

Running the 292-Mile Badwater Double

Lessons learned.

BY KENNETH A. POSNER

In 1977, Al Arnold became the first person to run the 146 miles from the Badwater Basin in Death Valley (which, at 282 feet below sea level, is the lowest point in the Western Hemisphere) to the summit of Mount Whitney (which, at 14,505 feet, is the highest point in the continental USA). In 1989, Tom Crawford and Rich Benyo conceived the idea of doubling this feat and became the first people to complete the 292-mile round trip, which is referred to as a “double” (Benyo 1991). In 2001, Marshall Ulrich set a record for the double of 96:07 as part of his celebrated “quad” crossing (Ulrich 2004). I set out on July 1, 2014, with the goal of completing the double and—if all went perfectly according to plan—of improving on the record. If successful, I would contribute in a small way

to the tradition that Tom, Rich, and Marshall established of seeking out extreme challenge in the beautiful but unforgiving environment of Death Valley and the High Sierra—and then raising the bar.

After the experience was over, my crew and I identified several lessons learned that we thought might aid other Badwater runners in such areas as planning, crew leadership, pacing, nutrition, and footgear. We offer these ideas with the goal of inspiring others to take on the Badwater course and to further improve the times for single, double, and other crossings. But first, here’s what happened.



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◀ Summertime temperatures in Death Valley commonly exceed 120 degrees F. Visitors beware.

Recap

The run started at the Badwater Basin at 7:11 A.M. Pacific time on July 1, 2014. I ran the 17 miles to Furnace Creek in just over three hours for an average pace of about 5.4 miles per hour. Having eaten a large breakfast of bacon and eggs before the start, I had no need for additional nutrition during this leg.

From Furnace Creek, the course heads north through Death Valley to Stovepipe Wells. The sun rose higher in the sky, and the temperature increased. My pace slowed to 3.9 mph as I took plenty of walking breaks to keep my legs fresh and my heart rate low. I passed the Salt Creek Interpretive Walk, where the day before I had admired the Pickleweed and Salt Grass growing along the dry stream bed. Then it was past a highway turnoff that leads to the Ubehebe Crater a few miles to the north. Some 1,000 years ago, hot lava intruded into a spring, and the resulting steam explosion left a crater nearly 600 feet deep. The local Timbisha Shoshone believe their god Coyote dropped a basket here, from which they escaped to populate a region that whites call “Death Valley” but which the Timbisha regard as a spiritual land that has powers of life and healing (Lengner 2013).

In due course, the Mesquite Dunes were in sight, and I scanned the horizon anxiously for dust devils, which might presage strong winds in the mountains. The coast looked clear. It was late afternoon, but the temperature was still rising. By the time we reached Stovepipe Wells, the thermometer in the crew vehicle read 127 degrees Fahrenheit.

Once past Stovepipe Wells, the course heads up a grueling 5,000 feet over 17 miles to Towne Pass, a mountain pass between Death Valley and neighboring Panamint Valley. The crew fished out my trekking poles, and I dug in with my upper body as well as legs, the tips clacking on the pavement. However, my energy began to flag. Because of the heat, I hadn’t eaten much during the day. I can run long distances without food, burning fat instead of glycogen, but there comes a point where the body requires an influx of calories. Meanwhile, the wind was picking up. I began to eat Gatorade Carb Energy Chews, which gave me a quick burst of energy. But the energy just as quickly faded, and I was left feeling weak and queasy. The sun set. Now the wind was howling in my face. The creosote bushes on the side of the road danced around in the gale, their branches whipping back and forth. I dragged myself a little farther up the mountain, groaning and cursing out loud. I finally reached a campground just past the 2,000-foot elevation marker. Out of energy, I collapsed on the ground and leaned back against a rock.

When the crew arrived, the foodstuffs I had so carefully selected for this run—salami, almonds, dark chocolate—no longer were palatable in the heat. Lynne Hewett, one of the two crew chiefs, rustled through the ice chests and pressed a variety of options on me, insisting that I needed nutrition. A few minutes later I was spooning split-pea soup, downing a fruit smoothie, and sipping a cup of ginger



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▲ Heading up the long road to the Whitney Portal.

ale. Diane Grecsek, the other crew chief, discovered a supply of hard-boiled eggs brought along by Chris Dooley, one of our pacers. Soon I was munching on an egg, courtesy of the Dooley family farm.

I was refueled and reenergized, and the rest of the climb up Towne Pass went a little better, but it is never easy slogging up this mountain, even on the best of days. The headwinds plagued me until just over the top. My average pace during this section was a miserable 2.1 mph, but having anticipated challenges, I had budgeted only 2.0 mph.

The reward for getting to the top is a punishing 9 percent grade descending 4,000 feet to the tiny hamlet of Panamint Springs. I trotted down at a moderate pace and then crossed the interminable salt plain at the bottom of the valley. The lights of the Panamint Springs gas station hovered in front of me for almost three hours. Everything in the desert is farther away than it seems. Eventually I arrived, two hours ahead of schedule and on pace to set a new record for the double.

Over the next 60 miles, however, I gave back most of that margin. First, I opted for a break in the hotel room at Panamint Springs. Before I could close my eyes, I was awake again. Whether it did me any good is hard to say, but it cost an hour.

From Panamint Springs, the road climbs steeply up 4,000 feet to a mountain vista. In developing the plan, I forgot that the road continues to rise another 1,000 feet after that. Surprised by the additional uphill, I gave up another hour to my plan.

The road into Lone Pine is a long 33 miles. The second day dawned, the temperature rose to 115 F, and the wind whipped sand and alkali dust off the dry bed



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▲ Hot, tired stomachs can be finicky. Choices are good.

of Owens Lake and scattered it across the road. This stretch of road, I explained to Chris (as I ate another of his eggs), is widely regarded as the most boring section of the Badwater course. Maybe if I had focused on my pace, instead of complaining about the scenery, I would have regained a little time, but instead I let slip an additional 20 minutes. We were met by photographer Laura Casner, who would follow us up Mount Whitney and back to Badwater.

After running through Lone Pine, I headed up to the Whitney Portal, some 4,000 feet above the valley floor. Badwater runners dread the portal road, as even the fastest athletes are typically reduced to a 3 mph pace. I trudged up at 2.7 mph, losing 24 minutes compared with my plan.

I finally arrived at the Portal around 11:30 P.M., after almost 40 hours of continuous effort. I was about 30 minutes behind schedule at this point, but I made the strategic decision to take a full four-hour rest break. My crew and I were mindful of the imposing altitude of Mount Whitney (at 14,505 feet, the tallest mountain in the continental USA), the 6,000-foot climb we faced, and the risk of altitude sickness. Diane relayed encouragement and advice from Marshall Ulrich, for whom she had crewed in the past and who was following our adventure from afar.

“Don’t kill yourself on the mountain,” he said, “but get up and down as quickly as you can.”

The longer you’re at altitude, his message seemed to indicate, the greater the risk of problems. A decent rest break might help me get to the top quickly. Failure to summit would defeat all my goals.

After a quick dinner, I slipped into a tent. No matter which way I positioned myself on the thin foam sleeping pad, my feet and hips ached. Strange dreams

assailed me. At 3:45 A.M., the wake-up call was sounded. Breakfast was eggs and cheese sticks.

The climb up Mount Whitney was a magical experience, at least at the start. The sun rose as we crossed a series of alpine meadows with sparkling lakes and rushing waterfalls enclosed by towering granite walls. Fragrant wildflowers lined the path in shades of red, blue, and purple. We made steady progress and passed many hikers. I began to run low on energy again. After the hard-boiled eggs and cheese sticks were gone, it was back to the sugary Carb Chews. My energy level fluctuated, and my pace was inconsistent. After some time, we reached a saw-toothed ridge, where gaps in the rock wall revealed stunning vistas across Owens Valley to the east and the Sierra Nevada to the west.

We reached the summit at 10:50 A.M. Most of us had mild headaches from the altitude. Lynne had lagged behind with a touch of nausea. We paused briefly for pictures, and then it was time to descend.

By the time we returned to the Portal, I had lost a lot of time. Never having climbed Whitney before, I had underestimated the steep, rocky path, which was almost as slow on the way down as it was going up. Rather than dwell on this setback, I grabbed a burger and fries from the Portal snack shop and headed down the road, trying to eat and walk. I wasn't sure how my legs would handle 4,000 feet downhill after the 6,000-foot descent from Whitney's summit. Even



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▲ On the way to Whitney's summit. That's me on the left, Dan Khalili on the right.

with the rest break the night before, I was tired, and as the strangely rounded, weathered boulders of the Alabama Hills came into sight, they began to take on the appearance of faces with sinister expressions. I kept my attention focused on the road and began to run slowly.

One of my pacers, Dan Khalili, was now due to head back home. He gave me some parting advice: “Ken, you’re five hours behind plan. But you’ve done the Badwater 135 race in 37 hours, and now you have 39 hours for the return trip, which should be easier. It’s net downhill and you’ll cross Death Valley at night when it’s cooler.” I nodded and waved as Dan and Chris drove off. Then I turned to Lynne.

“When we get back to Panamint Springs, I’m going to stop and look at the plan,” I said. I had programmed a three-hour rest break there, and I would make a decision about taking the full break or, if necessary, cutting back. For now, I would press ahead on the long road out of Lone Pine.

Two new pacers arrived to replace Dan and Chris. Deanna Culbreath and David Staley had struggled with canceled flight connections out of New York but had managed to reroute their travel and arrive just in time for the return trip to Badwater. We walked the long uphill into the Argus Mountains, talking and getting to know each other. As the fourth day dawned, we surveyed an immense plateau dotted with Joshua trees stretching from one end of the horizon to the other. Somewhere below this plain lay the Saline Valley, and in the distance loomed the peaks of the Inyo Mountains. There was no sign of humanity in this vast landscape, and it was impossible to judge distance.

Eventually, we began the 16-mile descent into Panamint Springs. I had been waiting for this point. It was time to get more aggressive. We started running. We could see the road sweeping down in great curves for mile after mile into the depths of Panamint Valley, then crossing the salt plains on the valley floor, and finally heading steeply up the far side of the valley toward Towne Pass.

A few hours later, arriving in Panamint Springs, we trotted up to the crew vehicle for fresh water and food. Lynne strode over to us, concern evident on her face. She hadn’t waited for me to study the plan.

“Ken, you’re still five hours behind plan, so I can’t allow you to sleep for three hours—the most you can have is one.”

“I’m doing OK right now,” I replied. “Let’s skip the break entirely.”

We headed out across the flats. The temperature was 110 F, and the wind was blowing sand across the road. Cars and motorcycles zoomed past. I was hot and tired, and my focus was starting to fade. But then I recalled Dan’s guidance. True, there was a massive uphill in front of us, but it would be the last one. Further, I recalled from the plan that I had budgeted only 2.5 mph for this section. But now it dawned on me that the flat valley floor made up fully half the mileage of this leg. I could get some time back here.



◀ Crew co-chiefs Diane Grecsek (left) and Lynne Hewett (right) managed with precision every logistical need I had during my double crossing.

Now we were heading up the back side of Towne Pass. Out came the trekking poles, and now for the first time, I began to watch the pace on my Suunto Ambit GPS watch—3.5 mph wasn't too hard. If I really pushed, I could get up to a 4.0 mph pace. My pacer David Staley hung steadily on my heels and after 20 miles showed no signs of fatigue. His quiet strength was inspiring.

As we approached the top of the pass, Lynne hopped out of the vehicle, her face glowing with excitement. "You've made up an enormous amount of time; you're only an hour back!"

Now Deanna swapped out with Dave and guided me on the long 17-mile, 5,000-foot downhill back into Stovepipe Wells. She kept me on a steady 5.0 mph pace.

As we passed the campsite where I had collapsed two days ago, I looked out across the Mesquite Dunes, still miles away and 2,000 feet below us. A large cloud of dust had formed on the dunes. It gathered itself into a funnel, reached for the sky, and then drifted away to the north. Then another dust cloud formed.

As we got closer to Stovepipe Wells and the valley floor, Deanna suggested we pick up the pace by 15 to 20 seconds per mile. "Go for it," I said. I was feeling hot again, and my attention was wavering. It was all I could do to follow the white line on the side of the road.

By the time we got to Stovepipe Wells, the temperature was 123 F. Lynne tied an ice bandanna around my neck and handed me a fresh water bottle. I drained it in one long gulp. I stumbled into town, still following Deanna. "Don't stop," I shouted. There were only 44 miles left to the finish. The vehicle drove off two miles farther down the road.

With an hour or two until sunset, the winds were blowing fiercely as I strode past the Mesquite Dunes, trying unsuccessfully to sustain a 4.0 mph pace. The winds would subside when the sun went down, I reasoned. But this did not hap-

pen. The steady rush in my face did not abate. The wind was screaming through the creosote bushes and whistling through the sharp teeth of the desert holly. *No one can run in these conditions*, I thought.

It was dark and Deanna was gone. Laura would pace me now, and she strode off at a brisk walk. But my watch showed we were only moving at 3.5 mph. Laura, too, kept glancing at her watch. Evidently the battery had died. At the next stop, she switched watches, and now she took off at blistering pace straight into the howling wind. I tried to keep up, but now with the sun down, I was struggling to stay alert. The road surface and bushes began to take on strange shapes and colors. Thirty-six hours after waking up at the Portal, I was dreaming on my feet.

I stumbled toward the crew vehicle for a break, but Lynne waved me off, barking at Laura, “He’s got to keep moving at 4.0 mph, Laura. Keep him up tempo, military!” Turning to me, “Ken, I can’t let you back in the vehicle, it’s wasting too much time, too much is at stake.”

I staggered on into the winds. I didn’t know where I was or what time it was. The record no longer seemed feasible. Now Lynne had her arm around my shoulders, shaking her head, “I’m sorry, Ken, the winds are horrible.”

Dave and Deanna were back. They were talking about me, but I couldn’t follow what they were saying. In a daze, I stared down at the white line and tried to keep up with their brisk walk. We reached a gentle downhill, and they asked if we could try a slow trot. I didn’t see how anyone could run into what must have been 30 mph winds, but if they would try, I would, too. Then I watched with astonishment as they accelerated into the wind, seemingly without effort, taking short choppy steps, their form easy and relaxed. They might have been spirits, disguised in human form but not really of this world. Under the accumulated fatigue, my mind had become largely blank, but I experienced an epiphany of sorts: if I would but make the effort, I would keep moving forward. It seemed like the hardest thing I had ever done. But my heart wasn’t racing, and my breathing wasn’t labored. It was a challenge of mind and spirit.

Eventually we reached familiar sights: the road to Ubehebe, the Salt Walter Creek Interpretive Trail, Furnace Creek, and finally the turnoff to Badwater. With 17 miles to go, I perked up. Flashes of lightning lit up the sky above the Badwater Basin, but victory now seemed within my grasp.

With three miles to go, Lynne emerged from the crew vehicle and ran with us, urging me into a sprint. I didn’t think this was a good idea, but I followed her orders, lifted my knees, and swung my arms. We were soon running 8:00-minute miles and then, according to my Suunto log, I put in a final mile at a 7:34 pace with a heart rate of 140 beats per minute. At 5:50 A.M. on July 5, 2014, with the crew cheering and Laura snapping photos, we arrived at the Badwater Basin. The double was complete, and a new record of 94:39 was in the books. The winds finally calmed.

► The last mile.

Lessons learned

Planning

General Dwight Eisenhower once said, “In preparing for battle, I have always found that plans are useless but planning is essential.” Indeed, my plan contained several misjudgments, but even so, it provided a framework to evaluate progress and helped me and the crew make critical decisions, like skipping the rest break at Panamint Springs or setting the 4.0 mph target pace for the final miles.

The plan also created a psychological benefit. By committing the plan to paper and circulating it to the crew in advance, I showed the team the goal was serious. As a result, the team approached the event with excitement, a sense of mission, and belief in the possibility of setting a record.



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Crew-chief leadership

I was fortunate to have two highly experienced chiefs in charge of my crew, Lynne Hewett and Diane Grecsek. Between the two of them, they had participated as crew members on 13 separate Badwater crossings including, in Diane’s case, Marshall Ulrich’s quad crossing in 2001. Both women are accomplished endurance athletes, and Lynne’s racing career includes ultras in the Arctic and the Himalayas.

The most obvious role of the crew chief is logistics. This includes organizing the crew vehicle; resupplying water, ice, drinks, food, and gasoline from the small number of retail establishments along the route; and shuttling crew members to and from hotels for rest breaks. This is no easy task. Diane reports that we consumed 50 bags of ice during the double, or about 12 per day. Thanks to Diane’s and Lynne’s competence, I never experienced a shortage of anything needed during the event.

The crew chief also plays a leadership role for the rest of the team by briefing the pacers, administering to their needs, and rotating them on and off duty.



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▲ Dark chocolate proved unpalatable in the desert heat but served perfectly well to mark the finish line.

Lynne played a decisive role with respect to nutrition and pacing. When I couldn't face the foods I had selected for the run, she exhorted me to try different items until we settled on alternatives. Lynne also took ownership of the plan and calculated the required target pace necessary to achieve the goal.

Without Diane and Lynne in charge, we wouldn't have set a new record.

Working with pacers

The pacers made a critical contribution to the record, especially over the last 45 miles where I was struggling with fatigue and the wind. By maintaining a positive and confident attitude, they motivated me to keep moving forward. At several points during the run, one or the other of the pacers dropped out because of nausea, fatigue, or heat-related problems. But they were careful not to let me see their struggles, and as a result I didn't know until afterward. With their GPS watches, they were able to keep on target pace and provide immediate feedback when I lagged.

Rest breaks

Do rest breaks really help? Sometimes you need a break from the heat, wind, and movement to regroup mentally. But the time adds up. During the 40-hour return trip from the summit of Mount Whitney, I spent almost seven hours stationary, according to my GPS log.¹ Unless you are dealing with a crisis, it's better to keep moving.

Table 1: Badwater Double Plan and Actual Performance

Leg	Mileage	Plan		Actual		Delta	
		MPH	Time	MPH	Time	MPH	Time
Furnace Creek	17	4.5	03:46	5.4	03:10	0.9	- 00:36
Stovepipe Wells	27	3.5	07:42	3.9	06:57	0.4	- 00:34
Towne Pass	16	2.0	08:00	2.1	07:27	0.1	- 00:33
Panamint Springs	14	4.0	03:30	4.4	03:11	0.4	- 00:19
Darwin	16	3.5	04:34	2.4	06:36	-1.1	+ 02:01
Lone Pine	33	4.0	08:15	3.9	08:34	-0.1	+ 00:24
Whitney Portal	12	3.0	04:00	2.7	04:24	-0.3	+ 00:24
Rest	0	-	04:00	-	04:42	NA	+ 00:42
Whitney Summit	11	2.0	05:30	1.7	06:38	-0.3	+ 01:08
Whitney Portal	11	3.0	03:40	2.0	05:29	-0.1	+ 01:49
Lone Pine	12	4.0	03:00	3.5	03:23	-0.5	+ 00:23
Darwin	33	3.5	09:25	3.1	10:34	-0.4	+ 01:08
Panamint Springs	16	3.0	05:20	3.3	04:55	0.3	- 00:25
Rest	0	-	03:00	NA	00:00	NA	- 03:00
Towne Pass	14	2.5	05:36	3.2	04:20	0.7	- 01:16
Stovepipe Wells	16	4.0	04:00	4.3	03:43	0.3	- 00:17
Furnace Creek	27	3.5	07:42	4.0	06:50	0.5	- 00:52
Badwater Basin	17	3.5	04:51	4.5	03:46	1.0	- 01:05
<i>Cumulative</i>	292		95:54		94:39		- 01:15

During the last 40 miles, as the margin to break the record was in doubt, Lynne kept me out of the vehicle. She gave me food and drinks to consume on the move. In hindsight, vehicle breaks probably should have been minimized from the start.

How much sleep is necessary? I completed the run with a total of five hours of rest, of which about four was actual sleep, and none at all during the last 48 hours. On a normal night I try to get seven hours. When I'm moving, however, and my heart is beating faster, I seem to need less sleep than when I'm working in a sedentary office environment. The record for a person going without sleep is 11 days, and no ill effects were reported afterward.² Maybe I could have gotten by with less.

It's true that when you are tired, hallucinations become a problem, as they did during my last night out on the course, but I have learned to keep hallucinations

under control by focusing my gaze on the road. Further, in my experience, the ill effects of sleep deprivation have a lot to do with state of mind, thus the importance of staying close to plan and the entire team maintaining a positive attitude.

Nutrition

Nutrition is a critical aspect of endurance sports, especially for a 292-mile odyssey through extreme conditions.

Traditionally, road runners have opted for carbohydrate fueling, but this doesn't necessarily work well for ultradistance runs. I recently came across Olympic marathoner Don Kardong's account of running the Le Grizz 50-miler in the 1980s (Kardong 1988). His fueling strategy included breakfast cereal, molasses cookies, Pepsi, Snickers bars, and beer—anything “that would speak the language of carbohydrates.” Twenty miles into the race, he began to feel “slightly dizzy, moderately disoriented,” which he attributes to glycogen depletion. This was followed by stomach problems, nausea, vomiting, and finally “drastic personality deterioration.”

He writes, “When blood sugar drops, the ‘personality,’ a supposedly fixed set of human traits and attributes, proves to be about as permanent as Mount St. Helens. Ordinarily reasonable, pleasant folks become nasty, whining, hopeless idiots” (Kardong 1988).

Overindulgence in carbs is a massive problem in our modern sedentary culture. According to the Centers for Disease Control, 12.3 percent of the US population over age 20 is diabetic and 37 percent more are prediabetic, conditions that result largely from excessive consumption of sugar and processed carbs.³ Americans' preference for processed carbs reflects the addictive properties of sugar and gluten as well as an ill-fated decision by the American Heart Association and governmental agencies to advocate low-fat diets on the basis of research that today has been largely discredited.⁴

I became interested in fat-burning as an alternative to carbohydrate fueling after struggling with blood-sugar swings



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► With my mission accomplished, I make a point of sitting down before I fall down.

and nausea during several of my first ultramarathons. I discovered that a small but vocal community of endurance athletes, including multiday race veteran Stu Mittleman, advocate a fat-adapted or “ketogenic” racing strategy and lifestyle (Mittleman and Callan 2000, Tortorich and Lorey 2013).⁵ This made sense to me because I imagined that our ancestors would likely have gone long periods of time without food. Indeed, 19th-century travelers across the American West reported that American Indians “were accustomed to go for long periods without food, and with little apparent inconvenience.” Indeed, they appeared “happy and contented” even after days without food (Manly 1894).

It wasn’t long ago that after 15 miles I would hit the Wall. My legs would turn to rubber and my mood would darken unless I got another shot of sugar. However, with a few years of serious ultrarunning under my belt, today I can more effectively burn fat. In the last year, I’ve completed several training runs of up to 30 miles with zero calories and felt strong and clear headed throughout the run. Friends report similar experiences. When racing, however, I still take carbs, seeking to maximize output by using both energy systems. Also, the supply of fat is not unlimited, and after extremely long distances, reserves get depleted.

My strategy for the Badwater double was to rely on high-fat nutrition, with carbs reserved for higher-effort sections of the course, such as the steep uphill climbs. The goal was to maximize energy consumption and output without triggering an insulin spike, which shuts off fat-burning and can lead to plummeting blood sugar.



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▲ With a great team, anything is possible. From left, Lynne Hewett, Diane Grecsek, me, David Staley, and Deanna Culbreath (team members not pictured: Chris Dooley, Dan Khalili, and Laura Casner).

Table 2 lists the main foods consumed during the double, together with their estimated glycemic load (a measure of the degree to which blood sugar rises within a period of time after eating the food). At the top of the list are the Gatorade Carb Energy Chews, which provide an estimated glycemic load of 27. On two occasions, the chews provided too much sugar, triggering an insulin spike and energy depletion (heading up Towne Pass and on Mount Whitney). None of the other foodstuffs gave me problems during the run. Of note, chia seeds and eggs have glycemic loads of close to zero. They are an excellent alternative to foods high in sugar and carbohydrates.

This selection of items would not be right for everyone, but it may be helpful for other runners to think about the glycemic loads of different fuels. For many people, high-carb diets will not be the best way to move long distances through the desert. Even worse, a heavy intake of sugar and processed carbohydrates poses risk for obesity, heart disease, stroke, dementia, and possibly cancer—even if you run regularly (Perlmutter 2013).

Salt/electrolytes

I didn't take any supplemental salt or electrolytes during the run. Further, the foods I consumed were generally low in sodium. None of my teammates took salt or electrolyte supplements.

While the sports-drink industry markets the importance of electrolytes, Tim Noakes has argued that the body contains enough salt and electrolytes to last for weeks. Further, he points out that in a hot environment, the salt content of sweat and urine drops by 90-plus percent. People see white, crusty sweat on their clothes after running because their bodies are ridding themselves of the excessive salt contained in the typical western diet (Noakes 2012). Ironically, people see the salt crusts and, worrying that they are running low on electrolytes, eat more salt—when they actually may have more than they need.

In this regard, we may not be different from the desert holly bushes (*atriplex hymenelytra*) that line the roads in Death Valley. The plant tolerates a highly saline environment by excreting excess salt through its leaves. But too much salt will kill even this hardy desert plant, which is why it does not grow in the salt plains.

Anecdotally, in their long experience crewing at Badwater, Diane and Lynne associate salt consumption with stomach distress, swelling of the feet, and blisters. I once crewed for a Badwater runner who had measured the salt content of his sweat (in normal conditions) and took salt tablets at a rate that he thought would replace the lost salt (not factoring in that the salt content of his sweat was likely dropping in the hot environment). His feet swelled and he got terrible blisters (fortunately for him, none other than John Vonhof, the foremost authority on foot-care for endurance athletes and the author of *Fixing Your Feet*, was on the course to dress his feet). The runner was so surprised: “I *never* get blisters,” he said.

Table 2. Badwater Double Nutrition

Nutrition type	Serving size	Kcal	% Kcal fat	Carbs (g)	Estimated Glycemic	
					Index	Load
Gatorade Carbo Chew (1)	1 pack	100	0%	24	111	27
Naked Juice Smoothy (2)	1/2 bottle 7.5 fl. oz.	130	0%	31	65	20
Ginger Ale (3)	Cup w/ice 5 fl. oz.	53	0%	13	85	11
Progresso Split Pea Soup (4)	1/2 can	70	NA	12	86	10
Watermelon (5)	1 wedge 240 g.	72	0%	12	72	9
Chia seeds (6)	1 tbsp. in water	60	58%	4	1	0.04
Hard-boiled egg (7)	1 egg	13	62%	0	0	-

- (1) <http://www.fatsecret.com/calories-nutrition/gatorade/energy-chews> and http://www.lowglycemicload.com/glycemic_table.html glycemic index based on beverage
- (2) <http://www.nakedjuice.com/our-products/juice/strawberry-banana> Glycemic index based on average of apple juice, orange juice, strawberries, and banana as per http://www.lowglycemicload.com/glycemic_table.html
- (3) <https://www.formulazone.com/Help.asp?TID=ILUP&IID=014136&food=Soda%2C+ginger+ale&Amount=6&Measure=7%3A0&Lookup=Lookup>
- (4) <http://www.progresso.com/products/soup/traditional-split-pea-with-ham> and http://www.lowglycemicload.com/glycemic_table.html
- (5) <http://www.glycemicindex.com/foodSearch.php> and <http://nutritiondata.self.com/facts/fruits-and-fruit-juices/2072/2>
- (6) <http://www.fatsecret.com/calories-nutrition/spectrum chia-seeds> and <http://blog.thrivefoods.net/2009/07 chia-seeds-top-10-benefits.html>
- (7) <http://lowglycemicload.com/index.cfm?ID=106> and http://www.calorieking.com/foods/calories-in-eggs-whole-hard-boiled_f-ZmlkPTEzMjk.html

Shoes

I covered the entire distance in minimalist shoes manufactured by INOV-8, specifically the roadXtreme 138 model for the first half and the F-lite 192 for the return. Both models are zero drop (no heel) and have little structural rigidity or cushion. A pair of the roadXtremes weighs just under 5 ounces, and the F-lites are just under 7 ounces. After 100 miles, I doubled up the inserts to provide a little additional protection from bumps in the asphalt.

Minimalist shoes have helped me run with what is for me good form, particularly by forcing me to shorten the stride, land on the balls of my feet, splay the

toes, and engage the core muscles. When I run with good form, my entire body acts as the “cushion,” and I need only a tiny amount of additional cushion from my shoes. Conversely, when wearing highly cushioned shoes, I find myself slipping back into heel-strike mode, which sends unpleasant shock waves through my knees, hips, and lower back.

I’ve noticed the growing popularity of a new breed of supercushioned shoes (Hokas and the like) and wonder about unintended consequences. Anecdotally, Diane reports seeing an increase in rolled ankles associated with these shoes.

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Endnotes

- 1 The Suunto Ambit 2-R watch recorded GPS locations every 10 seconds. The seven hours represents the cumulative number of 10-second intervals for which there was no change in location.
- 2 The 11-day record was extensively documented. There are other claims for longer periods, up to 18 days, but the documentation is not as extensive. [http://en.wikipedia.org/wiki/Randy_Gardner_\(record_holder\)](http://en.wikipedia.org/wiki/Randy_Gardner_(record_holder))
- 3 <http://www.cdc.gov/diabetes/pubs/statsreport14/national-diabetes-report-web.pdf>
- 4 <http://www.thedailybeast.com/articles/2014/05/22/the-heart-association-s-junk-science-diet.html>
- 5 <http://eatingacademy.com/my-personal-nutrition-journey> 