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News Release

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CONTACT: Suzanna Cisneros, suzanna.cisneros@ttuhsc.edu
(806) 773-4242

TTUHSC's Urbatsch Hosts 2023 Gordon Research Conference

Biennial Meeting Focused on Multidrug Efflux Systems Research

Ina Urbatsch, Ph.D., a professor in the Department of Cell Biology and Biochemistry at the Texas Tech University Health Sciences Center (TTUHSC) School of Medicine, hosted the 2023 Multidrug Efflux Systems Gordon Research Conference (GRC) March 26-31 in Galveston, Texas.

GRCs are a group of internationally organized scientific conferences, each focused on specific topics and technologies that represent the latest frontiers of research that cover the latest developments — some yet to be published — related to the biological, chemical and physical sciences.

The Multi-Drug Efflux Systems GRCs are conducted every two years, though the 2021 event was canceled due to the pandemic. The theme of the 2023 meeting was "Targeting the Mechanisms and Regulation of Transporters for Advancing Health During a Pandemic," and the conference program included a wide range of diverse speakers and discussion leaders representing institutions and organizations worldwide and concentrating on the latest developments in the field.

Urbatsch, a member of the TTUHSC School of Medicine's Center for Membrane Protein Research, said Gordon Research Conferences are conducive to scientific interactions because they are relatively small (200 people maximum) and are focused on a specific topic.

"These scientific interactions are very intense interactions that really promote the bringing together of early career investigators with more established researchers," Urbatsch said. "I have sat next to a Nobel Prize laureate, discussing themes that came up in the morning session over lunch."

Urbatsch said a major focus the 2023 conference was the multifaceted mechanisms of multidrug efflux pumps (transporters) and how to harness them to develop better drugs. These multidrug transporters are bacterial determinants of antibiotic resistance that exist in all organisms. Some are located in the intestines, where they limit absorption of dietary components. Others are located in the liver, where they enhance the excretion of toxic compounds from the bloodstream.

For instance, when someone ingests a pill, that pill interacts with the multidrug transporters. In cases where the interaction leads to a rejection of the medicine, the multidrug efflux pumps have prevented it from entering the intestine so that it is never absorbed. Urbatsch said this process causes the rejection of the majority of cancer drugs. For those administered intravenously, multidrug transporters in the liver will excrete the drugs before they are absorbed.

"Multidrug efflux pumps determine the lifetime of the drugs in the bloodstream, and they often control it," Urbatsch explained. "We also have transporters like that in the tumor cells themselves, and if the drugs are recognized by these transporters, they're kicked out of the tumor cells and then they are kicked out through the liver and the concentration of the drug just goes down to the point where it's no longer effective. My research focuses on modifying the chemical composition of drugs so that the drugs are no longer recognized. They evade those transporters and become more effective, they live longer and then they have a higher therapeutic index."

Urbatsch said it is important to note that the 2023 Multi-Drug Efflux Systems GRC brought together researchers from two traditionally isolated fields: those whose research focuses upon prokaryotic transporters (located in bacteria) and those focused upon eukaryotic transporters (located in the liver, gut and brain).

"The transporters in the bacteria are a little different, and they may use slightly different mechanisms," Urbatsch said. "By bringing the two fields together, they can cross fertilize; whatever they learned in bacteria, we may be able to find an application in cancer research, and vice versa."

Urbatsch said another issue the 2023 Multidrug Efflux Systems GRC sought to address is the mechanisms of resistance that lead to rejection and often leave the patient without options if relapse occurs. For example, the first time a patient receives treatment for breast cancer, the treatment may kill 99.999% of all the cancer cells, but for some unknown reason a very tiny population of the cells are resistant to the treatment. After treatment ends, these cells may return, multiply and expand, sending the patient into recurrence five to 10 years down the road.

"When it returns, all of the cancer cells are resistant because they have this mechanism or mechanisms for resistance that was present in the small population that wasn't killed," Urbatsch said. "And usually they are not just resistant against the drug that was originally used for treatment, but they are resistant to a whole variety of drugs. That leaves the patient with very few treatment options at recurrence, and it's due to these transporters that are overexpressed at the cell surface. They recognize the drugs and they kick them out, so if we can find a way to block the transporters without interfering with the drug, you could sensitize the patient again to treatment."

Bringing researchers together from across the world to find long-sought-after solutions to difficult issues is one of the things Urbatsch enjoys about GRCs. She ensured the 2023 Multidrug Efflux Systems GRC would have a global feel by inviting international researchers from Australia, Europe, India and Japan to join U.S. scientists from Texas, Pennsylvania, Oklahoma and Washington.

"I have an extensive network of collaborators that I have developed over the years through these and other conferences," Urbatsch said. "I had two of my collaborators come to give talks at this meeting, and they presented the newest and even some unpublished data. We have a policy (at GRCs) of sharing unpublished results to really keep us at the forefront of science and to foster that unhindered exchange of new information."

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