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## Monell Center Receives Funding to Develop Technologies to Improve Taste of Lifesaving Drugs

*Interdisciplinary team seeks effective solutions to problem of pediatric pharmaceutical compliance in developing countries*

PHILADELPHIA (December 1, 2016) – The Monell Center announced today that it has received a \$345,000 grant from the Bill & Melinda Gates Foundation. The grant supports an innovative global health research project titled, “Developing Novel Pediatric Formulation Technologies for Global Health: Human Taste Assays.”

Millions of children in sub-Saharan Africa, Southeast Asia, and other developing regions die each year from treatable diseases. Although cost-effective medications are available for many diseases, children often reject medicines due to their horrible taste.

The overall goal of the newly-funded research is to utilize Monell interdisciplinary expertise on the sense of taste to identify compounds that block the bitter or other bad tastes of potentially lifesaving drugs. By combining cell-based screening assays with human sensory testing, Monell scientists will validate a viable method to identify natural compounds or FDA-approved drugs that block aversive sensory messages at the taste receptor level in the mouth before they reach the brain.

“Even the best drugs are not effective if people won’t take them,” said Monell Center Director Robert Margolskee, MD, PhD. “The Gates Foundation grant will allow us to leverage Monell’s collective strengths in sensory science, taste cell technology, and interdisciplinary research to reduce the repellent tastes of life-saving oral medications.”

Tablets are the formulation of choice in developing countries because they are cost-effective and have a more durable shelf life. However, most children under the age of seven are unable to swallow pills, so medications for young children typically are administered as crushed tablets added to a liquid. Although sweeteners and other flavors often are added to partially mask the offending tastes, this approach has limited effectiveness for young children, who find bitterness more repulsive than adults.

With the intent of providing proof of principle for the efficacy of cell-based taste screening assays to identify taste blockers that can increase pediatric pharmaceutical compliance, the newly-funded studies will focus on four life-saving drugs.



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Three of the target drugs are used to treat devastating parasitic infections: artemisinin and piperazine, which are administered together as a treatment for malaria, and praziquantel, given for schistosomiasis. The fourth drug, zinc sulfate, is used to help manage the symptoms and severity of recurrent diarrhea, a leading cause of death of infants and young children in developing countries.

The exploratory research will be conducted by an interdisciplinary team of Monell scientists over an 18-month period.

Sensory scientist Paul Breslin, PhD, will conduct human perceptual studies to determine the oro-sensory and nausea-inducing profiles of the target drugs. While the Monell team suspects that bitterness will be the primary offending sensory quality, testing will also probe for other off-putting qualities, including sourness, astringency, odor, and irritation.

The human sensory findings will guide molecular biologist Hakan Ozdener, MD, PhD, and taste physiologist Alexander Bachmanov, PhD, who will use cultured human taste cells, a technology developed at Monell, to identify whether bitter, sour, or other taste cell types are stimulated by the drugs. Another group led by molecular biologist Peihua Jiang, PhD, will identify which of the 25 different human bitter receptors are activated by each of the four drugs.

Sensory cells that respond positively to the drugs will be used to identify potential receptor blockers. DiscoveryBioMed, Inc., a human cell-based drug discovery contract research organization led by physiologist Erik Schwiebert, PhD, will use target sensory cells supplied by Monell to perform high-throughput screening assays using libraries of natural compounds and pharmaceuticals.

Compounds identified as potential blockers will then be validated at Monell both *in vitro*, using cultured human taste cells and bitter receptors, and *in vivo* by human sensory testing.

“The human sensory studies will allow us to precisely identify the sensory barriers that children experience when taking these drugs, while the two cell-based screening assays will help us identify blockers for bitterness or other objectionable sensory qualities. Using this interdisciplinary approach, we will establish the principle of taste screening to help improve the palatability and effectiveness of oral medications world-wide,” said Margolskee.

The Monell Chemical Senses Center is an independent nonprofit basic research institute based in Philadelphia, Pennsylvania. For over 48 years, Monell has advanced scientific understanding of the mechanisms and functions of taste and smell to benefit human health and well-being. Using an interdisciplinary approach, scientists collaborate in the programmatic areas of sensation and perception; neuroscience and molecular



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