PRACTICAL CONSIDERATIONS OF IMPLEMENTING SPORTS NUTRITION SCIENCE

GATORADE SPORTS SCIENCE INSTITUTE

OVERVIEW

- Using science-based recommendations
- Paper to Podium Matrix
- Communicating sports nutrition science

SCIENCE-BASED RECOMMENDATIONS

Research on the impact of nutrition on athletic performance has grown to the point of offering solid, evidence-based recommendations, particularly for macronutrient intake and hydration.

BUT these recommendations are just that – recommendations, providing a starting point for your work with athletes.

Implementing sports nutrition science is also an art. You must listen to your athlete, understand their personal beliefs related to nutrition, pay attention to how they are feeling and responding to particular foods, understand their rituals, know their likes and dislikes, monitor their changes in performance and injury, etc.

Reminder: Examples of Recommendations from the Scientific Literature

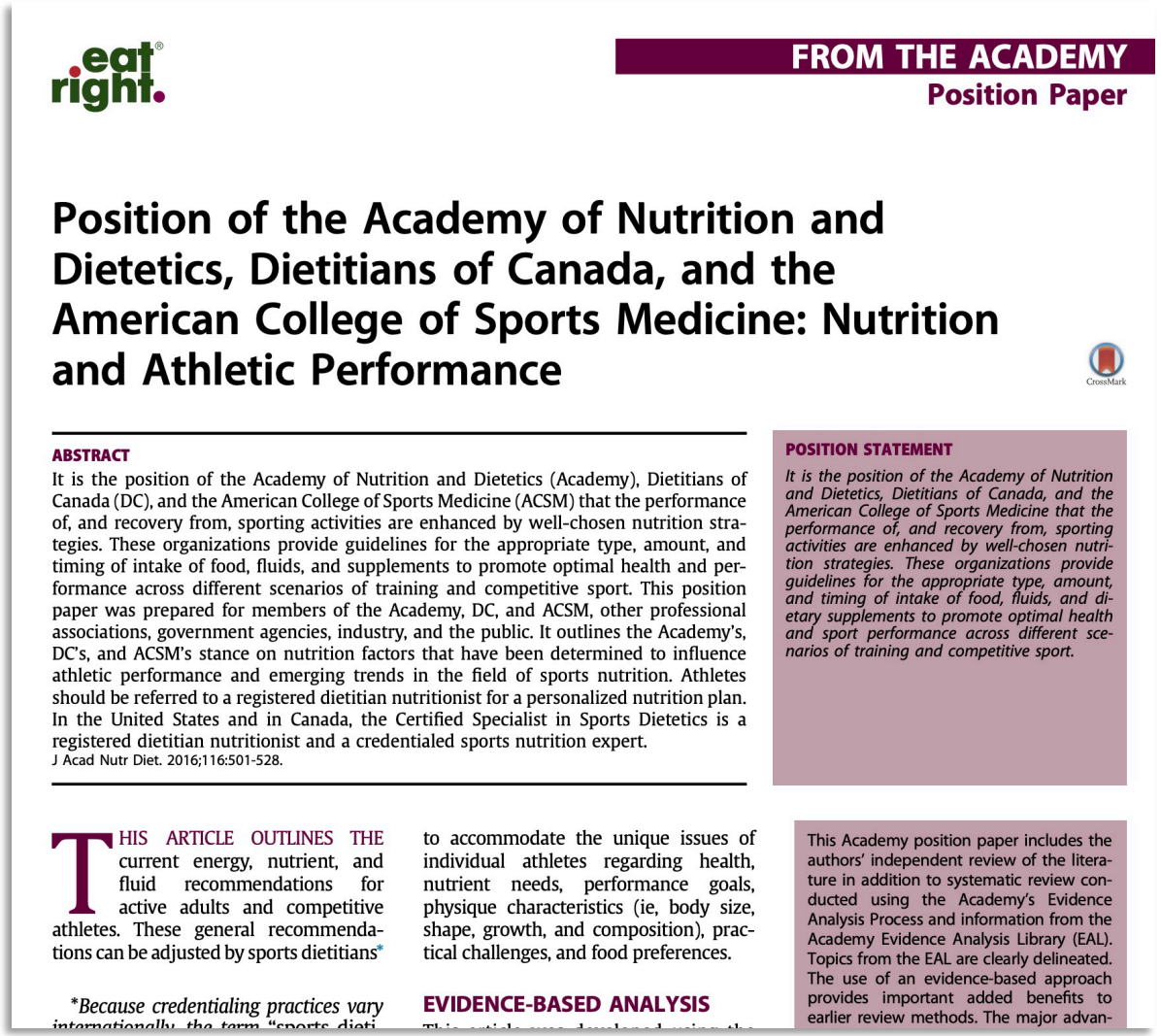
30-60 g/h carbohydrate

0.25-0.3 g/kg protein post-exercise

Hydrate to maintain body weight losses of less than 2%

SCIENCE-BASED RECOMMENDATIONS

Professional groups, in this case the Academy of Nutrition and Dietetics, Dietitians of Canada, and American College of Sports Medicine, publish reviews with a summary of the literature, and grade evidence for use by their practitioner membership.



eat right.

FROM THE ACADEMY
Position Paper

Position of the Academy of Nutrition and Dietetics, Dietitians of Canada, and the American College of Sports Medicine: Nutrition and Athletic Performance

ABSTRACT

It is the position of the Academy of Nutrition and Dietetics (Academy), Dietitians of Canada (DC), and the American College of Sports Medicine (ACSM) that the performance of, and recovery from, sporting activities are enhanced by well-chosen nutrition strategies. These organizations provide guidelines for the appropriate type, amount, and timing of intake of food, fluids, and supplements to promote optimal health and performance across different scenarios of training and competitive sport. This position paper was prepared for members of the Academy, DC, and ACSM, other professional associations, government agencies, industry, and the public. It outlines the Academy's, DC's, and ACSM's stance on nutrition factors that have been determined to influence athletic performance and emerging trends in the field of sports nutrition. Athletes should be referred to a registered dietitian nutritionist for a personalized nutrition plan. In the United States and in Canada, the Certified Specialist in Sports Dietetics is a registered dietitian nutritionist and a credentialed sports nutrition expert.

J Acad Nutr Diet. 2016;116:501-528.

POSITION STATEMENT

It is the position of the Academy of Nutrition and Dietetics, Dietitians of Canada, and the American College of Sports Medicine that the performance of, and recovery from, sporting activities are enhanced by well-chosen nutrition strategies. These organizations provide guidelines for the appropriate type, amount, and timing of intake of food, fluids, and dietary supplements to promote optimal health and sport performance across different scenarios of training and competitive sport.

THIS ARTICLE OUTLINES THE current energy, nutrient, and fluid recommendations for active adults and competitive athletes. These general recommendations can be adjusted by sports dietitians*

*Because credentialing practices vary internationally, the term "sports dieti-

to accommodate the unique issues of individual athletes regarding health, nutrient needs, performance goals, physique characteristics (ie, body size, shape, growth, and composition), practical challenges, and food preferences.

EVIDENCE-BASED ANALYSIS

This Academy position paper includes the authors' independent review of the literature in addition to systematic review conducted using the Academy's Evidence Analysis Process and information from the Academy Evidence Analysis Library (EAL). Topics from the EAL are clearly delineated. The use of an evidence-based approach provides important added benefits to earlier review methods. The major advan-

SCIENCE-BASED RECOMMENDATIONS

Example from the Academy of Nutrition and Dietetics Evidence Analysis Library related to sports nutrition

Evidence Analysis Library question	Conclusion and evidence grade
Energy balance and body composition	
#1: In adult athletes, what effect does negative energy balance have on exercise performance?	In three out of six studies of male and female athletes, negative energy balance (losses of 0.02% to 5.8% body mass; over five 30-day periods) was not associated with decreased performance. In the remaining three studies where decrements in both anaerobic and aerobic performance were observed, slow rates of weight loss (0.7% reduction body mass) were more beneficial to performance compared to fast (1.4% reduction body mass) and one study showed that self-selected energy restriction resulted in decreased hormone levels. **Grade II - Fair**
#2: In adult athletes, what is the time, energy, and macronutrient requirement to gain lean body mass?	Over periods of 4-12 weeks, increasing protein intake during hypocaloric conditions maintains lean body mass in male and female resistance-trained athletes. When adequate energy is provided or weight loss is gradual, an increase in lean body mass may be observed **Grade III - limited**
Recovery	
#3: In adult athletes, what is the effect of consuming carbohydrate on carbohydrate and protein-specific metabolic responses and/or exercise performance during recovery?	Based on the limited evidence available, there were no clear effects of carbohydrate supplementation during and after endurance exercise on carbohydrate and protein-specific metabolic responses during recovery. **Grade III - Limited**
#4: What is the effect of consuming carbohydrate on exercise performance during recovery?	Based on the limited evidence available, there were no clear effects of carbohydrate supplementation during and after endurance exercise on endurance performance in adult athletes during recovery. **Grade III - Limited**
#5: In adult athletes, what is the effect of consuming carbohydrate and protein together on carbohydrate- and protein-specific metabolic responses during recovery?	• Compared to ingestion of carbohydrate alone, coingestion of carbohydrate plus protein together during the recovery period resulted in no difference in the rate of muscle glycogen synthesis. • Coingestion of protein with carbohydrate during the recovery period resulted in improved net protein balance postexercise. • The effect of coingestion of protein with carbohydrate on creatine kinase levels is inconclusive and shows no impact on muscle soreness postexercise. • **Grade I - Good**

J Acad Nutr Diet. 2016;116:501-528

USING THE RECOMMENDATIONS

Scenario 1

You are a new sports dietitian working with a basketball team. One of the star players with high minutes currently says she feels great without any fuel during a game. You want her to take in 50-60 g of carbohydrate, explaining that this is the amount shown in the scientific literature to improve performance. She is not interested. What do you do?

USING THE RECOMMENDATIONS

Scenario 2

You are working with a football player to gain muscle in the off-season. He is not seeing the results he wants from his lifting program, and you realize he is not taking in enough protein, particularly after training sessions. You tell him he should increase his recovery protein to 0.25 g/kg, and he agrees. You then provide him with whey protein shakes, since the research shows this is the most effective protein source for stimulating muscle protein synthesis. He tells you he can't have these shakes because he's vegan. What do you to do help him achieve his goals?

USING THE RECOMMENDATIONS

When working with an athlete who is interested in making a change to their nutrition habits, you'll use a process of trial and error, starting with the published guidelines, to find the best plan to meet their needs. Set the ultimate goal but start small and work up to that goal in small achievable steps.

USING THE RECOMMENDATIONS

Sometimes you may think an athlete *should* make a change to their nutrition habits, but it's difficult to convince them to follow the current guidelines.

Don't get frustrated. Plant the seed in their head and tell them what they need to hear. If they are still not interested, tell them that you will be available when they do want to commit to make the change.

USING THE RECOMMENDATIONS

Sometimes your athletes will want to use new supplements or foods/ingredients, some making grandiose claims. If you don't have published guidelines, a meta-analysis, or information in the Evidence Analysis Library, you will need to evaluate the current state of the science.

As a sports dietitian, you will need to navigate each of these scenarios.

USING THE RECOMMENDATIONS

- Following recommended sports nutrition guidelines based on published research is not always “cool” or exciting to an athlete.
- Athletes are often more interested in unusual, unproven supplements or diet patterns followed by their peers or pro athletes.
- Practitioner jobs in professional sports are few and sought after. There is often pressure to find something new and different.
- Waiting until something is “proven” by science is often seen as too slow and won’t be “cutting edge” or provide a competitive advantage.
- Some athletes are going to do what they want regardless of what you say. Keep in mind that you can’t control everything and that education and reiteration of your foundational nutrition principles will keep your message consistent.
- Even though you think you may have the best nutrition plan for an athlete based on the recommendations that are backed by scientific evidence…a plan that an athlete does not follow is just as good as no plan at all.

How can a practitioner balance evidence-based practice with the desire to be “cutting edge”?

"ISSUES" WITH SPORTS NUTRITION RESEARCH

- The subject population of a research study varies, so evaluating if an intervention will translate to elite athlete performance is often difficult:
  - Elite athletes may not want to experiment on their bodies
  - Coaches may not allow research using their teams
  - "Recreationally active" individuals are more available on a college campus
  - Funding may be for target populations, such as older adults
- Sample sizes, especially if elite athletes are tested, are often small.
- Many interventions begin with endurance-type activity (running or biking) because it's easier to control in the lab and has clear performance outcomes. The definition of "performance" varies among studies on team sports.

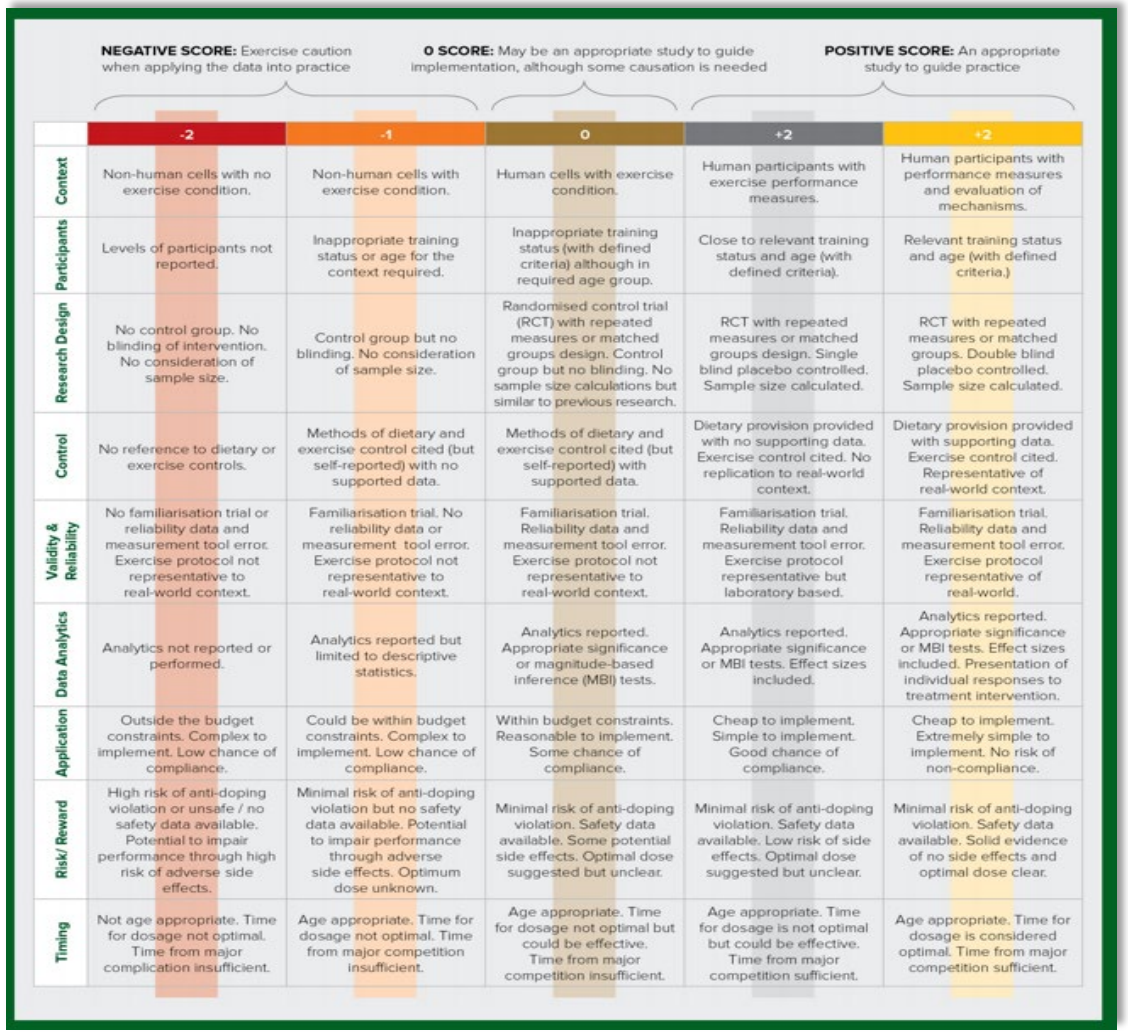
"ISSUES' WITH SPORTS NUTRITION RESEARCH

- Research in the lab may not translate to the field of play, and field research can be difficult to control.
- New ingredients may be studied in isolation, but in the real world consumed as part of a food matrix.
- To feel confident in the effectiveness of a nutritional intervention, a body of research must be developed. Definitive answers do not come from one research study alone.
- It takes time to build a body of literature, and athletes or practitioners looking for an "edge" don't want to wait.

From Paper to Podium: Evaluation of the Translational Potential of Performance Nutrition Related Research

Graeme Close, Andreas Kasper and James Morton, researchers and practitioners at Liverpool John Moores University, developed a framework to critically evaluate performance nutrition-related research papers: the Paper to Podium Matrix

PAPER TO PODIUM MATRIX



NEGATIVE SCORE: Exercise caution when applying the data into practice

0 SCORE: May be an appropriate study to guide implementation, although some causation is needed

POSITIVE SCORE: An appropriate study to guide practice

	-2	-1	0	+2	+2
Context	Non-human cells with no exercise condition.	Non-human cells with exercise condition.	Human cells with exercise condition.	Human participants with exercise performance measures.	Human participants with performance measures and evaluation of mechanisms.
Participants	Levels of participants not reported.	Inappropriate training status or age for the context required.	Inappropriate training status (with defined criteria) although in required age group.	Close to relevant training status and age (with defined criteria).	Relevant training status and age (with defined criteria.)
Research Design	No control group. No blinding of intervention. No consideration of sample size.	Control group but no blinding. No consideration of sample size.	Randomised control trial (RCT) with repeated measures or matched groups design. Control group but no blinding. No sample size calculations but similar to previous research.	RCT with repeated measures or matched groups design. Single blind placebo controlled. Sample size calculated.	RCT with repeated measures or matched groups. Double blind placebo controlled. Sample size calculated.
Control	No reference to dietary or exercise controls.	Methods of dietary and exercise control cited (but self-reported) with no supported data.	Methods of dietary and exercise control cited (but self-reported) with supported data.	Dietary provision provided with no supporting data. Exercise control cited. No replication to real-world context.	Dietary provision provided with supporting data. Exercise control cited. Representative of real-world context.
Validity & Reliability	No familiarisation trial or reliability data and measurement tool error. Exercise protocol not representative to real-world context.	Familiarisation trial. No reliability data or measurement tool error. Exercise protocol not representative to real-world context.	Familiarisation trial. Reliability data and measurement tool error. Exercise protocol not representative to real-world context.	Familiarisation trial. Reliability data and measurement tool error. Exercise protocol representative but laboratory based.	Familiarisation trial. Reliability data and measurement tool error. Exercise protocol representative of real-world.
Data Analytics	Analytics not reported or performed.	Analytics reported but limited to descriptive statistics.	Analytics reported. Appropriate significance or magnitude-based inference (MBI) tests.	Analytics reported. Appropriate significance or MBI tests. Effect sizes included.	Analytics reported. Appropriate significance or MBI tests. Effect sizes included. Presentation of individual responses to treatment intervention.
Application	Outside the budget constraints. Complex to implement. Low chance of compliance.	Could be within budget constraints. Complex to implement. Low chance of compliance.	Within budget constraints. Reasonable to implement. Some chance of compliance.	Cheap to implement. Simple to implement. Good chance of compliance.	Cheap to implement. Extremely simple to implement. No risk of non-compliance.
Risk/ Reward	High risk of anti-doping violation or unsafe / no safety data available. Potential to impair performance through high risk of adverse side effects.	Minimal risk of anti-doping violation but no safety data available. Potential to impair performance through adverse side effects. Optimum dose unknown.	Minimal risk of anti-doping violation. Safety data available. Some potential side effects. Optimal dose suggested but unclear.	Minimal risk of anti-doping violation. Safety data available. Low risk of side effects. Optimal dose suggested but unclear.	Minimal risk of anti-doping violation. Safety data available. Solid evidence of no side effects and optimal dose clear.
Timing	Not age appropriate. Time for dosage not optimal. Time from major complication insufficient.	Age appropriate. Time for dosage not optimal. Time from major competition insufficient.	Age appropriate. Time for dosage not optimal but could be effective. Time from major competition insufficient.	Age appropriate. Time for dosage is not optimal but could be effective. Time from major competition sufficient.	Age appropriate. Time for dosage is considered optimal. Time from major competition sufficient.

The first step in translating research to practice should be a critique of the translational potential of the existing scientific evidence

The matrix includes an evaluation and scoring of:

- Context
- Participants
- Research Design
- Control
- Validity & Reliability
- Data Analytics
- Application
- Risk/Reward
- Timing

Close, G, Kasper, A and Morton, J. *Sports Science Exchange*. 2019;29(197):1-6

EXAMPLE #1

Carbohydrate mouth rinse and caffeine improves high-intensity interval running capacity when carbohydrate restricted (Kasper et al. 2015)

Research Context (+1)

Human participants but no mechanisms tested

Research Participants (+1)

Recreationally active and appropriate age

Research Design (+1)

Randomized, repeated measures double-blind study. Sample size commensurate with previous studies but no sample size calculations provided

Feasibility of Application (+1)

Cheap to implement and good chance of compliance

Dietary & Exercise Controls (+1)

Caffeine was restricted for 24–48 h and protein provided prior to sleep low but could be considered limited application to real-world scenario given that true glycogen depletion training protocols are unlikely to be performed prior to bed

Validity & Reliability (+1)

Familiarization trial cited and reference to reliability statistics. Exercise trial was a laboratory- based protocol consisting of exercise on a motorized treadmill

Data Analytics (+1)

Analytics reported and individual responses plotted although effect sizes not reported

Risk/Reward (+1)

Minimal risk of anti-doping violation and sufficient safety data available although optimal dose of CHO mouth rinse unknown

Timing of Intervention (+2)

Age-appropriate and time available for dosing is considered optimal to be effective and time from major competition is sufficient to warrant testing the new strategy.

Total (+10)

An appropriate study to guide practice

Kasper, A. et al. *Eur J Sport Sci*. 2016;16(5):560-8. doi: 10.1080/17461391.2015.1041063

Close, G. et al. Sports Med. 2019; 49(Supp1):25-37. doi: 10.1007/s40279-018-1005-2

EXAMPLE #2

N-Acetylcysteine's attenuation of fatigue after repeated bouts of intermittent exercise: practical implications for tournament situations
(Cobley et al. 2011)

Research Context (+1)

Human participants but no mechanisms tested

Research Participants (+1)

Recreationally active and appropriate age with activity clearly defined

Research Design (+2)

Between-subjects pair-matched design. Sample size calculated and stated

Feasibility of Application (0)

Cheap to implement but some chance of non-compliance with the loading regime

Dietary & Exercise Controls (-1)

Diet recorded and asked to be repeated but not formally assessed and no objective data

Validity & Reliability (-1)

Familiarization trials performed and described; however, no objective reliability data provided. Exercise trial was a laboratory-based protocol consisting of shuttle running

Total (+2)
May be an appropriate study to guide implementation, although some caution is needed

Data Analytics (0)

Analytics reported but lacked effect sizes. Lacking individual responses

Risk/Reward (-2)

Limited availability of batch- tested product and high risk of side effects that could limit performance. Optimal dosing unknown

Timing of Intervention (+2)

Age- appropriate and time available for dosing is considered optimal to be effective and time from major competition is sufficient to warrant testing the new strategy.

Cobley JN. et al. *Int J Sports Nutr Exerc Metab*. 2011;21(6):451-61. doi: 10.1123/ijsnem.21.6.451

Close, G. et al. *Sports Med*. 2019; 49(Supp1):25-37. doi: 10.1007/s40279-018-1005-2

PAPER TO PODIUM MATRIX

The matrix is not exhaustive

But, use of the matrix may help practitioners evaluate a research paper, increasing their confidence in an intervention which may lead to a more enthusiastic athlete and increase the chance of effectiveness

Note: You need to find and read the entire research paper! Relying on an abstract or information found on social media is not an effective way to truly evaluate a research study.

Additional Resource: Please see the learning activity “Evaluation and Translation of Sports Nutrition Research” to practice using the matrix

SCENARIO

Scenario: You are a new sports dietitian for a soccer team. From attending a conference, you've become interested in a new strategy and think it can help your team. The theory is strong, but there have only been a few published research studies.

You've evaluated the available research using the Paper to Podium matrix and feel confident in implementing this strategy.

What's next?

SCENARIO CONTINUED

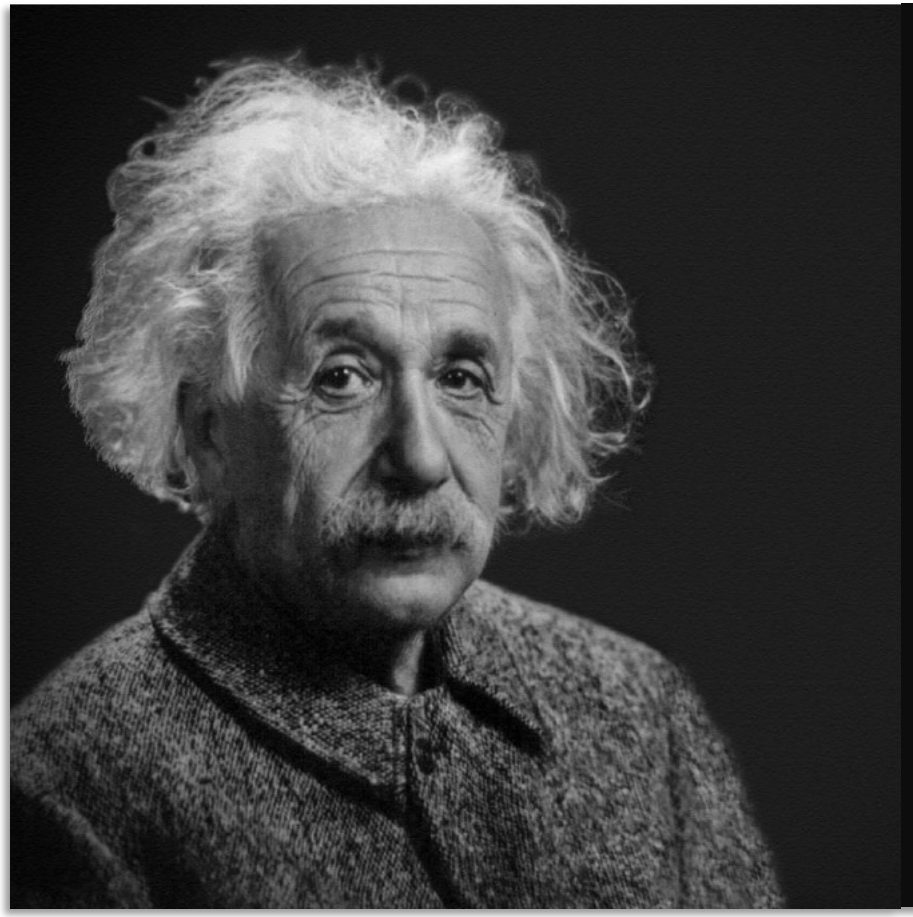
- Consider your athletes. Do any of your athletes have food sensitivities, specific beliefs, or any other issues that could hinder implementing this strategy? If so, can you alter the strategy to incorporate these individual athlete needs?

- Check the regulations of your league to ensure all parts of the new strategy are permissible.

- Develop a plan to implement the strategy. Be sure to consider:
  - Individual needs of each athlete. Is the strategy right for everyone?
  - Timing – begin to implement slowly and stepwise. Also plan plenty of time to adjust during practices well in advance of competition.
  - How to evaluate effectiveness
  - Cost and logistics

- Develop a communication plan to the sport coaches, performance and sports medicine staff, and then the athletes. Be prepared for the staff or athletes to push back on the new ideas.

COMMUNICATING SPORTS NUTRITION SCIENCE



"If you can't explain it simply, you don't understand it well enough."

-Albert Einstein

COMMUNICATING SPORTS NUTRITION SCIENCE

- Keep your message to the athletes **simple.**
- Elementary is good most of the time; if you are presenting to a team, keep it short, concise, and visual.
- Assess their knowledge level and stay one step ahead of the athlete; if you are two steps ahead or more you will lose them.
- Let them know you feel confident in the science, but don't overwhelm them with scientific details; eliminate scientific jargon like "protein synthesis" or "glycogenolysis" and replace with "muscle recovery" or "using your bodies fuel stores".

COMMUNICATING SPORTS NUTRITION SCIENCE

- Focus on how the plan can help support their performance or how it may improve upon their “weaknesses”.
- Take into account any hesitations the athletes may have when developing your communication plan.
- Be willing to teach your athletes the “why” behind your plan, not only the “what”. Some athletes will take better to learning your reasoning than others, but think about creative and simple ways to convey the science.
- Be confident!

COMMUNICATING SPORTS NUTRITION SCIENCE

Know your athletes, use a method to communicate that reaches them.

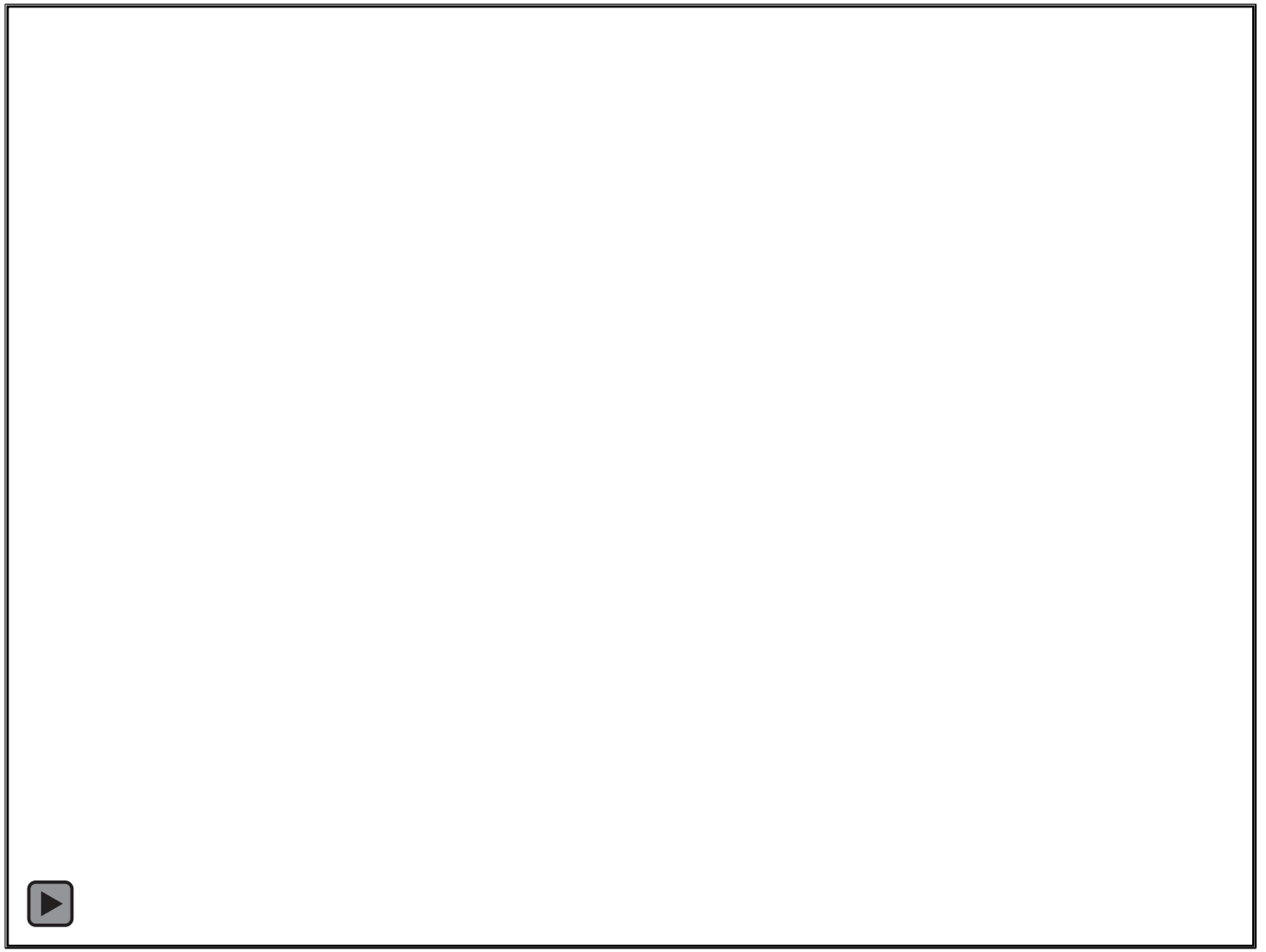
Some ideas:

- Text message vs email
- Posters vs video boards
- Do they engage with you on social media?
- Do they respond better to one-on-one or group sessions?
- If you're presenting to a group of athletes, usually a Power Point-type presentation won't engage them. Speak directly to them, if you need to use slides as visuals keep them short!

SCIENCE VS PRACTICE

View a clip from Asker Jeukendrup's webinar "Communicating Science"

Click here to find the full webinar



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How can you clearly and effectively communicate your reasoning for change to this athlete?

KEY TAKEAWAYS

- ✓ Bridging the gap between science and the field of play is an important role for a sports dietitian.
- ✓ Understand that published recommendations are not absolute but guides to help you customize a sports nutrition strategy for your athletes.
- ✓ To help you evaluate if a new ingredient, supplement or strategy are appropriate, use an evidence-based approach.
- ✓ Evaluating the scientific literature can be difficult. Look for a meta-analysis on a topic. If you are evaluating an individual study, consider the Paper to Podium matrix.
- ✓ Clear communication to your peers on staff and the athletes is crucial to implementing evidence-based nutrition strategies.

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