Photo by SSgt Sam Bendet

Dangerous diets

The dangers of low carbohydrate diets for fighter crews

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Americans spend $40 billion annually on weight-loss programs and devices, special diet foods, diet books, and other related "get skinny" programs. As many of us have experienced, some of the myriad of weight loss plans actually are effective; however, in the long run, most are not. Even for those plans that do result in weight loss, many of them cannot be sustained for long periods without medical contraindications or without negatively affecting performance. "Extreme diets" are included in this last group. The focus of this article is on low-carbohydrate (low-carb) diets, a popular but possibly dangerous type of extreme diet that may help you lose weight, but one that may impair your cognitive and physical performance and lower your ability to fly your aircraft, particularly high-G weapons systems.

As many can attest, low-carb (a.k.a. "high protein") diets can promote rapid weight loss; however, much of the weight loss is water, often leading to dehydration. If you think this is not a big deal, think again. Centrifuge studies have demonstrated that as little as 3 percent dehydration can reduce sustained acceleration or G tolerance up to 50 percent. Additionally, the severe restriction of carbohydrates can easily result in depletion of muscle glycogen stores and lowering of blood glucose levels. The combination of muscle glycogen depletion, low blood glucose, and dehydration has been demonstrated in numerous scientific studies to impair both cognitive and physical performance, including dramatic decrements in muscular strength and power.

In training or in combat, impaired cognitive and physical performance can result in a degraded or failed mission outcome — or worse. For example, in F-22 Raptor, F-16 Viper, F-15 Eagle, and other high-performance flight crews, muscle glycogen depletion and dehydration can impair muscular strength and adversely affect performance of the anti-G straining maneuver. A degraded anti-G strain reduces tolerance to peak and/or sustained G and can effectually take a crew member out of the fight. Although not pleasant to discuss or even think about, low-carb diets also can result in impaired bowel function, and we all know what a serious performance detractor that can be. The following flight scenario illustrates some of these concerns.

Eagle 1 and Eagle 2 briefed their early morning, two-ship offensive Basic Fighter Maneuver (BFM) sortie. Both were experienced flight leads, current and qualified in BFM. During the past year, Eagle 1 had gained a few pounds; the same gradual weight creep experienced by all too many Americans who eat or drink a little more than they need and don't exercise enough. He decided to get back into fighting shape and started a popular low-carb diet 10 days prior to the BFM sortie. Just this morning he weighed himself and noticed he had lost 8 pounds. He skipped breakfast because he was "getting skinny" and feeling "ops normal."


Courtesy Photo

Eagle 2 also had gained a little weight over the past year. Several weeks earlier, he decided to cut back a little on the sweets and began exercising more (i.e., aerobics and weight training). He ate the standard three meals per day and even enjoyed an occasional dessert. Even after eating a light breakfast, he noticed he had lost a little over 2 pounds in the past 3 weeks and felt good the morning of the BFM sortie.

The two-ship launched at 7:10 a.m., arrived at the designated airspace and began their first engagement as briefed with Eagle 2 in the offensive role. On the second engagement, Eagle 1 grayed out during his first defensive, 8G break turn, and then backed off to 6Gs to get his full vision back. Eagle 2 recognized this BFM error and quickly scored a guns track and kill. A third engagement ended in similar manner. Eagle 1 correctly recognized he was behind the jet and that his G tolerance was substandard. He decided it was time to "knock-it-off," come back and try it another day; a smart decision since pressing the fight could have been disastrous. During the postflight briefing, Eagle 1 admitted that he missed breakfast and that he wasn't feeling too well. Let's review and determine some "lessons learned."

What caused Eagle 1's poor performance? Consider the following: Ten days on the low-carb diet likely lowered his muscle energy stores and caused Eagle 1 to become dehydrated. An extended time on the low-carb diet, coupled with missing breakfast, possibly impaired his cognitive function and contributed to his inability to keep up with the jet. His already low muscle energy stores probably were even further depleted, hampering his ability to sustain a good G-strain, especially during his second and third engagements. All things considered, the outcome could have been much worse for Eagle 1. Bottom line: While his low-carb diet may have made Eagle 1 initially feel like he could fly BFM that day, it caused or certainly contributed to the impairment of his ability to fly, fight, and win. Regardless of the type of diet he was on, missing breakfast didn't do him any favors, either. In fact, even if you are not dieting, stepping to the jet without a preflight meal or healthy snack is asking for trouble.

Photo by TSgt Ben Bloker

Stepping to the jet without a preflight meal or healthy snack is asking for trouble

What about Eagle 2? He was the same age as Eagle 1. They both participated on the squadron sports teams and both had recently started a weight-loss program. Despite these similarities, there were differences. Eagle 2's weight loss was more gradual and, therefore, less likely to result in dehydration and depleted muscle energy stores. He had continued regular participation in aerobic fitness activities and a resistance training program, which both probably helped him to pull high G without fatiguing. Because he had three meals per day, his blood glucose levels were normal, enabling him to cognitively "keep up with the jet." Bottom line: Eagle 2 was more "nutritionally fit" and prepared to fly, fight, and win.

Admittedly, no one has studied the effects of extreme diets on G tolerance. However, based on proven physiological principles associated with extreme diets, the scenario described here is realistic. Here are some good nutrition guidelines to help you make good nutritional choices.

- Eat a balanced diet that includes carbohydrates, fats, and protein food; try to get some of each at every meal.
- If you want to cut back a little on carbohydrates, cut back on those that have little or no nutritive value: soft drinks, candy, chips and other high-sugar or high-calorie snack foods.
- A little more protein is not necessarily bad, but avoid extremes. If you need to lose weight, employ a smart weight loss strategy that includes cutting back in total calories — not just restricting carbohydrates or fats.
- You should include exercise as part of any weight-loss plan and keep a diet/exercise log to make you aware of how much and how often you eat and exercise.
- Don't skip meals and plan ahead. Try to make healthier choices of what you do eat and, if you need to, bring your lunch. Don't leave meals to chance!


Photo by TSgt Ben Bloker

- If step to postbrief exceeds 4 hours, take food and water with you on the flight.

Remember, you don't have to be extreme to be effective. Eat smart, fly safe, fight effectively!