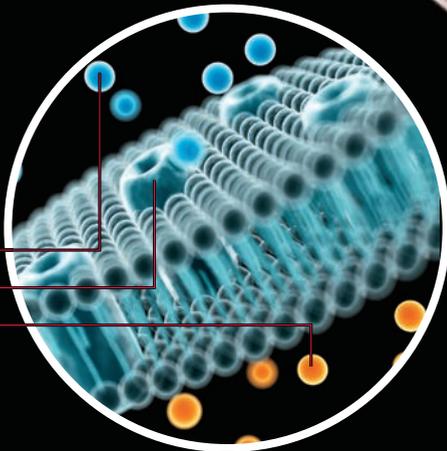




# PAIN: HOW IT WORKS

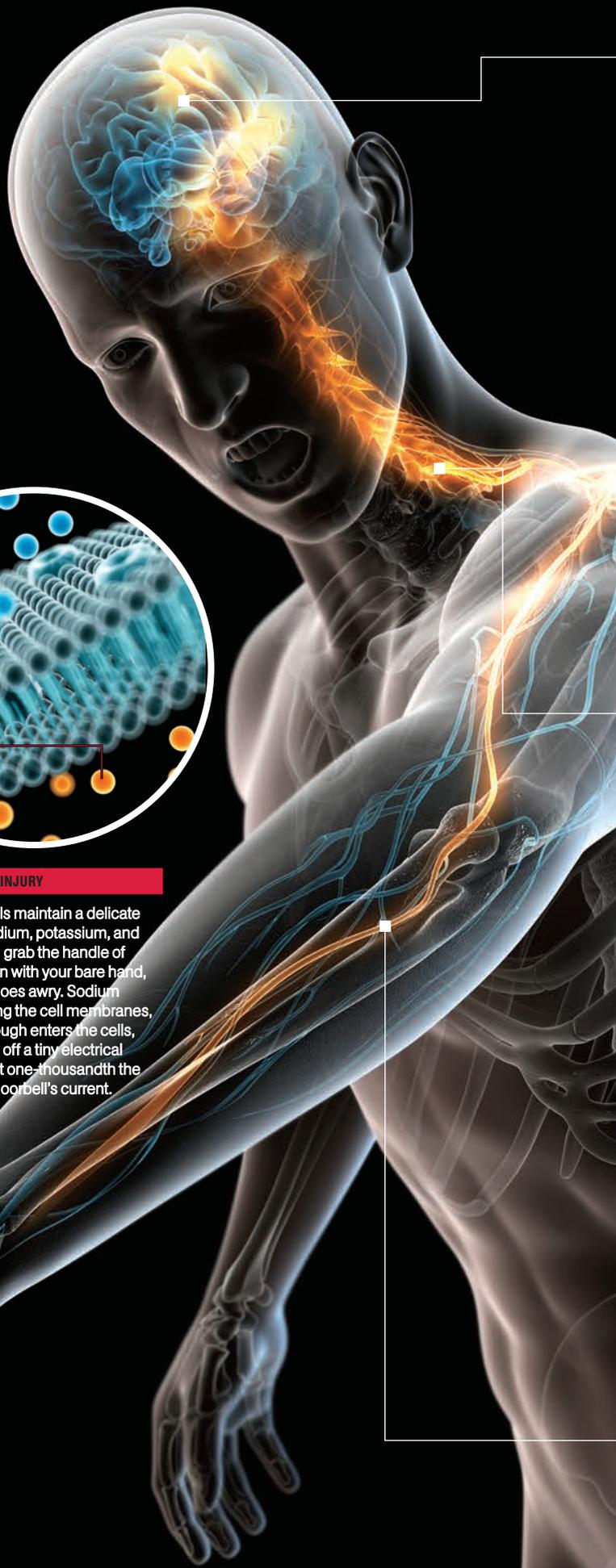
YOUR NERVOUS SYSTEM IS DESIGNED TO HELP YOU RESPOND TO PAIN WITH ASTOUNDING SPEED. GOOD THING, TOO—IF THE REACTION WERE SLOWER, A SIMPLE COOKING BURN COULD END UP THREATENING YOUR LIFE.



Sodium ions  
Sodium channels  
Potassium ions

## 1/ THE POINT OF INJURY

Your nerve cells maintain a delicate balance of sodium, potassium, and calcium. If you grab the handle of a hot frying pan with your bare hand, that balance goes awry. Sodium begins crossing the cell membranes, and when enough enters the cells, the nerves fire off a tiny electrical charge—about one-thousandth the strength of a doorbell's current.

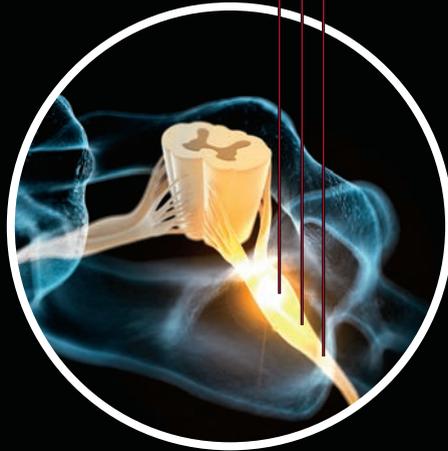


#### 4/ THE PROCESSING ZONE

After traveling through your spinal cord, the signal hits your brain's receiving center, the thalamus. For a heat injury, the entire journey takes 0.01 second. And that's actually slow; chemical and mechanical nerve fibers work at 10 times that speed. Your thalamus now modulates the pain to reflect the perceived risk, and then sends it on for interpretation in your cerebral cortex.

#### 5/ YOUR REACTION TO THE PAIN

Spinal nerve  
Spinal ganglion  
Electrical signal



#### 3/ THE NERVE CENTER

All pain signals will eventually reach your spinal cord. The one originating from your hand will enter in the middle to lower part of your neck, somewhere between the fifth and seventh vertebrae. The exact entry point depends on where you were hurt—pain that originates from your thumb, for example, enters at the fifth vertebra.

#### YOU PULL AWAY

This is the most primal response you can have to accidentally pan-frying your hand. "Your body is wired to save your life," explains *MH* family medicine advisor Ted Epperly, M.D. "So it reflexively jerks your hand back."

#### YOU SWEAR OR SCREAM

Letting loose with a string of obscenities (or a high-pitched, head-swiveling shriek) may actually serve an evolutionary purpose. "It could have been used to warn others that danger is around," says Dr. Epperly. Watch out: Man cooking!

#### YOU PASS OUT

This less-than-heroic response is to spare you unbearable pain, but it's pretty rare, says Dr. Epperly. "Generally, your body wants to stay alert so it can move you away from harm." Besides, if you pass out, the steak will burn.

## OUTSMART ANY HEADACHE THE KEY TO EASING YOUR AGONY? FIGURE OUT WHAT'S ROCKIN' YOUR NOGGIN.

#### Tension Headache

Feels like... your skull is in a vise. Stress can cause brain chemicals to flatline, activating pain pathways, says Jessica Ailani, M.D., a headache specialist at Georgetown University.



+ TAKE A HIKE A 10-MINUTE WALK CAN BRING YOUR NEUROTRANSMITTERS BACK TO HEALTHY LEVELS, SAYS DR. AILANI.

#### Migraine

Feels like... a railroad spike in one side of your head. As with tension headaches, migraines tend to be triggered by a dip in brain chemicals. Light and noise increase the ache, says Dr. Ailani.



+ DRINK UP FOLLOW TWO TYLENOL WITH GATORADE AND COFFEE, SAYS DR. AILANI. HYDRATION AND CAFFEINE BOOST RELIEF.

#### Sinus Pain

Feels like... intense pressure in your cheeks and brow. When sinus cavities become inflamed, the mucus inside can't drain, says rhinologist Martin Citardi, M.D., of the University of Texas.



+ BURN IT OUT SPRITZES OF A CAPSAICIN NASAL SPRAY CAN EASE THE ACHE, SAY UNIVERSITY OF CINCINNATI SCIENTISTS.

#### Cluster Headache

Feels like... only the worst pain ever (hence the nickname "suicide headache"). Eye redness and a droopy lid are other tells. Brain abnormalities may be to blame, says Dr. Ailani.



+ HIT THE O<sub>2</sub> IF IT LASTS LONGER THAN 20 MINUTES, GET A RIDE TO THE E.R. "OXYGEN CAN STOP THE PAIN," DR. AILANI SAYS.

#### 2/ THE OUTER ROAD

Different nerve fibers carry different types of pain—mechanical, chemical, or thermal. The electrical signal coming from your just-singed palm selects the relevant nerve fiber, jumps on board, and shoots toward your spinal cord.

A-delta fiber  
Electrical signal  
C-fiber

