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## **Cold and Bubbly: The Sensory Qualities that Best Quench Thirst**

*Understanding sensory drivers of thirst may help improve hydration in at-risk populations*

PHILADELPHIA (October 3, 2016) – New research from the Monell Center and collaborators finds that oral perceptions of coldness and carbonation help to reduce thirst, the uncomfortable sensation caused by the need to drink fluids. Because thirst and its cessation contribute to how much fluid a person drinks, the current findings could help guide sensory approaches to increase fluid intake in populations at risk for dehydration, including the elderly, soldiers, and athletes.

Drinking fluids helps protect against dehydration, which occurs when the body loses more fluid than it consumes. Mild to moderate dehydration can lead to thirst and headaches, but severe dehydration can be deadly and requires immediate medical attention.

“We have a decent understanding of what turns thirst on, but need to better understand what turns it off so we can motivate the elderly and other at-risk populations to keep drinking their fluids,” said Paul A.S. Breslin, PhD, study senior author and a sensory biologist at Monell.

While it is commonly believed that rehydration alleviates thirst, in actuality thirst is relieved, and the act of drinking ceases, long before a consumed liquid is absorbed by the body. Sensory cues in the mouth appear to play a role in thirst quenching, but the specific signals that the body uses to determine the amount of liquid consumed and when to stop drinking remain largely unknown.

In the current study, published in the open access journal [PLOS ONE](#), Monell researchers investigated several oral sensations to identify which have an impact on thirst and influence the amount of liquid people drink.

A total of 98 healthy individuals between the ages of 20 and 50 participated in the experiments. To induce thirst, participants abstained from liquid and food overnight and then ate a small breakfast of toast and jelly. At this point, the participants rated their thirst as ‘strong.’ Each then had five minutes to drink 400 ml (13.5 oz) of water under one of four conditions, varying temperature (room-temperature or cold refrigerator-temperature) and carbonation (plain or carbonated).



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Then, after a short rest, the participants were allowed to drink as much plain (non-carbonated, room temperature) water as they wished.

By measuring how much plain water was consumed after the experimental beverage, the researchers could evaluate how well the experimental beverage had quenched participants' thirst.

Using this functional measure, the researchers found that cold liquid reduced thirst more effectively than room temperature. Adding carbonation to a cold beverage further enhanced the beverage's thirst quenching properties. Experiments testing the thirst-quenching effects of astringency, sweetness, and mild acidification showed no effect, supporting the specific effects of cold and carbonation on thirst reduction.

"Our results confirmed what people tend to naturally do when they are thirsty: drink a cold and often carbonated beverage to feel a sensation of relief," said Catherine Peyrot des Gachons, PhD, also a sensory biologist at Monell and the study's lead author.

A separate experiment showed that using menthol to chemically create the sensation of cooling had a similar thirst quenching effect to the water actually being at a cold temperature. "This shows that it's the perception of coolness that's influencing thirst, not the actual coolness itself," said Breslin.

Breslin emphasizes the importance of sensory information in guiding how much fluid we drink. "Thirst signals a physiological need, but the cessation of thirst is the result of sensory information being integrated in the brain," he said.

Moving forward, the researchers are interested in exploring the sensory cues that trigger a desire to drink, which could lead to beverages or techniques that improve hydration in at risk populations.

Also contributing to the research were Michael Gleason and Siyu Zhang of Monell; Julie Avriillier of Monell and AgroSup Dijon Institut National Superieur, Dijon, France; Laure Algarra of Monell and AgroParisTech Paris, Paris, France; and Emi Mura and Hajime Nagai of Suntory Global Innovation Center Limited, Osaka, Japan. Dr. Breslin also holds an appointment at Rutgers University School of Environmental and Biological Sciences. This research was funded in part by a grant from the Suntory Global Innovation Center. Other than the research contributions of authors Mura and Nagai, Suntory played no role in design, data analysis, or interpretation.

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



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