Personalized Nutrition: Opportunities and Challenges

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Objectives

- Describe multiple aspects of personalized nutrition
- Identify strengths and limitations of products and companies that sell/off er personalized nutrition to consumers
- Apply critical thinking skills to a personalized nutrition case study

Predictions:

1. Plant-based eating
2. Mindfulness meditation
3. Mash-up classes like piloxing (pilates + boxing)
4. Personalized nutrition (i.e. nutrigenomics)
5. Workplace wellness

What is Personalized Nutrition (PN)?

- is at the heart of what registered dietitians have been doing since the advent of the profession: delivering tailored nutrition advice that fits the physical, clinical and emotional needs of their patients. - Allison Webster, PhD, RD

- is delivery of personalized diets based on information related to people’s existing diets, lifestyle and/or phenotypic information (e.g. nutrient profile; cholesterol; BMI; BP, etc.), and/or genetic data. - Celis-Morales C et al

- is uncovering details about your genetics, lifestyle, metabolism and goals to design personalized eating recommendations for the one, unique you. - Habit

Personalized Nutrition vs. Nutrigenetics/genomics

RD/DTR → Dietary Assessment
Taste/Culture/Preference → Personalized Nutrition
Nutrigenetics/Nutrigenomics
Microbiome
Varying Levels of PN Specificity

https://www.nutraingredients.com/News/Promotional-Features/Defining-personalized-nutrition

Test your food for gluten: anytime, anywhere.

Nima empowers you to dine out more often, stay gluten-free outside, double-check a packaged food, and travel for work, etc.

https://nimasensor.com

Test your food for peanuts: anytime, anywhere.

Nima empowers you to dine out more often, stay gluten-free outside, double-check a packaged food, and travel for work, etc.

https://nimasensor.com

platejoy

https://www.platejoy.com/
Company Observations

- **Fancy websites** with fit, healthy, white people & testimonials
- Appreciation for individual x diet interactions
- Little (if any) RD representation
- Sometimes: business ideas are ahead of the research

There is research, but…
It's complicated.

http://nap.edu/25049

Harvie R et al. JAND 2017;12:1865-69

(Gut) Microbiome and Health
Enjoy eating better and feeling better based on your microbiome.

Balance your blood sugar with personalized nutrition.

https://www.daytwo.com/

800 person PN study

When do you usually wake in the morning on a working day?
8:00 AM

At what time do you usually go to sleep on a working day?
11:00 PM

How many hours per day do you sleep during midday (if you do)?
- Less than half hour
- Half hour to one hour
- One hour to two hours
- More than two hours
- None

Blood Test Results
Although less is important, it will be great if you can fill the following lab test. You can fill results from the last 12 months.
If you plan to take these tests soon, don’t worry you can always come back to this page and provide the results afterward.

- HIV
- Hepatitis B
- Hepatitis C
- Cholesterol
- Blood sugar
- Triglycerides
- Alcohol (AST/ALT)
- Alcohol phosphorytion
**Day Two Results**

**YOUR MOST SIGNIFICANT MICROBIOME LIST**

The bacteria information is the best that science supports today. We cannot tell you for example if a bacteria is good for you or how to change it.

The following list presents the top gut microbiome groups from various levels of the microbiome hierarchy.

<table>
<thead>
<tr>
<th><strong>BACTERIOME</strong></th>
<th><strong>Yeast</strong></th>
<th><strong>Population</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Bacteroides</em></td>
<td>2.7%</td>
<td>68%</td>
</tr>
<tr>
<td><em>Bifidobacterium</em></td>
<td>4.1%</td>
<td>9.6%</td>
</tr>
<tr>
<td><em>Bacteroides</em></td>
<td>2.0%</td>
<td>4.3%</td>
</tr>
</tbody>
</table>

**BACTERIODES_VULGARIS**

Yeast: 2.7% Population: 4.3%

**BACTERIODES_INTERFACELS**

Yeast: 4.5% Population: 8.1%

**Characteristics:** The *Bacteroides* genus is part of the normal human intestini microbiome.

**Metabolism:** Members of this genus have the ability to utilize complex polymers; carbohydrates, which are otherwise indigestible by humans. Members of this genus can produce the short chain fatty acids butyrate, propionate and acetate, which contribute a major source of energy for the human body.

**Association:** A recent study has suggested that the levels of *Bacteroides* may be associated with the intake of a high soy diet. Soy is high in isoflavones, a metabolite which is related to vegetable or vegetarian versus omnivorous or carnivorous diets. In the same study, vegetarians and vegans had lower *Bacteroides* levels.

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All foods are given a score from A+ to C- based on the user's postprandial blood glucose response. Our scoring system has three color-coded tiers:

**A+**

Your best food choices. These are foods that will most likely raise your blood sugar levels the least.

**B**

These are not the best for you, but also not the worst.
Critical Thinking Case

- Consider what you know about the research that led to Day Two and the type of recommendations Day Two provides to consumers.
- What are potential implications of the Day Two approach for a generally healthy 50 year-old female?
- As an nutrition professional, what questions does this approach raise?
- As a nutrition professional, what opportunities do you see?

Sample Meal Plan #1

<table>
<thead>
<tr>
<th>Breakfast</th>
<th>Lunch</th>
<th>Dinner</th>
<th>Snacks</th>
</tr>
</thead>
</table>

2,175 kcals: mixed macros, 20g fiber, 1,114mg Ca, 420IU Vit D

<table>
<thead>
<tr>
<th>Food</th>
<th>Kcal</th>
<th>Fiber (g)</th>
<th>Calcium (mg)</th>
<th>Vitamin D (IU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 slices Challah French Toast</td>
<td>310</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1/2 C. Raspberries</td>
<td>32</td>
<td>4</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>1/2 C. Plain Whole Yogurt</td>
<td>149</td>
<td>0</td>
<td>296</td>
<td>5</td>
</tr>
<tr>
<td>8 oz. Cappuccino with Milk</td>
<td>30</td>
<td>0</td>
<td>276</td>
<td>109</td>
</tr>
<tr>
<td>1 tsp Butter</td>
<td>102</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>2 Tbsp Syrup</td>
<td>104</td>
<td>0</td>
<td>41</td>
<td>0</td>
</tr>
<tr>
<td>2 Tbsp Chipotle Ranch Dressing</td>
<td>90</td>
<td>0</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>1 Slice Whole Wheat Toast</td>
<td>76</td>
<td>1.9</td>
<td>37</td>
<td>0</td>
</tr>
<tr>
<td>1 tsp Olive Oil</td>
<td>40</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3 oz. Seared Salmon</td>
<td>315</td>
<td>0</td>
<td>13</td>
<td>360</td>
</tr>
<tr>
<td>1 C. Cooked Broccoli</td>
<td>55</td>
<td>5.1</td>
<td>62</td>
<td>0</td>
</tr>
<tr>
<td>1/4 C. Cheese</td>
<td>114</td>
<td>0</td>
<td>260</td>
<td>7</td>
</tr>
<tr>
<td>1/2 C. Mushroom Risotto</td>
<td>309</td>
<td>1.9</td>
<td>59</td>
<td>0</td>
</tr>
<tr>
<td>2 oz. Cream Cheese</td>
<td>196</td>
<td>0</td>
<td>55</td>
<td>0</td>
</tr>
<tr>
<td>Multi-grain Crackers</td>
<td>135</td>
<td>1</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

2,175 Kcal 20 gm 1,114 mg 421 IU

USDA Nutrient Database
Sample Meal Plan #2

<table>
<thead>
<tr>
<th>Breakfast</th>
<th>Lunch</th>
<th>Dinner</th>
<th>Snacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Raspberry White Chocolate Muffin</td>
<td>8 oz. Chicken Alfredo Broccoli by Bertoli</td>
<td>3 oz. Chicken Breast (Breaded)</td>
<td>Soft Serve Chocolate</td>
</tr>
<tr>
<td>1 Container (150g) Whole Fat Greek</td>
<td>1 slice Whole Wheat Toast</td>
<td>0.5 oz Bulgur Cooked</td>
<td>Ice Cream in a Cone</td>
</tr>
<tr>
<td>Yogurt</td>
<td>1 Tbsp Butter</td>
<td>1 oz. Canola Oil</td>
<td></td>
</tr>
<tr>
<td>16 oz. Sweetened Latte with Whole</td>
<td>12 oz. Canned Soup</td>
<td>1 slice Whole Wheat Toast</td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td>1/2 C. Cooked Cauliflower</td>
<td>1 Egg</td>
<td></td>
</tr>
<tr>
<td>12 oz. Can of Cola</td>
<td>2 oz. Penne Pasta</td>
<td>1/2 C. Cooked Cauliflower</td>
<td></td>
</tr>
<tr>
<td>16 oz. Sweetened Latte with Whole</td>
<td>2 Tbsp Pesto Sauce</td>
<td>8 oz. Red Merlot</td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td>0.2 oz Canola Oil</td>
<td>288 Kcal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1/2 C. Cooked Cauliflower</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 oz. Red Merlot</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2,696 kcals: 14 g fiber, 6.2 mg Fe, 58 IU Vit D

Research evaluates specific people and health endpoints.

Companies want to sell “health” as a package to everyone.
Opportunities
- Healthcare is changing and trending toward personalized everything
- Consumer interest in PN advice is high, and behavior change is more likely with PN versus generic advice (Berezowska et al., Celis-Morales C et al.)
- RDs preferred providers of PN (Stewart-Knox et al.)
- RDs best suited to understand & consider complexities and facets of food and of dietary behaviors
- Tremendous opportunities for new types of collaboration across business, healthcare, technology/informatics, research, etc.

Challenges
- Business models seem far (far) ahead of science; tricky to maintain well-rounded perspective and stay true to EBP
- PN business is being developed by non-RD and non-healthcare
  - Engage or it will happen without us
- PN trends likely require competent understanding of nutritional genomics and microbiome data (Abrahams et al., Harvie et al.)
- If PN, then PN for all (overcoming the SES divide)

Conclusions
- RDs are the food and nutrition experts with the greatest ability to provide PN for the whole person
- PN that is direct-to-customer or direct-to-provider is a growing industry
- Shifting from research findings to "real-world" poses many challenges
- Many PN opportunities for RDs to: engage, influence, collaborate, diversify, improve access
Acknowledgements

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Questions or Insights

References