

International Chair
for Advanced Studies
on Hydration



Cátedra Internacional
de Estudios Avanzados
en Hidratación

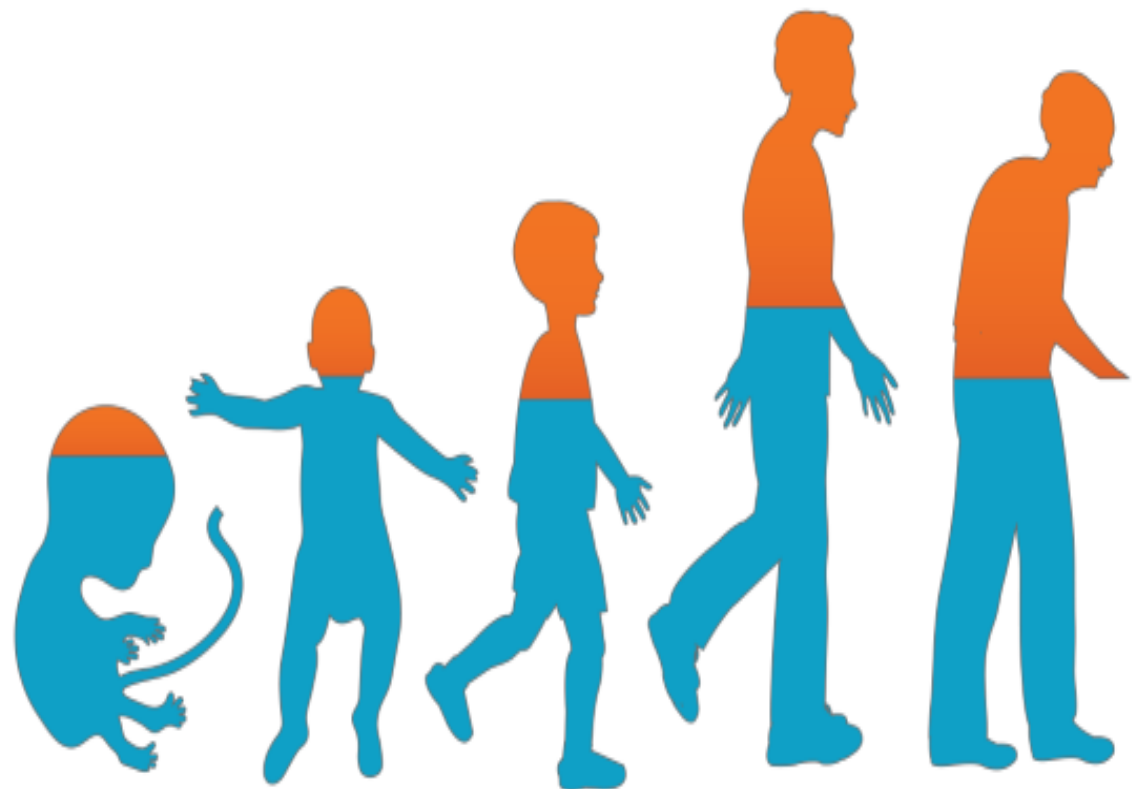
**The effects of hydration before, during and after sports competition:
the case of football**

Sérgio Cunha Velho - Pediatric Hospital of Coimbra, Portugal

I INTERNATIONAL WORKSHOP: ADVANCED STUDIES ON HYDRATION

19th – 20th January 2017, Gran Canaria Meeting

Water: an essential element for life



Do not turn your back on

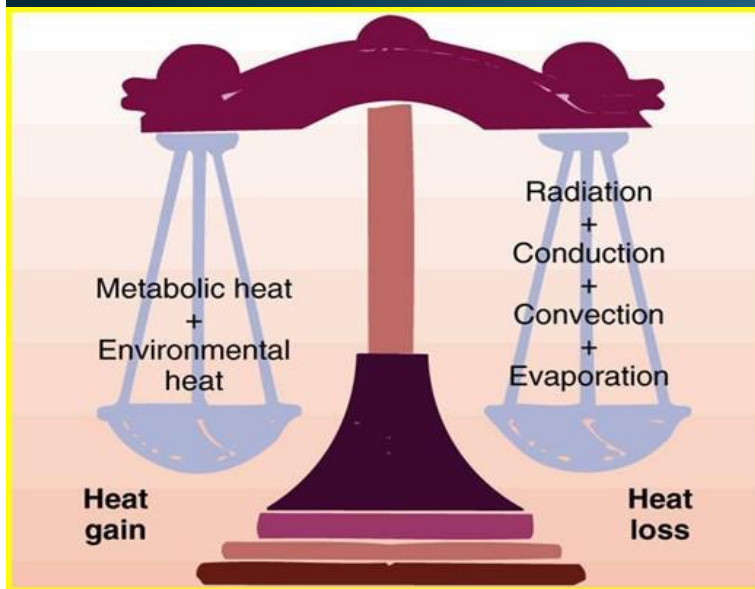
Why is a good hydration so important?

- Water is the major component of the human body.
- Water is the main way of transport used by the body to carry nutrients to cells and excrete the metabolic residues.
- Water maintains the hydroelectrolytic balance, ensuring the suitable functioning of the organism
- Water is indispensable to ensure the enzymatic reactions in the human body
- Water is essential for joint lubrication
- Water is an indispensable thermal regulator

Thermoregulation

Thermoregulation can be understood as a set of mechanisms that allows the regulation of the internal body temperature of an organism, so as to keep it within values compatible with life when the temperature of the external environment changes.

It's promoted by acclimatization



**1 liter of sweat
=
+/- 580 Kcal**

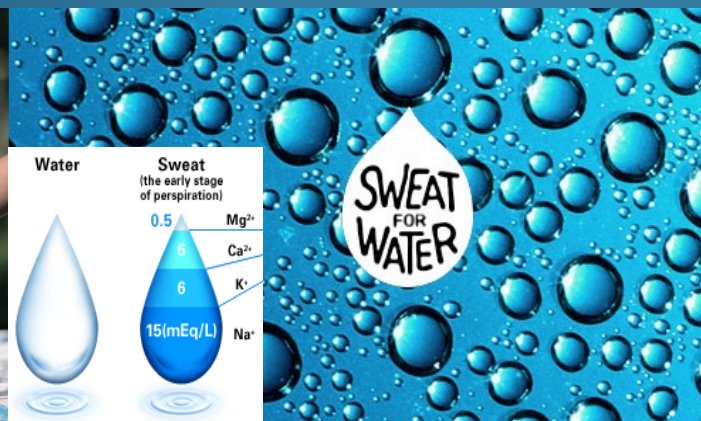
Heat Loss During Rest and Prolonged Exercise				
Mechanisms of Heat Loss	Resting % total	Resting Kcal/min	Exercise % total	Exercise Kcal/min
Conduction and convection	20	0.3	15	2.2
Radiation	60	0.9	5	0.8
Evaporation	20	0.3	80	12

Sweat composition

Sweat is largely formed by water, which accounts for about 99% of its composition. The remaining 1% corresponds to the concentration of sodium, chlorine, potassium and magnesium.

The osmolarity of this solution varies between 80-185 mOsm/l being almost half of the osmolar plasma concentration

During exercise, an excessive sweating can decrease the amount of sodium and chloride by 5-7% and potassium by 1%. Therefore it must be replaced in order to prevent deficit levels.



Sweating and sports performance

The function of sweating is to reduce the temperature of the body, leaving it around 36.5 ° C.

However, it's worth noting that sweat alone does not refresh the body, so it's necessary to evaporate it

The higher the temperature and the more humid the air, the slower the evaporation of sweat is

Never put water on your body during training/competition

According to the World Health Organization the ideal level of humidity for the human body, ranges from 40% to 70% .

Physical performance and environmental conditions: 2014 World Soccer Cup and 2016 Summer Olympics in Brazil

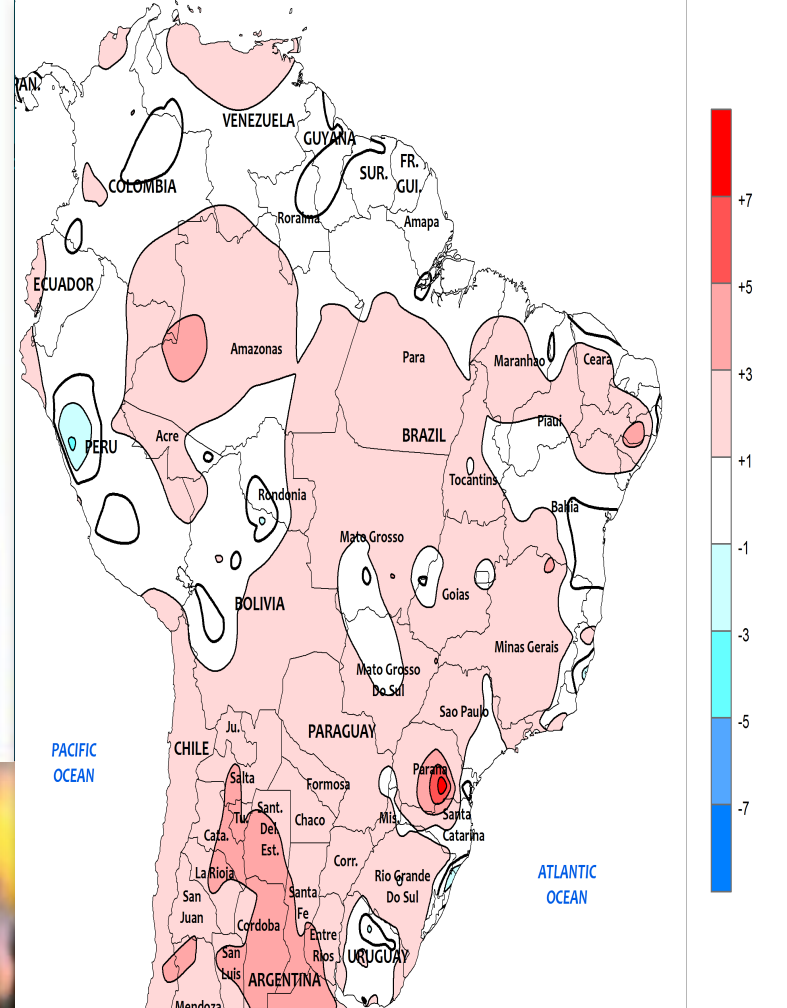
Christiano E Veneroso¹, Guilherme P Ramos^{2,3}, Thiago T Mendes^{1,2}, and Emerson Silami-Garcia^{1,2,*}

¹Department of Physical Education; Federal University of Maranhão – UFMA; São Luís, MA, Brazil; ²Exercise Physiology Laboratory (LAFISE); Federal University of Minas Gerais – UFMG; Belo Horizonte, MG, Brazil; ³Exercise Physiologist for the Brazilian Soccer Confederation (CBF); Rio de Janeiro, Brazil

A hot and humid environment imposes a great challenge to the human thermoregulation system, which can lead to performance decrements, and can increase the risk of developing hyperthermia.

Adequate hydration, acclimatization, and body cooling strategies are effective interventions to minimize the risks associated with exercise in the heat.

Heat acclimatization can be achieved after 6 – 10 days of training in the heat, with a targeted minimal deep body temperature of 38.5 C for at least 30 minutes in each training session.



#	▲	Grupo G
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CHAMPIONS!



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Every athlete who aims to achieve a performance of excellence, must hydrate well before, during and after training / competition

Therefore...



Do not turn your back on hydration

Nutritional Assessment

Starting point for the knowledge of body composition, eating habits, detecting errors and nutritional deficiencies.

The nutritional assessment has, in the careful anamnesis, the opportunity to establish a reciprocal cooperation between the athlete and the Nutritionist, which will allow favorable changes to optimize the sportive performance and hinder the risks of illness or injury.

Evaluation of Nutritional Profile

To evaluate it's necessary to collect individual data:

- a) Antropometric
- b) Bioquimic / Immunological
- c) Clinical / Physical
- d) Dietetic and Medical (Clinic history)



Assessing Hydration Status

Total: 25 Athletes



5 Athletes: 1 to 1,5 L

slight dehydration



3 Athletes: 0.5 to 1 L (a)

Slight overhydration

urine specific gravity: 1.010

Unnecessary additional weight, drinking too much water during exercise may predispose to exercise-associated hyponatremia (i.e. too low sodium levels in the bloodstream), a clinical condition characterized by the worsening of symptoms including headaches, vomiting, sweats at the extremities, fatigue, confusion and disorientation.

(a) Horsetail + Birch **extracts**

Factors that can influence hydration


- **Physiological factors:**
Body composition, genetic predisposition
metabolic rate and current hydration status
- **Environmental factors:**
Exercise intensity and duration, environmental
conditions, worn equipment and clothing and
acclimation
- **The osmolality, temperature and pH of beverages**
- **Nutritional composition of beverages**

Markers of hydration status.

Shirreffs SM¹.

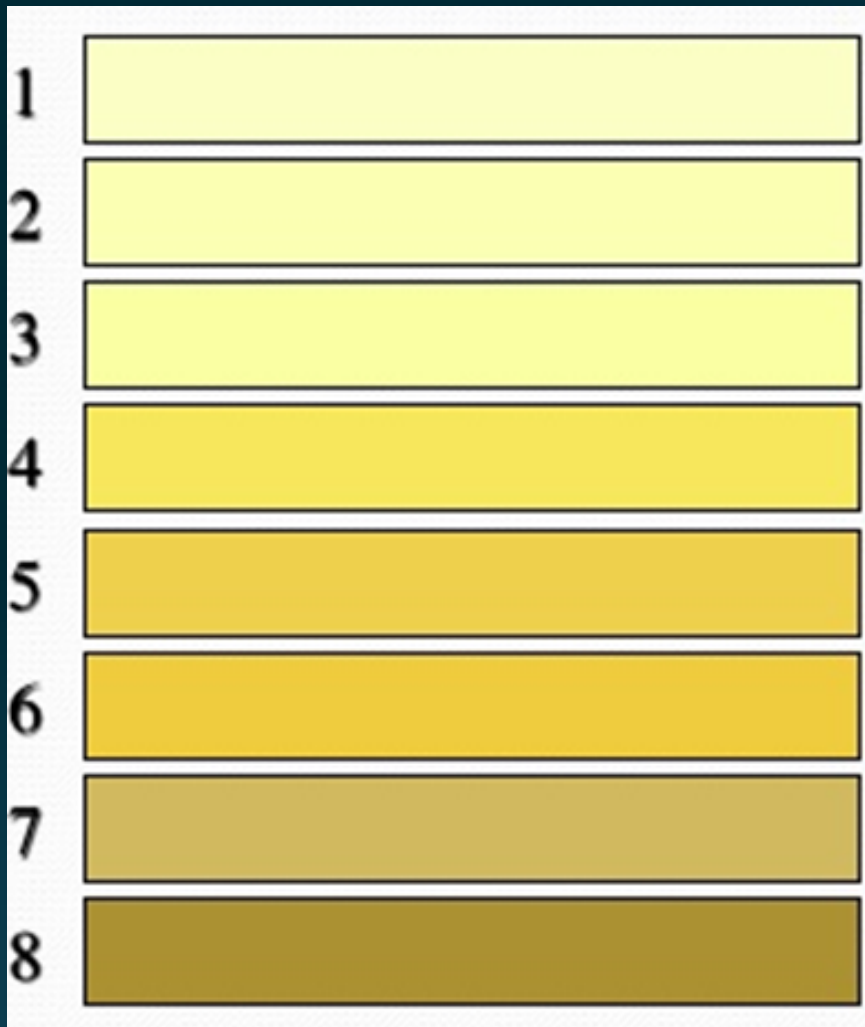
There are several methods available to evaluate hydration status, with each having limitations depending on how and when the fluids are lost.

The most widely accepted and recommended methods include:

- monitoring body mass changes
- measuring plasma osmolality
- urine specific gravity  1.013–1.029. ≥ 1.030 suggests dehydration and 1.001–1.012 may indicate over-hydration
- **color**

How do Athletes monitor hydration and rehydration?

➤ Urine Color Chart : Assess Hydration



Well Hydrated : 1, 2 or 3

Dehydrated : 4 or Darker

Urine color is an acceptable way to estimate hydration status in athletic or research settings when a high precision may not be needed or where self-assessment may be required.

Armstrong et al. (1998)



SPORTING CLUBE DE BRAGA Época de 2010/2011

A hidratação é fundamental para um bom rendimento desportivo e para evitar lesões.

Formas rápidas e fáceis de auto-avaliação do estado de hidratação

→ Através do **controlo do peso.**

Pese-se antes e após o treino/ competição. Se a perda de peso for superior a **3%** do peso inicial, o estado de desidratação pode ser considerado grave.

→ Através da **cor da urina após o treino/competição.**

Cor escura e pouca quantidade significam que o atleta continua desidratado, pelo que deve continuar a ingestão de líquidos

A perda do vosso rendimento poderá atingir os 20% se houver uma desidratação que represente 2% do peso corporal, podendo atingir os 60% se a perda de água representar 4% deste peso" Dr. José Manuel Constantino.

Se a desidratação representar mais do que 3% do peso corporal,

Verifica-se uma redução do volume sanguíneo, o débito cardíaco baixa e o sangue chega mais dificilmente aos músculos e à pele que dissipa o calor produzido, dificultando ainda mais as já difíceis condições de arrefecimento, dificultando o rendimento físico e aumentando o risco de lesões.

BEBA FREQUENTEMENTE E POUCA QUANTIDADE DE CADA VEZ.
NÃO ESPERE TER SEDE PARA BEBER.

Individual practice
recommendation
for
hydration



Evaluation of nutritional status and energy expenditure in athletes

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Football is a sport with very peculiar characteristics regarding hydration, mainly because it doesn't have frequent breaks.

The ingestion of liquids during exercise is extremely beneficial for the player, since it will minimize the effects of dehydration.

With dehydration, physical and cognitive performance may decrease and the possibility of contracting muscle injuries increases.

Simple loss of 1 to 2% (mostly in hot environments) of body weight during exercise can impair an athlete's performance about 10 %.

To prevent this from occurring, it is necessary to educate players about the importance of drinking liquids before, during and after exercise.



The purpose of rehydrating is to replace what has been lost in amount and composition.



How do sports drinks help the athletes' body ?

- Hydration
- Electrolyte replenishment
- Easy to digest / tolerated during intense activity
- Provide fuel (carbohydrate) to increase glycemia and delay fatigue
- Reduce lean tissue breakdown

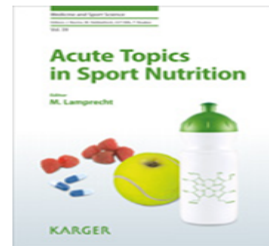
Characteristics of Sports Drinks before, during and after training

Nutrición Hospitalaria  Nutr Hosp. 2015;31(5):1889-1899
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S.V.R. 318

Revisión
Hydration and chemical ingredients in sport drinks: food safety in the European context
 Aritz Urdampilleta^{1,2}, Saïoa Gómez-Zorita³, José M. Soriano⁴, José M. Martínez-Sanz⁵, Sonia Medina⁶ and Angel Gil-Izquierdo⁶

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Before	During	After
Isotonic or slightly hypotonic	Isotonic	Slightly hypertonic
4 – 6 % Sugars	6 – 8 % Sugars	9 – 10 % Sugars
0,5 – 0,7g Na+/L	0,7 – 1,2g Na+/L Longer than 1 hour or under heat stress	1 – 1,5g Na+/L



Lamprecht M (ed): Acute Topics in Sport Nutrition. Med Sport Sci. Basel, Karger, 2013, vol 59, pp 127–134 (DOI:10.1159/000341954)

Chocolate Milk: A Post-Exercise Recovery Beverage for Endurance Sports

Pritchett K. · Pritchett R.

Department of Nutrition Exercise and Health Sciences, Central Washington University, Ellensburg, Wash., USA

Chocolate milk has become an affordable recovery beverage for many athletes, taking the place of more expensive commercially available recovery beverages. Low-fat chocolate milk consists of a 4:1 carbohydrate: protein ratio (similar to many commercial recovery beverages) and provides fluids and sodium to aid in post-workout recovery.

Consuming chocolate milk ($1.0\text{--}1.5\text{g}\cdot\text{kg}^{-1}\text{ h}^{-1}$) immediately after exercise and again at 2 h post-exercise appears to be optimal for exercise recovery and may attenuate indices of muscle damage.

Chocolate low fat milk/ Sports drinks

Nutritional composition / 250 ml

	Chocolate Low Fat Milk	Gatorade Thirst Quencher	Gatorade Endurance Formula	Accelerade
Kcal	160	52	53	85
Protein (g)	8,5	0	0	4
Fat (g)	2,8	0	0	0
Carbohydrate (g)	25,5	15	15	16
Sodium (mg)	142	115	211	127
Potassium (mg)	449	31	95	16

BEYOND HYDRATION...



Sporting Clube de Braga

JANTAR (servido entre as 19:45 / 20:00 horas)

1 - Alimentos fornecedores de Hidratos de Carbono; **Cartão Verde duplo**
Arroz, massa, pizza, lasanha, batata (só deve ser consumida assada/ a murro).

Com MUITA MODERAÇÃO: **Cartão Amarelo Duplo** :
Leguminosas Secas: Feijão, Ervilhas

Evitar batata frita, cozida ou sob a forma de puré : **Cartão Vermelho**

Pão: idealmente tostas ou pão de mistura

Evitar Broa ou pão integral: **Cartão Vermelho**

2 - Alimentos fornecedores de proteínas de alto valor biológico: **Cartão Verde**
Carne de aves (não devem comer as peles): Frango, pato, peru, avestruz.
Peixes: todos
Ovos: Cozidos ou escalfados

Com moderação: **Cartão Amarelo**
Carnes Vermelhas, omeletas/ovos mexidos

3 - Alimentos ricos em Fibras, Vitaminas e Sais Minerais: **Cartão Verde**
Frutas.
(Evitar os Kiwis ao Jantar)

Com moderação: **Cartão Amarelo** e **Cartão Verde** . Colocar os dois
Hortaliças e Saladas. São muito ricas em fibras e, por isso, um consumo muito elevado, pode impedir a ingestão adequada de Alimentos ricos em Hidratos de Carbono. Mas, para quem tiver tendência à obstipação...cartão verde

4 - Sobremesa (doces): **Cartão Verde**
Aletria, arroz doce, gelatinas, tartes... doces em geral sem cremes e fruta assada

Com moderação: **Cartão Amarelo**
Leite Creme e doces em geral com recheio

5 - Bebidas: **Cartão Verde**
Água, Sumos Naturais, Néctares
Com MUITA MODERAÇÃO: **Cartão Amarelo Duplo**
Coca Cola, Ice Tea... refrigerantes em geral



Sporting Clube de Braga

Ceia (Servida às 22h45/23h):

Alimentos com função de hidratação e fornecimento de Hidratos de Carbono **Cartão verde**
Chá ou 1 copo de leite ou 1 sumo natural Pode adicionar-se um pouco de açúcar (sacarose) ou Maltodextrinas

Torrada de pão de forma, biscoitos variados. Bolachas de aveia ou torrada: **Cartão verde**
Manteiga: **Cartão Amarelo**
Geleias, compotas, marmelada: **Cartão Verde**

Pequeno-almoço (Servido às 9h45/10h):

Alimentos fornecedores de Hidratos de Carbono: Pão torrado (fino ou de mistura), Tostas, Cereais, Bolachas (Aveia ou Torrada), Biscoitos, natas e Croissants. **Cartão Verde**
Fruta, marmelada, geleia, mel, compotas... **Cartão Verde**
Leite, iogurtes, sumos naturais e água: **Cartão Verde**
Queijo, fiambre, paio... **Cartão Amarelo**

Almoço (Servido às 13h15/13h30):

Esta refeição deve ser evidentemente agradável, mas com pouca quantidade de gordura e fibras e rica em Hidratos de Carbono.

Alimentos fornecedores de Hidratos de Carbono: **Cartão Verde duplo**
Arroz, massa (Talhaire é a melhor), pizza com ingredientes com pouca gordura. Pão fino
Carne: apenas aves **Cartão Verde**
Peixe: todos, excepto bacalhau. A digestão é muito prolongada, podendo atingir as 6/7 horas
Fruta rica em potássio e magnésio: banana, laranja ou **salada de fruta**
Sumos naturais, simples ou tipo "tuti-fruti" **Cartão Verde**

Sobremesa (doces): **Cartão Verde**
Aletria, arroz doce, gelatinas, tartes... doces em geral sem cremes e fruta assada

Com moderação: **Cartão Amarelo**

Saladas e vegetais cozidos e café

A não consumir: Cartão vermelho
Carnes vermelhas, batatas, pão integral e refrigerantes
Fritos, alimentos com molhos
Refrigerantes



**For the 1st time in its history,
Sporting Clube de Braga
arrived at a European final**





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