose behind this award, because this was a large and important component of Karen Wetterhahn's life."



During her day at NIEHS, Baker, left, met with Suk and other staff, to discuss her work at the University of Kentucky as an NIEHS-funded trainee. (Photo courtesy of Steve McCaw)



SRP program administrator Danielle Carlin, Ph.D., right, introduced Baker and acknowledged her contributions to research and the community. "Nicki knows what she wants to achieve and, as a result, works diligently and responsibly in all aspects of her project," Carlin said, quoting Baker's mentor, Lisa Cassis, Ph.D. "On her own initiative, she is serving as a role model for future scientists studying environmental chemicals." (Photo courtesy of Steve McCaw)



Suk, left, listens as NIEHS and NTP Director Linda Birnbaum, Ph.D., one of the many audience members who participated in discussions after the talk, addressed continuing efforts by NIEHS to investigate the association between PCBs and diabetes. (Photo courtesy of Steve McCaw)

In addition to research, Wetterhahn was passionate about teaching. Concerned about the higher dropout rate of women studying science compared to men, she worked with a colleague to develop the Women in Science Project at Dartmouth.

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