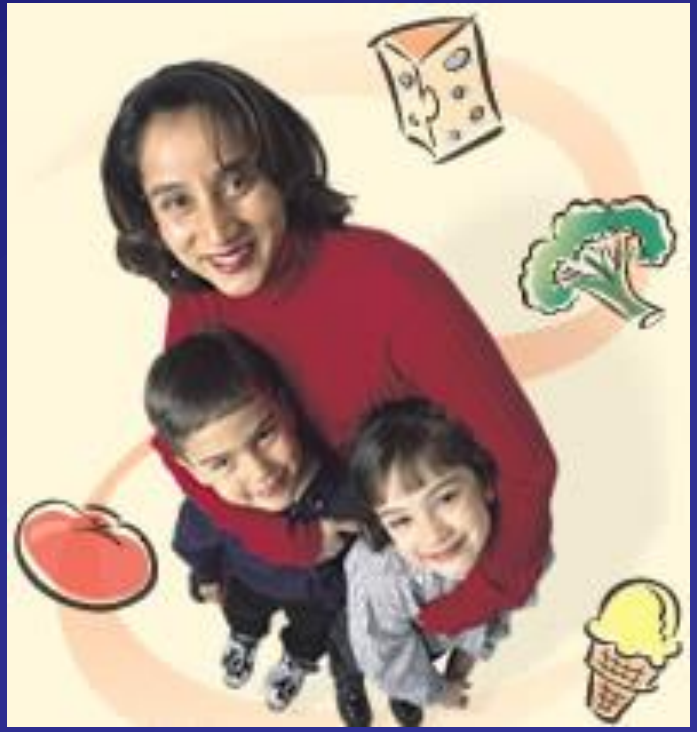
Carboidrato

Nutrição

Ciência de nutrir adequadamente

Ciência do alimentos, dos nutrientes; de suas ações e interações; processo pelo qual o organismo ingere, digere, absorve, transporta, utiliza e excreta as substâncias presentes nos alimentos



Nutrition & Environment for Health

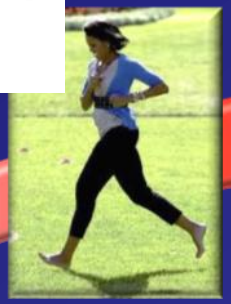
Genetic Profile, Sanitation, Water, & Built Environment

Health Status

Chronic Hunger
~1 billion

Hidden Hunger
~2 billion

Empty calorie excess
~2 billion



Well-nourished
~2 billion

Economic Security

Nutrients in Correct Ratios

Nutrição – Era celular ou molecular

- ✓ 1955 – microscópio eletrônico – componentes celulares
- ✓ Boa nutrição e célula saudável
- ✓ Pobre nutrição e disfunção ou morte celular
- ✓ Pelo menos 50 nutrientes devem ser oferecidos na dieta (dias atuais)
- ✓ Genética e nutrição (nutrigenoma)

Nutrição Humana e Metabolismo

Carboidratos

- Primeiro nutriente a ser identificado
- Carboidrato → ganho de peso?

Nutricionista

Nutriente essencial, principal fonte de energia cuja fonte são as plantas

CHO

Necessidades
45 a 65%

Acceptable Macronutrient Distribution Ranges (AMDR)
Intervalos de distribuição aceitável de macronutrientes

MACRONUTRIENTES	PORCENTUAL DE ENERGIA		
	1 – 3 ANOS	4 – 18 ANOS	ADULTOS
Gorduras Totais	30 - 40	25 – 35	20 – 35
(w-6) ácido linoléico	5 - 10	5 - 10	5 – 10
(w-3) ácido linolênico	0,6 – 1,2	0,6 – 1,2	0,6 – 1,2
Carboidratos	45 - 65	45 - 65	45 – 65
Proteínas	5 - 20	10 – 30	10 – 35

Carboidrato

- Depois da água é o maior componente da dieta
- 45 – 65% da caloria ingerida
- 1 grama = 4 kcal
- Dieta com 2000 kcal – 60% = 300g de carboidrato = 1200 kcal

Dietary Reference Intakes (DRIs): Recommended Dietary Allowances and Adequate Intakes, Total Water and Macronutrients

Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	*Total* Water[a] (L/d)	Carbohydrate (g/d)	Total Fiber (g/d)	Fat (g/d)	Linoleic Acid (g/d)	α-Linolenic Acid (g/d)	Protein[b] (g/d)
Infants							
0 to 6 mo	0.7*	60*	ND	31*	4.4*	0.5*	9.1*
6 to 12 mo	0.8*	95*	ND	30*	4.6*	0.5*	**11.0**
Children							
1–3 y	1.3*	**130**	19*	ND[c]	7*	0.7*	**13**
4–8 y	1.7*	**130**	25*	ND	10*	0.9*	**19**
Males							
9–13 y	2.4*	**130**	31*	ND	12*	1.2*	**34**
14–18 y	3.3*	**130**	38*	ND	16*	1.6*	**52**
19–30 y	3.7*	**130**	38*	ND	17*	1.6*	**56**
31–50 y	3.7*	**130**	38*	ND	17*	1.6*	**56**
51–70 y	3.7*	**130**	30*	ND	14*	1.6*	**56**
> 70 y	3.7*	**130**	30*	ND	14*	1.6*	**56**
Females							
9–13 y	2.1*	**130**	26*	ND	10*	1.0*	**34**
14–18 y	2.3*	**130**	26*	ND	11*	1.1*	**46**
19–30 y	2.7*	**130**	25*	ND	12*	1.1*	**46**
31–50 y	2.7*	**130**	25*	ND	12*	1.1*	**46**
51–70 y	2.7*	**130**	21*	ND	11*	1.1*	**46**
> 70 y	2.7*	**130**	21*	ND	11*	1.1*	**46**
Pregnancy							
14–18 y	3.0*	**175**	28*	ND	13*	1.4*	**71**
19–30 y	3.0*	**175**	28*	ND	13*	1.4*	**71**
31–50 y	3.0*	**175**	28*	ND	13*	1.4*	**71**
Lactation							
14–18	3.8*	**210**	29*	ND	13*	1.3*	**71**
19–30 y	3.8*	**210**	29*	ND	13*	1.3*	**71**
31–50 y	3.8*	**210**	29*	ND	13*	1.3*	**71**

NOTE: This table (take from the DRI reports, see www.nap.edu) presents Recommended Dietary Allowances (RDA) in **bold type** and Adequate Intakes (AI) in ordinary type followed by an asterisk (*). An RDA is the average daily dietary intake level; sufficient to meet the nutrient requirements of nearly all (97-98 percent) healthy individuals in a group. It is calculated from an Estimated Average Requirement (EAR). If sufficient scientific evidence is not available to establish an EAR, and thus calculate an RDA, an AI is usually developed. For healthy breastfed infants, an AI is the mean intake. The AI for other life stage and gender groups is believed to cover the needs of all healthy individuals in the groups, but lack of data or uncertainty in the data prevent being able to specify with confidence the percentage of individuals covered by this intake.

[a] *Total* water includes all water contained in food, beverages, and drinking water.

[b] Based on g protein per kg of body weight for the reference body weight, e.g., for adults 0.8 g/kg body weight for the reference body weight.

[c] Not determined.

SOURCE: *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids* (2002/2005) and *Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate* (2005). The report may be accessed via www.nap.edu.

Exemplo:
Dieta de 2000 kcal com 60% de CHO
1200 kcal / 4 kcal por grama = 300g

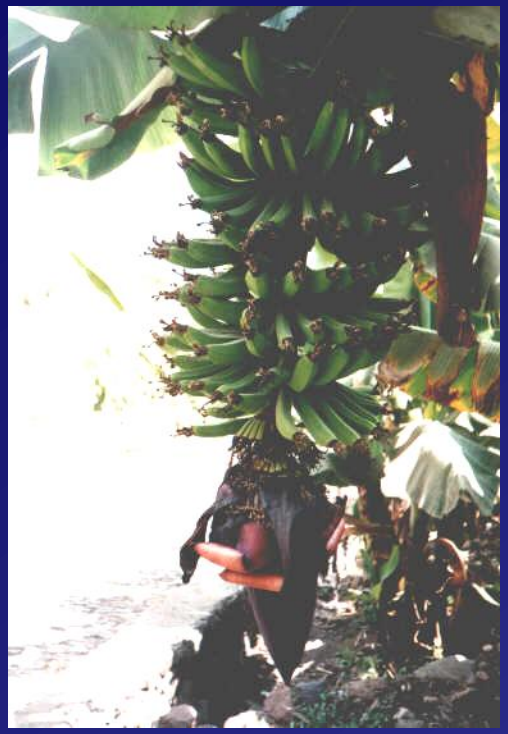
Cardápio

- Pão francês – 1 unidade de 50g
- Manteiga – 2 pontas de faca = 10g
- leite integral – 1 xícara de chá – 160ml
- Café com açucar – 50ml
- Banana prata – 1 unidade = 70g
- Arroz (A e J) – 5 colheres de sopa = 125g
- Feijão (A e J) – 5 colheres de sopa = 300g
- Abobrinha refogada – 4 colheres de sopa = 125g
- Moranga – 3 colheres de sopa = 90g
- Cenoura ralada – 3 colheres de sopa
- Alface – 3 folhas = 10g
- Tomate – 4 rodelas = 40g
- Bife (A e J) – unidade média = 100g
- Bolo simples – 1 fatia média = 130g
- Chocolate quente – 1 xícara de chá = 160ml
- Tangerina – 2 unidades = 160g

~300 g CHO

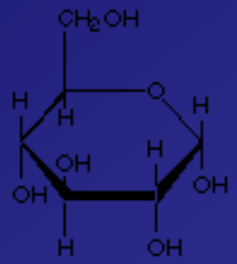
Carboidrato

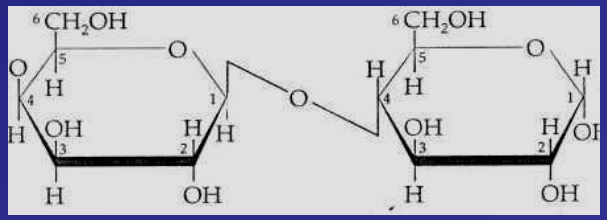
Amido e Frutose

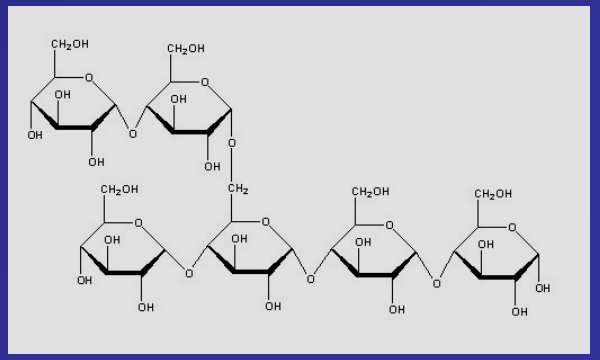


Classificação do carboidrato

- Monossacarídeo (glicose, galactose, frutose)
- Dissacarídeo (maltose, sacarose, lactose)
- Polissacarídeo (amido, glicogênio, fibras)

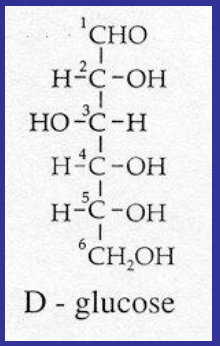


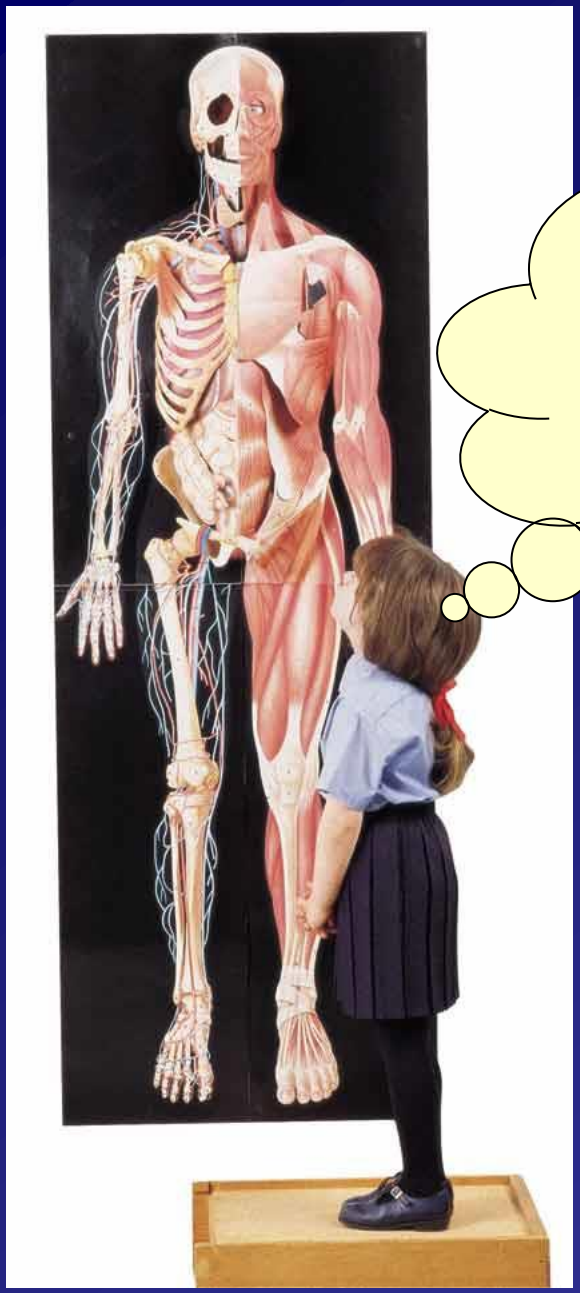




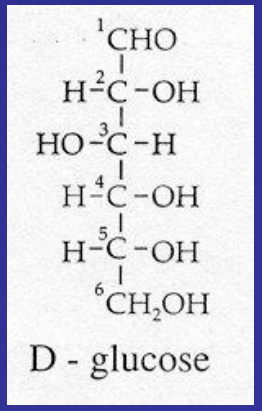
Açucar (30% total de CHO consumidos)

Sistema Nervoso Central precisa de 100 a 140g de glicose/dia

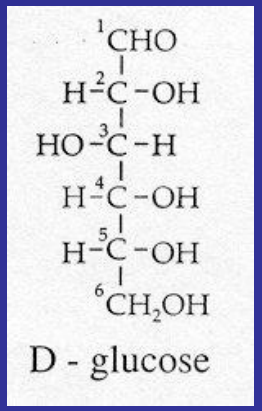




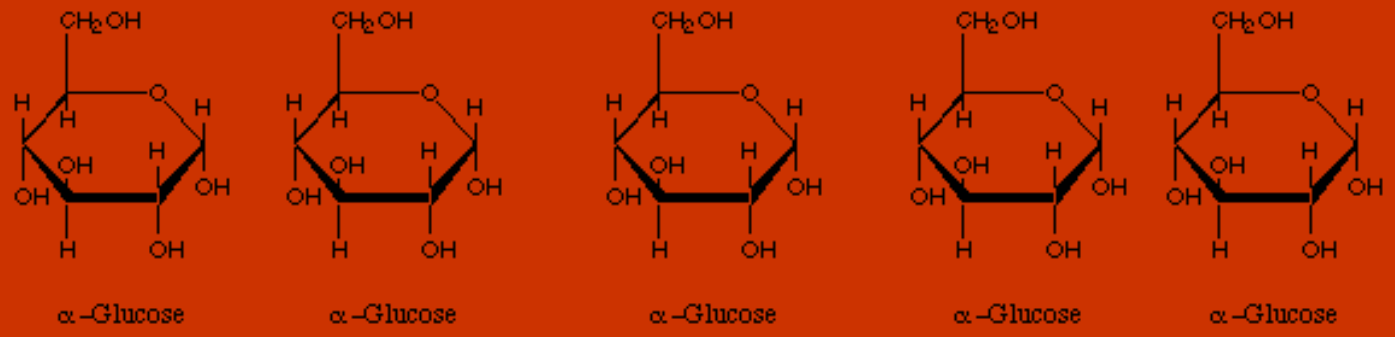
As células vermelhas do corpo humano precisam de 40 gramas de glicose/dia.



A maioria do carboidrato que comemos é convertida em glicose

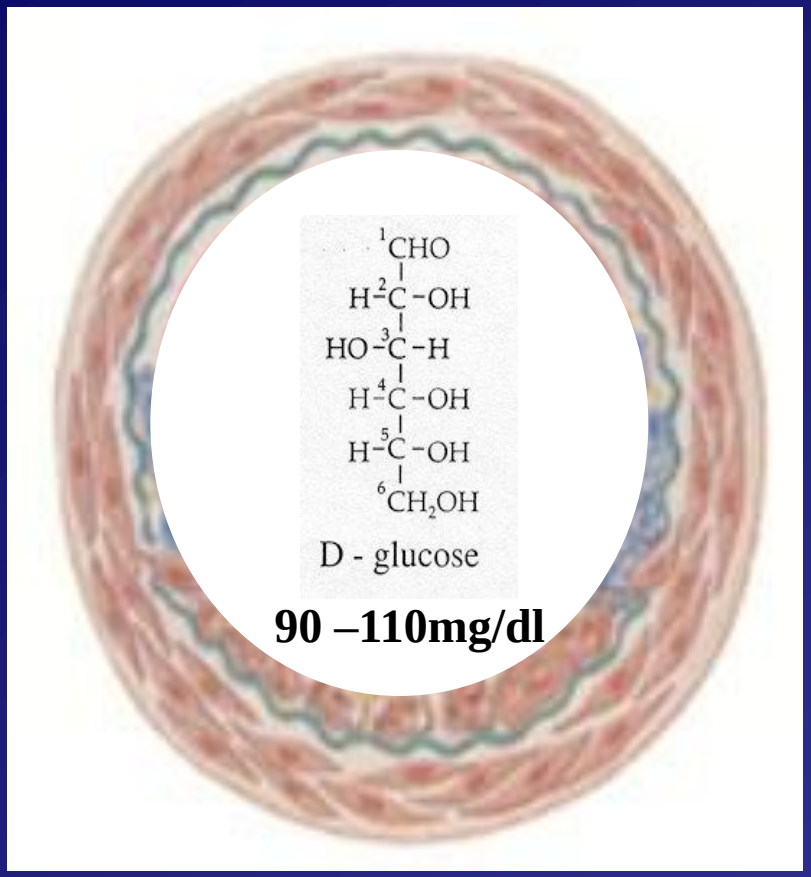


Vaso sanguíneo



90 – 110mg/dl

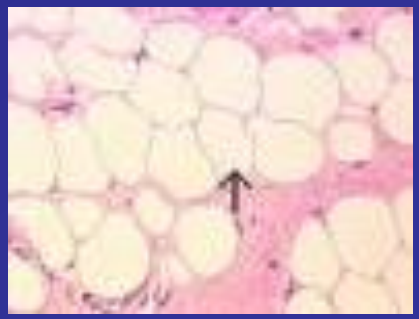
Fontes de glicose



90 –110mg/dl

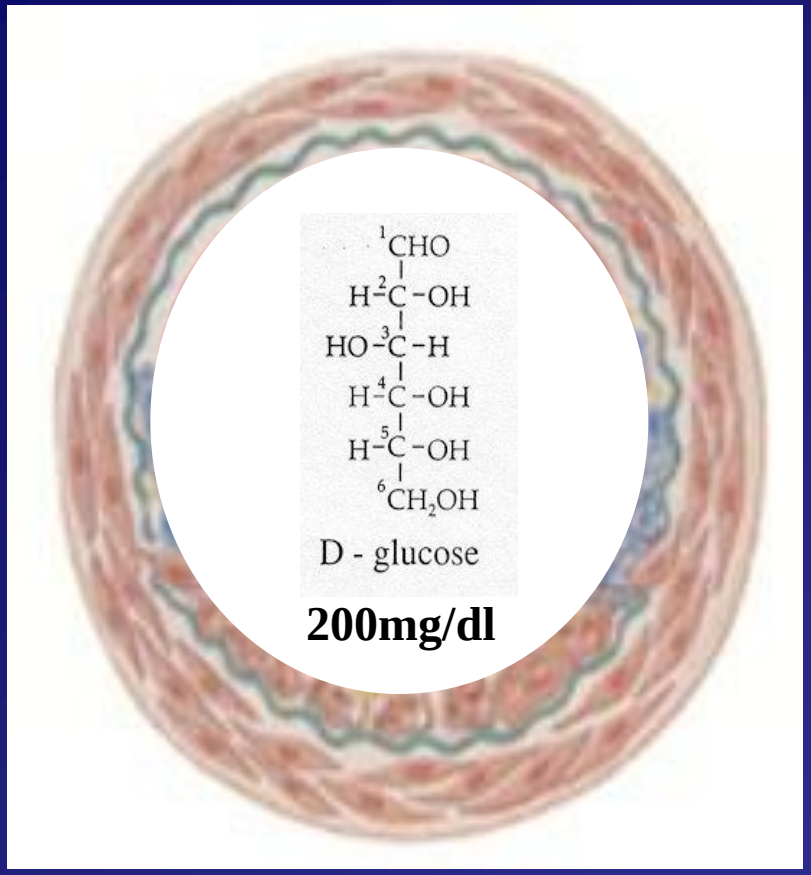
Alimento

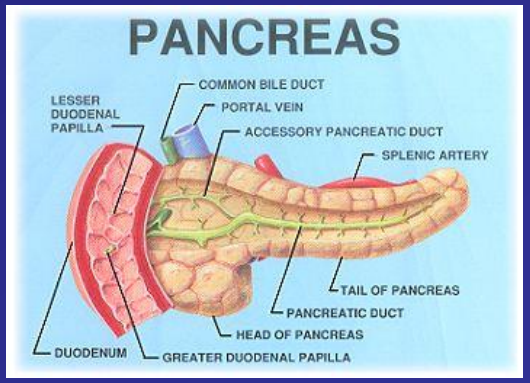
Glicogênio hepático



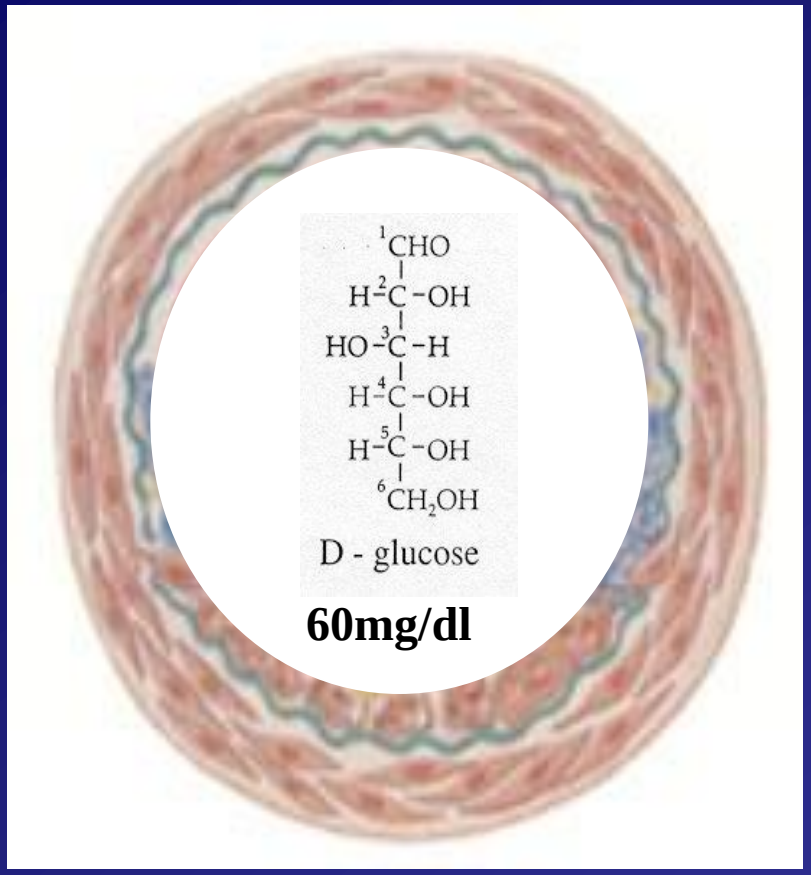
Proteína muscular e lipídios

Hiperglicemia



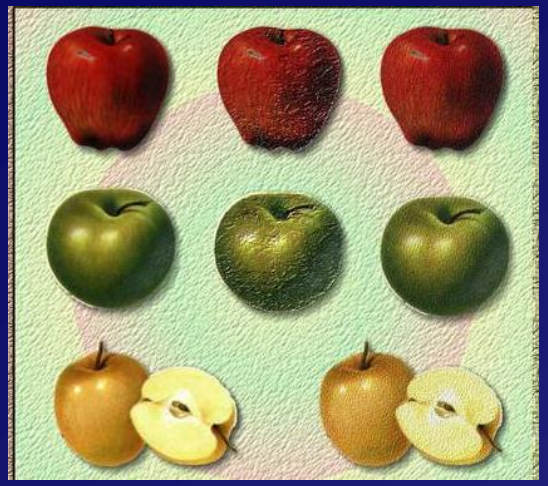


Hipoglicemia



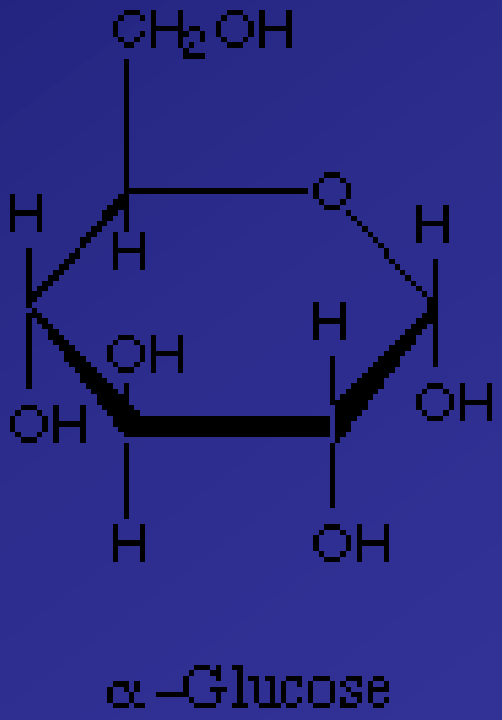
- Fome
- Fraqueza
- Suor
- Fotofobia
- ↑ produção de insulina
- ↓ coordenação neuromotora
- Movimentos não coordenados da perna

Glicose → Sorbitol

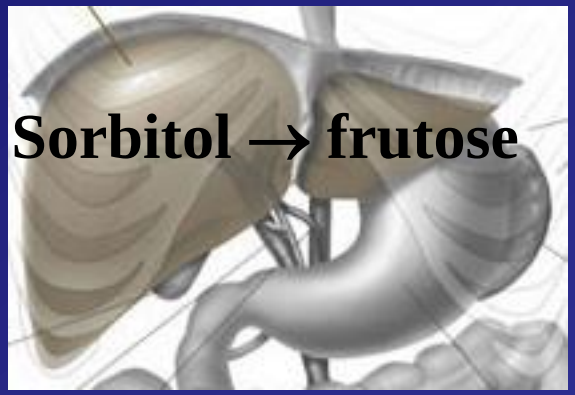


Redução da Glicose

H^+



α–Glucose



Sorbitol → Flatulência e diarréia

Pode aumentar saciedade!!!

Frutose → Açucar das frutas

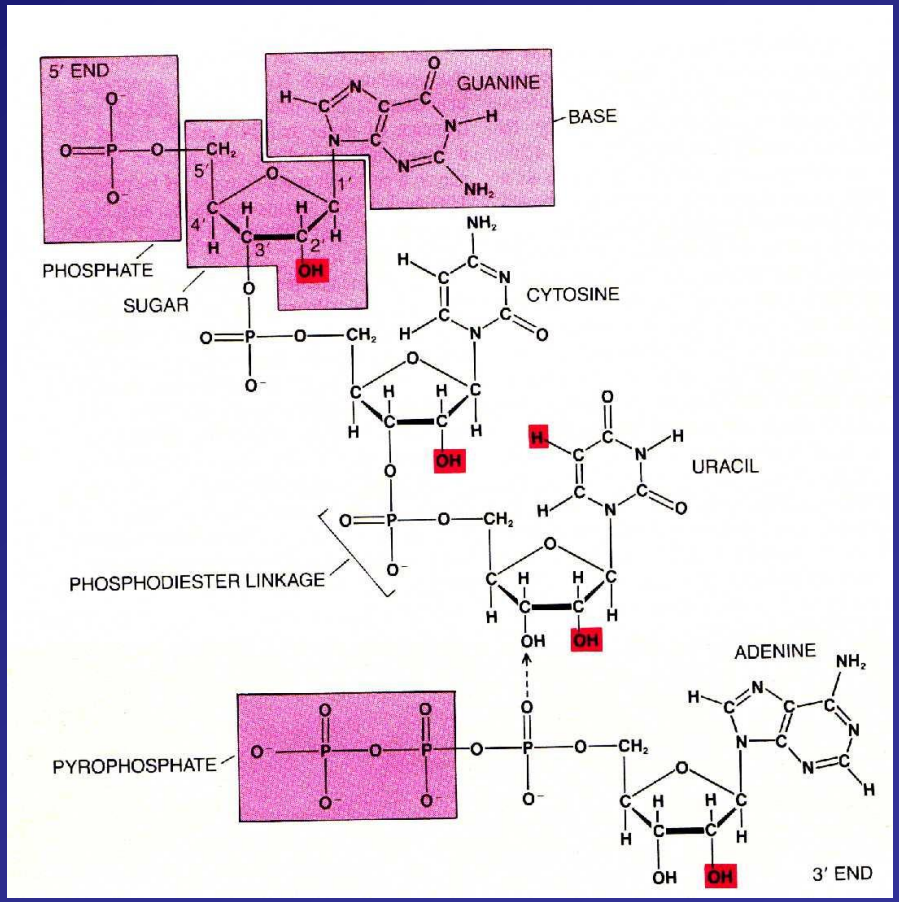
- Não precisa da insulina
- Mais doce do que a sacarose
- Melhor tolerado pelos diabéticos
- Menos cariogênico
- Excesso pode aumentar a necessidade de cobre

Galactose → Hidrólise da lactose

- Produzida pela degradação da lactose
- Não é encontrada nos alimentos
- 1 xícara de leite = 8 gramas
- Excesso de galactose e catarata ?
- Galactosemia → ↑ galactose no sangue

Monossacarídeos – Pentoses

- Ribose – riboflavina; ácido ribonucléico (RNA)
- Glicose → ribose



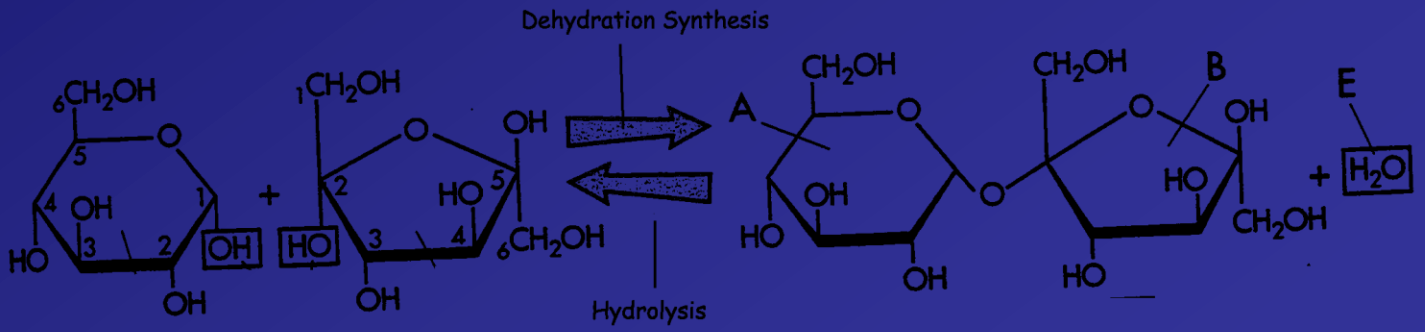
Monossacarídeos – Xilose

- Xilitol: Usado em gomas de mascar e balas – menos cariogênico que sacarose
- Não requer insulina
- Produzido comercialmente da celulose e hemicelulose da madeira

Dissacarídeos

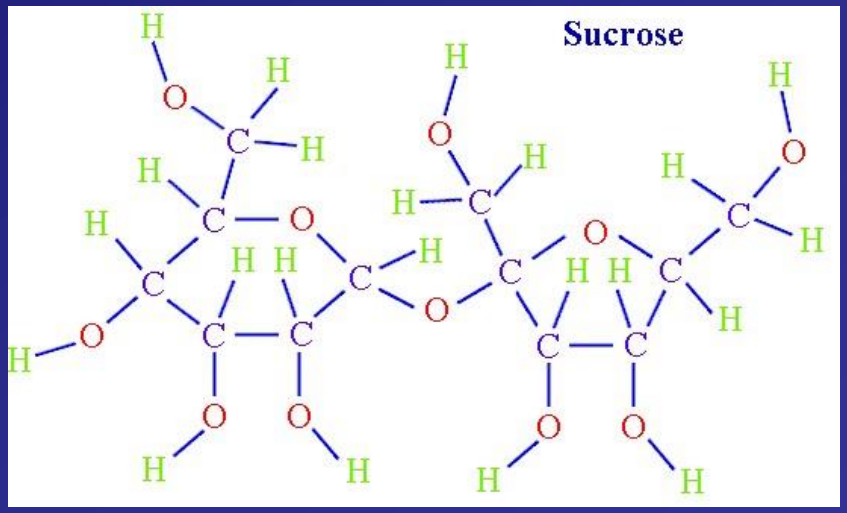
Formado pela reação de condensação

Libera H_2O



Dissacarídeos – sacarose

Glicose + Frutose



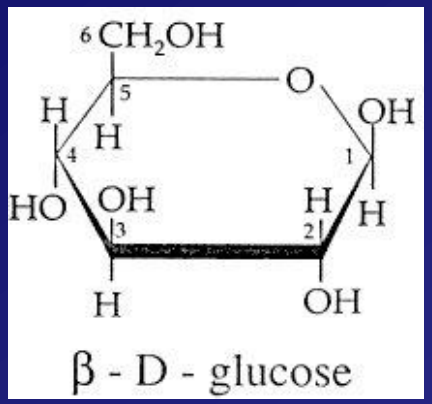
Açucar de mesa

Cana de açucar, beterraba, frutas, vegetais e mel

Consumo não deve ultrapassar 25% VCT

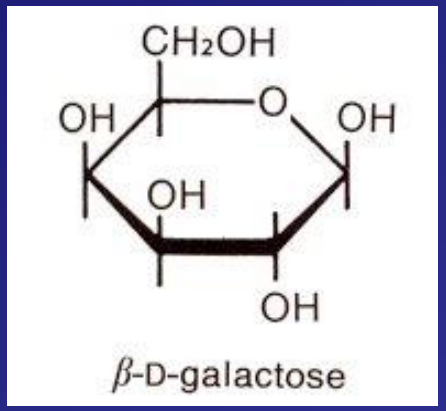
Dissacarídeos – lactose

Glicose + Galactose



β - D - glucose

+



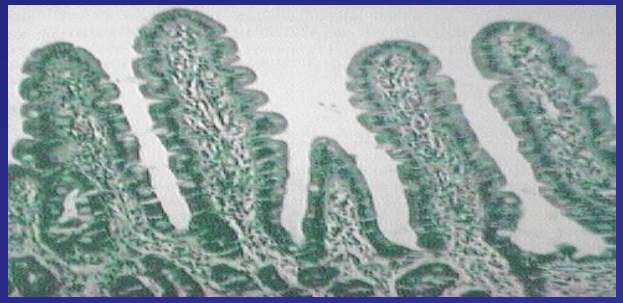
β-D-galactose

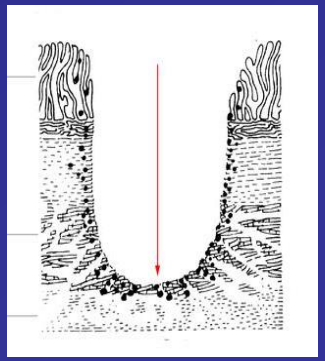
Leite e derivados

Dissacarídeos – lactose

Glicose + Galactose

- Aumenta a absorção intestinal de cálcio
- Lactase na mucosa intestinal digere a lactose
- A atividade da lactase é maior na infância, declina na adolescência e na vida adulta





Intolerância à lactose

Redução de lactase

Subnutrição; Doença Inflamatória Intestinal; Intestino curto

Intolerância à lactose

Leite não pode!!! E queijo, iogurte, pode?

Lactose → Ácido lático

Intolerância à lactose

A lactase é administrada antes ou com o alimento (tablete, cápsula)

Dissacarídeos – Maltose

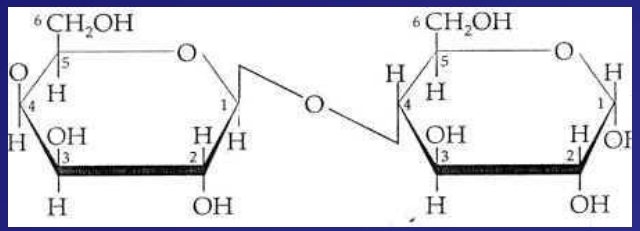
Glicose + Glicose

- Processo da germinação o amido do cereal é hidrolisado em moléculas de glicose para nutrir a semente.
- Processo de fermentação da cerveja e outras bebidas maltadas, a maltose é convertida em álcool

O Doce dos Açucares

Frutose

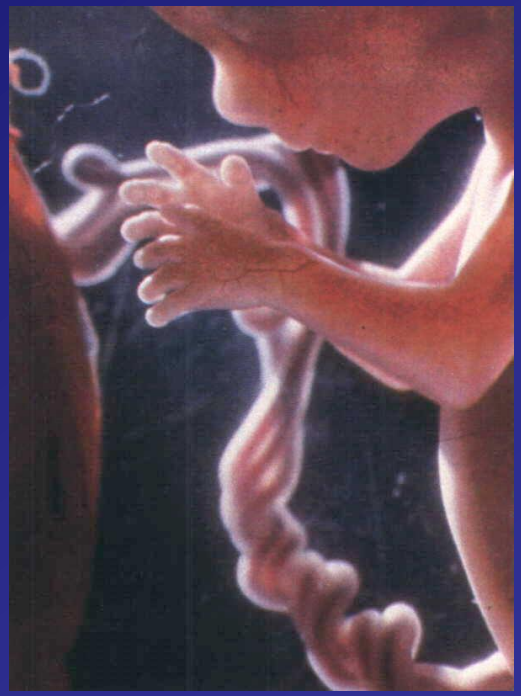
75% mais doce que qualquer açucar



Lactose

Menos doce dos açucares

O Doce dos Açucares

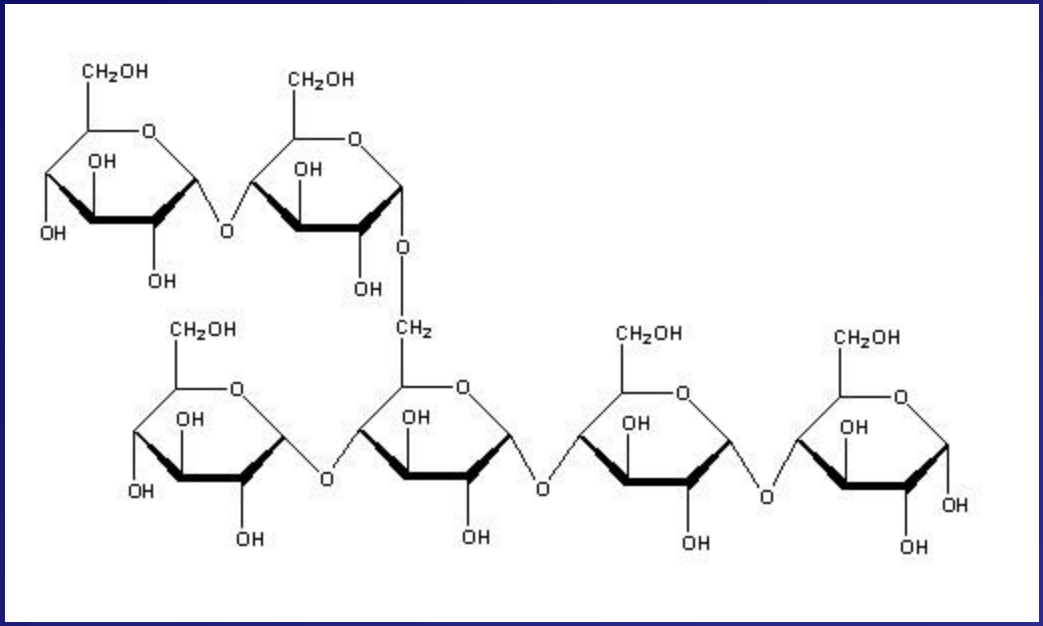


A preferência pelo sabor doce já está definida desde cedo?

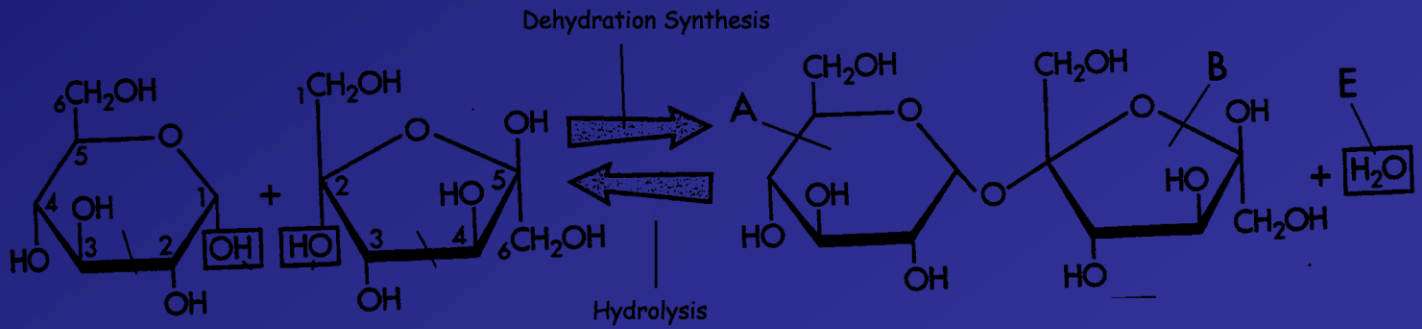
Oligossacarídeo – carboidrato complexo

- 3 ou 10 unidades de monossacarídeos (rafinose e estaquiose)
- Encontrado em alguns legumes
- Fermentados por bactérias colônicas → gases e ácidos graxos de cadeia curta
- Considerados probióticos

Polissacarídeo – carboidrato complexo

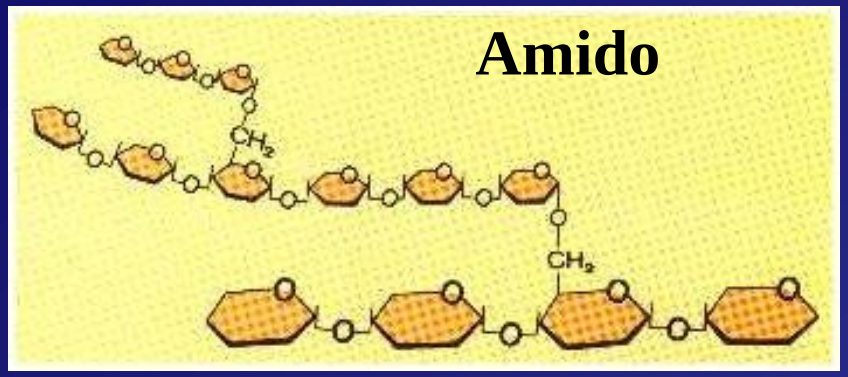


Formado por reação de condensação

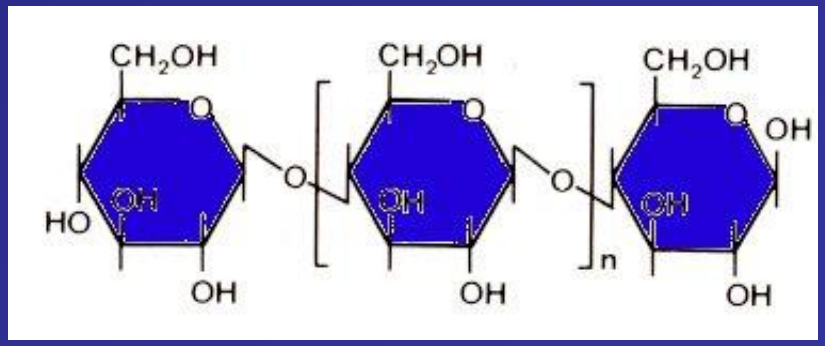


Polissacarídeo – carboidrato complexo

Importância nutricional



Dextrina

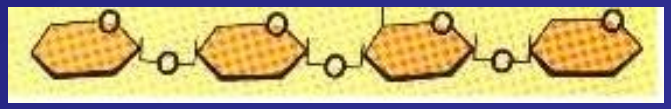


Celulose

Polissacarídeo – carboidrato complexo

Amido (amilose e amilopectina)

- ✓50% carboidrato da dieta
- ✓2000 a 26000 unidades de glicose
- ✓Ligação α(1- 4)

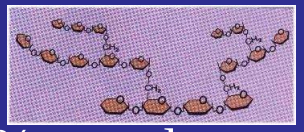


- ✓Cada planta produz um tipo de amido
- ✓Nutricionalmente todos os amidos são iguais

Polissacarídeo – carboidrato complexo

Glicogênio

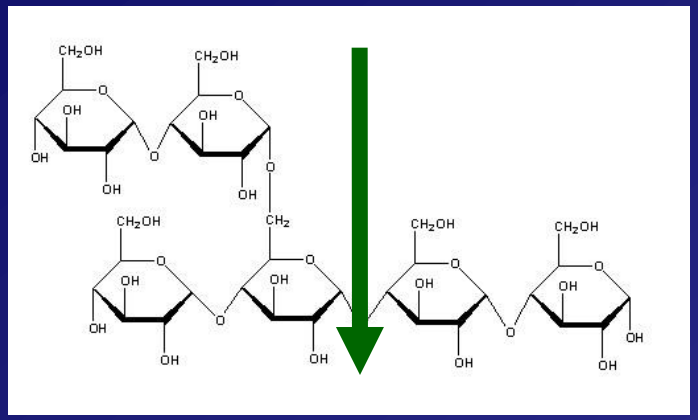
- ✓Carboidrato armazenado
- ✓500g armazenados (1/5 no fígado e 4/5 no músculo) – esgotado em 16hs
- ✓Ligação α(1- 4) e α(1- 6) – ramificações



- ✓Capacidade do fígado aumenta de 50 a 100% em atletas

Polissacarídeo – carboidrato complexo

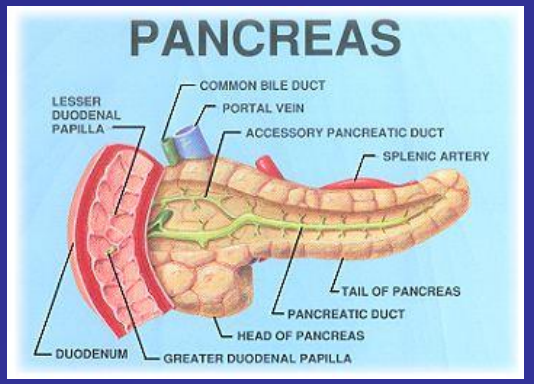
Dextrina



Dextrina

Mais doce que o amido

Maltose

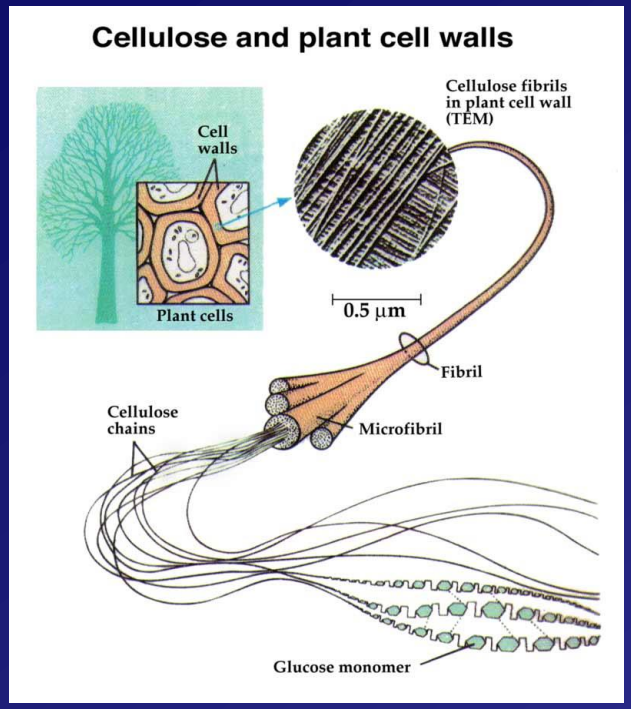


Definições de Fibra Alimentar (FA)

Definição do Codex Alimentarius - “Fibra alimentar é constituída por polímeros de carboidratos com grau de polimerização maior que 3, que não são digeridos e absorvidos no intestino delgado. Pode ser encontrada naturalmente nos alimentos na forma como são consumidos; obtidos de material cru por meio físico, químico, enzimático ou, ainda, por síntese. Apresenta uma ou mais das seguintes características : diminui o tempo do trânsito intestinal e aumenta o bolo fecal; é fermentada pela microbiota; reduz os níveis de LDL- colesterol; reduz os níveis plasmáticos de glicose e insulina”

Polissacarídeo – carboidrato complexo

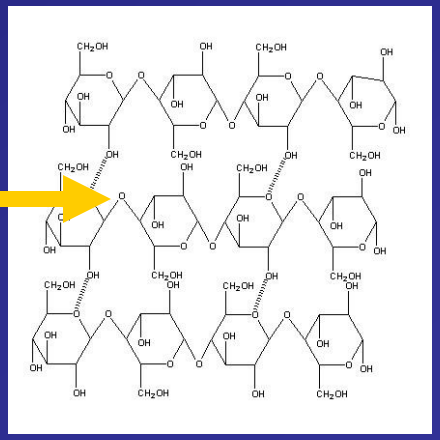
Fibra

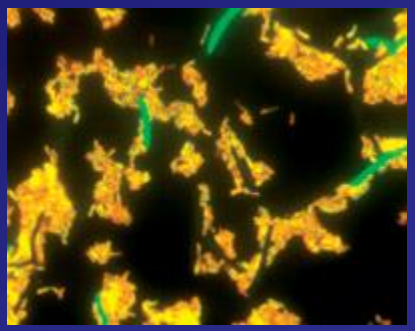


Fibra bruta – celulose (casca de frutas e legumes, vegetais folhudos, cereais integrais)

Composto orgânico mais abundante na terra

Ligação β (1 – 4)





Bactéria no cólon fermenta a celulose e produz ácido graxo de cadeia curta

Polissacarídeo – carboidrato complexo

Fibra

Fibra dietética – pectina, hemicelulose, lignina, celulose

Fibra solúvel

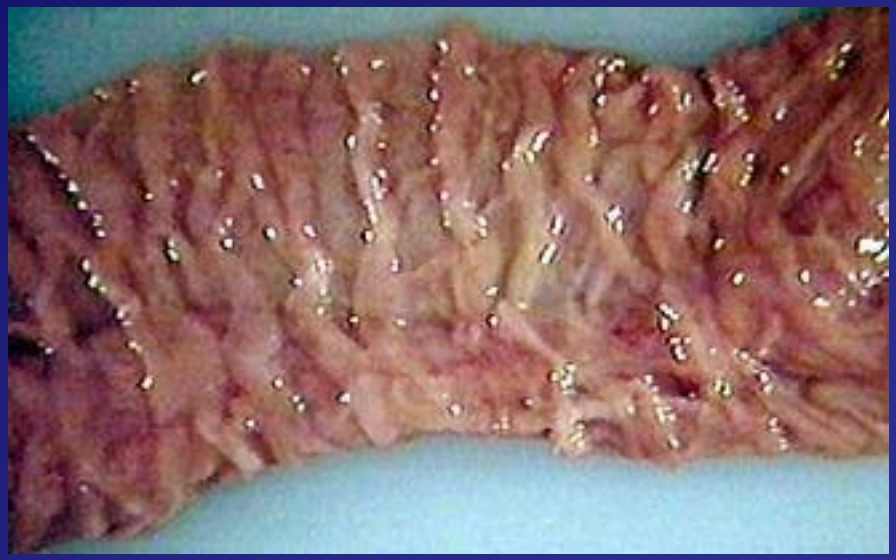
Frutas, legumes, aveia

Fibra insolúvel

Polissacarídeo – carboidrato complexo

Excesso de fibra

Síndrome do Intestino Irritável



Magnésio

Cálcio

Zinco

Ferro

Polissacarídeo – carboidrato complexo

Fibra - ingestão

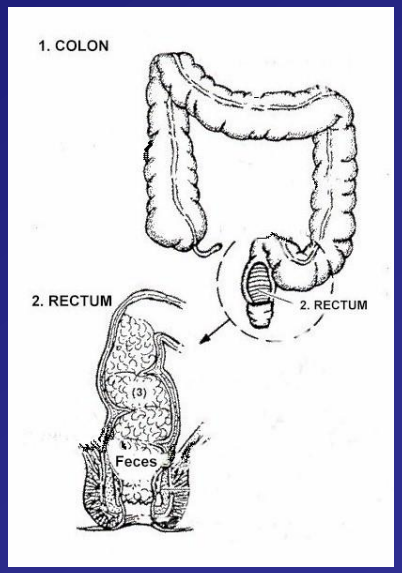
Usual – 10 a 15 gramas

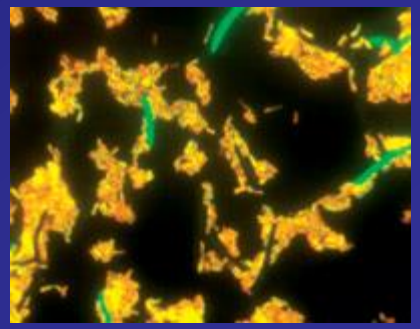
Ideal – 20 a 30 gramas

Fibra e proteção contra o câncer de cólon?

Polissacarídeo – carboidrato complexo

Fibra – ingestão - ↓ carcinógenos





Fibra e proteção contra o câncer de cólon, ou serão os fitoquímicos (carotenóides e flavonóides?

Polissacarídeo – carboidrato complexo

Fibra – ingestão - divertículo

Diverticulose e Diverticulite

20 a 30 gramas de fibra dietética por dia (10 vezes mais que a fibra bruta nas tabelas)

Índice Glicêmico

✓ Escala de resposta glicêmica a uma quantidade fixa de CHO quando comparado à resposta glicêmica de um alimento padrão, geralmente glicose ou pães.

✓ Processamento, mastigação, resposta fisiológica ou metabólica dos indivíduos, alto teor de fibras, ptn e lip nos alimentos, alteram índice glicêmico.

✓ Foster-Powell K, Holt SHA, Brand-Miller JC. International table of glycemic index and glycemic load values: 2002. Am J Clin Nutr 2002;76:5-56.

Fibras

- ✓ Polissacarídeos vegetais e lignina
- ✓ Solúveis: pectinas e gomas; Insolúveis: celulose, hemicelulose e lignina
- ✓ Alimentos contém mistura de fibras
- ✓ Solúveis: polpa de frutas, aveia e leguminosas (formam gel); ↓ absorção da glicose, ↓ pico glicêmico pós-prandial, ↑ excreção de sais biliares nas fezes, ↓ colesterol plasmático; produzem ácidos graxos de cadeia curta ao serem fermentadas no cólon

Fibras

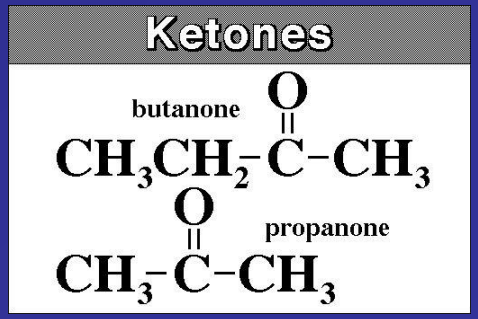
✓ Insolúveis: legumes, vegetais folhudos, farelos e cereais integrais (formam bolo fecal); ↓ pressão no cólon e aceleram o trânsito intestinal, ↓ cáries por estimular a secreção salivar, ↓ absorção de cálcio, ferro, zinco quando em excesso.

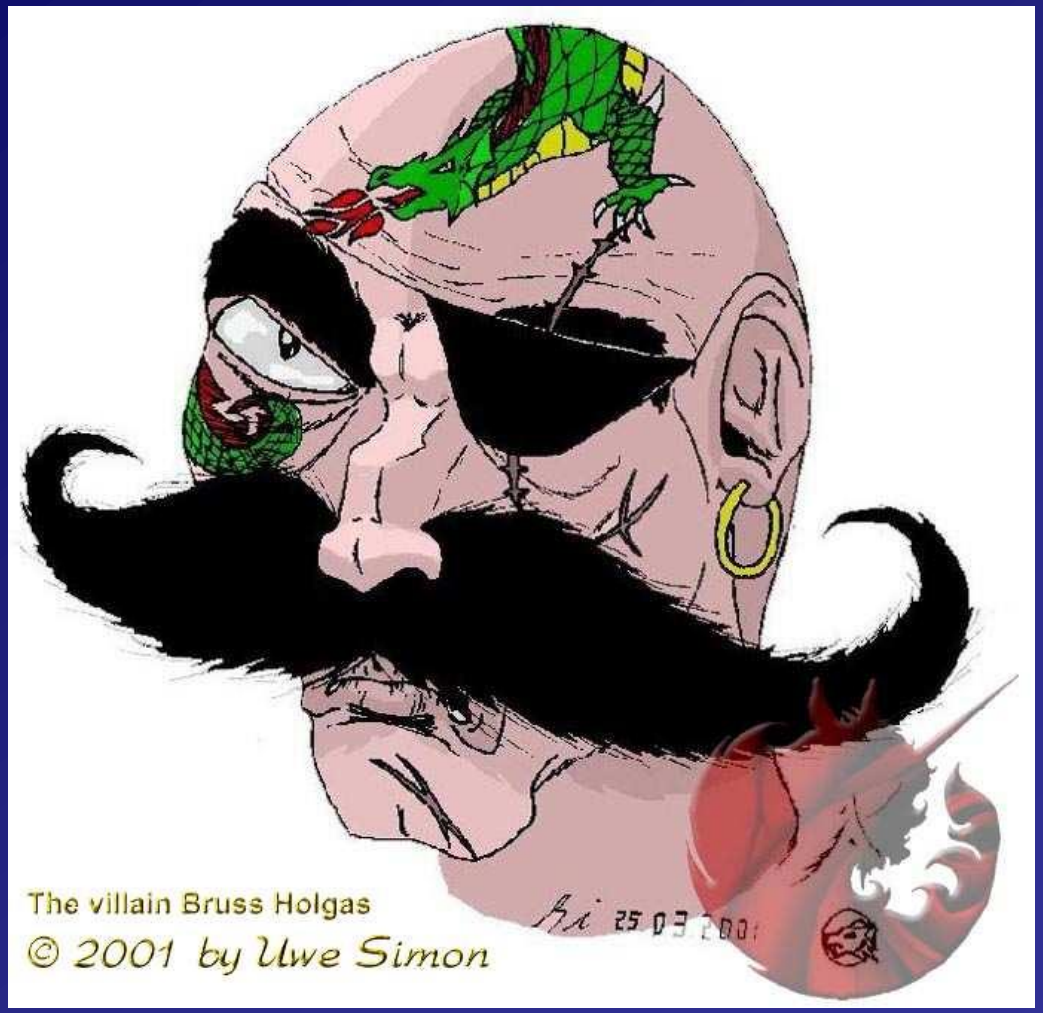
Necessidades e recomendação

- ✓ 45 a 65% do VCT
- ✓ CHO simples: 10% a 25% VCT
- ✓ Incentivo ao consumo de fibras: 20 a 30g/dia para adultos (até 20g/1000kcal; sem efeito adverso)
- ✓ Consumo arroz + feijão está reduzindo e aumenta o consumo de refrigerantes e açucares, biscoitos e pães

Dieta pobre em carboidrato - < 50g/dia

- Perda de sódio, potássio e água
- Perda rápida de peso
- Fraqueza
- Perda de massa muscular
- Acúmulo de corpos cetônicos → acidose
- Acidose → interfere nas funções normais corporais
- Cetose → fadiga e desidratação





➢Carboidrato não é vilão e sim parte essencial da dieta saudável

Eficácia e segurança das dietas pobres em carboidratos: uma revisão sistemática

(Bravata et al. JAMA, 2003)

- Estudos altamente heterogêneos: desenho experimental, conteúdo energético e de carboidratos, duração das dietas e características de participantes.
- Evidências insuficientes, contra ou a favor, de dietas restritas em carboidratos.
- Entre os publicados até então: perda de peso mais associada à redução energética e duração das dietas.

obesity reviews

doi: 10.1111/j.1467-789X.2008.00518.x

Management of Obesity

Systematic review of randomized controlled trials of low-carbohydrate vs. low-fat/low-calorie diets in the management of obesity and its comorbidities

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Summary

There are few studies comparing the effects of low-carbohydrate/high-protein diets with low-fat/high-carbohydrate diets for obesity and cardiovascular disease risk. This systematic review focuses on randomized controlled trials of low-carbohydrate diets compared with low-fat/low-calorie diets. Studies conducted in adult populations with mean or median body mass index of $\geq$28 kg m^{-2} were included. Thirteen electronic databases were searched and randomized controlled trials from January 2000 to March 2007 were evaluated. Trials were included if they lasted at least 6 months and assessed the weight-loss effects of low-carbohydrate diets against low-fat/low-calorie diets. For each study, data were abstracted and checked by two researchers prior to electronic data entry. The computer program Review Manager 4.2.2 was used for the data analysis. Thirteen articles met the inclusion criteria. There were significant differences between the groups for weight, high-density lipoprotein cholesterol, triacylglycerols and systolic blood pressure, favouring the low-carbohydrate diet. There was a higher attrition rate in the low-fat compared with the low-carbohydrate groups suggesting a patient preference for a low-carbohydrate/high-protein approach as opposed to the Public Health preference of a low-fat/high-carbohydrate diet. Evidence from this systematic review demonstrates that low-carbohydrate/high-protein diets are more effective at 6 months and are as effective, if not more, as low-fat diets in reducing weight and cardiovascular disease risk up to 1 year. More evidence and longer-term studies are needed to assess the long-term cardiovascular benefits from the weight loss achieved using these diets.

Keywords: Cardiovascular risk, low-carbohydrate, meta-analysis, obesity.

BMJ Open Diabetes Research & Care

Systematic review and meta-analysis of dietary carbohydrate restriction in patients with type 2 diabetes

Ole Snorgaard,[1] Grith M Poulsen,[2] Henning K Andersen,[3] Arne Astrup[2]

To cite: Snorgaard O, Poulsen GM, Andersen HK, *et al*. Systematic review and meta-analysis of dietary carbohydrate restriction in patients with type 2 diabetes. *BMJ Open Diabetes Research and Care* 2017;**5**: e000354. doi:10.1136/bmjdrc-2016-000354

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ABSTRACT

Objective: Nutrition therapy is an integral part of self-management education in patients with type 2 diabetes. Carbohydrates with a low glycemic index are recommended, but the ideal amount of carbohydrate in the diet is unclear. We performed a meta-analysis comparing diets containing low to moderate amounts of carbohydrate (LCD) (energy percentage below 45%) to diets containing high amounts of carbohydrate (HCD) in subjects with type 2 diabetes.

Research design and methods: We systematically reviewed Cochrane library databases, EMBASE, and MEDLINE in the period 2004–2014 for guidelines, meta-analyses, and randomized trials assessing the outcomes HbA1c, BMI, weight, LDL cholesterol, quality of life (QoL), and attrition.

Results: We identified 10 randomized trials comprising 1376 participants in total. In the first year of intervention, LCD was followed by a 0.34% lower HbA1c (3.7 mmol/mol) compared with HCD (95% CI 0.06 (0.7 mmol/mol), 0.63 (6.9 mmol/mol)). The greater the carbohydrate restriction, the greater the glucose-lowering effect ($R=-0.85$, $p<0.01$). At 1 year or later, however, HbA1c was similar in the 2 diet groups. The effect of the 2 types of diet on BMI/body weight, LDL cholesterol, QoL, and attrition rate was similar throughout interventions.

Limitations: Glucose-lowering medication, the nutrition therapy, the amount of carbohydrate in the diet, glycemic index, fat and protein intake, baseline HbA1c, and adherence to the prescribed diets could all have affected the outcomes.

Conclusions: Low to moderate carbohydrate diets have greater effect on glycemic control in type 2 diabetes compared with high-carbohydrate diets in the first year of intervention. The greater the carbohydrate restriction, the greater glucose lowering, a relationship that has not been demonstrated earlier. Apart from this lowering of HbA1c over the short term, there is no superiority of low-carbohydrate diets in terms of glycemic control, weight, or LDL cholesterol.

Key messages

- The ideal amount of carbohydrates in the diet in the management of type 2 diabetes is unclear.
- The current meta-analysis conducted according to the GRADE system of rating quality of evidence shows that low to moderate carbohydrate diets have greater glucose-lowering effect compared with high-carbohydrate diets.
- The greater the carbohydrate restriction, the greater glucose lowering.
- Apart from improvements in HbA1c over the short term, there is no superiority of low-carbohydrate diets in terms of glycemic control, weight, or LDL cholesterol.

with the aim of achieving weight loss and improving glycemic control and carbohydrates with a low glycemic index to improve postprandial glucose control.[1] However, the ideal energy percentage (E%) of carbohydrate in the diet is unclear. Traditionally, an intake of 45–60% carbohydrate (high-carbohydrate diet (HCD)) has been recommended, but in recent years, diets with a restricted amount of carbohydrate, that is, low-carbohydrate diets (LCD), have been suggested by some experts[2] and are preferred by some patients (http://www.diabetes.co.uk/diet-for-type2-diabetes.html). The arguments have been an improved glycemic control,[3] a quicker and more pronounced weight loss in obese people without diabetes, and a more beneficial effect on lipids.[2] However, this is not supported by the evidence from high-quality randomized controlled trials (RCTs) of type 2 diabetic subjects, and the published studies have been heterogeneous with regard to amount and

BMJ Open

Does high-carbohydrate intake lead to increased risk of obesity? A systematic review and meta-analysis

Kurt Sartorius,[1,2,3] Benn Sartorius,[1,2] Thandinkosi E Madiba,[2,4] Cristina Stefan[5]

To cite: Sartorius K, Sartorius B, Madiba TE, *et al*. Does high-carbohydrate intake lead to increased risk of obesity? A systematic review and meta-analysis. *BMJ Open* 2018;**8**:e018449. doi:10.1136/bmjopen-2017-018449

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ABSTRACT

Objectives The present study aimed to test the association between high and low carbohydrate diets and obesity, and second, to test the link between total carbohydrate intake (as a percentage of total energy intake) and obesity.

Setting, participants and outcome measures We sought MEDLINE, PubMed and Google Scholar for observation studies published between January 1990 and December 2016 assessing an association between obesity and high-carbohydrate intake. Two independent reviewers selected candidate studies, extracted data and assessed study quality.

Results The study identified 22 articles that fulfilled the inclusion and exclusion criteria and quantified an association between carbohydrate intake and obesity. The first pooled strata (high-carbohydrate versus low-carbohydrate intake) suggested a weak increased risk of obesity. The second pooled strata (increasing percentage of total carbohydrate intake in daily diet) showed a weak decreased risk of obesity. Both these pooled strata estimates were, however, not statistically significant.

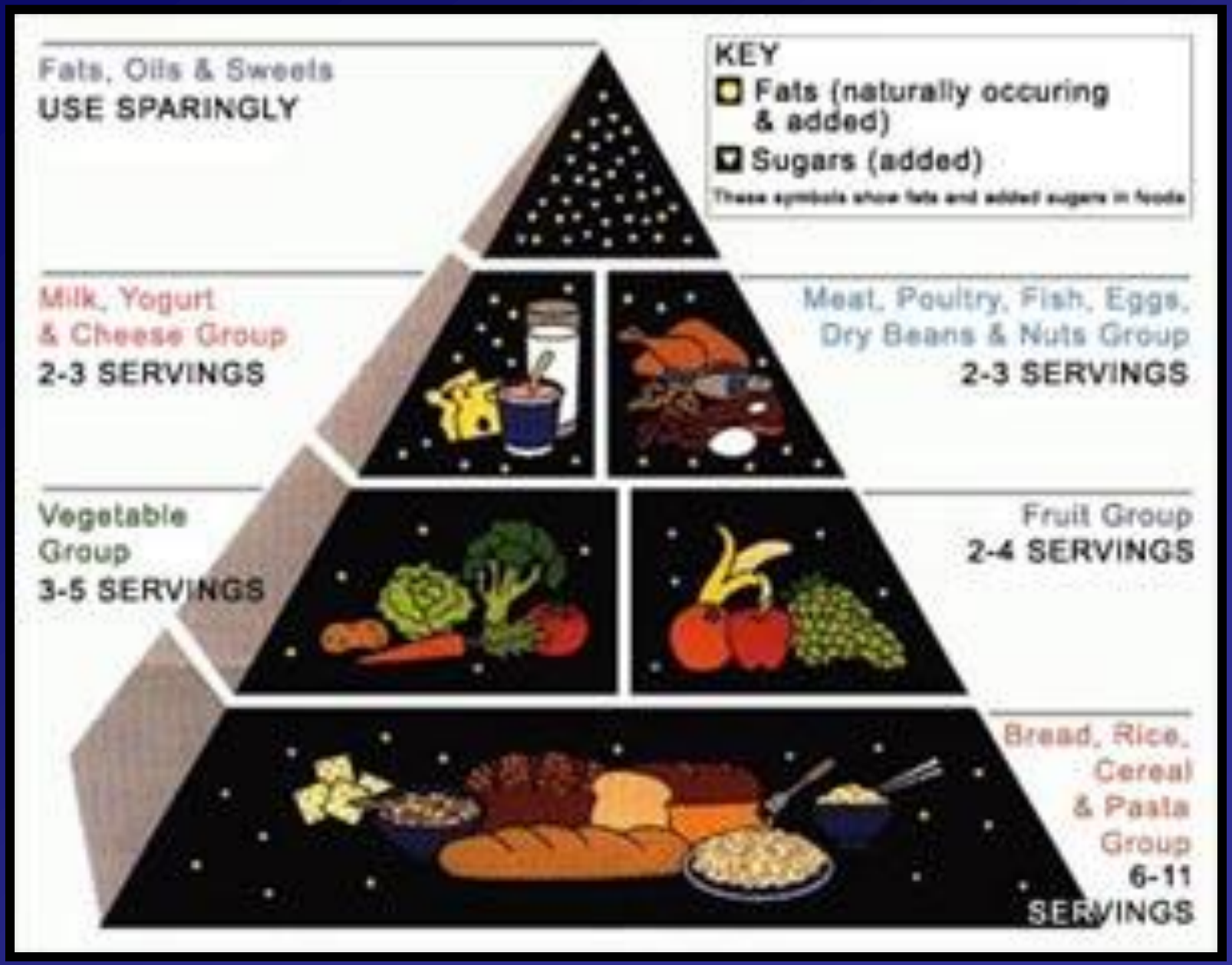
Conclusions On the basis of the current study, it cannot be concluded that a high-carbohydrate diet or increased percentage of total energy intake in the form of carbohydrates increases the odds of obesity. A central limitation of the study was the non-standard classification of dietary intake across the studies, as well as confounders like total energy intake, activity levels, age and gender. Further studies are needed that specifically classify refined versus unrefined carbohydrate intake, as well as studies that investigate the relationship between high fat, high unrefined carbohydrate–sugar diets.

PROSPERO registration number CRD42015023257.

Strengths and limitations of this study

- Systematic review of observational studies across low income, middle income countries and high income countries and first to explore this angle as far as we are aware.
- The scarcity of studies and/or data that either measured obesity risk versus total carbohydrate intake or alternatively measured obesity risk on the basis of a high versus low carbohydrate intake is a limitation.
- The non-standardised instruments for total dietary and total carbohydrate intake across studies is a further limitation.
- The heterogeneity in the classification of dietary carbohydrates and variation in staple carbohydrates is especially emphasised across different countries/cultures as well as developed versus developing settings and has been further compounded by socioeconomic changes over the last three decades.
- Studies with high heterogeneity and varying design and measurement quality may limit the quality of evidence from this study.

2013 and for women increased from 29.8% to 38%. These increases occurred in both developed and low income, middle income countries. In addition, significant increases in obesity were also recorded among children and adolescents in developed countries that indicated 23.8% of boys were either


Fats, Oils & Sweets
USE SPARINGLY
KEY
Fats (naturally occuring & added)
Sugars (added)
These symbols show fats and added sugars in foods
Milk, Yogurt & Cheese Group
2-3 SERVINGS
Meat, Poultry, Fish, Eggs, Dry Beans & Nuts Group
2-3 SERVINGS
Vegetable Group
3-5 SERVINGS
Fruit Group
2-4 SERVINGS
Bread, Rice, Cereal & Pasta Group
6-11 SERVINGS

Alimentos ricos em carboidrato

Alimento	Carboidrato (g/porção de 100g)
Abacaxi em calda	
Acarajé	
Açucar	
Açucar mascavo	
Aipim cozido	
Aipim frito	
All Bran Kellogg´s	
Ameixa seca	
Amedoim caramelizado	
Amedoim torrado com sal	
Angu	
Arroz à grega	

Fonte: Tabela para avaliação de consumo alimentar em medidas caseiras – Pinheiro et al.2002

Alimentos ricos em carboidrato

Alimento	Carboidrato (g/porção de 100g)
Arroz cozido	
Arroz-doce	
Arroz integral cozido	
Aveia em flocos	
Aveia farinha	
Baba de moça	
Bala	
Banana à milanesa	
Banana d’ água	
Banana da terra	
Banana da terra frita	
Banana maça	

Fonte: Tabela para avaliação de consumo alimentar em medidas caseiras – Pinheiro et al.2002

Alimentos ricos em carboidrato

Alimento	Carboidrato (g/porção de 100g)
Banana ouro	
Banana prata	
Bananada	
Barquete de legumes	
Batata baroa cozida	
Batata doce cozida	
Batata doce frita	
Batata frita Ruffles	
Batata inglesa cozida	
Batata inglesa frita	
Beiju com coco	
Bis	

Fonte: Tabela para avaliação de consumo alimentar em medidas caseiras – Pinheiro et al.2002

Alimentos ricos em carboidrato

Alimento	Carboidrato (g/porção de 100g)
Biscoito de água e sal	
Biscoito amanteigado	
Biscoito aveia e mel	
Biscoito baconzitos	
Biscoito cheetos	
Biscoito cream-cracker São Luís	
Biscoito drink piraquê	
Biscoito fandangos presunto	
Biscoito leite São Luís	
Biscoito maisena São Luís	
Biscoito Maria	
Biscoito Mirabel	

Fonte: Tabela para avaliação de consumo alimentar em medidas caseiras – Pinheiro et al.2002

Alimentos ricos em carboidrato

Alimento	Carboidrato (g/porção de 100g)
Biscoito recheado chocolate	
Biscoito roladinho goiaba piraquê	
Biscoito wafer chocolate	
Bolinho de arroz	
Bolo simples	
Bolo com glacê e recheio	
Bolo de banana	
Bolo de cenoura	
Bomba	
Bombom sonho de valsa	
Bombom sortido	
Brigadeiro	

Fonte: Tabela para avaliação de consumo alimentar em medidas caseiras – Pinheiro et al.2002

Alimentos ricos em carboidrato

Alimento	Carboidrato (g/porção de 100g)
Cachorro quente	
Cajuzinho	
Caldo de cana	
Caqui	
Castanha de caju torrada	
Cereal em barra neston coco (un.)	
Cereal em barra neston banana (un.)	
Cereal em barra banana nutri (un.)	
Cereal em barra aveia, banana, mel (un.)	
Cereal em barra trio light frutas (un.)	
Cheeseburguer	
Choco croc superbom	

Fonte: Tabela para avaliação de consumo alimentar em medidas caseiras – Pinheiro et al.2002

Alimentos ricos em carboidrato

Alimento	Carboidrato (g/porção de 100g)
ChocoKrispis Kellogg´s	
Chocolate alpino	
Chocolate meio amargo Nestlé	
Chocolate charge	
Chocolate chokito	
Chocolate com leite	
Chocolate diamante negro	
Chocolate em pó	
Chocolate em pó light new choco	
Chocolate prestígio	
Cocada	
Corn flakes kellogg's com nutriferro	

Fonte: Tabela para avaliação de consumo alimentar em medidas caseiras – Pinheiro et al.2002

Alimentos ricos em carboidrato

Alimento	Carboidrato (g/porção de 100g)
Coxinha de galinha	
Cremogema sabor chocolate	
Cremogema tradicional	
Croissant	
Diet shake baunilha	
Doce de abóbora com coco	
Doce de banana em calda	
Doce de leite	
Esfiha	
Farelo de trigo	
Farelo de arroz	
Farinha de trigo	

Fonte: Tabela para avaliação de consumo alimentar em medidas caseiras – Pinheiro et al.2002

Alimentos ricos em carboidrato

Alimento	Carboidrato (g/porção de 100g)
Farinha láctea	
Farofa	
Feijão-preto cozido	
Fruta do conde	
Fubá	
Geléia de fruta	
Geléia de morango diet	
Germe de trigo	
Geléia de mocotó	
Granola tradicional Kellogg's	
Inhame cozido	
Karo	

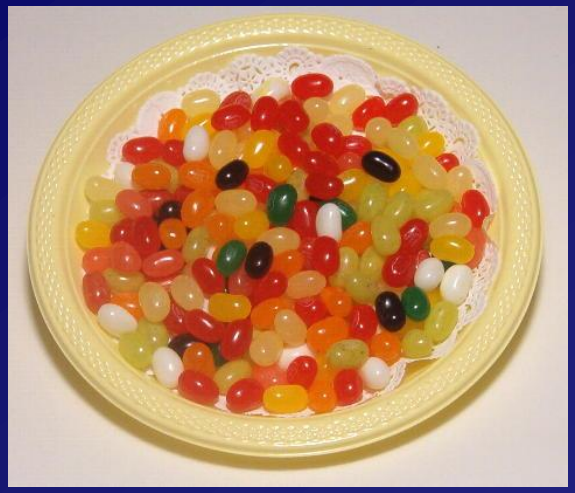
Fonte: Tabela para avaliação de consumo alimentar em medidas caseiras – Pinheiro et al.2002

Alimentos ricos em carboidrato

Alimento	Carboidrato (g/porção de 100g)
Ketchup	
Lasanha à bolonhesa	
Leite condensado	
Macarrão à bolonhesa	
Macarrão ao alho e óleo	
Massa de pastel frita	
Mel de abelha	
Milho verde	
Mingau	
Mucilon de arroz	
Muslix tradicional Kellogg's	
Nescau	

Fonte: Tabela para avaliação de consumo alimentar em medidas caseiras – Pinheiro et al.2002

Carboidrato e saúde dental

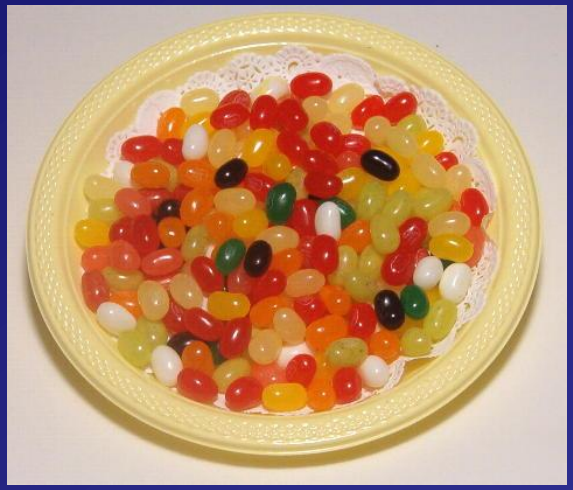


Carboidrato simples

Streptococcus mutans

Desmineralização e cárie

Alimentos cariogênicos

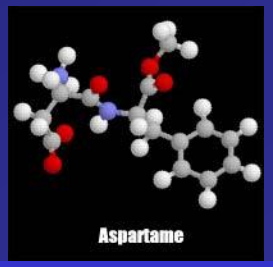


Adoçantes artificiais

Sacarina

Açucar

Adoçante



Aspartame

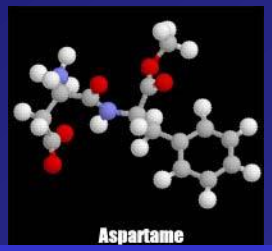
Acesulfame-K

Adoçantes artificiais

Sacarina

- ✓ 1879 – cristal branco
- ✓ Derivada de sub-produto do petróleo
- ✓ 200 a 700 vezes mais doce que sacarose
- ✓ Não é metabolizada, é excretada intacta na urina
- ✓ Excesso em animais levou ao câncer de bexiga
- ✓ FDA tirou do mercada nos EUA
- ✓ Sabor metálico

Adoçantes artificiais



Aspartame

- ✓ 1960; aprovada em 1974 e banida em 1975
- ✓ Reaprovada em 1981
- ✓ 180 vezes mais doce que sacarose
- ✓ Fenilalanina + Ácido aspártico
- ✓ Fenilcetonúria – não metaboliza fenilalanina
- ✓ Instável em ácido
- ✓ Perda do sabor doce com o aquecimento
- ✓ ADI = 50mg/kg (18 latas de refrigerante por dia)
- ✓ NutraSweet

Adoçantes artificiais

Acsulfane-K

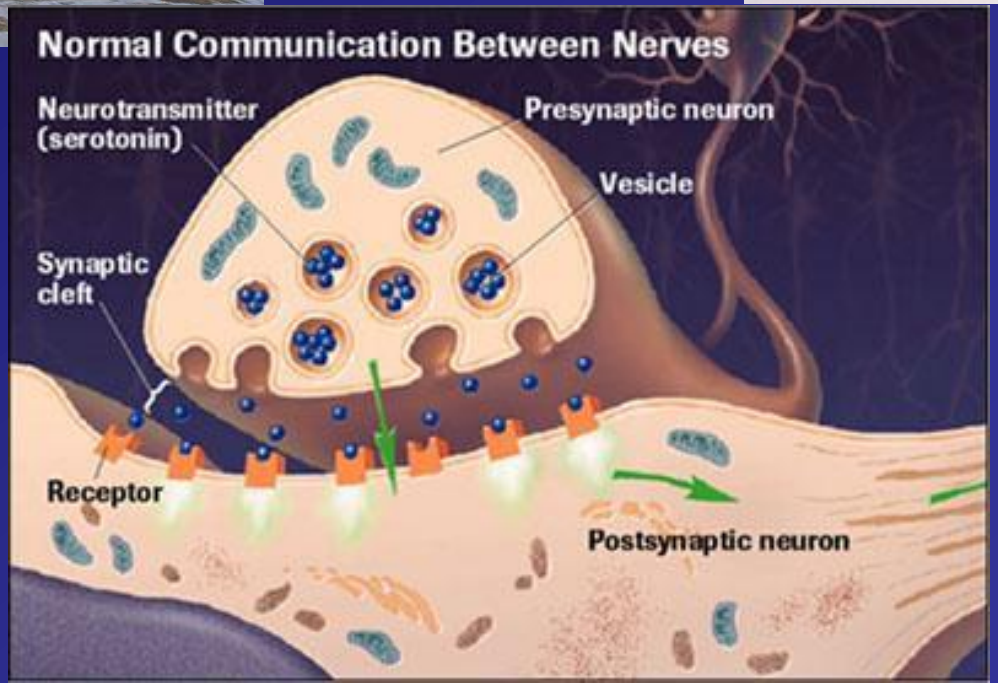
- ✓ Aprovada no FDA 1988
- ✓ Descoberta em 1967
- ✓ “Sunette”
- ✓ 200 vezes mais doce que sacarose
- ✓ Pode ser aquecida
- ✓ ADI = 15mg/kg

Adoçantes artificiais

Ciclamato

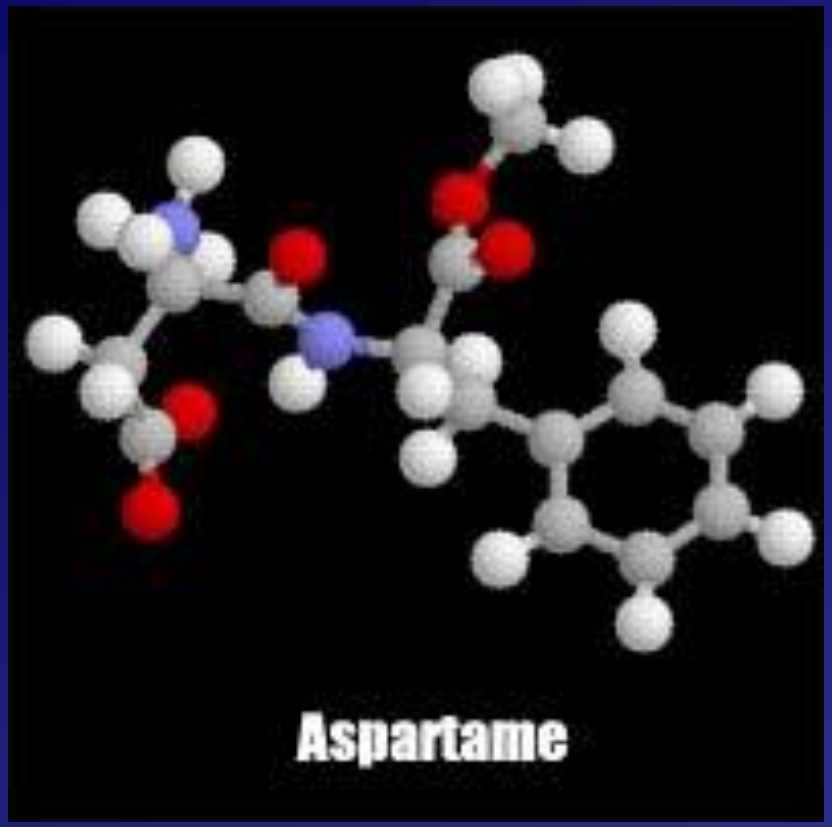
- ✓ Adoçante não nutritivo
- ✓ Descoberta em 1937
- ✓ Banido em 1969 nos EUA
- ✓ Ciclamato de cálcio e ciclamato de sódio

Açucar e comportamento infantil

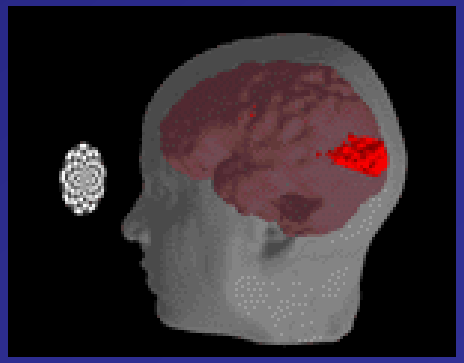


- Hiperatividade
- Falta de atenção
- Delinqüência juvenil
- Pré-escolar mais sensível ao açucar

Aspartame e comportamento infantil



↑ Fenilalanina plasma



Faltam evidências científicas!!!!

Carbohydrates and Health

Scientific Advisory Committee on Nutrition 2015

London: TSO

Total dietary carbohydrate

Overall, the evidence from both prospective cohort studies and randomised controlled trials indicates that total carbohydrate intake appears to be neither detrimental nor beneficial to cardio-metabolic health, colo-rectal health and oral health. However, this report highlights that there are specific components or sources of carbohydrates which are associated with other beneficial or detrimental health effects. The hypothesis that diets higher in total carbohydrate cause weight gain is not supported by the evidence from randomised controlled trials considered in this review.

Sugars and sugars-sweetened foods and beverages

Prospective cohort studies indicate that higher consumption of sugars and sugars-containing foods and beverages is associated with a greater risk of dental caries. Prospective cohort studies indicate that greater consumption of sugars-sweetened beverages is associated with increased risk of type 2 diabetes mellitus. Randomised controlled trials conducted in adults indicate that increasing or decreasing the percentage of total dietary energy as sugars when consuming an *ad libitum* diet leads to a corresponding increase or decrease in energy intake. Reduction in the percentage of dietary energy as sugars was achieved in these trials either through the substitution of other macronutrient components or by replacing sugars with non-caloric sweeteners. Randomised controlled trials conducted in children and adolescents indicate that consumption of sugars-sweetened beverages, as compared with non-calorically sweetened beverages, results in greater weight gain and increases in body mass index.

Starch and starch-rich foods

Prospective cohort studies suggest there is no association between total starch intake and incidence of coronary events or type 2 diabetes mellitus or between the intake of refined grains and risk of type 2 diabetes mellitus. Consumption of brown rice is associated with a reduction in risk of type 2 diabetes mellitus, but the evidence is limited to a small number of studies. Prospective cohort studies indicate an association between greater consumption of white rice and increased risk of type 2 diabetes mellitus in Asian populations (in Japan and China) consuming amounts of white rice that are not generally achieved in the UK. It is therefore uncertain whether this detrimental association is relevant to the whole UK population. A small number of studies suggest that higher consumption of potatoes is associated with a risk of type 2 diabetes mellitus, but it is not possible to exclude confounding by other dietary variables e.g. cooking methods for potatoes such as frying. There is insufficient evidence to draw a conclusion on the association between starch intake and weight gain.

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Dietary fibre

There is strong evidence from prospective cohort studies that increased intakes of total dietary fibre, and particularly cereal fibre and wholegrain, as they are classified in this report, are associated with a lower risk of cardio-metabolic disease and colo-rectal cancer. Randomised controlled trials indicate that total dietary fibre, wheat fibre and other cereal fibres, as they are classified in this report, increase faecal mass and decrease intestinal transit times. Randomised controlled trials also indicate that higher intake of oat bran and isolated β-glucans leads to lower total cholesterol, LDL cholesterol and triacylglycerol concentrations and lower blood pressure.

Non-digestible oligosaccharides, resistant starch, polyols and polydextrose

In this report there is evidence to show that non-digestible oligosaccharides, resistant starch, polyols and polydextrose increase faecal mass. SACN concluded that whilst there is evidence of potentially beneficial effects of these compounds on physiological parameters the health benefits relating to the consumption of these specific compounds is uncertain.

Glycaemic index and glycaemic load

Prospective cohort studies indicate that diets with a higher glycaemic index or glycaemic load are associated with a greater risk of type 2 diabetes mellitus. Limited evidence from cohort studies and randomised controlled trials suggests that there may also be other adverse health effects. However, higher and lower glycaemic index/glycaemic load diets will, in most cases, differ in many ways other than the carbohydrate fraction and therefore study results are difficult to interpret as it is not possible to exclude confounding by other dietary variables.

Dietary carbohydrate recommendations for ages 2 years and above

SACN's recommendations are set out below; the reasoning behind them is described, in full, in the report.

The dietary recommendations for total carbohydrate, free sugars, starch and sugars contained within the cellular structure of food, and milk sugars have been proposed in the context of an energy intake which is appropriate to maintain a healthy weight (SACN, 2011).

It is recommended that the dietary reference value for total carbohydrate should be maintained at an average population intake of approximately 50% of total dietary energy.[1]

It is recommended that the definition for 'free sugars' be adopted in the UK. This comprises all monosaccharides and disaccharides added to foods by the manufacturer, cook or consumer, plus sugars naturally present in honey, syrups and unsweetened fruit juices. Under this definition lactose when naturally present in milk and milk products is excluded.

It is recommended that the average population intake of free sugars should not exceed 5% of total dietary energy for age groups from 2 years upwards.

With the proposed reduction in the population intake of free sugars, their contribution toward recommended total carbohydrate intake should be replaced by starches, sugars contained within the cellular structure of foods and, for those who consume dairy products, by lactose naturally present in milk and milk products. The complete replacement of energy derived from free sugars by these carbohydrate sources would only apply to those people who are a healthy BMI and in energy balance. In those who are overweight, the reduction of free sugars would be part of a strategy to decrease energy intake.

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With the proposed reduction in the population intake of free sugars, their contribution toward recommended total carbohydrate intake should be replaced by starches, sugars contained within the cellular structure of foods and, for those who consume dairy products, by lactose naturally present in milk and milk products. The complete replacement of energy derived from free sugars by these carbohydrate sources would only apply to those people who are a healthy BMI and in energy balance. In those who are overweight, the reduction of free sugars would be part of a strategy to decrease energy intake.

It is recommended that the consumption of sugars-sweetened beverages should be minimised in children and adults.

It is recommended that dietary fibre should be defined as all carbohydrates that are neither digested nor absorbed in the small intestine and have a degree of polymerisation of three or more monomeric units, plus lignin. For extracted natural carbohydrate components or synthetic carbohydrate products to be defined as dietary fibre, beneficial physiological effects, similar to those demonstrated for the naturally integrated dietary fibre component of foods, must be demonstrated by accepted scientific evidence. Dietary fibre is to be chemically determined using the prevailing AOAC methods agreed by regulatory authorities.

It is recommended that the dietary reference value for the average population intake of dietary fibre for adults should be 30g/day, as defined in the paragraph above and measured using the AOAC methods agreed by regulatory authorities. The previous dietary reference value of 18g/day of non-starch polysaccharides, defined by the Englyst method, equates to about 23-24 g/day of dietary fibre if analysed using these AOAC methods, thus the new recommendation represents an increase from this current value.

It is recommended that the average population intake of dietary fibre for children aged 2 to 5 years should approximate 15g/day, for children aged 5 to 11 years 20g/day, for children aged 11 to 16 years 25 g/day and for adolescents aged 16 to 18 years about 30g/day.

Most of the evidence for the wide range of health benefits of fibre comes from studies where the exposure reflects dietary fibre intakes achieved through a variety of foods where it is present as a naturally integrated component. There is evidence to show that particular extracted and isolated fibres have positive effects on blood lipids and colorectal function but due to the smaller evidence base, it is not known whether these components confer the full range of health benefits associated with the consumption of a mix of dietary fibre rich foods. Therefore, it is recommended that fibre intakes should be achieved through a variety of food sources.

No quantitative recommendations are made for children aged under 2 years, due to the absence of information, but from about six months of age, gradual diversification of the diet to provide increasing amounts of whole grains, pulses, fruits and vegetables is encouraged.

Carbohydrates and Health

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Recommended dietary pattern in relation to carbohydrates

The National Diet and Nutrition Survey shows that mean intakes of total carbohydrate meet, or are close to, the levels recommended by COMA in 1991 but that the population overall consumes more than the recommended amount of sugars and less than the recommended amount of dietary fibre. With the proposed increase in the dietary reference value for fibre and the new lower recommendation for free sugars, the difference between recommended intakes and current dietary intakes of the population would become greater for both. In order to address this imbalance, there needs to be a change in the population's diet so that people derive a greater proportion of total dietary energy from foods that are lower in free sugars and higher in dietary fibre whilst continuing to derive approximately 50% of total dietary energy from carbohydrates.

Evidence considered in this report shows that increasing sugars intake leads to a corresponding increase in energy intake. For overweight individuals, reducing the percentage energy intake from free sugars, in the absence of increased energy intake from other sources, could contribute to a reduction in total energy intake and result in weight loss. For individuals who are maintaining a healthy body weight, the reduced intake of energy from free sugars should be replaced by energy from starches, sugars contained within the cellular structure of foods and for those who consume dairy products, by lactose naturally present in milk and milk products. Reducing consumption of free sugars would help to lower the risk of dental caries in all individuals.