Motion Sickness: It's All In Your Head

You may know the feeling: as you start a long car trip, you feel nauseated, maybe to the point of vomiting. You may also have a headache, loss of appetite, upset stomach and a generally sick feeling. You're car sick, and it's no fun. Motion sickness can take place just about anywhere; people get seasick, airsick and yes, even space sick. When astronauts face motion sickness, especially at critical points in a mission, it can jeopardize an operation, so they have to be able to cope. But how?

One of the keys to solving a problem is knowing what caused it, and that's part of the mystery. Nobody is exactly sure how motion sickness is brought on, because it's experienced so differently in patients. Scientists do know that microgravity seems to accentuate motion sickness, and a person's orientation and head movements enter into the equation. Shifting of body fluids, such as blood and cerebrospinal fluid, and changes in the balance organs of the vestibular system (inner ear) also play a role.

Mercury and Gemini space flight astronauts did not experience space motion sickness, and scientists attribute this to the design of the space capsules. Mobility and peripheral vision was restricted, so the astronauts didn't encounter spatial disorientation during flight.

It was with the Apollo and Skylab missions that space motion sickness first surfaced; when astronauts started moving about with greater freedom, the sensory issues of microgravity became a concern. As astronaut candidates began training for micro gravity experiences in high-flying aircraft, motion sickness became a more significant problem. In the current Space Shuttle and Space Station programs, about 50 percent of astronauts and cosmonauts experience some degree of motion sickness.

Two NASA scientists from Ames Research Center in California have developed Autogenic Feedback Training (AFT), a special program to help astronauts control their symptoms of space motion sickness. Doctors Patricia Cowings and William Toscano's goal was to teach astronauts and cosmonauts how to control their own autonomic responses, which would help them cope with the woozy feeling of being space sick.

"AFT is a six-hour training program where astronauts are given self-suggestion exercises," says Dr. Toscano. "They learn to recognize the early symptoms of motion

sickness and respond. Everyone is unique in the way they experience motion sickness, so the first part of the program consists of monitoring each person for their particular responses and then tailoring the self-suggestions to be most effective."

Common symptoms of motion sickness include accelerated heartbeat, loss of blood to the extremities, and rapid breathing. When patients recognize these early physiological signs of stress, they're taught to change their behavior to bring their bodily functions back to near-resting levels.

"For cold hands, the patient would imagine warmth in the hands," says Dr. Toscano. "For accelerated heartbeat or breathing, the patient would consciously slow down his systems. He could use a metronome, perhaps, to control the speed of respiration. These learned responses have been shown to drastically improve motion sickness."

If this sounds too simple to be true, look at test results. Since the 1970s, Cowings and Toscano have tracked the success of their approach. Using ground-based studies, with rotating chairs, they've found that 85 percent of their patients report reduced or eliminated motion sickness with AFT techniques. In other studies the United States Air Force used AFT on their pilots—with similar results.

In another study, Cowings and Toscano compared AFT with the use of promethazine, the motion sickness drug of choice in the U.S. space program. "Patients using AFT had a two-to three-times higher tolerance for motion sickness conditions," Toscano says. "Additionally, AFT has none of the side affects of drugs, which include impairment of cognitive and neuromotor skills."

The training of AFT involves removing the stereotypes associated with behavioral treatment, and tuning in to your body's rhythms, Toscano says. "Imagery and visualization techniques carry negative images with them," he says. "We don't use mantras and we don't meditate. It's about focusing attention on a problem and re-directing the way your body responds to certain conditions. It's about using mental, instead of pharmacological treatments."

Training the body to respond to its own symptoms has had some earth-bound success as well, Toscano says. Besides its use with airplane pilots, AFT has been used with success in medical patients with certain autoimmune disorders that make them unable to tolerate food. Until using AFT techniques, patients resorted to tube feeding in order to avoid vomiting with every meal. "After AFT, doctors report that patients are able to eat normal meals again," Toscano says. "The success we've seen with the simple techniques of AFT offer encouragement for many types of disorders beyond motion sickness."

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