Goosebumps and the shivers

Dear Alice,

Why do you shiver? What causes "goosebumps"?

Lena

Answer

Dear Lena,

Brrr!! Shivering is when the muscles contract and relax quickly, causing uncontrollable quivering all over the body. This is an involuntary muscle reaction to a variety of conditions, the most common of which is feeling cold. However, fever, illness, fear, childbirth, orgasms, and many other circumstances may also set off the shivers. Goosebumps often accompany shivering as they’re caused by the pilomotor reflex that happens in response to cold temperatures, intense emotional stimuli (such as awe, pleasure, or fear), or if the skin is irritated. This reflex triggers an involuntary muscle contraction that raises the hairs of the skin, producing goosebumps.

There are some biologically adaptive advantages for both shivering and goosebumps. In the case of a reaction to cold, a decrease in skin and body temperature sends a signal to the preoptic area of the hypothalamus, located in the brain. This signal causes the hypothalamus to stimulate muscle contractions (the shivering reflex) in order to warm up the body. The rapid contraction and relaxation of the skeletal muscles helps return the body’s temperature back to normal (around 97 to 98 degrees Fahrenheit). At this point, the shivering stops. Goosebumps, triggered by the cold as well, cause the base of each hair follicle to contract, which forces the hairs to stand on end (i.e., piloerection). The erect hairs trap air near the skin, thereby retaining heat for the body (this feature works better in mammals with more fur than humans).

Interestingly, babies and very young children can’t shiver. That’s one reason for the extra baby fat. Instead of shivering when they’re cold, babies thermo-regulate (or produce heat) by burning fat and glucose in a process called thermogenesis. This is the same mechanism used by hibernating mammals to keep warm. However, as babies grow older, thermogenesis decreases, therefore making the mechanism of shivering necessary for temperature control.
Lastly, as mentioned, strong emotional experiences, especially fear, may produce shivering or “the chills.” This is usually in response to adrenaline when really scared or startled. For mammals with lots of fur, all the erect hair can make them appear larger and more threatening to predators. And in the case of some mammals, such as the porcupine, this makes them not only appear more threatening, but more dangerous as well. While a good scary movie may make a human’s hairs on the body stand on end, it doesn’t provide the same benefits of thwarting off threats.

Stay warm,

Alice!

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