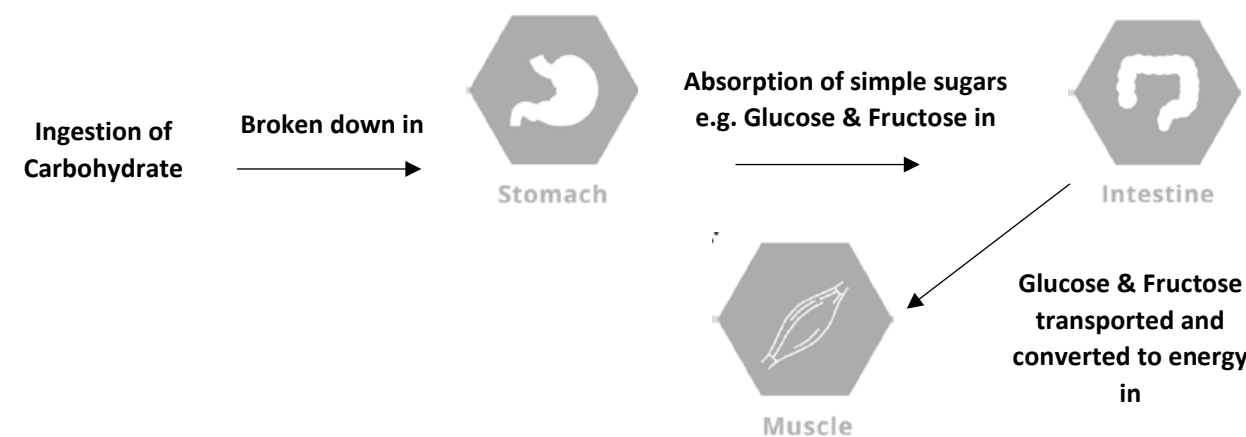


Fuelling with Carbohydrate – During Exercise and Competition

Background: *Brief overview of the research to establish context*

- Fuelling during exercise is a way to ensure there is adequate fuel supply for the exercising muscles, especially during demanding bouts of exercise greater than one hour
- This helps to delay glycogen depletion → see our **Before Exercise Brochure** to understand glycogen
- Carbohydrate-based foods such as fruit and bread are broken down into simple sugars → glucose and fructose
- There is a difference between ingestion rates (what, and how much you eat) and the absorption rates (how much of what you eat is taken up by your body)



(Burke et al., 2011) (Gonzalez et al., 2017) (Burke & Deakin, 2015)

Goals of Intra-Exercise Nutrition: *Why intra-exercise fuelling may be an option for you*

- Meet the demands of exercise
- Enhance performance
- Avoid “bonking” (glycogen depletion) → see our **Before Exercise Brochure** to understand glycogen
- Provide additional fuel to our exercising muscles
- Ensure we are consuming the correct amounts and types of simple carbohydrates during exercise to match our work demand

(Burke et al., 2011)

Guidelines and Considerations: *Here are the main practical takeaways*

- Intake guidelines are **independent** of body mass and **dependent** on exercise intensity and duration
- Intake increases proportional to exercise intensity and duration
- Maximum glucose absorption is approximately 60 grams per hour (see **Figure 3** on the following page)
- Select foods with transportable carbohydrates → glucose and fructose → to absorb more than 60 grams per hour
- The gastrointestinal tract is trainable → practice race day nutrition in training

Intra-Activity Fuelling Requirements – Decision Making Table

Duration	Activity Example	Carbohydrate Guidelines
< 45 minutes	Race or continuous training effort	Not required
45 – 75 minutes	Non-continuous training (e.g., intermittent interval training)	Mouth rinse (e.g., sports drink)
1.0 – 2.5 hours	Race, endurance training, and non-continuous training	30 – 60 grams per hour (glucose or glucose-fructose mix) (Podlogar & Wallis, 2022)
> 2.5 hours	Race long continuous training effort	90 grams per hour (2:1 glucose: fructose) i.e., 60g glucose and 30g fructose per hour

(Podlogar & Wallis, 2022) (Burke et al., 2011)

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Burke, L. M., Hawley, J. A., Wong, S. H. S., & Jeukendrup, A. E. (2011). Carbohydrates for training and competition. *J Sports Sci*, 29(1), S17-S27. <https://doi.org/10.1080/02640414.2011.585473>

Gonzalez, J. T., Fuchs, C. J., Betts, J. A., & van Loon, L. J. C. (2017). Glucose Plus Fructose Ingestion for Post-Exercise Recovery-Greater than the Sum of Its Parts? *Nutrients*, 9(4), 344. <https://doi.org/10.3390/nu9040344>

Podlogar, T., & Wallis, G. A. (2022). New Horizons in Carbohydrate Research and Application for Endurance Athletes. *Sports Medicine*, 52(1), 5-23. <https://doi.org/10.1007/s40279-022-01757-1>

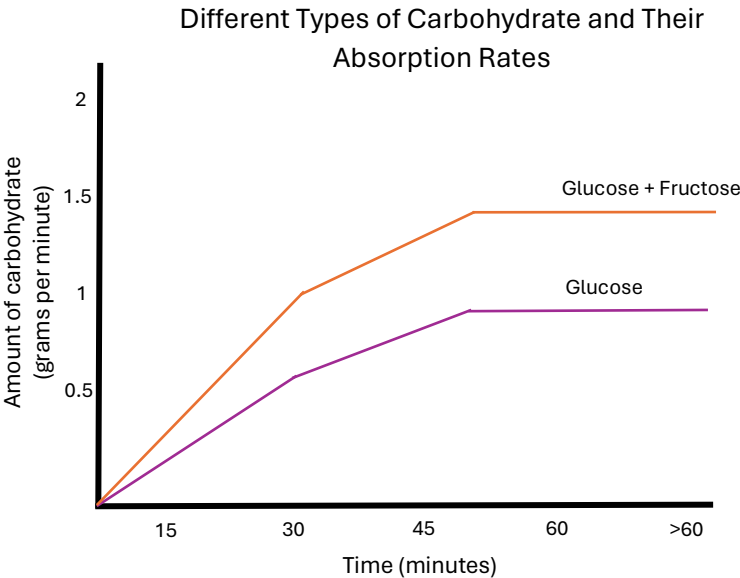
Fuelling with Carbohydrate – During Exercise and Competition

Food Characteristics and Practical Application of Sports Gels: *Follow this guide when choosing your intra-exercise fuel*

- Easily absorbable carbohydrates → glucose and fructose
- Convenience and practicality → sports foods e.g. carbohydrate gels
- Check the ingredients list on your preferred sports gel to determine the **source** of the carbohydrate
- Maltodextrin (glucose) is a common ingredient in sports foods
- A gel containing a total of 30g of carbohydrates per serve with a 2:1 glucose to fructose ratio contains 20g of glucose and 10g of fructose
- To consume 90g of carbohydrates per hour, you would need to consume a total of 3 gels within the hour → equates to 60g glucose and 30g fructose per hour
- Sports drinks should have a 6 to 8% concentration of carbohydrate (6 to 8 g/100mL)

(Burke & Deakin, 2015)

Figure 3: Comparison between the absorption rates of glucose and fructose in the gut. The limiting rate of glucose absorption is about 60g per hour (equates to 1g per minute). To absorb more than this, a carbohydrate source containing a combination of glucose and fructose to achieve this



Examples Foods: *Presented as Serving Size and Carbohydrate (CHO) Content per Serve*



Sports Drink
600mL/35.6 g
(5.9%
carbohydrate)



Sports Gel
45g/29.8g Maltodextrin
(Glucose) only



Sports Gel
51g/30g
2:1 Glucose:Fructose ratio



Sports Chews
50g/38g
with caffeine (50mg)

Intra-Exercise Carbohydrate Calculator: *Practical tool*

- Use the following links or scan the QR code to access a calculator to determine the amount of carbohydrate to consume during exercise!
- **Practical Application:** check the Nutrition Information Panel on your preferred sports gel or chew to determine if you are meeting the guidelines → remember to assess your individual response during exercise

During-Exercise Carbohydrate Calculator:

https://asluggett.github.io/Sport-Nutrition/intra_nutritional_calculator.html

Calculator Home Page:

<https://asluggett.github.io/Sport-Nutrition/>

