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## Unique Sensory Responses to the Pediatric HIV Medication Kaletra *The Taste of Personalized Medicine*

PHILADELPHIA (December 13, 2017) – Bad taste can lead to rejection of life-saving medicines by infants and young children, who require liquid formulations because they are unable to swallow pills yet lack the language to explain why something does not taste good. Seeking to understand why some infants strongly reject Kaletra™, a medication commonly administered as part of the first-line treatment for HIV, while others readily accept it, a recent study from the Monell Center and the Children’s Hospital of Philadelphia used a trained adult sensory panel to examine individual differences in the sensory response to the medication. The findings documented a wide range of individual differences in the taste of Kaletra and identified genetic sources of the taste variation.

“The expectation that a given pharmaceutical should taste good to everyone fails to recognize the highly personal nature of taste,” said study lead author Julie Mennella, PhD, a developmental psychobiologist at Monell.

The World Health Organization estimates that half of pediatric patients do not take their medicines correctly in part because of the lack of child-friendly, “good-tasting” formulations. Taste can impede medication adherence in infants and young children, who are unable to swallow pills coated to mask offending qualities. At the same time, not all infants and children respond to a given medication in the same way. In the case of Kaletra, some readily accept and swallow the life-saving medication when tasting it for the first time while others forcefully reject it, thereby negating Kaletra’s anti-retroviral effectiveness.

To explore the extent of variation in how individuals perceive the taste of liquid Kaletra, which contains the active drugs lopinavir and ritonavir along with inactive ingredients, the researchers used a trained sensory panel of adult women in a proof-of-concept approach.

The findings, published in *Clinical Therapeutics*, revealed that individual adults responded very differently to the taste of Kaletra. Reflecting the wide range of responses of infants in clinical care, the panelists’ ratings for Kaletra’s palatability ranged from ‘moderate like’ to ‘strongest imaginable dislike’. The more the medicine tasted bitter to or irritated the mouth of a panelist, the more that panelist disliked the taste.

The wide variation in the palatability and bitterness of the medicine could in part be explained by variation in panelists’ taste receptor genes.



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In the study, 84 adult trained panelists rated their liking for Kaletra and other ingredients contained in the formulation including sucrose, sodium chloride, and ethanol. They also rated the strength of each specific taste quality (sweet, sour, salty, bitter, savory) and irritation. Panelists tasted each stimulus for 5 seconds and did not swallow. A subset of the panelists were retested several months later to establish that the sensory ratings were stable over time. Each participant also provided saliva, which was used to identify person-to-person variation in genes that determine the structure and function of several taste receptors.

Moving forward, the researchers plan to develop methods to measure taste responses in pediatric patients when tasting Kaletra and other medicines for the first time. The ultimate goal is to broaden the focus of precision medicine to include measures of taste, thereby identifying children who are unlikely to tolerate the taste of a given medicine.

“In this age of personalized medicine, the growing field of pharmacogenetics needs to assess how our genes affect how a given medicine tastes to that unique child,” said Mennella. “No matter how powerful, a drug cannot be effective if a child does not take it.”

Also contributing to the research was Dr. Elizabeth Lowenthal of the University of Pennsylvania Perelman School of Medicine and Phoebe Mathew of Monell. Research reported in the publication was supported by grants DC011287 and P30DC011735 from the National Institute on Deafness and Other Communication Disorders of the National Institutes of Health. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

The Monell Chemical Senses Center is an independent nonprofit basic research institute based in Philadelphia, Pennsylvania. Poised to celebrate its 50th anniversary in 2018, Monell advances 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 biology; environmental and occupational health; nutrition and appetite; health and well-being; development, aging and regeneration; and chemical ecology and communication. For more information about Monell, visit [www.monell.org](http://www.monell.org).