
“The hope is that although the projects are solicited as individual investigator-driven projects, by sharing this information, we are building a community that is interested in finding out what’s going on. We can start to get some idea about whether we should be concerned and where we need to do more work.”

“That is translated to the reporter, binds to the reporter and turns on a gene and the cell glows, and it does it in a dose-dependent fashion. Now you can say this chemical can be an estrogen or a progesterone or whatever, and determine the dose. It lets us know we now have an active compound to study.”

Spyropoulos and Baatz also have been able to harvest lung cells from pygmy sperm whales and make inducible pluripotent stem cells where they took lung cells and “drove them backwards developmentally.” Guillette says they’ll be able to take aged oil or whatever substance they’re studying and test it on cells to see if it changes the developmental process, so instead of stimulating muscle cell growth, the treated cell becomes a fat cell, for example.

“There’s a whole world out there we realize of compounds called obesogens. These are chemicals that in the developing embryo instead of stimulating the production of muscle or fibroblast cells, it actually stimulates more fat cells. The chemicals and contaminants in the diet during embryonic development may be programming that body to store more fat.”

The Gulf of Mexico research initiative received 629 applications and MUSC was one of 19 chosen. The initiative is helping to build a portfolio of top scientists who are working together.

“The hope is that although the projects are solicited as individual investigator-driven projects, by sharing this information, we are building a community that is interested in finding out what’s going on. We can start to get some idea about whether we should be concerned and where we need to do more work.”

There are several chemicals that are common, such as BPA found in plastics and tri-butyl-tin found near harbors around the world, that have been suggested to have obesogenic activity. Guillette says their BP study can’t answer everything, but they know how to be selective in their focus to find those chemicals that do disrupt endocrine cycles.

“We know that obesogens are a critical component and that things like estrogens and androgens are critical for long-term

and short-term fertility. We know that glucocorticoids or stress hormones are associated with inflammation and immune function. We can take human glucocorticoid receptors, whale and alligator and fish glucocorticoid, and line them up in different cells and test the chemicals all at the same time. Then we can see if the chemical potentially interacts with the receptor that is associated with stress and immune function, and we can also test if it goes across species.”

The Carson Connection

Their work builds on what Rachel Carson believed decades ago, even without the scientific testing methods that researchers have today. If Carson were alive today, he’d like to tell her thank you and that she was right. He’s proud to be following in her footsteps.

“If I told you that in a week you’re going to get 2,000 chemicals in your body that your grandparents never had in their body, and we have no idea what the health consequences are, and not just in you – it’s in your kids too. Would you think that was good?”

The revolution happening is that scientists from critical disciplines are joining forces to change the way this game is played, he says.

“We’re coming together to say as biologists, as health professionals, as chemists, we need to start working together. Chemists need to start taking toxicology and health classes, and biologists need to start working with chemists.”

It’s an immense undertaking and one still surrounded in controversy, but Guillette sees the science winning out.

“We’re supposed to be bright people. We’re supposed to be leaders in the world in innovation. Let’s start innovating. And you know what? There’s money in that. There’s real money in that because a proprietary chemical is always going to make you more money than something that’s 50 years old. If that’s your vested interest, that’s fine. For me, I just want healthy kids.”

Guillette says biologist-author Carson was right about the dangers of synthetic chemical pesticides.