



“From Mouth to Muscle – Fuelling Performance”

Emma Gardner
Sport Scientist Lucozade Sport



'From Mouth to Muscle – Fuelling Performance'

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Lucozade Sport – Fuelling UKA

'Work together with the lead nutritionists to turn podium finishes into gold medals'

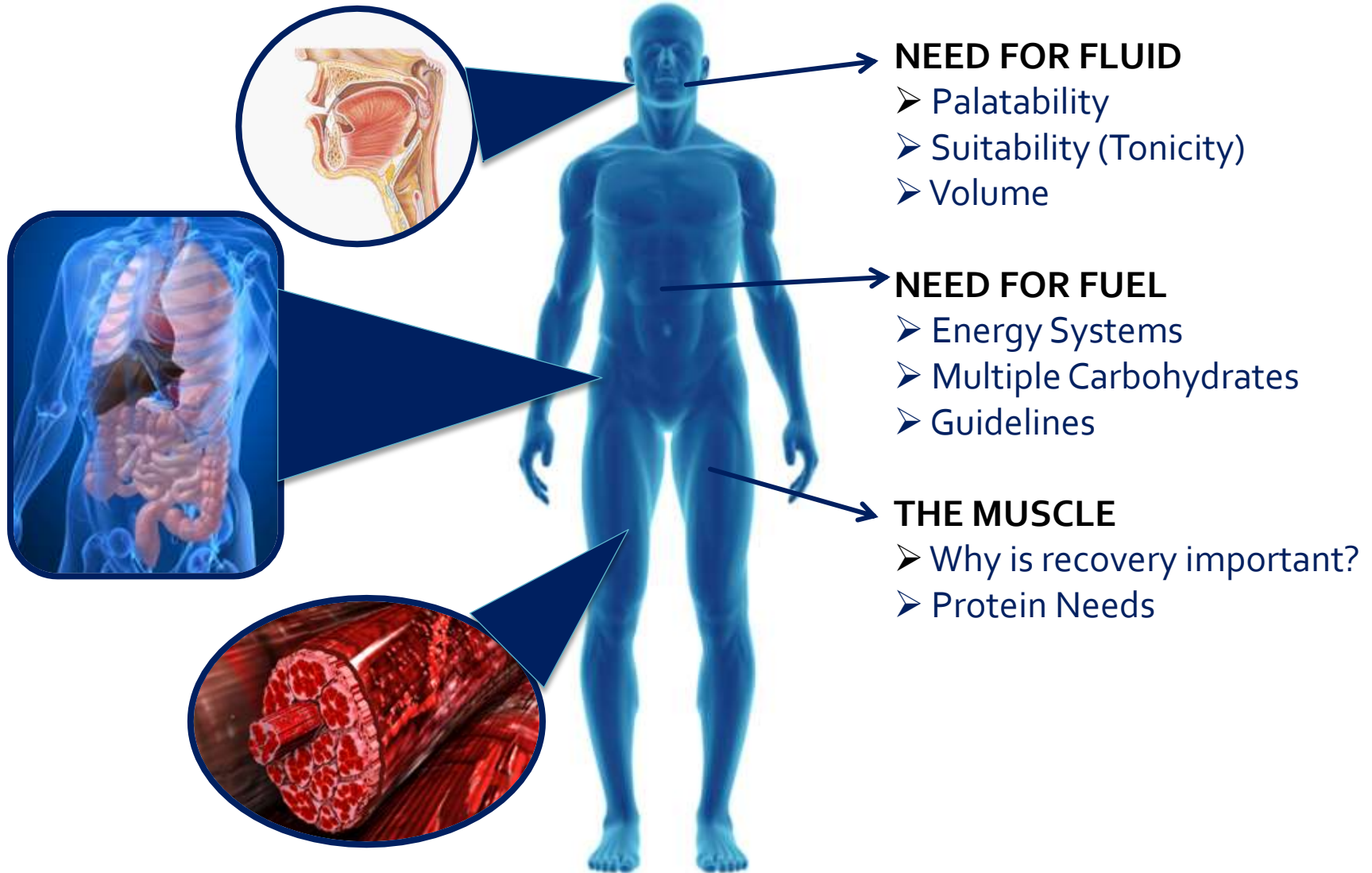
Partnership with UKA to provide nutritional support and advice

Lucozade Sport – Fuelling UKA

- Lucozade Sport Science Team work with athletics clubs to provide education and support for athletes of all levels
- Nutritional Advice
- Performance Testing



'From Mouth to Muscle'



'From Mouth to Muscle'



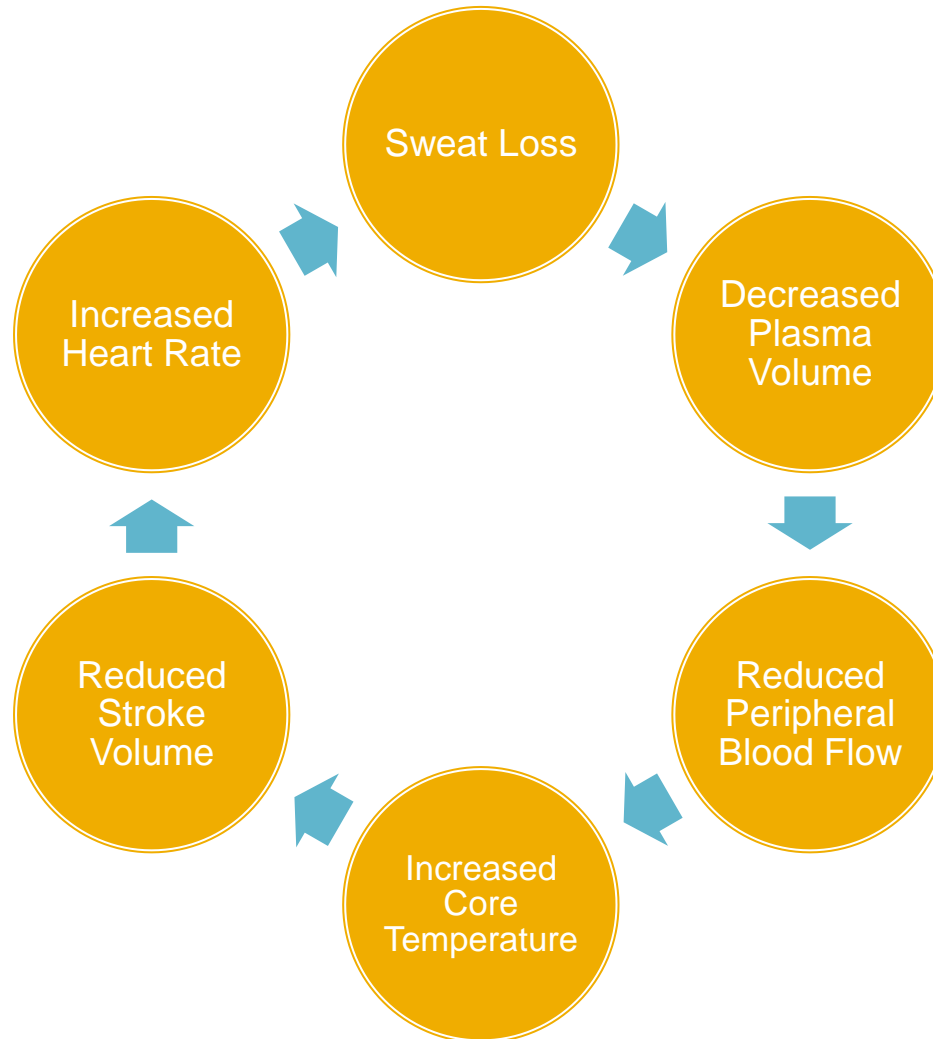
NEED FOR FLUID

- Palatability
- Suitability (Tonicity)
- Volume

Fluid Needs - Hydration

'Dehydration by as little as 2% can negatively affect both mental and physical performance, especially during endurance-based events'

Fluid Needs - Hydration



Need for Fluid - Palatability



NEED FOR FLUID

- Beverage palatability is known to influence fluid consumption during exercise
- Sports Drinks Vs Water?

Need for Fluid - Palatability

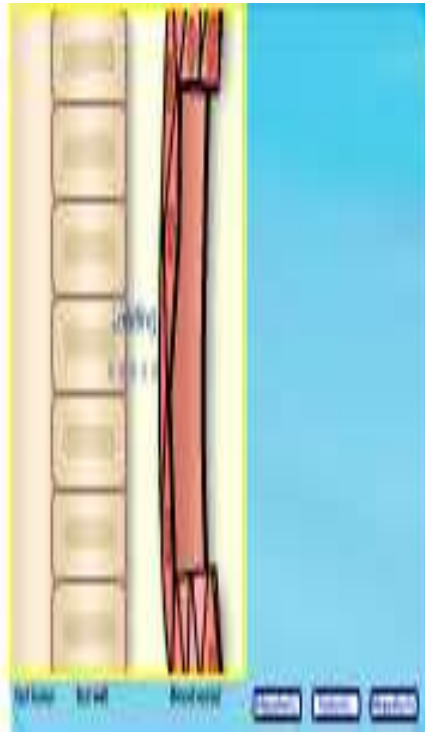
- **BEVERAGE CHOICE** - Lightly flavoured hypotonic carbohydrate-electrolyte drink promoted greater voluntary fluid intake and was more effective than water in maintaining fluid balance (Peacock, Stokes & Thompson, 2008).
- **AVOIDING DEHYDRATION; VOLUNTARY FLUID INTAKE** - Ad libitum consumption of a CHO-E drink may be more effective than water in minimising fluid deficits and mean core temperature responses (Bergeron, Waller & Marinick, 2009; Shiriffs, 2003)
- **WATER** – Low intensity sessions <60mins/<45 min high intensity



Need for Fluid - Suitability

SUITABILITY – Tonicity

Tonicity is a measure of the osmotic pressure gradient of two solutions separated by a semi permeable membrane



Need for Fluid - Suitability

Hypotonic

Fluid & Electrolytes



HYDRATION

Isotonic

6-8% CHO, fluid & Electrolytes



FUEL & HYDRATION

Hypertonic

Carbohydrate

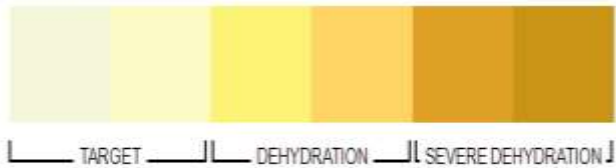


FUEL

Need for Fluid – Monitoring Your Athlete

'Approximately 40% of athletes turn up to training and competition dehydrated'

PRE EXERCISE



DURING EXERCISE



AFTER EXERCISE



**(1 kg of BM loss =
1L of sweat loss)**

Need for Fluid - Volume

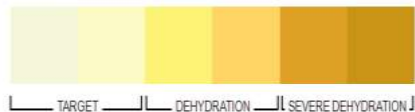
PRE
EXERCISE

DURING
EXERCISE

POST
EXERCISE

5-7ml/kgBM*

3-4 hours prior
Monitor urine colour



100-150ml every 10-15 min

Match sweat and urine loss
Between Events



150% fluid replenishment

(Weighing Method)
Electrolytes



*millilitres per kilogram of body mass

Summary – Fluid Needs

- Dehydration can affect an athlete's performance
- The palatability and suitability of a drink will affect an athlete's fluid intake
- Fluid intake strategies should be specific to the athlete and scenario

'From Mouth to Muscle'

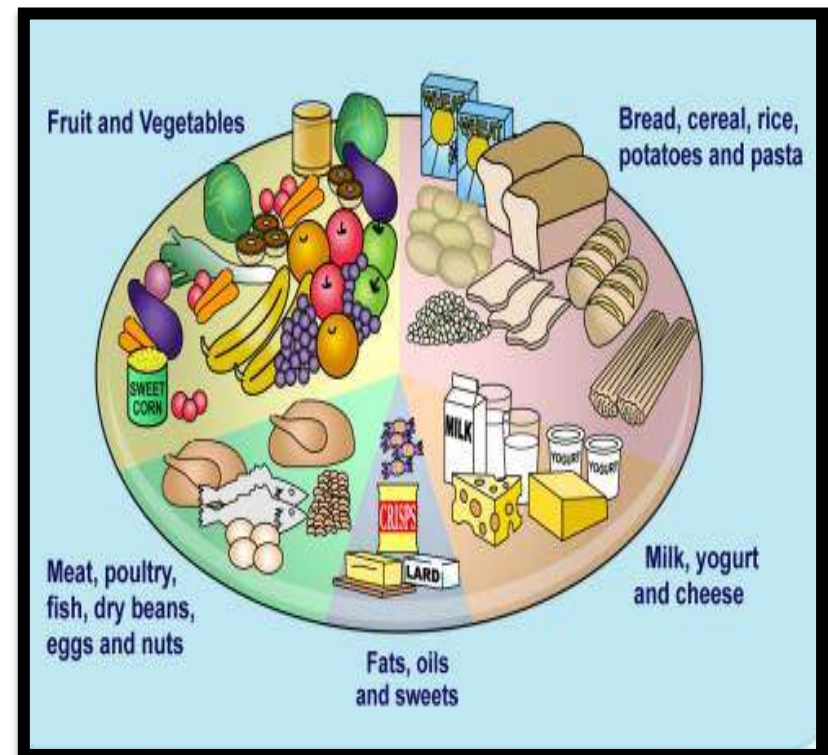


NEED FOR FUEL

- Energy Systems
- Multiple Carbohydrates
- Guidelines

Need for Fuel

- Carbohydrate is the body's main source of fuel for the brain, central nervous system and working muscles
- Carbohydrate is crucial to ensure an athlete meets their training demands and fuels their performance
- 3 energy systems, 2 rely upon glucose



Energy Requirements – Daily Needs



Table 1 - Carbohydrate Requirements

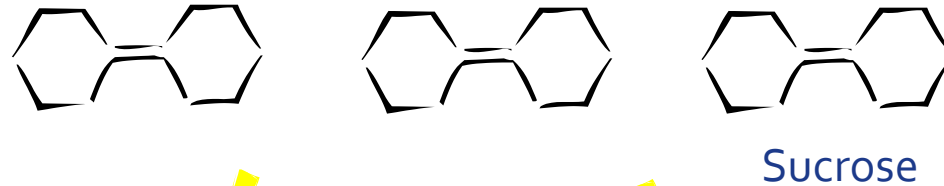
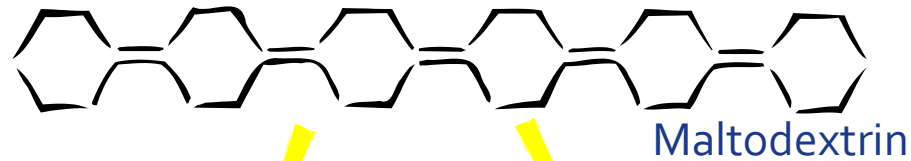
Training Level	Carbohydrate (g/kg/d)*
Regular levels of activity (3-5 hrs/week)	4-5
Moderate duration/low intensity training (1-2 hrs/day)	5-7
Moderate to heavy endurance training (2-4+ hrs/day)	7-12
Extreme exercise programme (4-6+ hrs/day)	10-12

*grams per kilogram of body mass per day

Need for Fuel - Carbohydrates

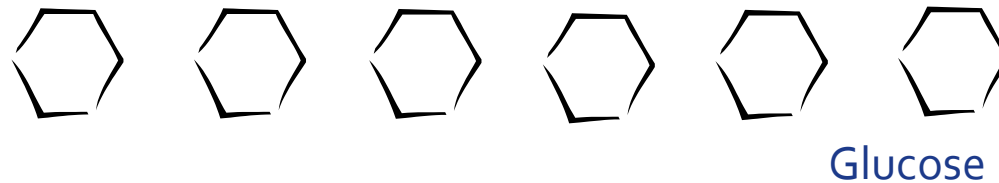
Complex

- e.g. Starch



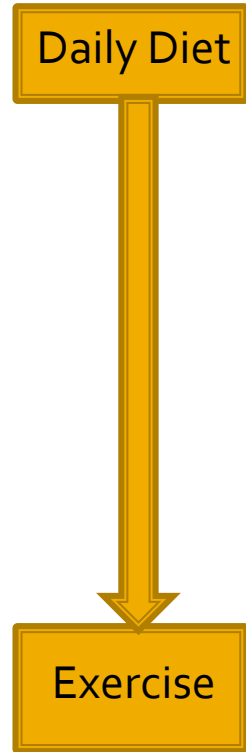
Simple

- e.g. sugars



Daily Diet

Exercise



Need For Fuel – Energy Systems



SYSTEM – PCr
ENERGY SOURCE - ATP

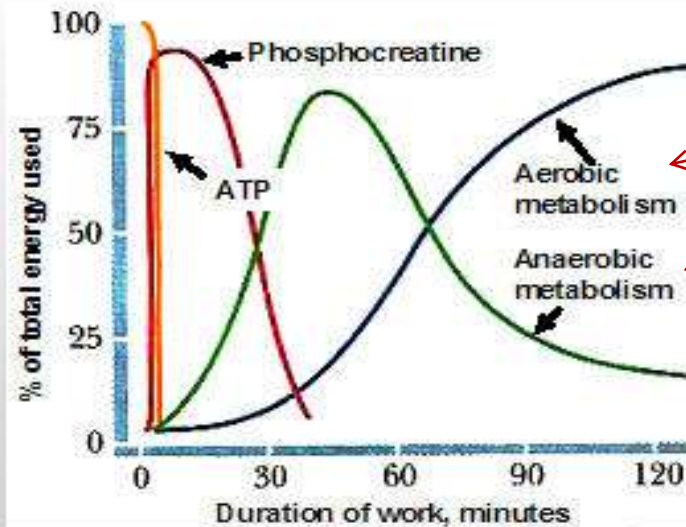
SYSTEM – Anaerobic
ENERGY SOURCE – Blood glucose,
muscle & liver glycogen



SYSTEM – Aerobic
ENERGY SOURCE - Blood glucose,
muscle & liver glycogen, fatty acids

Need for Fuel - Energy Systems

Energy Sources in Working Muscles



G



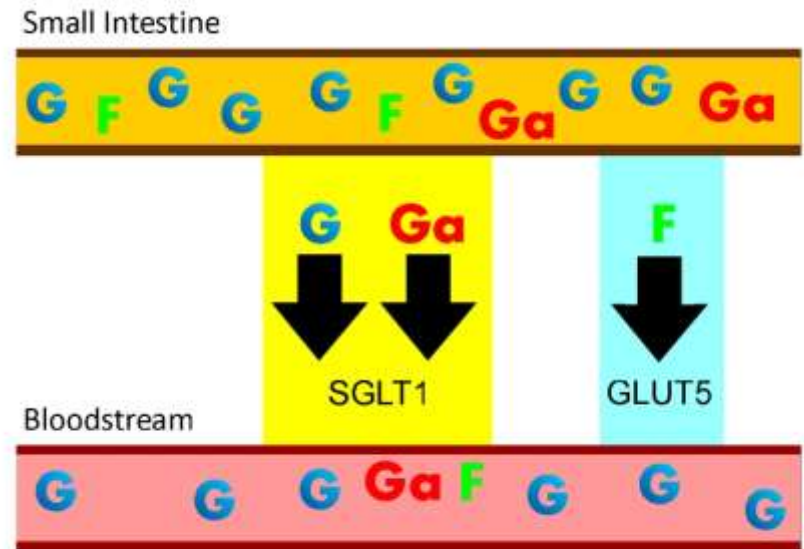
Energy Requirements - During

- Glucose $\sim 1\text{g}/\text{min}$
- For exercise lasting $> 60\text{mins}$
- Multi events/heats within and between
- Recommendation 30-60g per hour (endurance)



Need for Fuel – Multiple Carbohydrates

- Multiple carbohydrates e.g. Fructose and glucose ~1.5 g/min
- Endurance lasting > 90 min
- Endurance Athletes

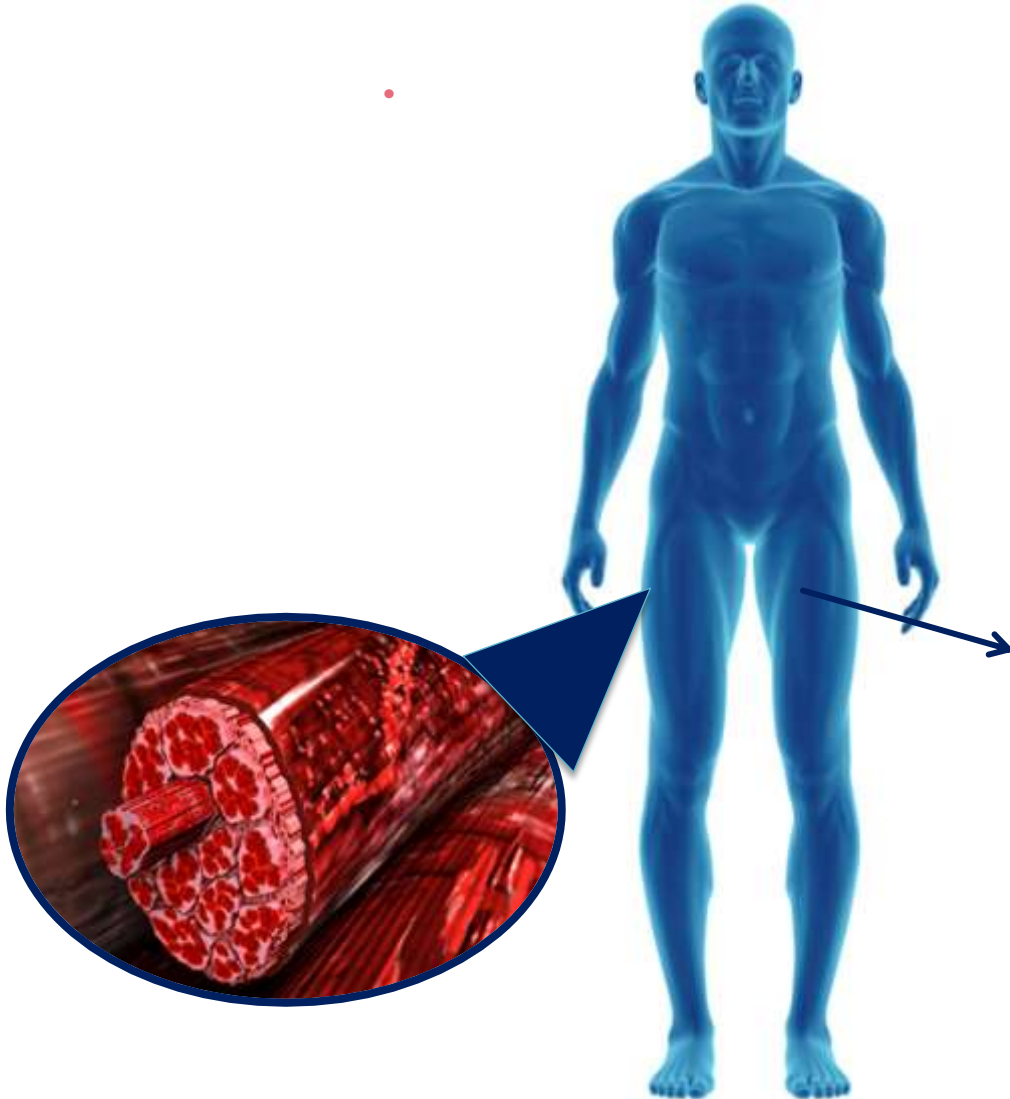


Glucose (G) & galactose (Ga) are absorbed through the same transporter from the small intestine to the blood, called Sodium Dependent Glucose Transporter (SGLT1). However fructose (F) is absorbed by a separate transporter, GLUT5.

Need for Fuel - Summary

- Carbohydrate is crucial to ensure an athlete meets their training demands and fuels their performance
- Guidelines should be tailored to meet the athlete's needs
- For endurance events >60 min, CHO should be consumed and multiple CHO's may be of benefit

'From Mouth to Muscle'



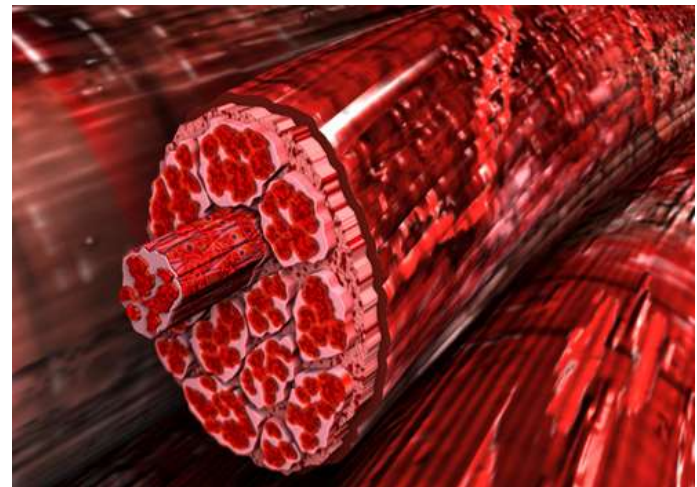
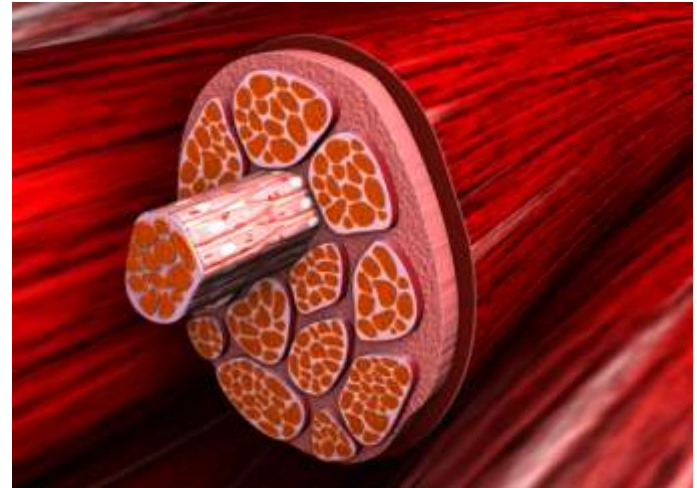
THE MUSCLE

- Why is recovery important?
- Protein Needs

The Muscle – Recovery Needs

THE NEED FOR PROTEIN:

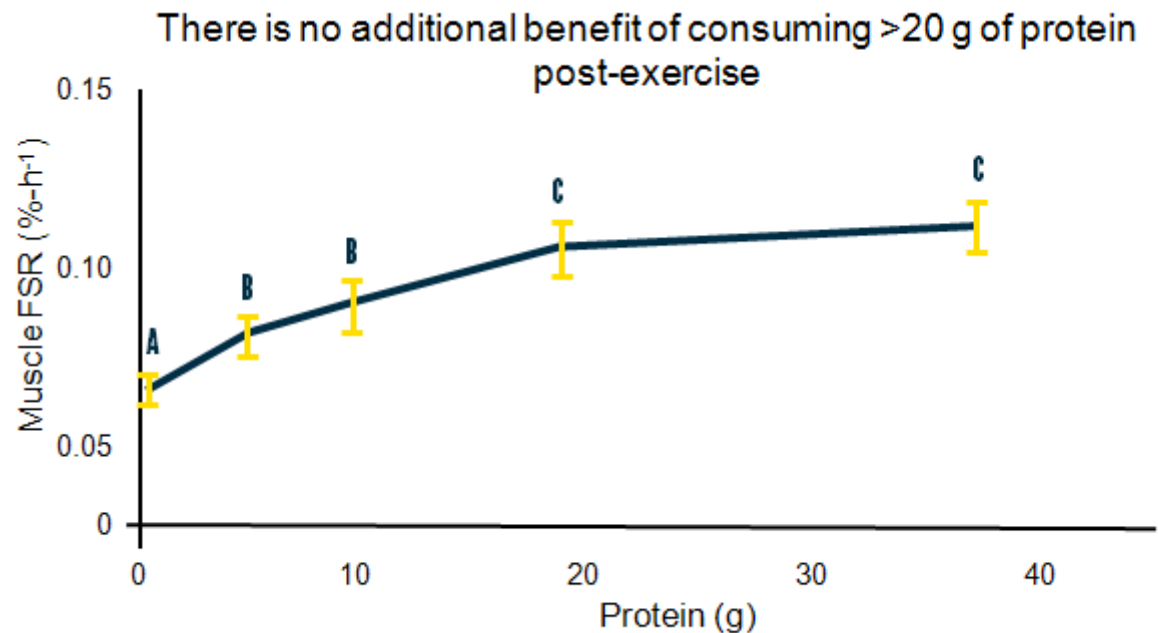
- Proteins are the building blocks of muscle
- The rate of muscle protein breakdown is increased during exercise
- The rate of muscle protein synthesis is increased during the recovery phase



The Muscle – Recovery Needs

Protein following exercise:

- 'Window of Opportunity'
- 15-20 g optimum
- 2 hours



The Muscle – Daily Protein Needs

Table 2 Protein Requirements

Activity Level	Protein Intake (g/kg/d)
Low Levels Activity (non sporting)	0.75
Regular Activity (more than 1 hour per day)	1.0-1.2
Middle Distance/Endurance Athletes	1.2-1.4
Strength/Power/Speed Athletes	1.2-1.7

Summary - Recovery

- Proteins are the building blocks of muscle
- The rate of muscle protein breakdown is increased during exercise
- Protein should be consumed as soon as possible after exercise
- 15-20g protein is an optimum amount; there is no benefit to taking more than 20g

References

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