

# Understanding the composition of sports recovery drinks, a necessity for adequate prescription

## *Conocer la composición de las bebidas de reposición para el deporte, una necesidad para una adecuada prescripción*

**Rafael Urrialde de Andrés**

*Presidente de la Comisión Científica de la Sociedad Española de Medicina del Deporte.*

*Profesor Asociado de la Unidad Docente de Fisiología Vegetal del Departamento de Genética, Fisiología y Microbiología de la Facultad de Ciencias Biológicas de la Universidad Complutense de Madrid.*

*Profesor Asociado de Seguridad Alimentaria del Departamento Ciencias Farmacéuticas y de la Salud de la Universidad San Pablo CEU de Madrid.*

*Profesor Colaborador Honorífico de Nutrición de la Facultad de Enfermería de la Universidad de Valladolid.*

*Académico Correspondiente de la Real Academia Europea de Doctores.*

*Vocal Honorífico de Alimentación del Consejo General de Colegios Oficiales de Farmacéuticos.*

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For more than 30 years, research in the field of rehydration and recovery has been one of the priorities in the area of sports medicine, especially in sports practice. Such research has explored glucose, sodium and other minerals and vitamins, for example, focusing on a rapidly absorbable source of carbohydrates, such as glucose, sucrose or dextrins. It has also looked into sodium salts and other minerals. All of this in order to help achieve an adequate level of physical performance with an optimal supply of water and nutrients that are necessary for energy metabolism and human physiology in sports practice.

In this context, over the past 20 years, scientific consensus has been achieved in the European Union and its member countries, which have come to establish, based on scientific evidence, the necessary composition of recovery drinks. In 2001, the Scientific Committee on Food of the Directorate-General for Health and Consumers of the European Commission established a position (*Composition and specifications for carbohydrate-electrolyte solutions*) in which the composition requirements of a recovery drink were collected based on scientific evidence. According to this report, carbohydrates should be the majority source of energy in such beverages and they should be effective in maintaining and restoring hydration status. To achieve this, beverages should contain not less than 80-kcal/1000 ml and not more than 350 kcal/1000 ml, with at least 75% of the energy being carbohydrates with a high glycemic index such as glucose, dextrins and sucrose. These beverages must contain between 460 – 1,150 mg/1,000 ml of sodium. The composition must cover an osmolality range between 220 and 330 mOsm/kg of water, being considered an isotonic drink when in the range of +/- 10%, i.e. 270 – 330 mOsm/kg of water.

In 2015, a technical report by the *European Food Safety Authority* ratified the 2001 report of the *Scientific Committee on Food*. Particularly as concerns recovery drinks, the former underlined the role of hydration and carbohydrate supplementation in maintaining physical performance during high-intensity physical exercise, as well as the role of electrolytes (specifically sodium) in maintaining adequate hydration during physical exercise and for rehydration afterward. In addition, it reiterated the importance of other related nutrients with other physiological aspects such as thiamine (vit B1), pyridoxine (vit B6), long-chain polyunsaturated fatty acids, caffeine, and creatine as ergogenic aids.

In 2016, Pöschmüller *et al.* performed a systematic review and meta-analysis on the beneficial effects of carbohydrates with performance trials in randomized controlled competitions. They concluded that carbohydrates in a concentration range of 6-8% had a beneficial effect on male cyclists and that more research was needed as regards a wide variety of other exercises of a duration less than 90 minutes.

In line with the scientific evidence and the positioning of Food Safety authorities, the recommendations regarding the usefulness of recovery drinks with carbohydrates in sports and on the composition and guidelines for fluid replacement have been established and approved based on the consensus on sports drinks by Sports Medicine Societies in different countries.

In 2012, Manonelles P. established that athletes' hydration is a fundamental aspect within the different and diverse strategies to improve physical performance and avoid health problems. However, it is fitting to also keep in mind the important role of the temperature and relative humidity of the environment, since hydration guidelines are clearly

**Correspondence:** Rafael Urrialde  
E-mail: rurriald@ucm.es

modified as a result of such environmental conditions in certain sports and performance areas.

Sweating, as well as prolonged exertion, causes both losses of fluid and electrolytes that must be compensated through replacement drinks. Additionally, it requires the use of energy substrates that decrease and deplete muscle glycogen reserves. It is, thus, essential to account for both of these factors, ensuring that beverages have a specific composition to produce the desired effect of providing water, carbohydrates and electrolytes to athletes.

To be optimal, they must be used in suitable amounts and proportions in accordance with the type of physical effort, its duration and intensity. The aim being to guarantee an improvement in sports performance and avoid potential physiological problems and even pathologies related to heat.

In 2008, the Spanish Society of Sports Medicine, through its nutrition group, established a consensus on 5 general recommendations for fluid replacement composition and guidelines, in line with what had been established by the *Scientific Committee on Food* of the European Union. However, that consensus diverged from the latter as related to its recommendations for the time for fluid replacement, be it during sports practice or thereafter. The importance of hydration and carbohydrate and electrolyte replacement through beverages was highlighted, the values of which must appear on beverage labels. Their caloric value is recommended to be between 8/kcal/100 ml and 35 kcal/100 ml of which at least 75% must come from high glycemic load carbohydrates. Sodium content is recommended to be within the range of 46 mg/100 ml and 115 mg/100 ml. Osmolality should be between 200-330 mOsm/kg of water and always below a maximum of 400 mOsm/kg, with at least 75% provided by high glycemic load carbohydrates. Sports drinks used for immediate post-effort consumption must also have an amount of

sodium ion between 92 mg / 100 ml and 115 mg / 100ml and a potassium intake in the range of 2-6 mmol/l. The conditions of osmolality should be the same as for beverages consumed during sports practice.

Indisputably, it seems that the scientific evidence on the requirements for replacement drink composition is clear, and not only thanks to the opinion of the scientific community. Indeed, in the European Union, the European Food Safety Authority has approved three health claims related to these properties, which the Commission, the Parliament and the Council included in Regulation 432/2012, either at the time of its publication or subsequently via amendments of that Regulation. As a result, health claims of such beverages can only be made if a beverage falls within the composition guidelines established in the applicable legislation, and under the conditions stipulated therein. Table 1 compiles these health claims and the conditions under which they can be considered to be met.

## Conclusion

There is scientific evidence related to the ideal composition of replacement drinks both during and after training or competition. This scientific evidence has been approved by the *European Food Safety Authority* and included in Regulation 432/2012. The latter establishes a list of permitted health claims that can be made on foods, other than those referring to the reduction of disease risk and to children's development and health. It is essential to continue researching the composition of replacement drinks according to the physical exercise carried out, both by type of sports activity, duration, and intensity, while also taking into account different environmental conditions. Replacement drinks can be supplemented with other nutritional contributions and bioactive

**Table 1. Health claims permitted by Regulation 432/2012.**

<b>Carbohydrate-electrolyte solutions</b>	
Carbohydrate-electrolyte solutions contribute to the maintenance of endurance performance during prolonged endurance exercise	In order to bear the claim carbohydrate-electrolyte solutions should contain 80-350 kcal/L from carbohydrates, and at least 75 % of the energy should be derived from carbohydrates which induce a high glycaemic response, such as glucose, glucose polymers and sucrose. In addition, these beverages should contain between 20 mmol/L (460 mg/L) and 50 mmol/L (1,150 mg/L) of sodium, and have an osmolality between 200-330 mOsm/kg water.
Carbohydrate-electrolyte solutions enhance the absorption of water during physical exercise	
<b>Carbohydrate solutions</b>	
Carbohydrate solutions contribute to improved physical performance during high-intensity and prolonged physical exercise in trained adults	The claim may be used only for carbohydrate solutions which, in accordance with the instructions for use, provide between 30 and 90 g of carbohydrates per hour, where the carbohydrates concerned are glucose, sucrose, fructose or maltodextrin, under the following conditions: –Fructose (from fructose or sucrose) should not account for more than one third of all carbohydrates, and –Glucose (from glucose, sucrose or maltodextrin) should not exceed 60 g/h. The consumer shall be informed that only trained adults performing high-intensity (at least 65 % of VO <sub>2</sub> max) and long-term (at least 60 min) physical exercise obtain the beneficial effect.

compounds that can provide an ergogenic aid. For all these reasons, it is essential that in all sports activities – and in the acts related to them – the drinks that accompany them must be replacement drinks. This is important both to facilitate adequate nutritional education in athletes and to be able to develop messages consistent with the nutritional recommendations and the physiological activities in which they are involved. There are components that are not recommended, such as carbon dioxide and alcohol and any other one that is not included within the composition guidelines. Moreover, these are also inherent and binding characteristics of a mutually exclusive character. All drinks that contain such properties, in addition to “zero” or “without” drinks, should not be presented as beverages related to hydration, replenishment and sport.

Editorial written based on the statement recently released by the Spanish Society of Sports Medicine on replacement drinks in sport.

[www.femede.es/documentos/Comunicado\\_sobre\\_bebidas\\_en\\_el\\_deporte.pdf](http://www.femede.es/documentos/Comunicado_sobre_bebidas_en_el_deporte.pdf)

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