Healing goes high-tech as **hyperbaric chambers** are used to treat everything from problematic wounds to crushed body parts

By Stacey Colino

**Four years ago,** Stephan Ashton developed a blister on the bottom of his left foot that gradually turned into a skin ulcer, thanks to poor circulation from diabetes. He sought the help of his primary-care physician and a podiatrist, and tried ointments and oral antibiotics—but no matter what he did, he couldn’t get it to heal completely.

“I was keeping it at bay, but I wanted to get rid of it,” says Ashton, 47, a former executive protector (aka, bodyguard) who lives in Silver Spring.

Then he read that wide receiver Terrell Owens, now with the Cincinnati Bengals, used hyperbaric oxygen therapy to hasten the healing of an ankle injury, and Ashton decided to seek the same treatment.

It took more than a year to get his insurance plan to approve the therapy. Finally, last fall, he underwent 30 treatments in the hyperbaric oxygen chamber at Shady Grove Adventist Hospital in Rockville, and gradually the ulcer shrank from 3 inches in diameter to half that size.

“It took awhile, but the wound is a lot better,” says Ashton, “and my doctors are really happy with the results.”

**Welcome to the world** of high-tech healing. Originally used to treat decompression sickness from scuba diving (commonly known as “the bends”), hyperbaric oxygen therapy is gaining momentum as a cutting-edge treatment for conditions including non-healing diabetic wounds, bone or soft tissue injuries that occur months or even years...
after the completion of radiation treatment, crush injuries, compromised skin grafts, gas embolisms in the arteries, and carbon monoxide poisoning. The Undersea & Hyperbaric Medical Society has approved its use in the United States for 14 different medical conditions, a list that Medicare and many insurance companies follow for reimbursement.

Hyperbaric medicine relies on an intriguingly simple premise: The patient lies on a gurney (or sits in a chair) in a sealed metal and/or clear acrylic, single-person chamber, that weighs 2,000 to 3,000 pounds—and breathes 100 percent pure oxygen delivered at double or triple the pressure found in our natural environment. (There are also larger, multiperson chambers.) In this way injured or infected organs, bones, or tissues are exposed to more oxygen, which is then absorbed into cells at the DNA level to facilitate healing, says Dr. B. Robert Mozayeni, founder and director of the Translational Medicine Group, which includes Bethesda Hyperbaric Oxygen Therapy, a private hyperbaric facility in the area.

“The air we breathe is 21 percent oxygen at sea level,” Mozayeni says. “When you increase the atmospheric pressure and create an environment that has 100 percent pure oxygen, many times the usual amount of oxygen can be delivered to the body’s tissues.” That, in turn, “induces the production and release of proteins and repair enzymes that accelerate the healing of a wound, infection or other injury.” These mechanisms decrease swelling and pain and enhance white blood cell activity at the wound site, Mozayeni explains. Hyperbaric oxygen therapy (often called HBOT) also causes stem cells from the bone marrow to be mobilized into the circulation, thereby increasing stem cell levels to eight times their usual levels within five treatments, which may be another way hyperbaric oxygen helps restore injured tissues. “It’s like jump-starting the body’s natural healing process with electrical paddles,” Mozayeni says.

Mozayeni recently used hyperbaric oxygen treatments on a 75-year-old man who had broken his heel bone. “He went in with pain—and within five treatments there was a big difference in his pain and healing,” Mozayeni says.

A typical session ranges from 90 min-
“It’s like jump-starting the body’s natural healing process with electrical paddles.”

— Dr. B. Robert Mozayeni, founder and director of the Translational Medicine Group

Georgetown University Hospital added four hyperbaric chambers to its Center for Wound Healing and Hyperbaric Medicine last year.

is one reason those who work in the subspecialty of hyperbaric medicine say they’ve faced an uphill battle convincing mainstream physicians of its benefits for common uses. Indeed, there are few hyperbaric treatment centers among hospitals in the area: Besides Shady Grove, only Georgetown University Hospital, George Washington University Hospital and the University of Maryland Medical Center in Baltimore have chambers.

“There was a time when outrageous claims—such as that hyperbaric oxygen could help in revitalizing youth and vitality—were being made,” says Dr. Phuong Jeannie Le, director of hyperbaric medicine and an attending physician at Georgetown University Hospital, which added four hyperbaric chambers to its Center for Wound Healing and Hyperbaric Medicine last year. “As a result, there are still physicians who are skeptical of hyperbaric oxygen therapy.”

Moreover, the therapy isn’t widely understood by those outside the field, so misperceptions about what pure oxygen can and can’t do are common. “Some people think 100 percent oxygen is this magical elixir,” Le says. “But 100 percent oxygen is a drug. At up to three times the atmospheric pressure for a short amount of time, it’s therapeutic. But if you go beyond that, it’s toxic.”

“And in the majority of the conditions for which treatment with hyperbaric oxygen is used,” she adds, “it’s not even the oxygen being given that’s doing the job—it’s what the combination of the pressure and the oxygen signals in your body that induces the healing process.” That’s why the level of pressure and the length of any individual session will vary, depending on the medical condition being treated.

Beyond 60 treatments, however, there’s a point of diminishing returns: If improvements haven’t occurred by then, they’re not going to happen, Le says, and excessive treatments carry risks, such as seizures and temporary changes in vision. “It is not a treatment to be used on a chronic basis,” Le says. “It either works or it doesn’t.”

Meanwhile, controversy exists over what constitutes an appropriate medical condition for HBOT, aside from its approved uses. For example, it has been used to treat sports injuries, such as sprains, strains and contusions in elite athletes at special sports medicine facilities. Many professional teams have these chambers in their locker rooms, and The Washington Post recently reported that Washington Redskins wide receiver Santana Moss has a hyperbaric oxygen chamber in his home. But local hospitals won’t treat sports injuries the hyperbaric way.

“For sports injuries, it’s unnecessary,” Le says. “Athletes are healthy individuals who will heal normally, and healing faster is not the point of it. We’re not in a race—people naturally heal at different rates. Hyperbaric oxygen is typically used for the worst of wounds that have been shown not to heal within a certain amount of time despite conventional care. It’s not a first-line treatment.”

Decompression sickness and carbon monoxide poisoning are two instances in which hyperbaric medicine is often a first-line treatment. “In the last few years we’ve had several incidences of people using gasoline motors indoors, and they’ve developed carbon monoxide poisoning and were in critical condition,” Shady Grove’s Buzy says.

Last winter, a man in his 30s developed carbon monoxide poisoning while using a gasoline-powered saw in his basement. He was in critical condition and required four hours of hyperbaric treatment at Shady Grove Adventist to get his blood reoxygenated. “Hyperbaric oxygen greatly reduces the amount of carbon monoxide that’s binding to the red blood cells and allows oxygen to be carried to the tissues of the body instead,” Buzy says. Once that
"With hyperbaric oxygen treatments, what we’re really doing is laying the groundwork for continued healing.”

— Dr. Joel Buzy, medical director of the Shady Grove Adventist Hospital’s Hyperbaric Unit

happens, the patient recovers immediately, as did the man with the saw.

With many other conditions in the United States, hyperbaric oxygen therapy is usually an adjunct to other forms of care. “Most of these patients are also being seen by wound-care doctors, podiatrists, or vascular surgeons if there’s poor circulation to the area,” Buzy says. These specialists will remove dead tissue from a wound or injury, make sure the site is free of infection, and take other steps to create the best possible environment for oxygen to be delivered to the wound.

After being diagnosed with breast cancer in 2009, Cindy Jones of Owings, Md., underwent chemotherapy, had a mastectomy and received radiation treatments. Breast reconstruction followed in August 2010, but the surgical flap became compromised and the wound in the irradiated tissue began to break down, which threatened the viability of the entire area. Because of that, Jones initially underwent 10 hyperbaric oxygen treatments at Georgetown University Hospital, then had another 40 treatments at the same facility to heal the wound.

“The hyperbaric treatments closed the wound up,” recalls Jones, now 56. “By the time I finished my treatments at the end of October, it looked like healthy skin again—which was the doctors’ main concern—and I no longer had any discomfort.”

Experts such as Mozayeni of the Translational Medicine Group believe that the approved or “on-label” uses for hyperbaric oxygen therapy are just the tip of the iceberg. They think it might help with cerebral palsy, multiple sclerosis, migraines, autism spectrum disorders, Lyme disease and stroke recovery. But the enthusiasm may be ahead of the science, especially since research findings on HBOT’s effectiveness for those purposes are mixed at best.

Hyperbaric oxygen therapy also is being studied as a possible treatment for traumatic brain injuries among U.S. soldiers returning from overseas—and there is some evidence that it may help.

“Of the two sets of pilot data that recently came out, the results are spectacular,” Mozayeni says. “In one study of 30 people, almost all of them returned to baseline [in their brain activity]. Other
centers are beginning to independently validate the findings.” HBOT also is being looked at as a possible treatment for posttraumatic stress disorder.

With additional research, hyperbaric oxygen therapy may become more widely available and used for even more conditions than it is now—at least that’s the hope of practitioners like Mozayeni. “The medical establishment always resists change, and that’s partly because they have a vested interest in maintaining the status quo,” Mozayeni says. “It typically takes 12 to 17 years for an innovation in medicine to become, if not accepted, at least not thwarted.”

There are signs, though, that hyperbaric medicine is gaining more acceptance. “At first, a lot of physicians were skeptical. But as they see how patients are brought back to health [with hyperbaric treatments], they’ve started referring more and more patients,” says Kenneth Stokes, director of outpatient wound care at Shady Grove Adventist, which often has a waiting list for hyperbaric treatments. “I only wish we had more chambers so we could treat more patients.”

Recently, an elderly man came into Shady Grove Adventist seeking help. Already suffering poor circulation in his legs and feet because of peripheral artery disease, he had had one of his feet crushed in an accident. “The tips of his toes were black, and his foot was swollen and purple,” Buzy says. “He was in danger of losing his toes and the front portion of his foot.”

After a week of daily hyperbaric oxygen treatments at Shady Grove Adventist, the man’s foot began to look much healthier. “We were able to save his foot from amputation,” Buzy says, “which is what we were hoping for.”

**THE APPROVED LIST**
The Undersea & Hyperbaric Medical Society, a professional organization representing doctors, nurses and technicians in the field of hyperbaric medicine, has approved the use and reimbursement for hyperbaric oxygen therapy for 14 different medical conditions in the U.S. They are:
- Air or gas embolism
- Carbon monoxide poisoning
- Gas gangrene
- Crush injury
- Decompression sickness
- Healing of problem wounds (related to diabetes, for example)
- Arterial insufficiencies
- Severe anemia
- Intracranial abscess
- Necrotizing soft tissue infections
- Osteomyelitis (a serious bone infection)
- Delayed radiation injury
- Compromised grafts and flaps
- Thermal burns

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