
THE CrossFit JOURNAL

Deconstructing Pukie

Hilary Achauer gets to know the clown and examines the physiology behind exercise-induced vomiting.

By Hilary Achauer

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Alicia Anthony Baldwin

Ben Bristow was just being polite.

His girlfriend had brought in some homemade date-chocolate energy balls for him to sample pre-workout. Bristow, a coach at CrossFit 858 in San Diego, Calif., ate a few of them about 25 minutes before the workout that day. The Marine of 12 years was a two-year veteran of CrossFit and thought this would be enough time for digestion before the workout.

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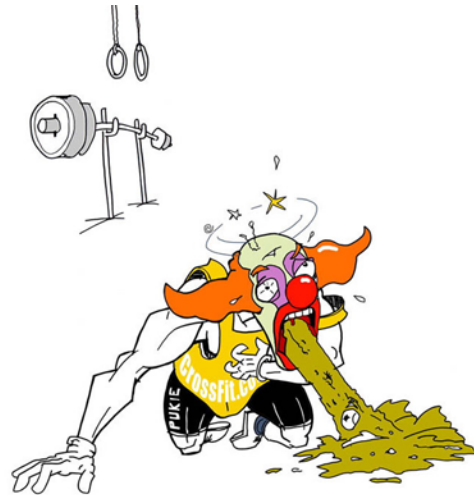
Unfortunately for Bristow, CrossFit 858 was tackling Kalsu: 100 135-lb. thrusters with 5 burpees at the top of each minute until the thrusters are finished.

Bristow regretted eating those date balls almost immediately.

"On the 58th rep, I lost it," he said.

Bristow ran outside and puked in the bushes, then valiantly came in and carried on. He got in 10 more thrusters before he had to run outside again.

The workout was over.



Staff/CrossFit Journal

Bristow regretted eating those date balls almost immediately.

Rite of Passage?

In the almost three years I've been doing CrossFit, I've experienced most of the unpleasant physical rites of passage that come with the sport: ripped hands, scraped shins and even the surprising Ab-Mat ass burn.

However, after doing hundreds of evil and frightening workouts, I've never worked out so hard I vomited.

Some less insane people might say, "That's great! Who wants to throw up?"

I don't exactly want to throw up, but CrossFit's mascot is a barfing clown named Pukie, and I've long harbored the suspicion that I've never thrown up because I don't push myself hard enough.

"Maybe some people are more prone to post-WOD barfing than others," said my always-reasonable husband.

Maybe—but why?

"There is a good deal going on physiologically in the body in response to strenuous exercise," Sarah Kirtland said. She's the fitness manager at San Diego State's Aztec Recreation Center and is earning her master's degree in rehabilitation science.



Paul Woo

A visit from Pukie.

"The primary explanation for vomiting is dilation of the blood vessels to the working skeletal muscles and the concomitant vasoconstriction of vessels leading to the viscera (i.e., stomach, intestines). Therefore, if there is anything in the stomach during this type of exercise, the body is likely to eliminate these contents," she explained.

Maybe eating lunch right before Fran is like asking for a visit from Pukie.

But is questionable timing of meals the only culprit?

**Maybe eating lunch
right before Fran is like asking
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Another cause of vomiting and nausea during exercise is the production of lactate, which can cause the body's pH level to drop rapidly. During exercise, the cells go into high gear in order to give the body energy for the workout. The method through which the body gets more energy is aerobic and anaerobic metabolism. A byproduct of this process is a decrease in blood pH.

"The entire system becomes too acidic, and everything comes up. This is more common in fit individuals," said Jacob Lawler-Schwartz, a graduate student finishing his master's degree in kinesiology at San Diego State's School of Exercise and Nutritional Sciences.

He says he believes a person's physiological makeup is the biggest factor in whether he or she will vomit during intense exercise.

"Everyone's physiology is different," Lawler-Schwartz said. "But when someone vomits during or after exercise, there are a few mechanisms at work. It's a case of exercise-induced nausea, associated with a training state. It's a shock reaction."



Alicia Anthony Baldwin

One of these people just ate a triple cheeseburger and is now regretting the decision.



Staff/CrossFit Journal

Jenn Jones placed in the top 30 at the CrossFit Games without vomiting once.

Kirtland agrees that the propensity for exercise-induced nausea and vomiting has a genetic component.

"Everyone has a different resting heart rate, a different max heart rate and various levels of hormones," she said. "You're not going to get the same response. Everyone has a different physiological capability. Some people's bodies are effective at that near-lactate threshold, and they are good at maintaining stability—whether that is pH levels or blood flow."

Despite these theories, nobody is quite sure exactly what causes exercise-induced vomiting. Part of this is due to the challenges of the human model. Everyone's physiology is different, and it's difficult to tease out the myriad factors that cause nausea and vomiting during exercise.

"We can use animal models to infer, but at most we have anecdotal evidence. There is no definitive answer," Kirtland said.

Everyone can agree that vomiting happens when there's a constriction in places that don't need the immediate oxygen and blood flow demanded by muscles working intensely, but scientists are not sure why some people are more prone to reaching this state than others.

The Smoking Gun

"I'd throw up once or twice a week," Jeff Sing said. "Box jumps always made me throw up."

Sing, an athlete at CrossFit 858, has been doing CrossFit for about six months. Prior to starting, the 29-year-old was obese and out of shape. He ran half marathons and worked out regularly at a Globo Gym but still had trouble losing weight.

Sing spends his day working in a cubicle as an engineer, and he was sick of being out of shape and feeling terrible. Desperate for a change, he started working out at CrossFit 858.

"It killed me. And I loved it," Sing said.

However, after three months of CrossFit, he found he would throw up frequently, especially in an intense conditioning workout.

"If I didn't throw up, I'd dry heave and cough," Sing said.

He had cleaned up his eating, but there was one unhealthy habit he hadn't changed: Sing was a smoker. He had smoked for 10 years, starting in college. He smoked about a pack every two days. After struggling with a nasty cough and a feeling that he had water in his lungs, Sing made a decision to stop smoking.

"I didn't want to smoke anymore," he said. "I quit, and it sucked. I was miserable."

Sing stuck with his resolution, and now, after three months of not smoking, he doesn't cough anymore. Even better? "I haven't puked in two to three months," Sing said.

"I did Fran last week and I managed to do it RX in less than 10 minutes," he said, proudly. "I felt dizzy, but that was about it."

Lawler-Schwartz says he thinks Sing's smoking-related barfing might have something to do with the amount of carbon dioxide produced versus the oxygen consumed.

"The buildup of tar in the lungs blocks the receptors from taking in oxygen," he said.

Carbon dioxide builds up in the blood, and this oxygen debt could alter the pH in blood, leading to nausea and vomiting, Lawler-Schwartz said.

The lack of vomiting isn't the only good news in Sing's life. After six months of CrossFit and clean eating, Sing has lost 35 lb. A recent doctor's appointment revealed he was no longer obese and his cholesterol was within normal levels.



Miranda Oldroyd knows how to push herself, and she often pays the price.

Elite Vomiting

It makes sense that smoking would affect performance and produce unpleasant side effects, but what about high-level CrossFit athletes who frequently push themselves to the edges of their abilities? Do all of them get to the point where they vomit?

Former gymnast Jenn Jones competed in her first CrossFit Games in 2012 and placed 28th. This 28-year-old full-time nurse knows how to push herself and has competed at the highest level of the sport, yet she's never vomited during or after a CrossFit workout.

"At certain points I've felt nauseated, but I've never thrown up," she said. "I always try to manage what I have in my system. I don't eat for at least an hour and a half before I go to the gym."

In competitions, Jones said she grazes and is careful to never push herself beyond the "red line."

"I try to be very aware of where that line is, where I can't do any more," she explained. "I think for some people, the panic mode will trigger nausea. I try to never get panicked because then I can't perform. I take a deep breath and keep moving."

Jones said she didn't see Games athletes losing their lunch right and left at the Games, and that's the pinnacle of the sport. If there's a time to puke during a workout, it would be with \$250,000 on the line and the world watching. Most of the puking Jones sees is from people who are new to CrossFit, who either make the mistake of eating right before a workout or whose bodies just aren't used to that type of exertion.

Do elite CrossFit athletes get to the point where they vomit?

Kirtland said she feels a likely cause of vomiting during intense exercise is lack of preparation.

"If you have an improper warm-up and don't gradually build up to the exercise, your body will have a violent response," she said. "Some people require a longer warm-up."



The theory that high-level CrossFit athletes don't vomit doesn't explain one of the more famous pukes in CrossFit: [Miranda Oldroyd's post-Fran barf](#) from Sept. 9, 2010. Pat Barber, a multi-year Games competitor, has also talked about puking "after each workout" when he first started CrossFit ([Don't Call It a Comeback](#)).

Oldroyd, who has been doing CrossFit for five years, is a member of the Level 1 Seminar Staff. She is also part of the on-camera talent for the CrossFit Games. Even back in 2010, she was extremely fit and experienced, but as she said at the end of the video, "I think I've only ever done Fran one time without puking."

Oldroyd said she used to vomit more frequently when she started CrossFit.

"These days (I don't puke) as frequently," she said recently. "When we first started, I puked at least once a month. Nowadays it is rare and usually only happens in competition. Every once in a while I will (vomit) in a regular workout, but not too often."

For Oldroyd, it was a process of figuring out what to eat—and when.

"I absolutely have to be very careful about when I eat," she said. "I think my figuring this out has helped in the puking becoming less frequent. I also have to worry about what type of food I eat pre-workout. For the most part, it needs to be easily digestible and (I need) a minimum of one hour before I go hard in a workout. Sometimes this fails and I will still throw up even if it has been hours since I have eaten."

Oldroyd said she feels there are many factors that contribute to her exercise-induced vomiting, and her propensity for puking has decreased as she's increased her level of fitness and learned how to control the circumstances that lead to her vomiting.

If she does make it to the CrossFit Games this year, it's likely she'll be looking for a place to discretely lose her lunch.

"I have noticed a major correlation of vomiting when the stakes are raised," she said. "I have never gotten through an entire competition without puking at least once. I think the reason I puke when it's Fran is a combination of the level of intensity and the nerves that go along with it."



No matter how carefully she manages her warm-up and pre-workout nutrition, Oldroyd has a tendency to vomit when the stakes are high.

Oldroyd said she thinks the biggest factor contributing to her puking is not her level of fitness or how hard she pushes herself but rather her genetics.

"I think I may have the genetic profile to puke," Oldroyd said, "as most of my siblings who have tried CrossFit have puked on their first WOD. I remember my first time ever puking due to physical exertion was when I was 11 years old at a race in elementary school. This trend continued in high-school track and even a few times from bodybuilding-type workouts."

How Many Blocks in Vomit?

For those who think vomiting after a CrossFit workout is a sign you're hardcore, keep in mind that ejecting all those nutrients is not going to make you any stronger.

"If your goal is to build strength, throwing up goes against (that goal)," Lawler-Schwartz said. "The nutrients you ingested prior to the workout won't go to repair and rebuilding."

If you're frequently vomiting from exercise, you will have trouble making performance gains, Kirtland said.

**Things just get weird,
and sometimes you have to
pay the clown.**

"It's a beautiful balancing act," she added.

On the one hand you want to push intensity, and sometimes you trip hard on the red line. That's part of pushing your limits and competing. On the other hand, you need food for fuel and liquid for hydration, so regular vomiting can derail your nutrition and might indicate you need to make some changes to lifestyle or diet. Smoking would appear to be a bad idea if you want to avoid puking, but few CrossFitters light up for other obvious reasons. Experimenting with food and time of intake might also result in a few less trips to the bucket marked "not for chalk."



Staff/CrossFit Journal

The clown pays a visit.



This one will freeze near the entrance to the gym and serve notice to all who pass through the door: it's go time.

But sometimes people vomit during and after workouts. It just happens. Scientists don't totally understand why. Things just get weird, and sometimes you have to pay the clown.

That, of course, will often result in a video being filmed as you retch, and maybe even a special T-shirt from the gym.

It also brings up important nutrition questions for conscientious CrossFitters.

As Oldroyd said after her famous on-camera puke: "Do I have to re-eat all those blocks?"



About the Author

*Hilary Achauer is an award-winning freelance writer and editor specializing in health and wellness content. In addition to writing articles, online content, blogs and newsletters, Hilary is an editor and writer for the **CrossFit Journal** and contributes to the CrossFit Games site. An amateur boxer-turned-CrossFit athlete, Hilary lives in San Diego with her husband and two small children and trains at CrossFit Pacific Beach. To contact her, visit hilaryachauer.com.*