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Luisa Gomez
NUTR 7200
Probiotics

1. **Has the definition of probiotic changed since 2001?**

According to Consensus Statements, in 2001 an Expert Consultation of international scientist working on behalf of the Food and Agriculture Organization of the United Nations (FAO) met to discuss probiotics. They reworked the definition of probiotics to "live microorganisms which when administered in adequate amounts confer a health benefit on the host." (p.1). This specific definition has been used for probiotics since then.

2. **What are the benefits of probiotics?**

Two common benefits associated with probiotics: supporting a healthy digestive tract and a healthy immune system. (Consensus Statement p.3) Other benefits of probiotics is they help create a more favorable gut environment, gut immune response, and intestinal homeostasis, prevention and treatment of diarrhea, improvement of faecal properties and microbiota, treatment of irritable bowel syndrome, inflammatory bowel disease and constipation . (International Journal of Environmental Research and Public Health p. 4752).

Health benefits have mainly been linked to specific probiotic strains: *Lactobacillus, Bifidobacterium, Saccharomyces, Enterococcus, Streptococcus, Pediococcus, Leuconostoc, Bacillus, Escherichia coli.* (International Journal of Enveronimental Research and Public Health p. 4745).

3. **Are there risks to taking probiotics?**

Although probiotics have an excellent overall safety record, they should be used with caution in certain patient groups—particularly neonates born prematurely or with immune deficiency. It is demonstrated that the use of certain probiotics on immunocompromised patients with leaky gut has resulted in infections, sepsis, bacteraemia, and fungemia (International Journal of Enveronimental Research and Public Health p. 4745). The properties of different probiotic species vary and can be strain-specific. Therefore, the effects of one probiotic strain should not be generalized to others without confirmation in separate studies.

4. **How do you determine which probiotic(s) to recommend to patients/clients?**

Although most probiotics are regarded as safe and beneficial for healthy individuals, caution needs to be taken when selecting and recommending probiotics to patients. It is very important to be careful with the science and not to oversell it ((International Journal of Enveronimental Research and Public Health p. 4756). Many products currently do not go through pre-market approvals and their efficiency is not well established. Therefore when determining which probiotic to recommend to patients various factors need to be considered:

1. For what conditions does the patient need probiotics? Is it for chronic diarrhea, chronic constipation, abdominal pain, etc.?

2. Is the patient healthy or suffering from any disease? Special consideration and caution needs to be taken with immunocompromised patients, the elderly, and children.
3. Paying close attention to the probiotic label. Does the probiotic meet all the criteria to be considered a probiotic (according to its definition)?

5. Look for your name on the table below and the corresponding probiotic product. Try to locate a study about the probiotic (s) in the product. Provide a brief synopsis of the study.

"GoodBelly probiotic drinks contain live and active cultures of the probiotic strain, Lactobacillus plantarum 299v (LP299V®). This particular strain was chosen out of many, due to the 16 well-documented research trials that indicate their ability to promote healthy digestion.* Additionally, these trials GoodBelly probiotic drinks contain live and active cultures of the probiotic strain, Lactobacillus plantarum 299v (LP299V®). This particular strain was chosen out of many, due to the 16 well-documented research trials that indicate their ability to promote healthy digestion.* Additionally, these trials substantiate that LP299V® has a superior ability to survive the stomach's harsh acidic environment in order to inhabit the intestine. LP299V® has been used by millions of people safely for almost two decades. LP299V® was initially developed for use by gastroenterologists in Sweden to help their patients recover from surgery."

www.goodbelly.com

Clinical trial: *Lactobacillus plantarum* 299v (DSM 9843) improves symptoms of irritable bowel syndrome

Authors? Journal?

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3419998/

In this specific case study, *Lactobacillus plantarum 299v,* which is found in Good Belly products, was studied to assess the symptomatic efficacy for the relief of abdominal symptoms in irritable bowel syndrome (IBS) patients. A double blind, placebo-controlled, parallel designed study was used on two hundred and fourteen IBS patients. The patients were randomized to daily receive either one capsule of *L. plantarum* 299v (DSM 9843) or placebo for four weeks. Symptoms associated with IBS were assessed weekly on a visual analogue scale. After four weeks, both pain severity and daily frequency were lower with *L. plantarum* 299v (DSM 9843) than with placebo. Patients scored *L. plantarum* 299v (DSM 9843) 78.1 % symptomatic effect as excellent or good while only 8.1 % for placebo.

Statistically significant?

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* all work is attached

43 1/2 / 50

NUTR 7200
Parenteral Problems

Parenteral Problems: [mass / volume]

1. Calculate the final concentration for the following formulas. Each is worth 3 points.
   a. 280 grams CHO, 85 grams protein and 45 grams of fat. The total volume is 2100 mL

✓ 13.3% Dextrose, 4.0% AA, 2.1% Fat at 88 mL/hr

   b. 225 grams CHO and 60 grams of protein. Total volume is 1500 mL.

✓ 15% Dextrose, 4% AA at 63 mL/hr

2. Calculate the grams of CHO, protein, and fat and total calories for the following solutions. Each is worth 5 points.
   a. 3: 1 parenteral solution that is 16% dextrose, 5.8 % amino acid and 2.1 % fat. The rate of infusion is 84 mL/hr.

✓ 322g dextrose 117g AA
42g Fat 1983 Kcal total cal

   b. 2:1 solution: 4.8% amino acid and 20% dextrose at 75 ml/hr; 200 ml 20% lipid emulsion

360 320g dextrose ✓40g lipid
86 72g AA 1919 760 Kcal total calories

-3

3. The pharmacy carries substrates in bulk. How much of a 70% dextrose solution, 15% amino acid solution, and a 30% fat solution would be needed for the following formulas? (4 points each)

   a. 320 grams CHO, 135 grams protein and 55 grams of fat. The total volume is 2400 mL (3:1 solution)

183mL Fat, 457mL dextrose, 900mL AA, @ 64 mL per hour

1640mL solution + electrolytes 760mL water

100 mL/hr

-1

   b. 240 grams CHO and 65 grams of protein. Total volume for CHO and AA is 1800 mL. Provide 40 grams fat (2:1 solution)

✓2 [343 mL dextrose + 433mL AA = 776 + 924 mL H2O (100mL electrolytes)] = 1800mL

1 [133 mL fat]

3:1 4.2% AA, 9.9% Dextrose, 30% @ 100mL/hr

4. Determine 2:1 and 3:1 solutions for a patient that requires 25 kcal/kg and 1.2-1.5 g protein/kg. The patient weighs 72 kg. (11 points)

2:1 4.5% AA, 11% Dextrose @ 92 mL/hour
30% Liquid emulsion @ 8.2 mL/hour

5. Patient in # 4 is placed on a fluid restriction – no more than1600 ml per day. What is the new final concentration? (4 points)

2:1 6.25% AA, 15% Dextrose @ 67mL/hr
30% Liquid emulsion @ 8.2mL/hr

3:1
6.25% AA, 30% Fat
15% dextrose,
@ 67mL/hr

6. Calculate the osmolarity for the following formulas. (Which one can be given peripherally? Why? (2.5 points each) Neither can be peripherally given

a. 3:1 parenteral solution that is 16% dextrose, 5.3% amino acid and 2% fat. $16 \times 50 = 800$, $5.3 \times 100 = 530$ = 1330 mOsm/L (< 900 so) NO

This can no indication electrolytes added but will accept answer.

b. 2:1 solution: 5% amino acid and 7% dextrose $5 \times 100 = 500$, $7 \times 50 = 350$ = 850 mOsm/L BUT must include 70-100 mOsms of electrolytes (< 900)

7. How mg CHO is a patient receiving per kg/min from the following formula: Formula: 3:1 parenteral solution 14% dextrose, 5.5 % AA, 1.9 % fat @ 84 mL/hr. Patient weighs 70 kg. Comment on amount. (4 points).

Patient is receiving 2.8 mg CHO which may be ~~is~~ too low. (3-5mg/kg/min)
Patient ~~will~~ may become hypoglycemic

8. A patient requires 140 grams of protein/day. What is the minimum volume the parenteral solution can be considering the stability range for protein? (2 points).

Protein stability 20-60g (central)
Protein stability 20-40g (peripheral

$(x\ mL)(.02) = 140g$
$= 7000mL$ → would flood the patient

$(x\ mL)(.06) = 140g$
$= 2333mL$ minimum volume

① a.

CHO: 280 g / 2100 mL × 100 = 13.3% dextrose

Pro: 85g / 2100 mL × 100 = 4.0% AA

Fat: 45g / 2100 mL × 100 = 2.1% Fat

$\frac{2100\ mL}{24\ hrs/d}$ = 87.5 w▶ 88 mL/m

b.

CHO: 225 g / 1500 mL × 100 = 15% dextrose

Pro: 60g / 1500mL × 100 = 4% AA

$\frac{1500\ mL}{24\ hrs/d}$ = 62.5 w▶ 63 mL/m

) 16% dextrose
5.8% AA
2.1% Fat

84 mL/hr
2016 mL/day

Fat

$\frac{2.1}{1000\ mL} = \frac{X}{2016\ mL}$ X = 42 g Fat

$\frac{5.8}{000\ mL} = \frac{X}{2016\ mL}$ X = 117 g AA

$\frac{16}{1000\,mL} = \frac{x}{2016}$ $x = 322g$ dextrose

Total calories

322g x 3.4 Kcal/g = 1094.8 kcal
117g x 4 Kcal/g = 468 kcal
42g x 10 kcal/g = 420 kcal

1982.8 kcal total

(2b) 4.8% AA 75ml/hr
20% dextrose 1800ml/day
200ml - 20% lipid emulsion

$\frac{20}{1000\,mL} = \frac{x}{1800\,mL}$ $x = 360\,g$ dextrose

$\frac{4.8}{1000\,mL} = \frac{x}{1800\,mL}$ $x = 86\,g$ AA

$\frac{2\,kcal}{mL} \times 200mL = \frac{400\,kcal}{10\,kcal/g} = 40g$ lipid

320g x 3.4 = 1088 Kcal/g

360g x 4 kcal/g = 308 Kcal/g

Total cal = 1796 Kcal

(3) 70% dextrose — 320g CHO
15% Amino acid — 135g Protein
30% Fat — 55g fat
TV: 2400mL

30% Fat
55g Fat

$\frac{30g}{100mL} = \frac{55g}{x}$ $x = 183\,mL$

2400 mL
183 mL
2217 mL AA + CHO

70% dextrose
320g CHO

$\frac{70}{100mL} = \frac{320}{x}$ $x = 457\,mL$ dextrose

$\frac{15g}{100} = \frac{135g}{x}$ $x = 900\,mL$

1540 mL total / 24 hrs = 64 mL per hour
1540 mL + 100mL electro = 1640mL solution
2400mL - 1640mL = 760mL water

TV: 1800mL

(2:1 solution)

(3b) 240g CHO ~ 70% dextrose

65g protein = 15% AA

$\frac{70g}{100mL} = \frac{240g}{X}$ X = 343 mL dextrose

$\frac{15g}{100mL} = \frac{65g}{X}$ X = 433 mL AA

$\frac{30g}{100mL} = \frac{40g}{X}$ X = 133 mL Fat

1800 - [776 + 100] = 924 water

1800 ml
15 ml/hr + AA/Dextrose

30% lipid emulsion
45% carbs

2:1

④ 25 kcal/kg (-1%) 72 kg ✓

1.2-1.5g protein/kg 1800 kcal

✓ 86.4 - 108g protein

1800 kcal total (100g) → 400kcal

400 kcal Pro ✓ 2160 - 2520

= (2400mL TV)

1400 kcal

-810 kcal CHO 810kcal = 46% kcal

(590 kcal) Fat Emulsion 238g CHO = 2.36mg/kg/min

3kcal/ml (30%)

590 kcal / 3 kcal/mL = 197 mL of 30% will give us 700K cal

2400 mL (total volume)

-197 mL

2203 mL (CHO+AA)

100g (Pro) / 2203 mL x 100 = 4.5% AA ✓

(.45)(1800) = 810 kcal ÷ 3.4 kcal/g = 238g CHO

238g (CHO) / 2203mL x 100 = 11% Dextrose ✓

Rates

$\frac{2203\ mL}{24\ hrs} = 92\ mL/hour$ CHO + AA

$\frac{197\ mL}{24\ hrs} = 8.2\ mL/hour$ lipid emulsion

3:1

$\frac{100g}{2400\ mL} \times 100 = 4.2\%$ AA

$\frac{238g}{2400mL} \times 100 = 9.9\%$ Dextrose

$\frac{59g\ Sat}{2400mL} = 2.4\%$ Sat
30% Fat

$\frac{2400}{24\ hrs} = 100\ mL/hour$

(5) Fluid restriction - 1600 mL/day (-1½)

3:1

100g / 1600 mL x 100 = 6.25% AA ↑ Exceeds ↓ stability
↓ Pro

238g / 1600 mL x 100 = 15% dextrose ↑ Sat

1600mL / 24 hr = 67 mL/hour

2:1

1600 mL
197 mL
1403 mL TV

100g / 1403 mL x 100 = 7.1% AA Exceeds stability

238g / 1403 mL x 100 = 17% dextrose

1403 / 24 = 58 mL/hour

197 / 24 = 8.2 mL/hour

need to ↓ Sat volume so you can ↑ AA/Dextrose volume

(6) a.

16% x 50 = 800
5.3% x 100 = 530 > 1330 mOm/L

NO - exceeds 900

b.

5 x 100 = 500
7 x 50 = 350
850
+ electrolytes
< 900 so NO

(7) 3:1 70 kg
14% dextrose ∞ 84 mL/hr
5.5 % AA 2016 mL/day
1.9 % Fat

$\frac{14g}{100} = \frac{x}{2016}$ x = 282 g dextrose

$\frac{5.5}{100} = \frac{x}{2016}$ x = 111 g AA

$\frac{1.9}{100} = \frac{x}{2016}$ x = 38 g Fat

70 kg x (x) x 1440 / 1000 = 282