

Neurogastronomy: How our brains perceive the flavor of food

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ISN participants used tasting breaks to explore how the perception of flavor involves all five senses. Here, participants tried to identify foods while blindfolded and holding their nose. Credit: James K. Morris

Two women, seated at a table, told their stories in quiet tones. A group

of chefs, some standing, others seated, leaned forward eagerly, clearly interested in what these two women had to say. They peppered the women with questions: did food taste better cold or hot? Was texture an issue? Did a glass of wine before dinner help or hurt the flavor experience?

The women have taken chemotherapy for their cancer. One of them—Gina Mullin—will be taking chemotherapy every three weeks for the rest of her life. Both of them tell heartbreaking stories about a side effect of chemotherapy that gets swept under the rug: food tastes terrible.

"Can you imagine how much quality of life you lose when you can't enjoy your food?" asked Jen Cooper.

Chemotherapy, by design, kills all fast-growing cells in the body. As cancer cells die, so do all the healthy fast-growing cells, including the cells responsible for hair growth and taste buds. So your hair falls out and everything tastes metallic.

"Here they are, critically ill, needing good nutrition more than ever, and they can't enjoy food? It's beyond unfair," said Dan Han, a neuropsychologist at the University of Kentucky.

Han has become an ardent advocate for the concept that quality of life issues—specifically, the enjoyment of food— should be measured as a clinical outcome for patients. A chance meeting in 2012 with internationally acclaimed chef Fred Morin brought the issue to his attention.

"Like most clinicians, when patients brought up the issue of reduced or distorted flavor perception (if they brought it up at all), I was sympathetic but not motivated, because there's not much we can do to

help," said Han.



Cancer survivor Jen Cooper (right) answers questions from internationally acclaimed chef Jehangir Mehta and Leah Sarris (left) about her inability to enjoy food during her chemotherapy. Credit: James K. Morris

But Morin, chef and owner of the legendary restaurant Joe Beef, is a bioengineer by training and hugely interested in the concept of neurogastronomy, which merges the science and culinary worlds by studying the human brain and the behavior that influences how we experience food. Morin encouraged Han to read a book by Yale neuroscientist Gordon Shepherd, who coined the term in 2006.

"I was hooked," said Han. "I knew that if we could bring together chefs, neuroscientists and food scientists to explore ways to help these patients enjoy a meal, break bread with family and friends and enjoy that process again, it would be a significant contribution to science and to life."

That chance meeting was the spark for the founding of the International Society of Neurogastronomy (ISN), and last week more than 200 scientists, patients, chefs, foodies and others gathered at UK for the inaugural ISN Symposium, sharing their knowledge and exploring opportunities to improve quality of life for people who have lost their perception of taste or smell due to cancer, brain injury, stroke, Alzheimer's, Parkinson's, or other neurological disorders.

The innovative event departed sharply from the typical academic symposium. There were no poster presentations, no prolonged science-y lectures. Instead, chefs like Morin, "Next Iron Chef" finalist and New York restaurateur Jehangir Mehta, and multiple James Beard finalist chef Ed Lee shared the podium with Gordon Shepherd, prize-winning experimental psychologist Charles Spence, acclaimed physiologist Tim McClintock, agricultural researcher Bob Perry, and many others for brief TED talk-style presentations that addressed every aspect of food, flavor, perception and health.

During breaks, participants were encouraged to visit eight tasting stations, where experiments demonstrated how the perception of flavor is shaped by more than just the tongue. Attendees wore blindfolds, sniffed scent jars, held their noses, and more while they sampled. At one station, tasters eating a pink cookie while listening to gentle music were astonished to learn that it was equally as sweet as the black cookie paired with harsh music.

The most emotional part of the day looped back to the conversation between the chefs and the chemo patients. Chefs were paired with

neuroscientists and physicians to create two teams, which then competed in the "Applied Neurogastronomy Challenge"—a friendly competition to make food that appealed to Gina Mullin and Jen Cooper.

"Team Morin" prepared a chunky potato soup with a range of toppings to customize the flavor experience: diced potato and bacon, pulled chicken and ginger, garlic broccoli, and fried chicken skin with paprika. "Team Mehta" also took a mix and match approach, offering peppered scallops, grilled chicken, and mustard lime halibut to be paired with chili jam, apple goji reduction, lemon marinated apples, carrot yogurt salsa, or a chocolate chili mole.

"I tried every dish, and it was really fun," said Mullin, who said the only time she cried during her diagnosis and treatment was the day she ordered two of her favorite restaurant dishes only to throw them away after one bite because they tasted so bad.

"Potato soup wins!" shouted Jen Cooper to widespread applause. In truth, replied Leah Sarris, Program Director for the Goldring Center for Culinary Medicine at Tulane University and a member of Team Morin, everyone won.

"I learned so much from you, Jen and Gina, and it will inform the way I cook and teach others to cook," she said. "We read in books about how chemo affects taste, but your stories made it real."

While neurogastronomy, as a science, is still in its infancy, the symposium has opened the door to the flow of information and ideas among neuroscientists, culinary professionals, food scientists and agriculture scientists. Participants were enthusiastic about the day's successes and the prospect for continued conversations that advance the science in the context of neurologically-related taste impairments, sustainability, disease prevention, and more.

"This really organically grew into something amazing, because people from such randomly different disciplines came together," said Han. "The commonality that united us was to achieve better [food](#), better flavor, better health, and better quality of life."

Provided by University of Kentucky

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