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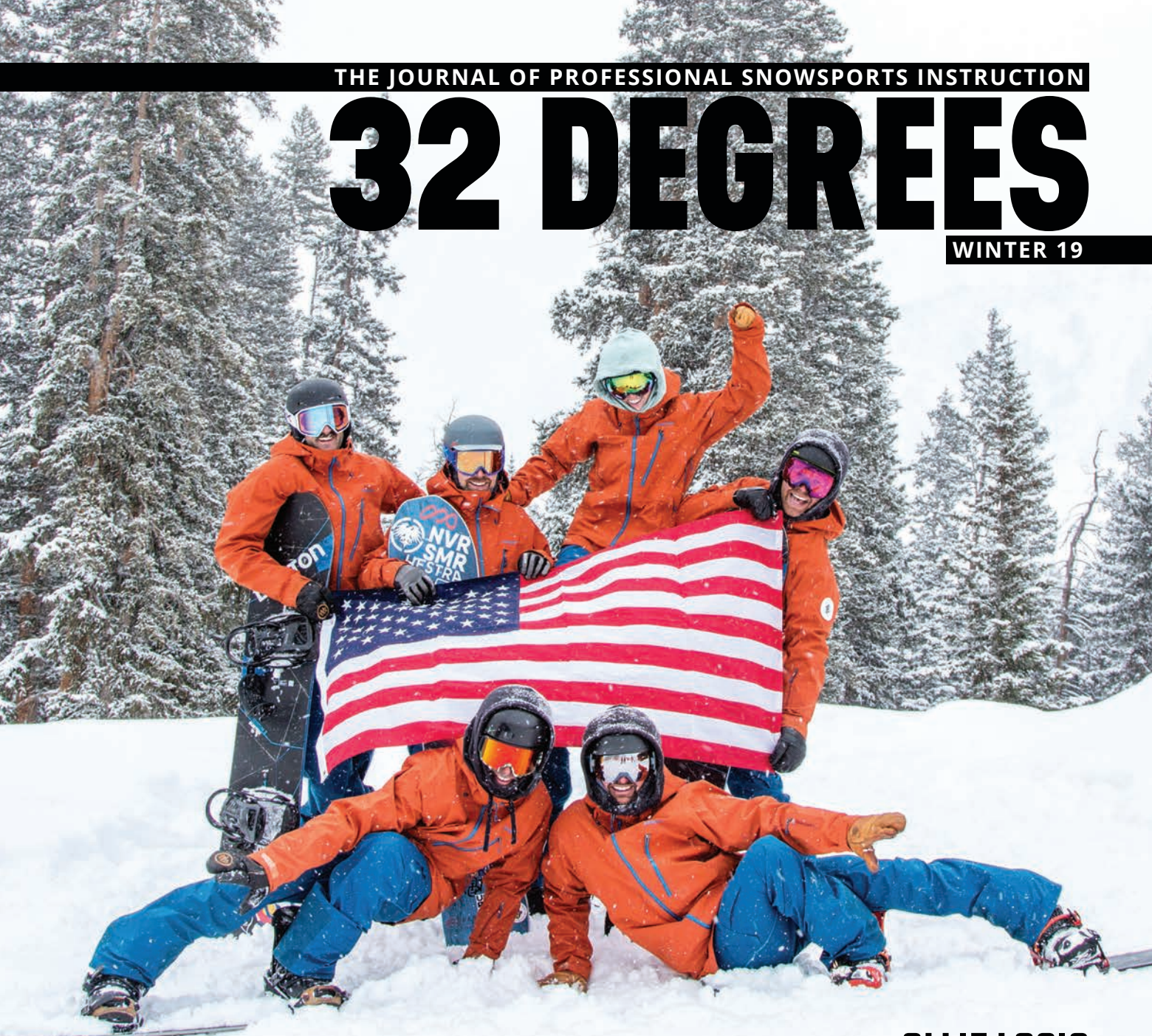
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Are you eating right for a great season on snow?

NUTRITION FOR INSTRUCTORS: A KEY TO FEWER INJURIES AND MORE FUN

By Dr. Delia Roberts

Have you ever wished you could maintain your energy level throughout a full day of teaching? Found it difficult to stay patient with a class that won't listen? Had one of those momentary lapses in concentration that resulted in a hard

crash? If you've answered yes to any of these questions, or just have an interest in health and nutrition, read on. In this article, you'll learn the how, what, and when of eating and drinking to improve your mood, ability to respond quickly and accurately to an unexpected event, and reduce fatigue levels over the season.

Our story begins with a research study to

look at the stresses experienced by ski and snowboard instructors in western Canada and continues with how the program has grown to help snowsports instructors across the U.S. avoid injuries and increase their on-snow performance. I'd begun my career as a sports scientist, supporting Olympic athletes to maximize their training responses and competition performances.

But as an avid skier myself, I saw people working on snow as instructors, patrollers, and mountain guides as occupational athletes. After all, your daily physical and mental effort demands a high level of performance! And even a simple injury can lead to serious consequences to your livelihood. Between 2009 and 2013, injuries to ski instructors in British Columbia accounted for 55 percent of all accident claims on ski hills. It was clear that existing safety programs were not as effective as they need to be, and with the cost to the industry and the individual so high, it was time to look for another approach.

A CLOSER LOOK AT STRESSES

As a research scientist, I know the first step is to define the problem. Hence, we began by spending a season evaluating the stresses experienced by ski and snowboard instructors while teaching at five ski resorts in Western Canada. We recorded workloads and movement strategies, as well as diet, hydration level, markers of metabolic output, and cognitive measures.

One area that was quickly identified to be of concern was the diet consumed by the majority of snowsport instructors. In general, instructors were dehydrated, consumed far too much salt, sugar, and unhealthy fats, and they weren't getting enough of many essential vitamins and minerals. In addition, most instructors were experiencing wide fluctuations in their blood sugar during the day. This finding is of concern for a number of reasons. Firstly, it is unhealthy because it can lead to insulin resistance and type 2 diabetes. Secondly, of more immediate concern is the effect of fluctuating blood sugar has on the nervous system. When large swings occur back and forth between low and high blood sugar, the nervous system is impaired.

HOW BLOOD SUGAR LEVELS IMPACT PERFORMANCE

My previous research and the work of others had shown that blood sugar levels affect reaction time, decision-making and mood, all of which are critical when skiing and teaching. To determine if this was a factor in instructor injuries, we took blood samples and reaction time measurements every two hours to determine the impact of high or low blood glucose levels on the nervous system. Every aspect of physical and mental performance was better when blood glucose levels were stable; participants reacted faster to an unexpected visual stimulus, made quicker and more accurate decisions, and experienced less fatigue and more positive moods when fed food and drink that prevented the highs and lows in blood sugar. Furthermore, the ability to assess risk may also be more accurate when blood sugar is less variable. The difference amounts to approximately 15 percent better accuracy and about half a second in reaction time (Roberts, D. "Chapter 23. The Occupational Athlete; Integrated Injury Prevention, Health and Wellness for Truck Drivers." In: *Implementing Physical Activity Strategies*. National Physical Activity



COURTESY OF DELIA ROBERTS

An instructor at Whitewater Ski Resort in Canada attaches a device which records heart rate and movement every five seconds. The device is called a triaxial accelerometer - essentially a very fancy Fitbit.

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WHY YOU SHOULD MAXIMIZE YOUR NUTRITION ON THE SLOPES

- ▶ Eating a diet that stabilizes blood sugar improves reaction time, decision-making, and mood in snowsport instructors.
- ▶ 70 percent of injuries can be attributed to fluctuations in blood sugar slowing reflexes, lowering vigilance and impairing risk assessment.
- ▶ High intensity, powerful, strong movements use carbohydrates as fuels.
- ▶ Consuming simple sugars, such as soft drinks, granola bars, sweetened yogurt, sweet baked goods, rice, or potatoes at rest will result in high levels of insulin, and a drop in blood sugar.
- ▶ Combining whole grain carbohydrates, such as unsweetened whole grain breads and cereals and whole fruits and vegetables with a little protein and fat provides the right amount of energy to be released at the right time for best physical and mental performance
- ▶ If the fat content exceeds 30 percent of calories provided in the meal, it will delay digestion for too long to meet energy needs while skiing.

CHECK OUT THESE RESOURCES FOR MORE INFO:

- ▶ [facebook.com/FitForSnow](https://www.facebook.com/FitForSnow)
- ▶ selkirk.ca/fitforsnow
- ▶ nrcresearchpress.com/doi/pdf/10.1139/apnm-2016-0366

Plan, Human Kinetics, Inc., Champaign, IL, pp 193-201, 2014). This might seem like a small change, but it makes a huge difference to performance while skiing, as well as in reducing the incidence of injury. Imagine how long half a second is when descending quickly through the trees or bumps! In fact, educating instructors on how to manage their blood sugar levels during the day consistently lowers injury rates by approximately 40 percent and data from 13 resorts in Colorado indicates that 70 percent of injuries occur more than three hours from the last snack or meal.

HOW YOUR BODY USES SUGAR AND WHY YOU SHOULD CARE

To get the most out of your season it's important to understand how sugar is used in the body to generate energy, how we modulate the level of sugar in the blood and what the difference between carbs and sugar are in this context.

Sugars are the simplest form of carbohydrates (carbs for short). They don't contain any vitamins or minerals, but do make a great source of energy. Dietary sugars that are consumed in food and drink are in a form that is ready to be absorbed, so they move from the digestive tract into the blood very quickly. Once taken up into cells, these little molecules can be burned right away, releasing a short, powerful burst of energy. It's the speed with which the molecule can be broken down and energy generated that is critical for performance, and this explains why if we want to do something quickly, powerfully

or strongly we have to burn sugar. While fats contain much more energy in total, they are complex molecules, very slow to digest (3-4 hours) and much slower to burn than carbs. Studies have shown that novice skiers rely much more on sugar as a fuel than more advanced skiers skiing the same run. But even an expert will rely on carbs to drive their skis or board into a turn, hold an edge at speed, or turn quickly. Another aspect of downhill skiing that makes carbs essential is its intermittent nature. It takes time to stoke up the fat burning system, and this long-lasting fuel works best when the effort is continuous and constant at a more moderate rate of exertion. Each time we stop to regroup or ride the chair, our energy generating systems have to ramp back up and carbs become the fuel of choice.

Of course, we also need to consider that consuming sugars has other important drawbacks. Since they are absorbed so quickly they can cause a rapid upswing in blood sugar level. During exercise, this doesn't happen because the muscle can take glucose up in the absence of insulin, especially in people who are fit. Working muscle will actually suppress the release of insulin so that it can hog dietary sugar for fuel. However, excess blood sugar is an entirely different case when it's not needed as fuel right away. When sugars are consumed by a person who is at rest, blood levels rise quickly and insulin is released. This hormone moves sugar from blood into cells where it is converted to fat and stored as such. Once this happens, it cannot be turned back into carbs and we have a

number of problems. Constant high levels of insulin cause the cells to stop responding to the hormone and insulin resistance or type 2 diabetes can ensue. In addition, the excess fat that collects over time can lead to obesity, high blood pressure, and increased risk of stroke or heart attack.

Most people are also familiar with the drop in energy that can occur about two hours after eating sugars. This happens because the release of insulin depends on how fast the sugars are dumped into the bloodstream. Consuming sugary drinks makes this happen especially quickly, so more insulin is produced than is needed, and there is an overshoot lowering of blood sugar below fasting levels. When this happens we experience symptoms of fatigue and poor mood including anger, frustration, and even shakiness and confusion. An example of where this might be problematic is when breakfast consists of sugar-laden juice, sweetened cold cereals, sweet muffins, maple syrup or flavored yogurt at 7:00 a.m. When you get on your skis at 9 a.m., your blood sugar will be at its lowest level, substantially raising your risk of injury. You feel tired, so grab a sugar laden granola bar at 10 a.m. and end up standing around for 30 minutes during line up. Once again, the sugar flooding your blood simulates insulin release and you feel irritated and grumpy during morning class. It's easy to see how this kind of cycle can contribute to poor performance on snow and in teaching.


HOW TO EAT TO FEEL YOUR BEST AND PERFORM BETTER

It's simple to remedy this situation, though it does require a little bit of planning and self-discipline. Your efforts will be well rewarded with improved energy level, lower injury rates and a better outlook on work and life in general. Start by reducing the amount of sugar in your diet; reaching instead for complex carbs that are less processed, higher in fiber, and slower to digest (the sugars are gradually released from the complex structure). Have slices of orange or other whole fruits with breakfast to capture all the goodness of the vitamins and minerals. And because you have to digest the fiber of the whole fruit, the sugars will be released slowly over the next hour or so, rather than all at once, which is what happens even with unsweetened "natural" juice. Choose whole grain toast over white bread, with a smear of peanut butter and banana or apple slices instead of jam, reach for plain Greek yogurt or cottage cheese with chopped fruit instead of high sugar flavored



Author Dr. Delia Roberts checks the blood glucose level of an instructor participating in the study.

less than 30 percent of calories from fat (for digestibility) and at least one gram of fiber for every 5 grams of sugar. Half a sandwich, wrap or bagel also makes a great snack, combining a whole grain outside with a little lean protein inside, and a few veggies for crunch and moisture to provide a full assortment of vitamins, minerals and the right ratio of carbs:protein:fats for energy and digestibility (30-40 percent carbs:30-60 percent protein: 12-30 percent fats).

Try switching out your high sugar, high fat breakfast and lunch for more frequent, smaller servings of food that will provide you with exactly the right energy at the right time and you'll not only find yourself performing at your best all season long, you'll enjoy it more as well. 

Delia Roberts holds a doctorate of exercise physiology and a fellowship with the American College of Sports Medicine. She has worked with many of Canada's Olympic medalists and is the author of the *Fit for Snow* injury prevention and performance enhancement program for snowsports instructors. Dr. Roberts also conducts research and designs programs for other occupations. **Email:** fit.for.snow@gmail.com

products. Adding either a little fat, some fiber, or protein will slow down digestion and the rate of uptake of the sugars in the food.

Plan on smaller more frequent meals, consuming half your normal breakfast when you get up, and half 2-3 hours later. Do the

same with lunch and encourage your guests to follow suit. They'll have a much better experience if they stabilize their blood sugar too! Carry snacks like a few nuts mixed with high fiber cold cereal and a little dried fruit, or power muffins or bars with



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