

Bring On the Burn

Brent Reid, DPh, CSPI

It's a feeling we all know. Bite into a dip of salsa labeled medium on the label, or a big spoonful of chili that your best friend says is very mild, and shortly after your mouth starts to tingle and burn, cheeks get red, and beads of sweat form across your brow. The food you have just consumed is made with some type of chili pepper. Nearly all chili peppers owe their kick to a family of molecules called capsaicinoids, capsaicin being the most common capsaicinoid. Other spicy foods (black pepper, ginger, wasabi) are molecularly different from capsaicin.

The burn stems from a chemical reaction when capsaicin, a colorless, odorless, oily chemical, bonds with pain receptors, which are the same neurons that detect heat and pain. The nerve cells naturally 'fire' a signal when local temperature gets above 108 degrees Fahrenheit. Capsaicin tricks the neurons, which can be in any part of the body (skin, mouth, eyes, nose) into the same 'firing' reaction.

The Scoville scale is a measure of capsaicin or the hotness of a chili pepper. Below are few examples of peppers included in that scale.

EXAMPLE	SCOVILLE HEAT UNITS
Pure capsaicin	16,000,000
U.S.-grade police pepper spray	2,500,000 - 5,300,000
Carolina Reaper	1,000,000 - 2,200,000
Trinidad moruga scorpion	1,000,000 - 2,000,000
Bhut jolokia (ghost pepper)	855,000 - 1,041,472
Red Savina habanero	350,000 - 580,000
Habanero chile, Scotch bonnet	100,000 - 350,000
Chiltepin	50,000 - 100,000
Tabasco pepper	30,000 - 50,000
Manzano pepper, chile de árbol	12,000 - 30,000
Serrano pepper	6,000 - 23,000
Chipotle pepper, jalapeño	3,500 - 10,000
Tabasco brand Original Red Sauce	2,500 - 5,000
Poblano (ancho), pasilla	1,000 - 4,000
Paprika, pepperoncini, pimento	100 - 900
Bell pepper	0

What to do when the heat is too much? What cools the burn?

Understanding that capsaicin is not an acid or base but a cellular irritant (inflammatory agent) that dissolves in fat, oil and alcohol but not in water, is key in determining treatments. Thus, drinking water after eating spicy food will only spread the oil base capsaicin around where it will come in contact with more pain/heat receptors. Avoid water and water base products like beer and soda. If the burn is on the skin, applying olive oil or vegetable oil to skin and washing with warm soapy water may be of some benefit. Even though warm water adds to the burn or pain, initially, it is better than cold water to remove the oil base capsaicin. Also dairy products like yogurt, or starches like white rice or bread, and sugars like honey or granulated sugar can help with the burn. The Scoville scale was originally based on the amount of sugar needed to dilute a chili pepper. A solution that is prepared out of chili pepper extract is diluted in water containing sugar until the heat of the capsaicin in the pepper is no longer measurable to a set of tasters. So Sugar may be of some help with the burn. (More recently there are scientific ways to test the capsaicin concentrations, like High Pressure Liquid Chromatography, and get a more accurate rating of the heat compared to those rating using the sensory method).

To sum it up:

If the burn is in the mouth, try yogurt, sour cream, peanut butter, honey, or sugar.

If the burn is on the skin, try applying olive or vegetable oil and washing with warm soapy water. Also a liquid antacid, like Maalox or Mylanta, applied to the previously washed skin and let dry in place then wash off, may be helpful.

If the burn is in the eye, irrigation with normal saline is best, but use water if that's all you have. Use a 'no tears' shampoo to rinse around eye area. A trip to the emergency room may be necessary for normal saline irrigation and topical painkillers.

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Oklahoma Center for Poison & drug Information