PA.
RESUMOS PALESTRAS

NUTRITIONAL MODULATION OF IMMUNITY

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The role of the immune system is to protect the individual against pathogenic organisms (i.e., harmful bacteria, viruses, fungi and parasites): it is a primary defence system for the body. People with weak immune systems have increased risk of becoming infected and of infections being more severe, even fatal. Many factors determine an individual's immune response and amongst these nutrition plays a role. Undernutrition, micronutrient deficiencies and obesity all weaken many aspects of the immune system. Thus, both the undernourished and the over-nourished have immune impairments and increased susceptibility to infections. Multiple nutrients are important in supporting the immune system to function, including the fat soluble vitamins, many water soluble vitamins, a number of minerals, a variety of amino acids, and essential fatty acids and their derivatives. Therefore, adequate intakes of a range of nutrients are required to support a well-functioning immune system. Although the immune system is protective, adverse immune reactions are linked to disease; most adverse immune responses typically involve inflammation. Many of the nutrients that support the immune system to function also help to control inflammation. Examples include vitamins C and E, zinc and selenium, and omega-3 fatty acids. Compounds of plant origin (phytochemicals) are also important in this regard. Another important link between nutrition and modulation of immunity is the gut microbiota. Microbes in the gut lumen interact with the host's immune system and the microbiota also influences host inflammation. Since the gut microbiota is affected by diet, modulating the microbiota through dietary change can also impact the immune system. Overall, a healthy diverse diet with plenty of plant-based foods provides the nutrients needed for the immune system to function well.

LESSONS LEARNED IN PANDEMIC TIMES: FOOD SYSTEMS IN THE POST-COVID ERA

Global impacts and policy lessons

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The disruption caused by Covid-19 is an unprecedented event in recent decades in our globalized societies because it affected, quickly and intensely, and at the same time, both food supply systems and the practices and lifestyles. In view of the states of emergency and calamity decreed by the State, a series of measures to prevent and contain the virus were implemented, which had impacts on food practices, from production to consumption. These measures forced the dis-placement and re-placement of eating practices and their connections to other daily activities (eg work, mobility, body hygiene and cleanliness, child care and education, communication, leisure and entertainment). This shift of practices from public spaces (eg eating out, leisure and entertainment, physical activity, work) to the private space of the home had several implications for the organization and adaptation of these spaces to accommodate new ways of working, shopping, disinfecting and storing food, preparing food, socializing with family and friends around meals, as well as managing food waste. Many of these practices were more dependent on the Internet to be performed, for example, digital communication and commerce. Others made use of short food supply chains (eg ordering box schemes from small producers websites, ordering meals online). Many of them coexisted in the same spatial-temporal contexts, for example, working online and having lunch at the same time. What effects and consequences have these disruptions had on food supply systems and foodways? Can we identify some seeds of change towards healthier and more sustainable eating? What implications might some of these impacts have on food policy design? This communication reflects on the direction of these changes and identifies some aspects that food policies must consider becoming more resilient to global systemic risks (eg. climate change, economic crises, health crises).

Agrofood systems perspectives

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"New" describes something which is up-to-date, contemporary. We know that what is new today very quickly becomes outdated. But "next" has a more complex meaning, as it suggests moving forward. And that is, indeed, our current state due to COVID-19. As the progression of the situation remains unknown, there are many "next normals" which will challenge us until the impact of the virus is resolved. The pandemic has transversally affected all areas of the agri-food sector and has accelerated trends, with the sector having to (re)adapt itself quickly. In general, the main changes were in digitization and mechanization, working from home and the need for more convenience products and meals at home, the concern with sustainability, as well as with physical and mental health. This need to find quick solutions makes innovation more relevant than ever for the food industry, as it is essential to provide added value to consumers in their consumption activities. Areas to focus on in terms of R&D are: digitalization & traceability, plant-based food, sustainability and health & nutrition. Thus, we may identify three future scenarios: Marginal change scenario, Lessons learned scenario and Planet humanity scenario. Companies ought prepare their business based on these scenarios, assuming that resilience accompanied by agility, good knowledge of the business & trends and investment, are key elements for a successful agrifood sector in the post-Covid period.

FEMALE ATHLETE

Impact of hormonal contraception on metabolism and exercise

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Atualmente no desporto as mulheres representam cerca de 50% do total de atletas. A extrapolação dos dados da população masculina levou, durante muito tempo, a uma interpretação incompleta e errónea da mulher enquanto desportista. Com o conhecimento das alterações cíclicas hormonais, a sua inter-relação com a prática desportiva passou a ser um foco na literatura científica ligada ao desporto de modo a otimizar o aconselhamento clínico para melhoria da performance desportiva. Acoplado a este tema, o uso de contraceção hormonal e a sua influência na performance e metabolismo tem gerado interesse crescente na comunidade científica. A terapêutica hormonal tem nesta área um papel fulcral, visto ser a escolha na grande maioria das atletas. A razão para esta adesão tão elevada prende-se, não apenas pela sua ação contracetiva, mas também pelos inúmeros benefícios associados ao seu uso, nomeadamente regularização do ciclo, diminuição dos sintomas pré-menstruais e melhoria da dismenorreia.

Sobre a influência do uso de contraceção hormonal na prática desportiva e no metabolismo a literatura mostra resultados por vezes discordantes. Estudos apontam tanto para uma diminuição da performance desportiva com o seu uso crónico, como uma ausência de interferência. Sobre o metabolismo a evidência atual aponta no sentido da ausência de influência com significado estatístico.
Em conclusão, as hormonas têm um papel importante tanto no metabolismo como na performance desportiva. O seu conhecimento é essencial de modo a permitir um aconselhamento dirigido e preciso. Apesar de existirem algumas diferenças na performance desportiva e no metabolismo, ainda não existe evidência categórica que nos permita defender ou desaconselhar o seu uso com base nesta variável. Assim, a avaliação deve ser sempre individual, dependendo da resposta pessoal ao uso de contraceção hormonal assim como do motivo que justificou o seu início.

THE GLYCEMIC INDEX TO ENCOURAGE CARBOHYDRATE FOOD CONSUMPTION FOR CARDIO METABOLIC AND PLANETARY HEALTH

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The glycemic index was conceived as a way of classifying carbohydrate foods based on the degree of rise that a standard portion of that food would have on the postprandial blood glucose response. The aim was that it might be of use in diabetes to control the postprandial blood glucose rise and so reduce the demand for insulin. A further reason was that carbohydrate foods had come under attack for reasons of their rapid digestibility and potentially adverse metabolic affects. Elimination of carbohydrate foods would reduce consumption of the plant foods at a time when internationally the public are advised to eat more of them for human and planetary Health and to avoid the current disastrous species loss.
Over the last 40 years studies have demonstrated benefits of low glycemic index diets in terms of reduction of HbA1c and diabetes, beneficial effects on C Reactive Protein and also on body weight. In cohort studies low glycemic index diets have been shown to reduce the incidence of type two diabetes and also cardiovascular disease, including stroke. Low glycemic index diets have been associated with a reduced risk of cancer, including breast and colon that may relate to a reduced post prandial insulin response, so reducing the levels of an important anabolic hormone.
The glycemic index has been included in the guidelines of the Australian, Canadian and European diabetes Association and is also reflected in advice given in India and China.
Most helpfully Dr. Jenny brand Miller and her colleagues have brought out a new addition of the glycemic index international Tables
The significant outcome data have been derived from prospective cohort studies so far. The future must also focus on randomized controlled trials with important clinical outcomes to confirm or refute the cohort data.

COLLECTIVE CATERING – EVIDENCE-BASED PRACTICE: THE NECESSARY PRINCIPLE

20 years of the General Food Law and the impact of transparency and sustainability regulation on risk assessment in the food chain at a glance

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At the dawn of 2022 (on 28.01.2022) it will be two decades since the European Parliament and the Council adopted Regulation (EC) No 178/2002 (GFL-General Food Law) - whose amendment regarding the transparency and sustainability of the system of risk assessment in the food chain, operates since 27.03.2021 with the entry into force of Reg(EU)No 2019/1381.

The GFL establishes the general principles and requirements of food law underpinning food safety decision-making, covering all stages of food and feed production and distribution. It establishes EFSA - the European Food Safety Authority to operate independently and provide impartial scientific advice to food safety policy makers (Commission, Council and Parliament) and EU Member States.
This whole journey is inspired by the principle from farm to fork, in a post-food crisis context in the late 1990s.
The process of revising European legislation under the REFIT-Regulatory Fitness & Performance Programme has taken the important step of bringing the concerns expressed by European citizens to the centre of the European institutions' future action. Specifically, in terms of demanding greater transparency and scrutiny throughout the risk assessment process in the food chain.
It is therefore in a clear spirit of defending the interests of European consumers that the new Transparency and Sustainability Regulation impacts on the entire food safety ecosystem. We enter the new era of Open Data that auspices disruptive trends that reconcile Artificial Intelligence (AI) and emerging technologies with ethics, contributing to a participatory dialogue with civil society in the scientific process. Let us welcome the new models both of EFSA governance and of interoperability of data and systems that enhance collaboration and co-creation between all actors in this process.

Exchange system for preparing diets and planning menus

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The food exchange lists are groups of weighed foods that approximately contribute the same macronutrient value. Within each food list, one exchange is approximately equal to another in the three macronutrients (carbohydrates, proteins, and fats) and they can be exchanged in a meal planning without significant differences in dietary intakes of patients (1, 2).
The food exchange lists have been used during the last 70 years. The first edition was published in 1950, and was developed by the American Dietetic Association, the American Diabetes Association, and the United States Public Health Service (3). Since that time, they have been updated some times, and many countries have worked to design their own lists (4-6).
In Spain, authors have developed food exchange lists arranged according to the three macronutrients and energy (2) as well as micronutrient and other nutrients of concern (7) to be used different physiological and disease situations across lifecycle, including vegetarian and vegans (8,9) and sports (10).
The food exchange system is a simple and fast methodology that is used to give dietary indications in health and disease. It`s used not only for healthcare purposes, but also in community nutrition, education and for menu planning in catering.
The food exchange system should be based in food lists that are designed with specific criteria such as: the amounts of foods should be established according to the culinary and dietetic practices of each region or country; it should correspond to food portions recommended in national dietary guidelines or, absent such portion values, to habitual food portions of consumption or to small amounts deliberately established to be easily convertible into small or large recommended portions. Also, all the amounts of foods should be convertible into household measures. Finally, foods that are included in a food list should satisfy the following statistical criteria to all the macronutrients and energy as shown in Table 1.

TABLE 1

Statistical criteria applied to define a food exchange list. From: Wheeler *et al.*, 19961; Marques-Lopes *et al.* 2018[2]

MACRONUTRIENT AND ENERGY	STANDARD DEVIATION (SD) FOR EACH GROUP	COEFFICIENT OF VARIATION FOR EACH GROUP (CV)	Z VALUES FOR EACH FOOD
Energy	± 20 kcal	30%	± 2
Carbohydrate	± 5 g		
Fat	± 2 g		
Protein	± 3 g		

REFERENCES

1. Wheeler ML, Franz M, Barrier P, Holler H, Cronmiller N, Delahanty LM. Macronutrient and Energy Database for the 1995 Exchange Lists for Meal Planning: A Rationale for Clinical Practice Decisions. J Am Diet Assoc.1996;96(11):1167-71.

2. Marques-Lopes I, Menal-Puey S, Martínez JA, Russolillo G. Development of a Spanish Food Exchange List: Application of Statistical Criteria to a Rationale Procedure. J Acad Nutr Diet. 2018;118(7):1161-70.

3. Caso EK. Calculation of diabetic diets. J Am Diet Assoc. 1950;26:575-83.

4. Benezra LM, Nieman DC, Nieman CM, et al. Intakes of most nutrients remain at acceptable levels during a weight management program using the food exchange system. J Am Diet Assoc. 2001;101(5):554-561. doi:10.1016/S0002-8223(01)00138-9.

5. Herselman MG, Esau N. Development of the South African renal exchange lists. South African Journal of Clinical Nutrition. 2005;18(2):51-57-57.

6. Sidahmed E, Cornellier ML, Ren J, et al. Development of exchange lists for Mediterranean and Healthy Eating diets: implementation in an intervention trial. J Hum Nutr Diet. 2014;27(5):413-425. doi:10.1111/jhn.12158.

7. Russolillo-Femenías G, Menal-Puey S, Martínez JA, Marques-Lopes I. A Practical Approach to the Management of Micronutrients and Other Nutrients of Concern in Food Exchange Lists for Meal Planning. J Acad Nutr Diet. 2018;118(11):2029-2041.

8. Menal-Puey S, Martínez-Biarge M, Marques-Lopes I. Developing a Food Exchange System for Meal Planning in Vegan Children and Adolescents. Nutrients. 2018;11(1).

9. Menal-Puey S, Marques-Lopes I. Development of a Food Guide for the Vegetarians of Spain. J Acad Nutr Diet. 2017;117(10):1509-1516.

10. Martínez-Sanz JM, Menal-Puey S, Sospedra I, Russolillo G, Norte A, Marques-Lopes I. Development of a Sport Food Exchange List for Dietetic Practice in Sport Nutrition. Nutrients. 2020 Aug 11;12(8):2403.

INBORN ERRORS OF METABOLISM: MILESTONES UP TO 2020 AND THE CHALLENGES FOR 2030

Milestones in Nutritional therapy of inherited metabolic disorders up to 2020

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Many inherited metabolic disorders (IMD's), responsible for a collection of diverse clinical conditions, are treated by life-long diet therapy. Diet may be the sole form of therapy or used in combination with other treatments such as pharmacological chaperones, vitamin co-factors, and nitrogen scavenging drugs. The overall goal of nutritional treatment is to correct the metabolic imbalance while providing adequate nutritional support for normal growth and development but avoiding excessive intake of any nutrient. Diet therapy is commonly highly restrictive, complex for patients and carers and requires careful on-going management and monitoring by experienced specialist metabolic dietitians. The evolution of dietary treatment for many of these conditions tells an interesting story and dietitians have played an important role. Phenylketonuria (PKU) is one of the more common conditions. Its history began in 1934 in Norway, when Følling saw two children, who had been normal at birth but subsequently developed intellectual disability, but the first formula for a successful dietary treatment was developed by a chemist Louis Wolf. This made in a hospital laboratory and given to a small child at Birmingham Children's Hospital the early 1950's. Louise Wolf said that his colleagues told him ' that he should not be dreaming up crazy treatments for conditions that everybody knew were untreatable'. From the 1950's the dietary treatment of other IMD's began. In 1954, Menkes described 'Maple Syrup Disease, but it was Louise Wolf, with a dietitian (Florence Dillistone) who proposed that a diet low in valine, leucine, and isoleucine may help. Dietary treatment was then attempted for many other conditions. The early origins of dietary treatment for IMD were associated with practical difficulties, nutritional deficiency, uncertainty and even 'heartache' but they have transformed the lives of so many patients.

The reality of the nutritional management in Portugal

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In 1975 was establishment the first Metabolic Unit to the diagnosis and clinical management of inborn errors of metabolism (IEM). In 1980 the Medical Genetics Institute created by DR. Jacinto de Magalhães in Porto, was pioneer in many aspects in the history of metabolic diseases diagnosis and the most remarkable achievement was the implementation of the newborn screening program (NBS). This screening covers currently the entire Portuguese population and it markedly changed the perspective of the diagnosis and management with a positive impact in the morbidity and mortality of these disorders.

The European directive dated from 2011 in which the European Commission supported the creation of the European network of reference centers in order to increase the European corporation in highly specialized healthcare, so the reference centers for the treatment of IEM were created and subsequently integrated into the European reference network, there are 5 reference centers in Portugal.

The treatment of IEM is complex, individualized in accordance with tolerance to the toxic metabolite, development and the clinical condition. The nutritional status evaluation must include. The food intake to evaluate and adjust nutrient intake, depending on the disease and the toxic nutrients is essential.

The diet of patients' needs specific formulas for each disease, free from the specific nutrient and that allow the supply of macro and micronutrients in order to prevent nutritional deficits and foods with low protein content that provide energy. The patients have free access to the formulas and the low-protein foods, which is essential because, due to their price.

Nutritional therapy is the key of treatment for various IEM, which should be implemented as soon as possible, the new therapeutic approaches in bring new challenges for nutritionists, which requires a constant training.

FEEDING IN THE BABY'S FIRST 1100 DAYS

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[1] Continente

São 1.100 os dias de nutrição que podem moldar toda uma vida, desde a preconceção até aos 2 primeiros anos de vida. O impacto da nutrição materna na saúde das futuras gerações tem sido cada vez mais claro, mas igualmente importante é a progressiva introdução de alimentos a partir dos 4-6 meses até à completa integração do bebé na dieta familiar. Um período crucial em que se moldam os gostos e as preferências alimentares e que se "programa" a saúde e os hábitos alimentares futuros.

A pensar nisso, o Continente lançou uma gama para bebés que pretende complementar a alimentação equilibrada que todos os bebés devem ter. Uma

gama que não pretende substituir o aleitamento materno, nem qualquer outro alimento em natureza, mas complementar a alimentação com novos formatos, novas texturas, novos sabores. Cada um dos produtos da gama cumpre rigorosos critérios nutricionais, como a ausência de açúcares adicionados (apenas os açúcares presentes na fruta e legumes), sem óleo de palma, gorduras hidrogenadas, corantes e aromas artificiais e com farinhas integrais. São ainda todos validados pela equipa de nutricionistas para que exista um equilíbrio do perfil nutricional garantindo que o bebé possa ter uma alimentação variada e mais saudável em cada uma das etapas do seu crescimento. O sabor não é descurado, pelo que é feita a avaliação da aceitação dos produtos com um conjunto de bebés e respetiva opinião dos pais.

Organizar todos os produtos do segmento bebé numa mesma marca, desenvolvendo novas soluções e unificando uma gama especificamente criada e pensada para os mais novos foi o objetivo da marca Continente do Bebé, que tem todas as preocupações relativas à qualidade, eficácia, preço, sabor, segurança e sustentabilidade. O nome Continente "DO" Bebé visa reforçar o compromisso, cuidado e dedicação da marca no desenvolvimento dos produtos que são mesmo "do" bebé, desenhados e criados para garantir os melhores cuidados em todas as etapas do crescimento.

CHEMICALS IN FOOD

Phytochemicals and its Health effects

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Some natural matrices have medicinal properties with great potential therapies in the treatment of several diseases (infectious and non-infectious), since they are a natural source of bioactive compounds, including antioxidants such as polyphenols, vitamins, carotenoids and unsaturated fatty acids and sugars. This diversity in biomolecules enables their use in various areas, especially as food additives and health promoters, by the production of phytochemicals (which represent a significant part of the global pharmaceutical market) serving as ingredients in the formulation of functional foods and nutraceuticals.

Recently, there has been an increasing interest in health-promoting products which are also natural and safe for consumption because the consumer market has been searching for a healthier lifestyle. This global market trend has driven the food industry to invest in the development of innovative products containing bioactive components. The recently discovered properties of phenolic compounds have been exploited and the food industry has launched numerous new functional products, that the health functionality of which is closely connected with their polyphenols content.

In this way, all this leads to the application of innovative extraction technologies, the increase in the quality of products available in the market, the increase in consumers preference for these products and, consequently, the improvement of the environmental impact, economic growth, and the development of a sustainable economy.

Phobia to agrochemicals

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Data in hand we have never enjoyed the food security that we have at this time, however, it seems that this perception is not reaching the public. The majority of news about food that reaches the general public or in mainstream media is often alarmist and in many cases does not adjust to reality, or only represents a minimal percentage of it. In general, the perception of the food system in the general audience is biased. This is especially worrisome when it affects to the food chain or to the nutritional decisions. Many people is turning to organic or "natural" food assuming that is healthier than conventional food even though there is no scientific evidence supporting this claim (1), or than conventional food may poison you dou to the use of agrochemicals in the field (2). All of this speaks against the public's image and confidence in food and agriculture and the proliferation of fears and also the people who take advantage of them through supposed miracle foods or abusing misleading advertising. In the current presentation we will address, from the point of view of science, what is the science behind statements such as that we eat worse and worse, that organic food is healthier, that we are poisoning ourselves by pesticides, that synthetic fertilizers are not effective or that better a label that it does not contain preservatives or colorants or that GMOs are dangerous.

REFERENCES

1. Mulet JM. Should we recommend organic crop foods on the basis of health benefits? Letter to the editor regarding the article by Barański et al. British Journal of Nutrition. Cambridge University Press; 2014;112(10):1745–7.

2. Mulet JM. Letter to the Editor Regarding the Article by Paganelli et al. Chemical research in toxicology. American Chemical Society; 2011;24(5):609.

NEW INSIGHTS IN OBESITY RESEARCH

Metabolically healthy obesity - does it exist?

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Obesity is frequently associated with several cardiometabolic abnormalities. However, not all individuals living with obesity present these abnormalities and have been named as metabolically healthy obese (1, 2). Controversial exists whether this is a unique group that does not develop metabolic dysfunction, there is a misclassification of these subjects, or they are in transition and will develop metabolic abnormalities at some point in time.

The definition of metabolically healthy obesity (MHO) has been based mainly on BMI and metabolic syndrome features – blood pressure, plasma glucose, triglycerides and HDL-cholesterol. However, some authors have also included indicators of insulin sensitivity/resistance and inflammation, resulting in more than 30 different definitions of MHO in the literature, and variable prevalence estimates (3). Heterogeneity in the identification of MHO also results from the number of metabolic alterations considered. While some studies have defined MHO as the absence (zero) of metabolic abnormalities, others have considered people with up to one or two risk factors as metabolically healthy. But, should subjects with obesity and with any metabolic abnormality really be considered in the MHO group? On the other hand, the stability of this phenotype has been investigated. Prospective studies have shown that up to 50% of subjects with MHO develop cardiometabolic abnormalities after one or two decades (4). Severity of BMI (BMI levels closer to the obesity cut-off or cumulative exposure to higher BMI across time) is also related to the transition to the unhealthy status (5, 6). Therefore, the MHO may be a transient state, at least for part of this group.

Finally, other characteristics may distinguish the MHO from the unhealthy counterpart. It is hypothesized that healthier lifestyle factors and adipose tissue biology, including body fat distribution, may explain the MHO (4, 7). However, for some of these factors the evidence is not strong or conclusive.

REFERENCES

1. Bluher M. The distinction of metabolically 'healthy' from 'unhealthy' obese individuals. Curr Opin Lipidol. 2010;21(1):38-43.

2. Stefan N, Haring HU, Hu FB, Schulze MB. Metabolically healthy obesity: epidemiology, mechanisms, and clinical implications. Lancet Diabetes Endocrinol. 2013;1(2):152-62.

3. Rey-López JP, de Rezende LF, Pastor-Valero M, Tess BH. The prevalence of metabolically healthy obesity: a systematic review and critical evaluation of the definitions used. Obes Rev. 2014;15(10):781-90.
4. Smith GI, Mittendorfer B, Klein S. Metabolically healthy obesity: facts and fantasies. J Clin Invest. 2019;129(10):3978-89.
5. Craveiro V, Ramos E, Araujo J. Metabolically healthy overweight in young adulthood: is it a matter of duration and degree of overweight? Nutr Metab Cardiovasc Dis. 2021;31(2):455-63.
6. Robson E, Norris T, Costa S, Kivimäki M, Hamer M, Johnson W. Contribution of 20-year body mass index and waist circumference history to poor cardiometabolic health in overweight/obese and normal weight adults: A cohort study. Nutr Metab Cardiovasc Dis. 2021.
7. Iacobini C, Pugliese G, Blasetti Fantauzzi C, Federici M, Menini S. Metabolically healthy versus metabolically unhealthy obesity. Metabolism. 2019;92:51-60.

FOOD AND NUTRITION IN SPORT: OTHER PERSPECTIVES

Vigorexia and diseases of eating behavior

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In various sports, body weight and body composition are crucial performance variables. A focus on low body weight and body fat content, combined with regulations in some weight-sensitive sports, are considered risk factors for extreme dieting, eating disorders and related health consequences among athletes.

The prevalence of disordered eating in athletes is unclear, mainly due to methodologic limitations of existing studies, but, compared to non-athletes, both female and male athletes are at higher risk of developing an eating disorder, which is especially true for athletes participating in sports where low body weight or leanness confers a competitive advantage.

Susceptibility of athletes to disordered eating is a serious concern because of increased physiologic demands imposed by high-intensity and high-volume sport training. Disordered eating can lead to adverse effects on health and physical performance. In some cases, this condition can be fatal.

Athletes with eating disorders should undergo thorough evaluation and treatment by an experienced multidisciplinary team. Efforts to prevent eating disorders should be aimed at athletes, coaches, parents and athletic administrators, and focused on expanding knowledge of healthy nutrition in support of sport performance and health.

Supplements *vs.* Food in physical activity and sport

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Research has showed that nutritional supplements' use increases with higher levels of training and age (1). In 2020 the supplement industry witnessed a meteoric growth of 14.5%, probably due to the sales of micronutrients in response to the COVID-19 pandemic (2).

Given its high consumption and potential, it is important to understand what role nutritional supplements play in the world of physical activity and sports, especially when compared to food. Evidence shows that multiple choices about food and supplements intake are not supported by science and lack consistency in proving results (3, 4).

From paper to practice, it becomes clear that food and supplements are not rivals in the world of physical activity and sport. They both support professional and recreational athletes in different ways: acknowledging when, why, and how each can be used is key to a healthy science-based approach to nutrition.

REFERENCES

1. Maughan, R. J., Burke, L. M., Dvorak, J., Larson-Meyer, D. E., Peeling, P., Phillips, S. M., . . . Engebretsen, L. (2018). IOC Consensus Statement: Dietary Supplements and the High-Performance Athlete. Int J Sport Nutr Exerc Metab, 28(2), 104-125. doi:10.1123/ijsnem.2018-0020.
2. 2021 Global Supplement Business Report. (2021). Retrieved 16/09/2021 available in https://store.newhope.com/products/2021-supplement-business-report.
3. Maughan, R. J., Burke, L. M., Dvorak, J., Larson-Meyer, D. E., Peeling, P., Phillips, S. M., . . . Engebretsen, L. (2018). IOC Consensus Statement: Dietary Supplements and the High-Performance Athlete. Int J Sport Nutr Exerc Metab, 28(2), 104-125. doi:10.1123/ijsnem.2018-0020.
4. Fassier, P., Chhim, A. S., Andreeva, V. A., Hercberg, S., Latino-Martel, P., Pouchieu, C., & Touvier, M. (2016). Seeking health- and nutrition-related information on the Internet in a large population of French adults: results of the NutriNet-Sante study. Br J Nutr, 115(11), 2039-2046. doi:10.1017/s0007114516001355.

MAKE WATER SCIENCE PLAIN AND INTELLIGIBLE

Myths and facts about drinking water, a vital nutrient. What is the best water to drink for mothers, children, sportsmen and seniors

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Atualmente estão disponíveis diversos tipos de água para consumo. Por um lado, as naturais - minerais naturais e de nascente – por outro, as preparadas e de abastecimento público.

O Decreto-Lei N.º 156/98 caracteriza as águas naturais, que devem que apresentar três características comuns: origem subterrânea, pureza no local da captação e isenção de qualquer tipo de tratamento que altere as suas características intrínsecas.

A mineralização das águas relaciona-se com a composição em minerais das mesmas - nomeadamente em sódio, cálcio, sílica, magnésio, nitratos, entre outros – sendo influenciada pelo tipo de rocha pela qual a água flui, pelo tempo de contato com o subsolo (um maior tempo de contato traduz-se numa maior mineralização) e pela temperatura e profundidade do aquífero (maior profundidade traduz-se em maior pressão e temperatura, resultando num maior grau de mineralização). Assim sendo, uma maior mineralização e diferentes combinações de fatores poderão influenciar a palatabilidade da água.

As águas naturais apresentam um conjunto de elementos na sua composição, com maior biodisponibilidade, ou seja, que são mais facilmente absorvidos pelo organismo, devendo uma ingestão adequada auxiliar no alcance das recomendações diárias em minerais. Assim, a água deverá ser escolhida em função do momento e estilo de vida, prestando especial atenção à infância, gravidez, idades seniores e prática desportiva.

Ressalve-se que o pH não deve ser o único fator a considerar na escolha, uma vez que, ainda que se atribuam benefícios ao consumo de águas alcalinas, não há evidência científica suficiente que suporte esta relação. Da mesma forma, não existe evidência que sustente uma relação entre o consumo de águas carbonatadas e a desmineralização óssea, muito frequente em determinados períodos da vida, como a menopausa.

Assim, torna-se fundamental compreender que as águas não são todas iguais, sendo fulcral atentar na sua rotulagem e perceber qual a sua composição – concentração e tipo de minerais – escolhendo a que mais se adequa às necessidades individuais.

NUTRITIONAL SUPPORT STRATEGIES

Nutritional supplementation with food

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Food fortification (FF), also known as dietary enrichment, is a nutritional support strategy that consist in adding food or specific nutrients for increase energy and/or nutrient density to a regular meal or snack, without increasing its volume (1). In practice, single ingredients like maltodextrin and whey protein and different foods like milk powder, eggs, legumes, nuts, seeds, oils, butter and jams can be added to bread, biscuits, soups, porridge, deserts, nourishing drinks, cakes and savoury meals. The multiple options available increase the diversity of foods offered and can promote an organoleptic enhancement of meals (2,3).

Systematic reviews published in the past years have reported an increment of energy and protein intake in older people in different clinical settings with FF, however more studies are needed to determine this impact in nutritional and functional status. In palatability and acceptability, its seems that FF has a good compliance, and this strategy has the advantage of respecting individual dietary habits and preferences (3-6).

The ESPEN guideline on clinical nutrition and hydration in geriatrics recommended that fortified food, in order to support adequate dietary intake, should be offered to older person with malnutrition or at risk of malnutrition. FF should be an intervention used in combination with others presented on this guideline, as dietary counselling, finger foods and oral nutritional supplements, especially in cases of high risk of malnutrition (7). In addition, FF intervention is recommended in several international clinical practice guidelines for prevention and treatment of malnutrition in elderly. In UK this strategy is the first-line of dietary advice in community and similar recommendations are made for aged care residences in Australia, Canada and Ireland (8-11). In France, FF is recommended in different settings, including hospitals, since 2007 (12).

Even more, this strategy is a well-tolerated and cost-effective intervention to improve dietary intake in older people and should be considered as part of a multi-component, individualised and comprehensive intervention against malnutrition in elderly (13).

REFERENCES

1. Cederholm T, Barazzoni R, Austin P, Ballmer P, Biolo G, Bischoff S, et al. ESPEN guidelines on definitions and terminology of clinical nutrition. Clin Nutr 2017;36(1):49-64.

2. Volkert D, Beck AM, Cederholm T, et al. Management of Malnutrition in Older Patients-Current Approaches, Evidence and Open Questions. J Clin Med. 2019;8(7):974.

3. Mills SR, Wilcox CR, Ibrahim K, Roberts HC. Can fortified foods and snacks increase the energy and protein intake of hospitalised older patients? A systematic review. J Hum Nutr Diet. 2018 Jun;31(3):379-389.

4. Trabal J, Farran-Codina A. Effects of dietary enrichment with conventional foods on energy and protein intake in older adults: a systematic review. Nutr Rev. 2015 Sep;73(9):624-33.

5. Morilla-Herrera JC, Martín-Santos FJ, Caro-Bautista J, Saucedo-Figueredo C et al. Effectiveness of Food-Based Fortification in Older People: A Systematic Review and Meta-Analysis. J Nutr Health Aging. 2016 Feb;20(2):178-84.

6. Douglas JW, Lawrence JC and Knowlden AP. The use of fortified foods to treat malnutrition among older adults: a systematic review, Quality in Ageing and Older Adults, 2015 Vol. 18 No. 2, pp. 104-119.

7. Volkert D, Beck AM, Cederholm T, Cruz-Jentoft A, Goisser S, Hooper L, et al. ESPEN guideline on clinical nutrition and hydration in geriatrics. Clin Nutr. 2019 Feb;38(1):10-47.

8. Holdoway A (Panel Chair). A Guide to Managing Adult Malnutrition in the Community. 2nd Eddition [Internet]. United Kingdom: Produced by a multi-professional consensus panel including the RCGP, RCN, BDA, BAPEN, PCPA. 2017 [cited 2021 Sep 14]. Available from: https://www.malnutritionpathway.co.uk/library/managing_malnutrition.pdf.

9. Bartl R, Bunney C. Best Practice Food and Nutrition Manual for Aged Care Homes Edition 2.2 [Internet]. Gosford: Central Coast Local Health District; 2015 [cited 2021 Sep 14]. Available from: https://x2x8z3r3.stackpathcdn.com/wp-content/uploads/BestPracticeFoodandNutritionManualforAgedCare.pdf.

10. Armstrong S, Arsenault M, Bendayan M, Berwick S, Boyd K, et al. Menu Planning in Long Term Care and Canada's Food Guide (2019). Ottawa: Canadian Malnutrition Task Force; 2020 [cited 2021 Sep 14]. Available from: https://www.nutritioncareincanada.ca/sites/default/uploads/files/2020-7-10%20DC_CNS_OPDQ%20LTC%20Menu%20Planning%20Guidelines%20ENGLISH.pdf.

11. PHA. Nutritional Guidelines and Menu Checklist for Residential and Nursing Homes.; Belfast: Public Health Agency; 2014 [cited 2021 Sep 14]. Available from: https://www.publichealth.hscni.net/sites/default/files/Nutritional_guidlines_and_menu_checklist_march_2014.pdf.

12. Raynaud-Simon A, Revel-Delhom C, Hébuterne X, Clinical practice guidelines from the French Health High Authority: nutritional support strategy in protein-energy malnutrition in the elderly. Clin Nutr. 2011 Jun;30(3):312-9.

13. Roberts HC, Lim SER, Cox NJ, Ibrahim K. The Challenge of Managing Undernutrition in Older People with Frailty. Nutrients. 2019 Apr 10;11(4):808.

YOUR NUTRITION; YOUR GENES

MyNutriGenes: DNA-guided diets

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A genética desempenha um papel fundamental na variabilidade interindividual, tal como a nossa interação com o ambiente (comportamento). Ambas, conjuntamente como os parâmetros antropométricos e bioquímicos, são importantes para caracterizar um indivíduo. Do ponto de vista genético, as características avaliadas no contexto da nutrição, seja em termos de composição corporal, alterações metabólicas ou resposta à ingestão de nutrientes, dependem de múltiplas variantes genéticas frequentes na população (polimorfismos). Tipicamente, cada uma destas variantes tem associada uma magnitude de efeito relativamente baixa, ou modesta, a uma dada característica. Assim, é importante considerar o seu efeito conjunto através de modelos matemáticos aditivos e ponderados, designados de modelos poligénicos. Estes permitem, de forma integrada, estimar o contributo da genética para várias caraterísticas, como o índice de massa corporal elevado, a resistência à insulina ou a esteatose hepática não alcoólica, ou o impacto positivo ou negativo associado à ingestão de diferentes nutrientes. Com base nesta informação, é possível caracterizar melhor o indivíduo e, consequentemente, conceber uma estratégia nutricional mais personalizada. A utilização da informação genética tem como objetivo estratificar os indivíduos com base na sua predisposição ou capacidade de resposta a uma intervenção. A predisposição para a esteatose hepática não alcoólica, por exemplo, é influenciada por três genes, envolvidos no metabolismo lipídico (*PNPLA3* e *TM6SF2*) e da glicose (GCKR). Sendo possível atuar sobre a componente ambiental, esta ação é tanto mais relevante quanto maior for o risco conferido pela genética. Como estratégias, salienta-se a vantagem da adoção de uma dieta mediterrânica e a prática de exercício físico. Este tipo de abordagem é preventivo, ao invés de reativo, inserindo-se na chamada medicina dos 4 P, que tem como objetivo o aumento do número de anos de vida saudável e ativa.

MICROBIOTA IN DIFFERENT POPULATIONS

Pregnant and Newborn

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The human gut microbiota has distinctive compositional and functional features across different periods of life. In early life, the gut microbiota is a complex and dynamic ecosystem, and it is an essential driver of a range of immune, metabolic

and physiological processes, ultimately controlling the balance between health and disease.

The historical paradigm assumes that neonates are born sterile and colonized differently depending on mode of delivery (i.e., cesarean vs vaginal). However, this notion is no longer uniformly accepted. Emerging evidence showing both a low biomass and low abundance of microbes harbored in the uterine decidua and fallopian tubes, as well as the amniotic fluid, placenta and the developing fetus, has challenged this notion, indicating that exposure to microbes (or at least their metagenomes) may begin well before delivery. Results from our group support the hypothesis that maternal bacteria from the gut and vagina can play a role in shaping neonates' gut microbiota and that mother-to-infant bacterial transmission is a controlled and time-specific process.

Postnatal factors further configure the microbiota in early life. Breastmilk contains a complex community of bacteria that may help seed the infant gut microbiota, and in breastfed infants the gut microbiota is dominated by species that metabolize human milk oligosaccharides.

Since diet is one of the main factors modifying the gut microbiota composition, mother's diet is of utmost importance before, during and after pregnancy. Previous studies in nonhuman primate model have established that a maternal high-fat gestational diet (but not maternal obesity per se) results in changes to the metabolic profile and epigenome of the offspring, likely mediated by an altered gut microbiome.

Thus, further studies are necessary to identify strategies to mitigate the negative impact of an aberrant microbiome acquisition in early life.

SUSTAINABILITY IN AGRIFOOD: FROM FARM TO FORK

Sistemas alimentares do futuro

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É inegável que as rápidas mudanças que o mundo atravessa têm impactos em diversas áreas e uma das mais importantes é a forma como nos alimentamos e alimentaremos. Decorre daqui o atual e pertinente debate sobre os sistemas alimentares do futuro. Instintivamente, o caminho aponta que estes tenham de ser sólidos e resilientes e, em simultâneo, mais sustentáveis.

O grande desafio é a concretização de um conceito de sustentabilidade integrada, que abranja não só a vertente ambiental, mas também a económica e social.

E quais são as soluções para atingirmos este objetivo? É consumir local? É privilegiar determinadas dietas? Ou regressar aos métodos de produção alimentar tradicionais?

O caminho não é linear porque o sistema alimentar é complexo e intrincado. Por isso, a abordagem terá de ser mais alargada e assente em firmes pilares estratégicos.

É crucial o desenvolvimento de ecossistemas 4.0, com digitalização aplicada a todas as fases, e a promoção de modelos de produção e consumo responsáveis. Destaca-se também a nutrição especializada e personalizada (um dos pilares mais desafiantes). Por outro lado, não pode ser esquecida a importância de legislação e regulamentação equilibradas, assim como de modelos eficazes de educação e informação ao consumidor. Por fim, mas talvez o principal pilar, é obrigatória a colaboração entre todos os intervenientes do sistema alimentar, dos diretos aos indiretos.

Como um dos principais atores deste sistema, a indústria agroalimentar está já a trilhar o caminho neste sentido. De sublinhar, por exemplo, que tem sido uma peça-chave para o desenvolvimento do conceito de nutrição especializada e personalizada, através da investigação e inovação. Acima de tudo, defende um sistema alimentar colaborativo, inovador e tecnológico, equilibrado e coerente, assente em informação e educação.

Em suma, nesta breve reflexão sobre o futuro, é importante relembrar as palavras do relatório anual da ONU (1): "a coerência na formulação e implementação de políticas e investimentos entre os sistemas agroalimentar, de saúde, proteção social e ambiental é essencial para construção de sinergias e soluções para sistemas alimentares mais eficientes e eficazes e para proporcionar dietas saudáveis a preços acessíveis para todos".

1. The State Of Food Security And Nutrition In The World 2021 | http://www.fao.org/3/cb4474en/online/cb4474en.html

Agrobiodiversity and short chains

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In the past, the number of cultivated crops and varieties was rich and diverse, and the number of steps in the food chain from producer to consumer was relatively low. Paradoxically, as the number of cultivated crops and varieties went down, the number of supply chain actors (and the physical distance from the farmer to the final consumption point) increased. With globalization and the development of novel processing and post-harvest technologies, the food value chains became more complex. This was done to support consumer demands and for understandable socio-techno reasons that often neglected to safeguard the collective benefits of a biodiverse-rich environment. This scenario brought consequences to our diets, that became increasingly focused on fewer and fewer locally grown ingredients. Recently, agrobiodiversity-friendly systems that aim to ensure that neglected, underutilized, forgotten, minor, or orphan crops are more present in agricultural systems, and in consumer´s food baskets, came back to the limelight. The impacts of agrobiodiversity in people´s lives include providing a foundation for food and nutrition while ensuring the resilience of agricultural systems. Thus, to promote healthy soils, increase the resilience to climate change, promote nutritional security, and create opportunities across the value chains, there is a need to "go back to the future" and develop tools and knowledge to help farmers diversify while ensuring a fair economic return. Successful short value chains must encompass agrobiodiversity and ensure that demand and production data are shared easily with consumers to counter the uncertainties of non-integrated supply chains, and to make them more resilient to disruption. To achieve this, multilateral co-learning must be supported among farmers, breeders, chefs, food retailers, scientists, nutritionists, representatives of food industry and civil society to generate appropriate questions and transformation avenues to ensure that agrobiodiversity is used sustainably and meets people's needs.

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GRUPO EDUCATIVOS EM ALIMENTAÇÃO E NUTRIÇÃO: O QUE FUNCIONA?

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Os grupos educativos têm uma longa história nas práticas da educação em saúde. A educação em diabetes para usuários de serviço de saúde, por exemplo, acontece desde a década de 1970. A Ciência da Nutrição e os profissionais

desta área buscam aprimorar essa prática para contribuir com o processo educativo dos indivíduos e de grupos populacionais. No Brasil, as ações de educação alimentar e nutricional são estimuladas e financiadas pelas políticas públicas. As ações grupais tem sido uma opção importante para a promoção da saúde. Técnicas como grupo de promoção da saúde, grupo operativo, roda de conversa, horta escolar têm sido descritas como promissoras na efetividade destas ações. Entretanto, verifica-se a importância de definir estratégias de avaliação para identificar o que funciona e o que não funciona. Pesquisas sobre o tema tem utilizados métodos quantitativos ou qualitativos. O impacto no conhecimento e nos indicadores da situação nutricional estão mais presentes nas pesquisas quantitativas enquanto que avaliações da vivencia e da autonomia para as escolhas alimentares estão mais presentes nos estudos de abordagem qualitativa. A avaliação da autonomia nas escolhas alimentares dos indivíduos, podendo constituir indicadores de avaliação da Educação Alimentar e Nutricional, bem como avaliar e monitorar as práticas de cuidado preconizadas na promoção da saúde. Apesar da importância desses achados, o detalhamento do processo educativo é frágil, impedindo a reprodutibilidade destes estudos.

REDUÇÃO DO RISCO DE DOENÇAS CARDIOVASCULARES – PODEM OS SUMOS CONTRIBUIR?

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[1] SUMOL+COMPAL

A SUMOL+COMPAL estabelece no seu Propósito um conjunto de linhas orientadoras de atuação: importância da fruta, foco no consumidor, suporte na ciência e equilíbrio dos pilares da sustentabilidade, que têm como decorrência que:
- a escolha de fruta Portuguesa seja uma das nossas prioridades,
- tenhamos uma agenda exigente em termos de compromissos de saúde & bem estar;
- a inovação seja assente em conhecimento (quer acerca do consumidor, quer científico).

Para enquadrar o impacto do consumo moderado de sumo na redução do risco de Doenças Cardiovasculares (DCV), a SUMOL+COMPAL tem em conta:
- as consequências para a saúde resultante do baixo consumo de fruta na generalidade da população,
- a constatação de que as DCV são a principal causa de morte em Portugal;
- dados que evidenciam que o consumo de sumo, pelas crianças e adolescentes, não tem limitado o consumo de fruta e que a prevalência de consumo excessivo de sumo é baixa (1,4% consome mais de 250 g/dia);
- o reconhecimento de que os sumos de fruta 1) podem compensar o baixo consumo de fruta e 2) têm um papel na viabilização da fileira da fruta (pela utilização de fruta de 2ª escolha, o que possibilita a prática de preços mais acessíveis na fruta fresca e, consequentemente um maior consumo de fruta).

O estado do conhecimento sobre a associação entre o consumo de sumos e as DCV pode ser sintetizado da seguinte forma:
- a *European Food Safety Authority* (EFSA) no âmbito da preparação da "*Opinion on the Tolerable Upper Intake Level for dietary sugars*" (doi:10.2903/j.efsa.20YY.NNNN), emitida em julho 2021, que procura identificar efeitos adversos sobre a saúde, concluiu que a evidência disponível não suporta que exista um efeito adverso entre o consumo de sumo e o risco de DCV;
- uma análise (Scheffers *et al.* (2019)) baseada em 2 estudos de coorte prospetivos (totalizando mais de 100 000 participantes) não encontrou consequências adversas do consumo de sumo na incidência de DCV;
- uma revisão sistemática e meta-análise (D'Elia *et al*. (2020)) de 21 Estudos Prospetivos (2 deles reportando de forma individualizada dados relativos a sumos e associação a DCV) e 35 RCT, demonstra, através do perfil dose-resposta, efeitos benéficos de consumos moderados de sumo para o risco total de DCV;
- os mecanismos de proteção das DCV estão provavelmente associados ao papel de determinados compostos presentes nos sumos (Vitamina C, Polifenois, Carotenoides, Hesperidina, Potássio e Folatos).

Há pois indícios fortes de que o consumo moderado de sumo pode dar um contributo favorável para a melhoria da saúde pública no domínio das DCV.

A combinação de espécies de frutas num sumo:
- proporciona, em cada dose, uma maior diversidade de micronutrientes e fitoquímicos do que uma dose com apenas uma espécie; e
- pode conseguir complementaridades / sinergias entre esses compostos.

As condições de produção de sumos têm vindo a ser otimizadas no sentido de aproximar cada vez mais a composição dos sumos à fruta de partida nos compostos mais importantes para a saúde (ou até melhorando bioatividade).

A fibra é o macronutriente em que a maioria dos sumos se afasta do teor da fruta; no entanto, os impactos na saúde dos vários tipos de fibras (solúveis, insolúveis, de diferentes pesos moleculares e ramificações) serão distintos e importa conhecê-los para potenciar o efeito dos sumos. É esta a motivação para a SUMOL+COMPAL ser a empresa líder do projeto Mobilizador cLabel+.

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