



**ROBERT N. ROSSIER**

COMMENTARY / STICK AND RUDDER

# High and Dry

Dissecting the danger of dehydration

BY ROBERT N. ROSSIER

**THE SUMMER FLYING SEASON** is fast upon us, and with that change comes the need to reevaluate the risks we face when flying. Despite all our thoroughness in our preflight planning and preparation, there are still risks that can sneak up and give us a good stout kick in the tail.

Many years ago, I learned firsthand of a risk I had never before considered but nonetheless held the power to incapacitate an unsuspecting pilot. The incident involved one of my most capable students, who at the time had earned an instrument rating and commercial pilot certificate and was soaking up aviation knowledge and experience like a sponge. As one of his aviation goals, he was undergoing training for mountain flying. We were in the midst of a round-robin flight that would take us from Jefferson County Airport (now Rocky Mountain Metropolitan Airport), west to Glenwood Springs, Aspen, and Leadville, then south to Santa Fe, New Mexico, and back home to Denver. The weather was perfect, and everything was going according to plan — at least for the first couple of hours or so.

The first hint of trouble came as we were at cruise altitude, headed south toward Santa Fe. I asked him to do some simple navigational checks to verify our position. This amounted to tuning in a VOR, getting our radial from the station, and looking for landmarks on the sectional chart. It was a simple task that he easily accomplished on many training flights, but for some reason he struggled. He seemed confused, and I was flummoxed by his sudden inability to perform such a routine task. We were experiencing some mild turbulence, and I thought maybe he was becoming airsick, but he said he felt fine. I took the controls to give him a break, thinking he was somehow stressed by our mountain excursion, but it didn't seem to help.

A short while later, we landed in Santa Fe. I thought it best if we took a break to cool off and recharge. He bought a soft drink and sat down to rest in the shade. After a while, he said he just didn't feel right and suggested he should go visit an aunt who lived nearby. This was odd, especially for someone who jumped at every chance to fly, but we ended the lesson then and there.

My student's condition had been worse than he was letting on. His aunt took him to the emergency room at the local hospital where doctors gave him a thorough check and determined he was suffering from dehydration. They put him on intravenous fluids. By the next day, he was back to his normal self.

I had never seriously contemplated dehydration as a risk for pilots. In retrospect, the pieces fit. The Rocky Mountains can be particularly dry with soaring temperatures in the summer. A long flight, high altitudes, and intense sun beating down on the cockpit can be brutal. Unless we're regularly drinking water throughout a flight, we could be putting ourselves at risk for dehydration.

## DIMINISHED PHYSIOLOGICAL AND MENTAL PERFORMANCE

It turns out that my student's experience was anything but unusual. Numerous scientific studies have documented the degraded mental acuity and performance experienced by pilots who become dehydrated. The Airman Certification Standards for private pilots include dehydration among the human factors to consider during preflight planning, but what we might not recognize is the potential severity of the symptoms involved.

The human body is roughly 70 percent water, with some 87 percent of that being intracellular water necessary for such functions as oxygen transport and maintaining the proper pH balance. As health experts tell us, this water keeps our blood moving, our digestive system functioning, and our body cooled by sweat in warm conditions. Without adequate water, any number of symptoms can sneak up on us.

Imagine a scenario where we perform our preflight in excessively hot conditions, we sit in a sunbaked cockpit on the ground waiting for takeoff and then climb into thin, dry air where we spend hours on end.



It isn't difficult to imagine that we could become dehydrated, especially if we were tending in that direction to begin with. But what really happens to us?

Dehydration brings on a multiplicity of physiological problems that can be dramatically important. First is the loss of our ability to control body temperature. The human body cools itself through the production of sweat, as well as through respiration — we breathe in dry air and exhale warm air saturated with water vapor. To conserve water, our kidneys begin concentrating urine. Low urine output and dark, yellow-colored urine are some of the first signs of trouble. Dehydration also diminishes our body's ability to transport oxygen to the cells and to our brain, and to maintain the necessary levels of nutrition. As we lose the water balance battle, the symptoms become more severe. We can suffer from nausea, lightheadedness, exhaustion, muscle and joint pain, and chest or heart pain. We can become confused, anxious, even paranoid. It's a bad situation for anyone, especially those at the controls of an aircraft.

#### DETECTING AND TREATING DEHYDRATION

A common myth is that dehydration is rare. Scientific research suggests otherwise. According to a study performed by New York-Presbyterian/Weill Cornell

rapid breathing and heartbeat, irritability, confusion, lightheadedness, muscle cramps, exhaustion, and delirium. Yellow urine, sunken eyes, or a lack of sweating, tears, or urination can also be telltale signs of dehydration. Clearly, many of these symptoms can be signs of other issues, but a simple test can verify the cause.

To begin, we gently pinch the skin on our belly or arm between two fingers to make a "tent," then let go. If the skin springs back to its normal position in one to three seconds, then we're okay. If it is slow to return to normal, we are likely dehydrated.

Treating dehydration — if it isn't too severe — is relatively simple. We should drink plenty of fluids (water is best), and apply a cold compress to our face or take an ice bath to cool down. A body temperature higher than 103 degrees Fahrenheit indicates a severe case of dehydration that should be treated in the emergency room.

#### FLYING HIGH AND GETTING DRY

The irony of our mountain flying excursion was that among our onboard survival equipment was a generous supply of drinking water. Had we only recognized what was happening, we might easily have taken steps to avoid the problem.

Strategies for staying healthy are not always as obvious as we might hope. We need to make a conscious decision to

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maintain proper hydration, especially in the heat of the summer flying season. By taking the right steps, we can avoid being left high and dry with the unexpected and mind-numbing symptoms of dehydration. *EAA*

Medical Center more than 20 years ago, roughly 75 percent of Americans likely suffer from chronic dehydration. It's not a good starting point, especially for pilots. All it takes is exposure to high altitude, maybe some exercise, excessive sweating, and low water intake to bring the danger of dehydration to our doorstep.

Among the many signs of dehydration are thirst, dry mouth, nausea, vomiting,



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