

Gut Mechanics, Ironman Nutrition & Hydration Presentation

Have you ever experienced stomach, nutrition and/or hydration problems in an endurance event and blamed the products you have used?



Presentation Overview Part 1 – Gut Mechanics

- ✦ Gut Definition
- ✦ Gut Facts
- ✦ Gut Function & Filtering
- ✦ Gut Threshold Warning Signs
- ✦ Recovery Strategies
- ✦ How Much Fuel
- ✦ Tips to Help Get it Right
- ✦ Summary



Gut Definition

“You put the fluid into the top hole and it mostly goes down your food pipe. Some comes out (from down below), and some comes out when you sweat. In between, it’s just a little bit of magic worked by your guts.”

Andrew Smith, age 5.

Introduction

- ✦ Have you ever experienced stomach, nutrition and/or hydration problems in an endurance event?
- ✦ Many things can ruin your race.
 - Not enough fluid
 - Too much fluid
 - Not enough electrolytes
 - Too much or the wrong hourly or inconsistent input
- ✦ Your stomach is either emptying, or it's not.
- ✦ The key word is **THRESHOLD**. It reaches a threshold and then shuts down.
- ✦ The worst thing that can happen during an endurance event is for your stomach to shut down.
- ✦ No stomach = no nutrition/hydration and a slower pace.

Introduction Continued

- ✦ The term 'gut' globally describes your stomach and intestine.
- ✦ The stomach is the first port of call for food and fluid you put in your mouth.
- ✦ Food and fluid travels down the oesophagus and is processed by the stomach first.
- ✦ Absorption of the guts contents is affected by three main factors:
 - Environmental temperature
 - Exercise intensity
 - Concentration of contents – what you're eating & drinking
- ✦ It's good to keep the first and last in check, so you can maintain intensity and maximise performance.

Gut Facts 1

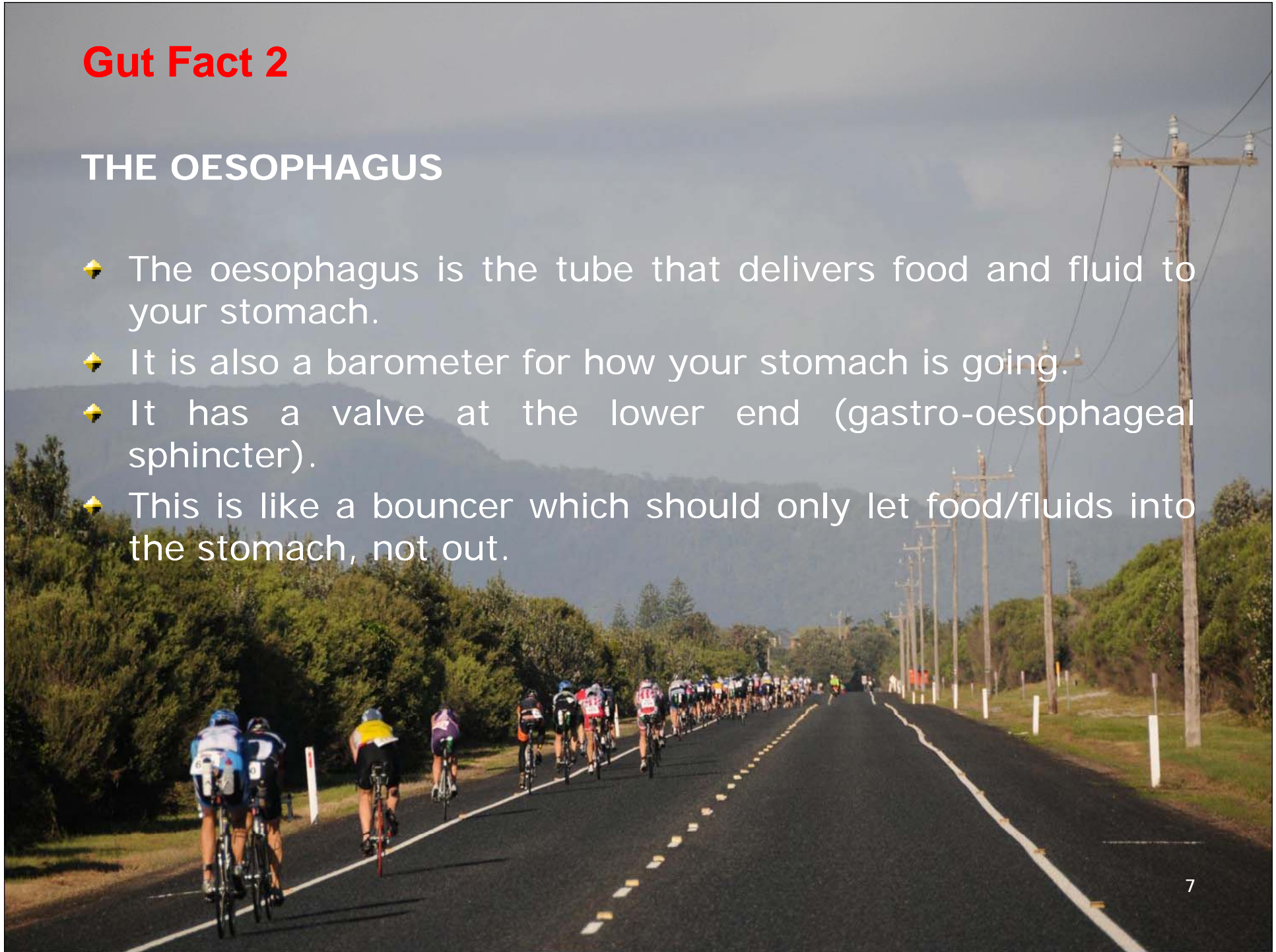
FLUID AND GLUCOSE CAN BE ABSORBED IN YOUR MOUTH

- ✦ Fluid and glucose can be absorbed in your mouth, especially under your tongue, where blood vessels are abundant.
- ✦ Running a gel around your mouth is the quickest way to reverse the debilitating fuzziness that we may experience from time to time. **THIS IS A WARNING SIGN.**
- ✦ If you don't get some glucose into your blood quickly, then your brain will continue to make your head woozy and as such, a poor decision maker.

Gut Fact 2

THE OESOPHAGUS

- ✦ The oesophagus is the tube that delivers food and fluid to your stomach.
- ✦ It is also a barometer for how your stomach is going.
- ✦ It has a valve at the lower end (gastro-oesophageal sphincter).
- ✦ This is like a bouncer which should only let food/fluids into the stomach, not out.



Gut Fact 3

THE LARGE BOWEL IS THE SUPER-SUPPER, TAKING UP WATER AND ELECTROLYTE.

- ✦ We have specially formulated sports drinks with electrolytes, as they are easily and quickly absorbed across the membrane wall of the small intestine.
- ✦ Carbohydrates should be in the range of 8-10%.
- ✦ Gastric emptying, the speed at which everything (including water) empties from your stomach, reduces every % point above 10%, depending on some variables which include your weight, intensity, sweat and most importantly the products you are using.
- ✦ Increasing the concentration will slow absorption and cause there to be banking up of fluid and can cause bloating and throwing up in your mouth.
- ✦ This is not the way to maintain intensity, maximise performance and run faster off the bike.

Gut Function & Filtering

- ✦ If you can understand how the stomach works, you'll be a lot closer to getting it right.
- ✦ So how much fluid with how much carbohydrate and electrolyte?
- ✦ Imagine your gut is a filter.
- ✦ It is essentially a water filter, and then an electrolyte and glucose filter. Then, and only then is it a fat and protein filter.
- ✦ Protein is a complex fuel that requires the most time to filter, but sustains you with slow burst energy.
- ✦ Carbohydrates and electrolyte clogs the filter, but not as much as fat and protein.
- ✦ Water should always be added to your gut contents when you consume carbohydrates e.g. gels, etc, etc
- ✦ Throughout the race you need to have an awareness of:
 - Your body sending blood to your skin to maintain body temperature
 - Plus the blood being sent to your muscles at your chosen exercise intensity.
- ✦ This is a complex task when you're going at race pace, but it's the absolute key to racing well.

Gut Threshold Warning Signs

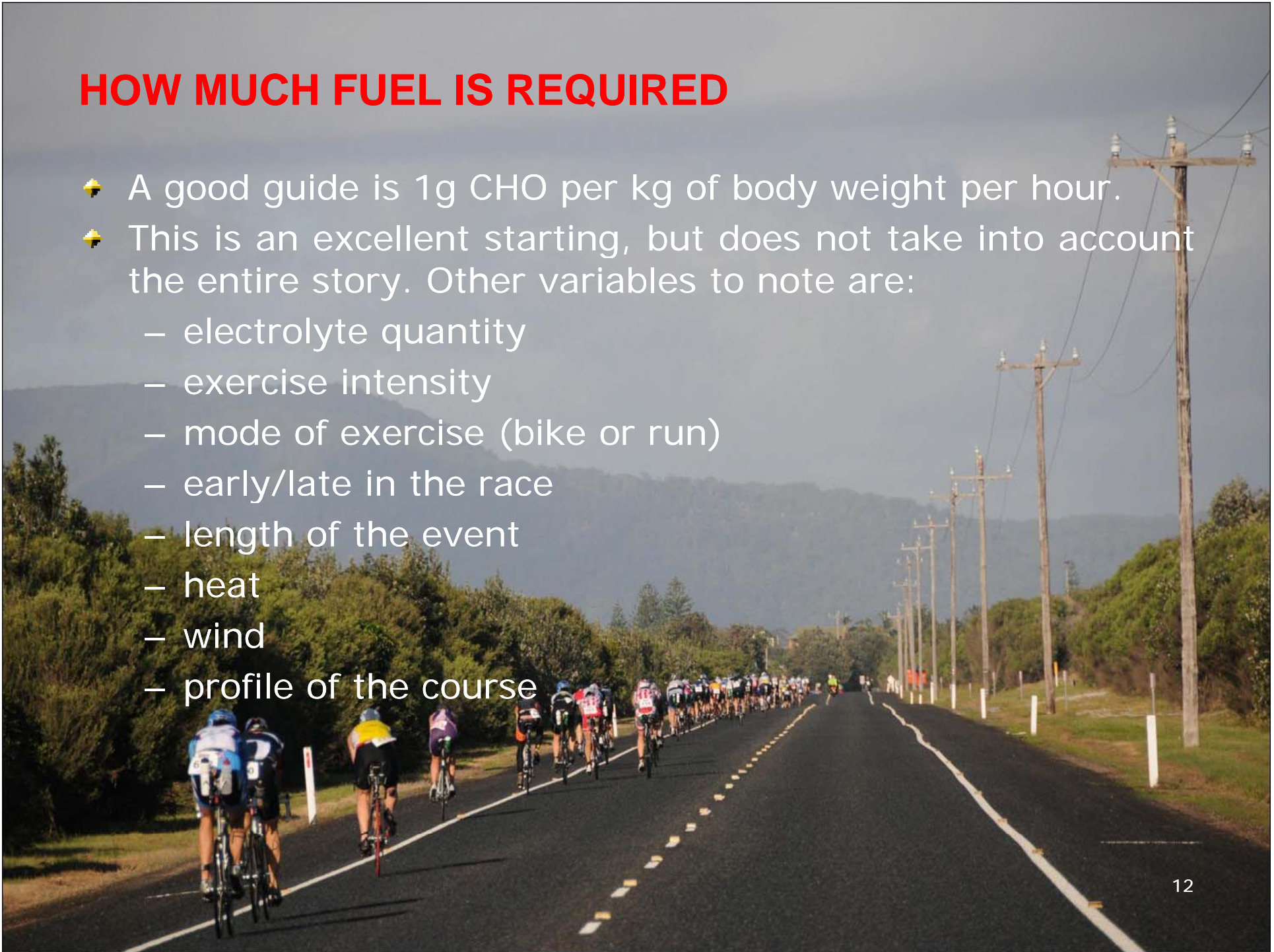
- ✦ When the stomach is full and not emptying as it should, the contents may reflux up the oesophagus (aka throwing up) **THIS IS THE WARNING SIGN**. We've all got that feeling at some point in a race.
- ✦ The stomach also has an expandable fundus, which can grow and grow, when we eat and drink vast quantities.
- ✦ The fundus expands up and makes it feel like it's hard to breath.
- ✦ It feels like that because it pushing on the under-side of your lungs! It gives you the deformed E.T. tummy look.
- ✦ This is not so good if you're racing and trying to get food and fluid into your blood and muscles.
- ✦ **THIS IS ANOTHER WARNING SIGN** - if you're bloated and feel like ET, your gut is not working so well.

GUT RECOVERY STRATEGIES

- ✦ The quicker you can diagnose stomach problems, the sooner you can start the process to unblock the filter.
- ✦ Water helps to unblock the filter by diluting the contents of the gut and flushing the carbs and electrolyte through your system.
- ✦ If you spot it early, STOP your nutrition and hydration and only drink water for a period of time until it starts working again.
- ✦ Slowing down will allow more blood to be sent to your stomach to aid emptying.
- ✦ Slowing down may only need to be for 5-10 mins, which is faster than walking later in the race.
- ✦ If you don't spot the danger signs until your stomach is really bloated then slow down, stop drinking and wait.
- ✦ If you feel alright after ten minutes, then start to add water in small amounts.
- ✦ Keep the brakes on your pace until your gut is tolerating fair doses of water.

HOW MUCH FUEL IS REQUIRED

- ✦ A good guide is 1g CHO per kg of body weight per hour.
- ✦ This is an excellent starting, but does not take into account the entire story. Other variables to note are:
 - electrolyte quantity
 - exercise intensity
 - mode of exercise (bike or run)
 - early/late in the race
 - length of the event
 - heat
 - wind
 - profile of the course



TIPS TO HELP GET IT RIGHT

- ✦ Firstly, remember how the filter works and be careful not to block it.
- ✦ Consider taking some extra sodium (e.g. Lava Salts) prior to the race as it may make a big difference to the efficiency of your gut on race day.
- ✦ The higher your exercise intensity, the more you should be wary about loading carb and electrolyte into your gut.
- ✦ Think about the filter getting finer and more likely to clog if any of the following variables alter:
 - Exercise intensity increases
 - It gets hotter
 - Course is hilly
 - It gets windy
 - Late in the race
 - Race Distance
- ✦ All the above elements compromise the amount of blood you can send to your gut thereby slowing the rate at which it can absorb fluid.
- ✦ Don't shovel it in to a set schedule of 75g per hour, and then get disappointed when your stomach ends up bloated.
- ✦ You should always be questioning yourself about the timing and relating it back to how your body is feeling, not behaving like a regimented soldier.
- ✦ **We all know the feeling when we've eaten too much chocolate cake.**

SUMMARY

- ✦ If you can understand how your stomach works and be able to heed the following warning signs, then half the battle is won:
 - Dizzy/light head
 - Refluxing (vomit)
 - E.T. look
 - Bloating
- ✦ It's not a simple case of following a regimented recipe or timing.
- ✦ Your stomach will have good and bad days.
- ✦ Understanding the ways it works is crucial to racing well
- ✦ If you push your stomach over its threshold, you'll have to slow down.
- ✦ If you get too dehydrated or take in concentrated solutions, then intensity will suffer due to gut shut-down or slowing.
- ✦ Race simulations are highly recommended during training so you can trial your nutrition and hydration strategies.

SUMMARY CONTINUED

- ✦ Carbs give you the instant energy while protein acts as reserve tank of fuel. Together they sustain your energy and increase your endurance.
- ✦ Choose foods low in fats but high in carbs that pack a lot of energy into a small serve.
- ✦ Fat will give you a lot more energy for a smaller amount of food, but during exercise, carbohydrates are your main fuel source because it produces more energy quickly for less oxygen and blood.
- ✦ You can break down fat quite easily, but it takes more oxygen and blood to do it and does it more slowly, so you can't produce the high-intensity bursts of exercise without carbohydrates.
- ✦ Drink appropriate amounts of fluids as you can lose 500ml to 2.5lt an hour depending on the weather conditions, exercise intensity and sweat rates.
- ✦ Manage your gut threshold, so you're always consuming as much water/carb/electrolyte as your gut can absorb.

Presentation Overview Part 2 - Ironman Nutrition & Hydration

- ✦ Nutrition problems in long course triathlons
- ✦ How much do athletes sweat
- ✦ Sodium - water isn't enough
- ✦ Why do some people perform well in a half Ironman and not so well in an Ironman
- ✦ Carbohydrate loading
- ✦ Tips for Ironman racing
- ✦ Summary
- ✦ Testimonial & Tips from Matt Lewis
- ✦ Questions

Nutrition Problems in Long Course Triathlons

Many things can ruin your long course races.

- Not enough fluid
 - Too much fluid
 - Not enough electrolytes
 - Too many carbohydrates or the wrong hourly or inconsistent input
- ✦ Due to the lack of knowledge people end up blaming the products instead of their intake and the timing.
 - ✦ In hot weather your sweat rates will be high, so the carbohydrate content of your stomach should be approximately 8-10%. This concentration will keep you hydrated and maintain your energy levels.
 - ✦ If you exceed 10% in hot conditions for long periods, you risk dehydration and loss of performance. This is because fluid may not empty your stomach fast enough to keep up with your sweating.

Nutrition Problems in Long Course Triathlons Continued

- ✦ The reason, gastric emptying, the speed at which everything (including fluid) empties from your stomach, reduces every % point carbohydrate concentration above 10%. Over a long race in heat, you should stay around the 10% or less or you may find that fluid does not empty fast enough to keep up with sweat loss.
- ✦ This will depend on some variables which include your weight, intensity, sweat and most importantly the products you are using.

Here Are Some Tips to Consider:

- Take carbs at regular intervals e.g. 15-20g every 15-30 mins.
- Calculate your sweat rates and consume adequate amounts of fluid at regular intervals every hour e.g. in hot conditions take a minimum of 1 litre of fluid an hour

Tips to Consider Continued

- ✦ In hot races consider taking extra salt.
- ✦ Try not to starve yourself, the more you can get through your intestine, the more energy you will have.
- ✦ Test your nutrition in training at race pace and adjust if necessary, play with the intake of solids, gels or drink mix to get the required calories.



How Much Do Athletes Sweat?

- ✦ To help develop a fluid intake plan, both during and after exercise, athletes need to know about the magnitude of their sweat losses.

How Can Sweat Losses Be Estimated?

- ✦ The most practical way to monitor sweat loss is to measure changes in body weight, pre and post-exercise.
- ✦ Each kilogram of weight loss is approximately equal to one litre of fluid deficit.
- ✦ Total sweat loss can be estimated by adding the weight of any food or drinks consumed during the session to this post session weight change.
- ✦ Dividing the total sweat loss by the duration of exercise will provide an estimation for the rate of loss.

How Much Do Athletes Sweat Continued

For example:

Pre-exercise weight	55kg
Post-exercise weight	53.5kg
Volume of fluid consumed during Exercise (1 litre)	1kg
Exercise duration	2 hours

Calculations:

Fluid deficit (L) = 55kg – 53.5kg = 1.5kg

Total sweat loss (L) = 1.5kg + 1kg = 2.5kg

Sweat rate (L/h) = 2.5kg/2 hours = 1.25 L/h



How Much Do Athletes Sweat Continued

Do Sweat Rates Vary Among Athletes?

- ✦ Yes. Individual sweat rates and fluid losses vary widely. Body size, gender, exercise intensity, environmental conditions and individual metabolism all effect sweat losses.
- ✦ The best way to calculate your sweat rates is to actually monitor your losses over a number of sessions under similar conditions.

Do Men Sweat More Than Women?

- ✦ In general women sweat less than men. Since women's sweat rates are lower, providing less opportunity to dissipate body heat, body heat may actually rise more in women during exercise.

Sodium - Water Isn't Enough

Are You Getting Enough Salt?

- If you drink water eventually you will deplete the natural salts in your body.
- If you deplete these salts then you will end up suffering from symptoms of hyponatremia.
- Salt also assists with carbohydrate absorption so if you don't have any, then your fuel source of carbs will not work.
- Sodium chloride is needed to replace sweat losses.
- ✦ Sweat contains 15-50 meq Na (blood sodium concentration content) per litre (approximately 1 gram) and you can lose anywhere from 2-4 litres per hour while exercising, so salt losses can be significant (up to 4 grams) in prolonged exercise.

Sodium - Water Isn't Enough Continued

- ✦ For endurance athletes (especially in hot and humid conditions), it is reasonable to plan to take up to a maximum of 1 gram (1,000 milligrams) of sodium per litre of fluid loss.
- ✦ Sodium chloride facilitates carbohydrate absorption. The main reason electrolytes are added to sports drinks is that the glucose transporter is sodium dependent, i.e. it needs sodium to work. Even if you don't take sodium with the drink the intestine secretes sodium to do the job up to a certain level.

Definitions

- ✦ Hyponatremia = Water and sodium are both lost from the body, but the sodium loss is greater
- ✦ Meq = one-thousandth of an equivalent
- ✦ Na = sodium

Why do some people perform well in a Half Ironman and not so well in an Ironman?

- ✦ The average person has approximately 2000 calories stored in their body.
- ✦ The average athlete will burn approximately 500 calories per hour during an aerobic endurance event.
- ✦ The majority of the field will reach the finish line 4-6 hours.
- ✦ Based on the body stores, the majority of athletes will have adequate carbohydrate stores in their body for the race and may only need to consume a minimal amount of carbohydrates throughout the race.
- ✦ The average athlete will burn approximately 5000-7000 calories during an Ironman. Taking into account the bodies carbohydrate stores, an adequate nutrition plan is vital for an Ironman. An adequate plan will allow you to maintain a consistent pace throughout the race.

Carbohydrate Loading

- ✦ Carbohydrate loading is a strategy involving changes to training and nutrition that can maximise carbohydrate stores prior to an endurance race. The technique was developed in the 1960's and involved a 3-4 day depletion phase, followed by a 3-4 day loading phase.
- ✦ Ongoing research has refined the method and carbohydrate loading is now more manageable.

Does carbohydrate loading improve performance?

- ✦ Muscle glycogen levels are normally in the range of 100-120 mmol/kg ww (wet weight).
- ✦ Carbohydrate loading enables levels to be increased to around 150-200 mmol/kg ww.
- ✦ Research has shown that this extra supply has improved endurance exercise performance, by allowing you to maintain your pace for a longer period of time.
- ✦ Carbohydrate loading can improve performance by 2-3%.

Carbohydrate Loading Continued

How do modern day athletes carbohydrate load?

- ✦ Ongoing research has demonstrated that the depletion stage is no longer required. Today, 1-4 days of exercise taper while following a high carbohydrate diet is sufficient to elevate muscle glycogen levels.

What are the common mistakes when carbohydrate loading?

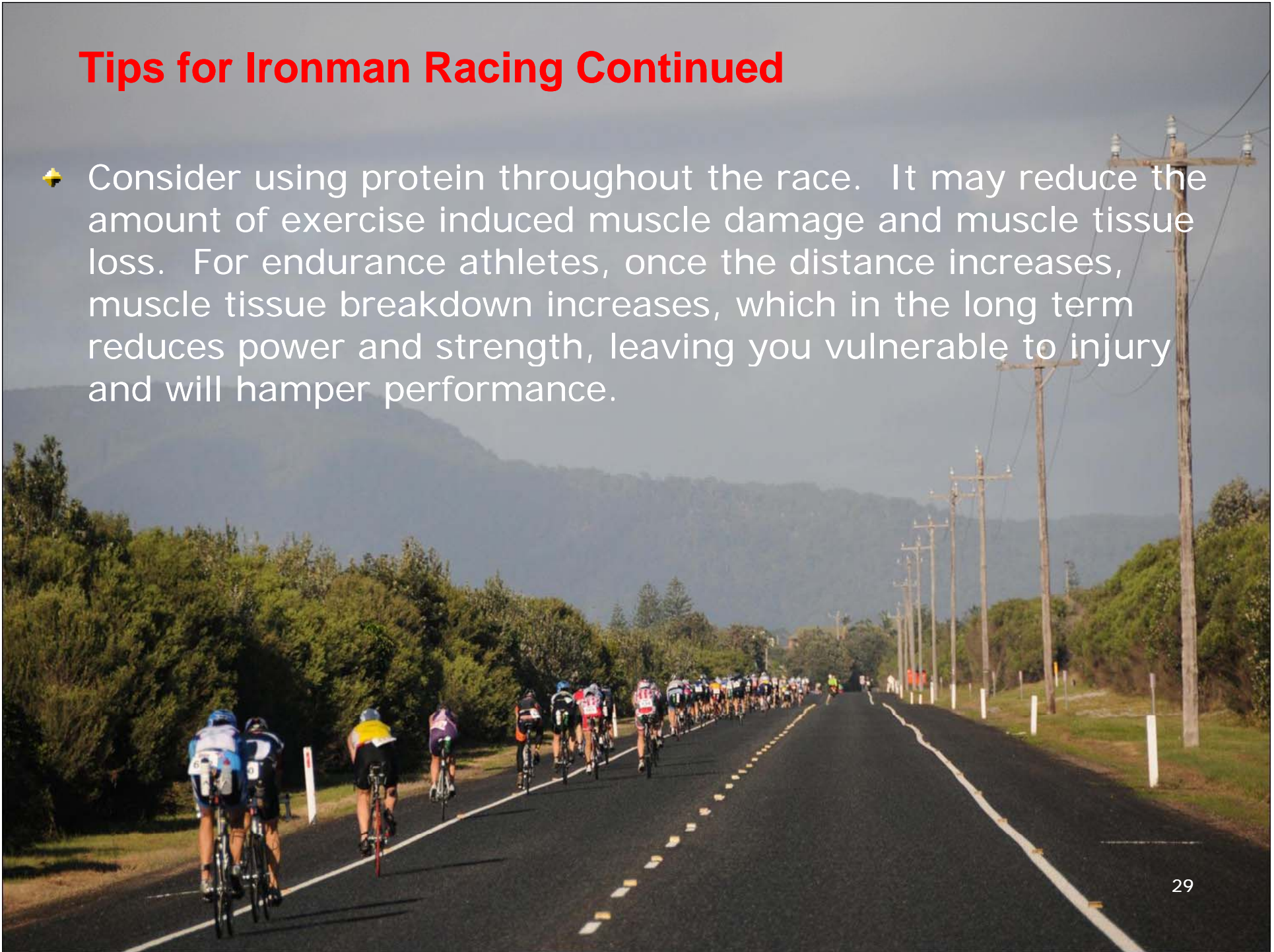
- ✦ Carbohydrate loading requires an exercise taper. Failing to taper will compromise carbohydrate loading.
- ✦ Failing to eat enough carbohydrates.
- ✦ It will be necessary to cut back fibre and consume compact sources of carbohydrates e.g. sugar, cordial, soft drink, sports drinks, jam, honey, jelly and tinned fruit to name a few.
- ✦ Include too many high fibre foods at this stage and you may suffer an upset stomach or find the food too bulky to consume.
- ✦ Carbohydrate loading is not an excuse to eat everything and anything in sight.
- ✦ Too many high fat foods may also result in a gain of body fat. Stick to high carbohydrate, low fat foods during this phase.

Tips for Ironman Racing

- ✦ Consume at least 800-1000 calories before the race. Consume a gel 20-30 mins before race start. This type of strategy will allow you to get the calories in without feeling bloated. Try it before race day.
- ✦ Have your proven nutrition strategy worked out, stick to it and make sure your strategy involves eating something throughout the bike and run at least every 15-30 mins. Quantity depends on your body weight, exercise intensity.
- ✦ Make sure you have tried the quantity of fuels you are putting in under race conditions and adjust depending on your heart rate and intensity during the race i.e. if you slow down you must reduce what you are putting in.
- ✦ Consume mainly sports drinks during the race and take water with carbohydrates.
- ✦ Consider taking extra sodium (e.g. lava salts) because no drink on the market will have enough sodium in it, if it is a hot day. Quantity will depend on your sweat rates.

Tips for Ironman Racing Continued

- ✦ Consider using protein throughout the race. It may reduce the amount of exercise induced muscle damage and muscle tissue loss. For endurance athletes, once the distance increases, muscle tissue breakdown increases, which in the long term reduces power and strength, leaving you vulnerable to injury and will hamper performance.



SUMMARY

- ✦ A good starting point is 1g of carbohydrates per kg of body weight per hour.
- ✦ Make sure your strategy involves eating something throughout the bike and run at regular intervals (e.g. every 15-30 mins).
- ✦ Consume carbohydrates with water.
- ✦ Practice your race strategy in the lead up to race at perceived race pace. If change is necessary, only make one change at a time, to determine what does and doesn't work.
- ✦ If your stomach becomes unsettled, limit carbohydrate intake for a period of time and drink water to dilute the content of your stomach for a short period of time.
- ✦ Consistent input of carbohydrates throughout the race, will maintain your energy levels and pace for the entire race.
- ✦ Calculate your sweat rates in similar conditions to determine your average sweat rates.
- ✦ Consider taking extra sodium because no drink on the market will have enough sodium in it, if it is a hot day. Quantity will depend on your sweat rates.

Testimonial & Tips from Matt Lewis



Questions



Contacts

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References

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- ✦ Eating Like a Champ by Alan McCubbin