


*Advancing Your Career in Diabetes Education*

**Getting to the Gut –  
Meet your Microbiome**

Beverly Thomassian, RN, MPH, CDCES, BC-ADM  
2020 DiabetesEd.net




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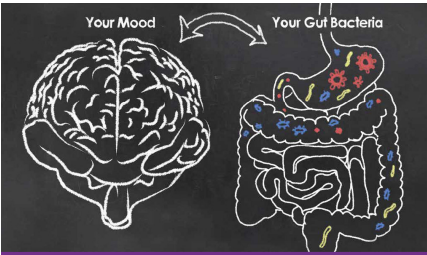
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**“I have a gut feeling”**



**Getting to the Gut –  
Meet Your Microbiome**  
AN INTERACTIVE WEBINAR  
Tuesday, November 17 from 1:00 – 2:30 p.m.




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**“Trust your Gut”**



**Northern Valley Indian Health**  
*Your Health, Our Mission.*

Join the wonderment as we explore the role of our Gut Bacteria. Have you ever had a “gut feeling?” Maybe you weren’t imagining it! Join Coach Beverly for this one-hour journey that will expand your view of how trillions of bacterial hitchhikers profoundly influence our health.

We will discuss how foods, the environment and our medical practices have impacted our gut bacteria over time and strategies we can take to protect these old friends. Join us!

**WEBINAR TOPICS:**

- Discuss the latest research on our microbiome
- State the relationship between gut health and diabetes risk
- Describe three strategies to get our microbiome back to better health


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## State of Wonder



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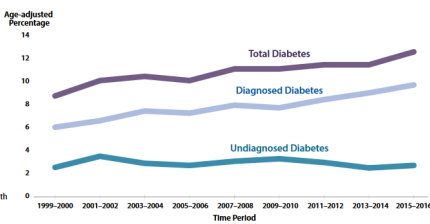
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## Diabetes in America 2020 - CDC

- ▶ 13% of adults have diabetes (34 mil)
- ▶ 21% of those don't know they have diabetes
- ▶ 35% adults have pre diabetes (88 mil)
- ▶ 85% of those don't know they have prediabetes

Figure 1. Trends in age-adjusted prevalence of diagnosed diabetes, undiagnosed diabetes, and total diabetes among adults aged 18 years or older, United States, 1999-2016.



Notes: Diagnosed diabetes was based on self-report. Undiagnosed diabetes was based on fasting plasma glucose and A1C levels among people self-reporting no diabetes.  
Data source: 1999-2016 National Health and Nutrition Examination Surveys.

CDC 2020 Report [www.DiabetesEd.net](http://www.DiabetesEd.net)

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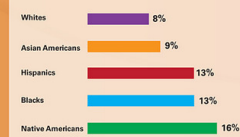
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## Native Americans Highest Diabetes Rates

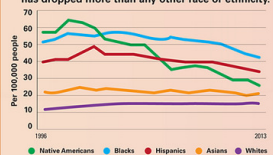
Team-based and population approaches reduce kidney failure from diabetes in Native Americans; can be a model for other groups.

Native American adults have more diabetes than any other race or ethnicity.



SOURCE: National Health Interview Survey and Indian Health Service, 2010-2012

Kidney failure from diabetes in Native Americans has dropped more than any other race or ethnicity.



SOURCE: United States Renal Data System (USRDS), 1996-2013, adults 18 and older.

<https://www.cdc.gov/vitalsigns/aian-diabetes/index.html>

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## CDC Announces



35% of  
Americans will  
have Diabetes  
by 2050

Boyle, Thompson, Barker, Williamson  
2010, Oct 22:8(1)29  
www.pophealthmetrics.com

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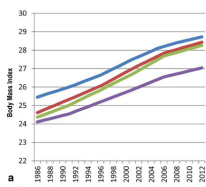
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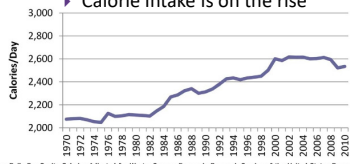
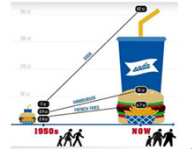
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## U.S. Weight - 68% experiencing overweight or BMI >30



- ▶ 34% BMI 25-29
- ▶ 34% BMI 30 +
- ▶ 1/3 of all people with extra weight don't get diabetes
- ▶ We burn 100 cals less a day at work
- ▶ Overall, food costs ~ 10-15% of income
- ▶ Calorie Intake is on the rise



Average Daily Per Capita Calories Adjusted for Waste. Source: Economic Research Service of the United States Department of Agriculture (Per Capita Data System).

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## Quick Question

- ▶ What do you think is contributing to increasing prevalence of type 2 diabetes?
  - A. Processed foods
  - B. Increased sugar intake
  - C. Lack of exercise
  - D. Changes in gut bacteria
  - E. Environment
  - F. All of the above

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## Increasing Weight - other factors?

- ▶ Not only humans are gaining weight globally
- ▶ Animals are getting heavier too (and not just the domestic kind).
- ▶ Factors – sleep deprivation, AC, light exposure, exposure to PFAS (polyfluoroalkyl substances) and other endocrine disrupters

▶ Marmosets to macaques



Newsweek, Fat Canaries in a Coal Mine, Dec 10, 2010.. Begley 

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## PFAS can be found in

- ▶ **Food** packaged in PFAS-containing materials, processed with equipment that used PFAS, or grown in PFAS-contaminated soil or water.
- ▶ **Commercial household products**, including stain- and water-repellent fabrics, nonstick products (e.g., Teflon), polishes, waxes, paints, cleaning products, and fire-fighting foams (a major source of groundwater contamination at airports and military bases where firefighting training occurs).
- ▶ **Workplace**, including production facilities or industries (e.g., chrome plating, electronics manufacturing or oil recovery) that use PFAS.
- ▶ **Drinking water**, typically localized and associated with a specific facility (e.g., manufacturer, landfill, wastewater treatment plant, firefighter training facility).
- ▶ **Living organisms**, including fish, animals and humans, where PFAS have the ability to build up and persist over time.



<https://www.epa.gov/pfas/basic-information-pfas>



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## In the Beginning

- ▶ Earth
- ▶ Human
- ▶ Spirit





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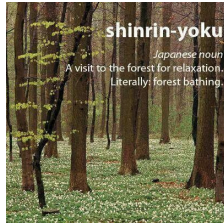
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## Humans Benefit from Nature

- ▶ Quiet: think tank of soul
- ▶ Trips to forest, enhance bodies immune system by increasing the number and activity of lymphocytes –  
2008 Nippon Med School Tokyo
- ▶ Tranquility lowers BP, reduces muscle tension, decreases stress related illness and improves sleep.



*shinrin-yoku*  
Japanese noun  
A visit to the forest for relaxation.  
Literally: forest bathing.

*Shinrin* in Japanese means “forest,” and *yoku* means “bath.” *Shinrin-yoku* means bathing in forest atmosphere, or taking in the forest through our senses.

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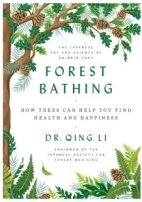
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## Forest Bathing Steps



- The key to unlocking the power of the forest is in the five senses.
- ▶ Let nature enter through your ears, eyes, nose, mouth, hands and feet.
  - ▶ Listen to the birds singing and the breeze rustling in the leaves of the trees.
  - ▶ Look at the different greens of the trees and the sunlight filtering through the branches.
  - ▶ Smell the fragrance of the forest and breathe in the natural aromatherapy of phytoncides.
  - ▶ Taste the freshness of the air as you take deep breaths.
  - ▶ Place your hands on the trunk of a tree. Dip your fingers or toes in a stream. Lie on the ground. Drink in the flavor of the forest and release your sense of joy and calm.
  - ▶ **This is your sixth sense, a state of mind.** Now you have connected with nature. You have crossed the bridge to happiness.

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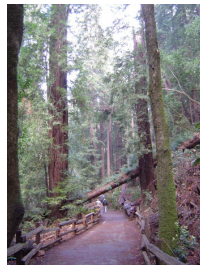
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## Phytoncides – Immune Boosters

- ▶ Exposure to forests boosts our immune system.
- ▶ We breathe in phytoncides
  - ▶ airborne chemicals that plants give off to protect themselves from insects.
  - ▶ Phytoncides have antibacterial and antifungal qualities which help plants fight disease.
  - ▶ When people breathe in these chemicals, our bodies respond by increasing the number and activity of a type of white blood cell called natural killer cells or NK.
  - ▶ These cells kill tumor- and virus-infected cells in our bodies.



<https://www.dec.ny.gov/lands/90720.html>

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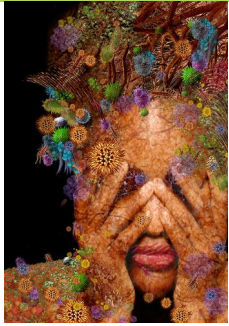
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## Bacterial Cells Outnumber Human Cells 10 to 1



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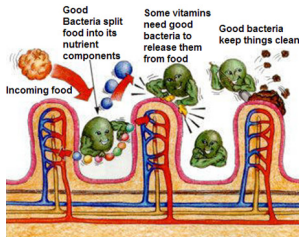
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## How do our bacteria help us?

- ▶ Maintain physiological homeostasis and metabolism.
- ▶ Other benefits
  - ▶ pathogen displacement
  - ▶ immune system development
  - ▶ barrier fortification
  - ▶ vitamin production
  - ▶ nutrient absorption
- ▶ Forgotten organ




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## Quick Question

- ▶ How much does your gut bacteria weigh?
  - A. 24 ounces
  - B. 3 pounds
  - C. Less than 1 pound
  - D. 1.5 pounds
- ▶ How much does your brain weigh?



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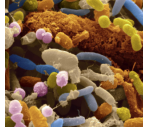
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### 3 lbs of Microbes in our Gut

- ▶ Community of bacteria extra 'organ' "microbiome".
- ▶ Evolved together with our microbiome over millions of years.
- ▶ Ratios of these communities has changed over the past 30 years
- ▶ Mirrors global spikes in obesity, diabetes, allergic and inflammatory diseases
- ▶ What are we doing to change these bacteria?



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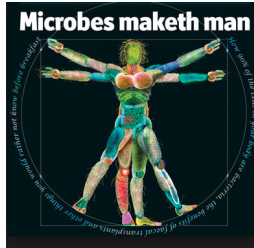
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### Gut Microbiome

- ▶ Part of endocrine axis
- ▶ Stabilized by 3 years of age
- ▶ Influenced by:
  - ▶ Birth method
  - ▶ Breast fed
  - ▶ Early Antibiotic use
  - ▶ Environment
  - ▶ Travel
- ▶ Help us
  - ▶ utilize energy
  - ▶ fight off invaders



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### Bacterial Taxis?



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## Bacteria and Romance



Los Angeles Times

**Mouth to mouth: Kissing transfers 80 million bacteria, scientists say**



Get Recipe

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The microbiome often acts as an invisible puppet master. We are attracted to partners by the scent of their microbiome. Partners are often attracted to others because they have different pathogen recognition genes  
Sonia Shah

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SCIENCE

## HUMANS SHARE MICROBIOMES WITH THEIR DOGS, STUDY FINDS

YOU HAVE A LOT MORE IN COMMON WITH FIDO THAN YOU THINK.  
By Francie Diep April 18, 2013



- ▶ Bring bacteria into house from soil and who knows what else?
- ▶ Increases human microbiome diversity
- ▶ Less allergic and autoimmune diseases

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## Household cleaners may alter kid's gut flora

- ▶ Canadian Med Association found that **common household disinfectants may increase the risk of obesity in children.**
- ▶ However, the children in households that used eco-friendly cleaners were less likely to be overweight.
- ▶ More research is needed "to explore the intriguing possibility that use of household disinfectants might contribute to the complex causes of obesity through microbially mediated mechanisms".



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## Stop Killing All the Bacteria The Hygiene Hypothesis

- ▶ In studies, mouse raised in clean environment is higher risk for DM than one raised in dirty one
- ▶ “Clean living” may increase risk for autoimmune diseases
- ▶ DM risk is higher in urban than rural settings
- ▶ Daycare, other early exposures, lower risk for DM
- ▶ Children exposed to dirt, farm animals, and other kids have less reactive immune systems



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## Quick Question

- ▶ In general, how does immigrating to the U.S. impact individual’s gut microbiota?
  - A. Increased diversity due to new food exposure.
  - B. A generational decline in bacterial diversity
  - C. They experience a sudden increase in *Akkermansia muciniphila*
  - D. Decrease in *helicobacter pylori*.

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HEALTH

## Just Months of American Life Change the Microbiome

Immigrants’ gut bacteria “westernize” soon after they move to the U.S., which might influence obesity in immigrants and Americans alike.

OLGA KHAZAN NOV 1, 2018 Atlantic.com Nov 2018



A Hmong woman carries grass in Vietnam. (INSUEN HUY KHAM / REUTERS)

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### From Vietnam to America – Hmong immigrants microbiome shifts associated with worse health

- ▶ In Minneapolis—scientists followed a group of Hmong immigrants for 9 months.
- ▶ Increased intake of protein, sugar, and fat and processed food.
- ▶ Researchers found that the immigrants’ gut microbiomes “westernized” and became less diverse
- ▶ Within a generation, Hmong women experiencing a BMI of >30 increased from 5% to 30%.



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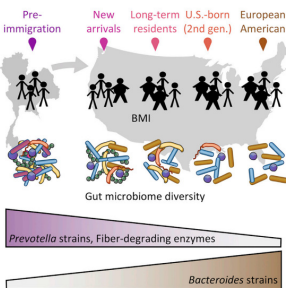
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### Moving to America isn't good for your health



Researchers don't know if eating a less-healthy diet increases the rate of obesity *and* changes the microbiome, or if a less healthy diet changes the microbiome so it makes people experience higher BMI.

Cell

Atlantic.com Nov 2018



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### Standard American Diet is SAD

- ▶ 70% of food consumed is processed
- ▶ Low fiber, high sugar
- ▶ Intake of fruit and veggies decreasing
- ▶ We are starving our good bacteria



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United States: The Revis family of North Carolina. Food expenditure for one week: \$341.98. Favorite foods: spaghetti, potatoes, sesame chicken. Peter Menzel, from the book, "Hungry Planet: What the World Eats."

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Guatemala: The Mendozas of Todos Santos - Food expenditure for one week: 573 Quetzales or \$75.70. Family Recipe: Turkey... [VIEW MORE](#) Peter Menzel, from the book, "Hungry Planet: What the World Eats."

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## McDonalds Study

After eating for Fast Food for 10 Days



McDonald's and the Microbiome: What Effect Does Junk Food Have on Gut Bacteria?

Tim Spector, a genetics professor at King's College London – Endo Today 2015

### Dramatic Changes

- ▶ Gut microbiome diversity devastated
- ▶ Firmicutes replaced by Bacteroidetes
- ▶ Bifidobacteria decreased by over 50%
- ▶ Felt bad- took over 2 weeks to get gut back to health

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## BMI >30 associated with



- ▶ Higher levels of:
  - ▶ Firmicutes
  - ▶ *Staphylococcus aureus*
- ▶ Depletion of:
  - ▶ *Bifidobacterium*
  - ▶ *Lactobacillus*
- ▶ Microbes might strategically generate cravings for food
- ▶ High fat diet, lower fiber diet decreases microbial diversity
- ▶ Decreases butyrate, gut more alkaline and inflamed

▶ *Endocrine Today, Oct 2014*  
Meghan Jardine

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## Pregnant Moms diet impacts baby's gut bacteria



[What you eat while pregnant may affect your baby's gut microbiota and growth](#) – Oct 21, 2020 Gut Microbiota for Health

- ▶ Mother's diet shapes gut microbiota during pregnancy, in birth and when breastfeeding
- ▶ Impact babies' gut microbial community and infant growth during first 18 months
- ▶ Disruption in gut colonization can lead to obesity, allergies and CV diseases later in life
- ▶ Diet is one of most powerful factors driving gut microbiota diversity

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## Weight and Gut Bacteria New and Early Research

- ▶ Leaner people appear to have more bacterial diversity and a higher proportion of **bacteroidetes**
- ▶ People with BMI >30 appear to have higher levels of **firmicutes**
- ▶ Bacteria tend to run in families



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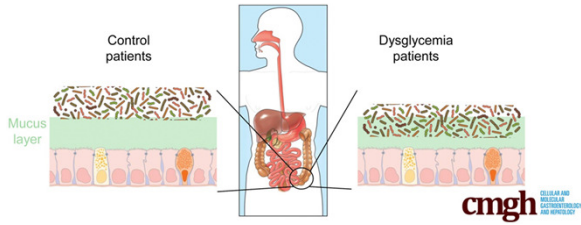
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## Colonic Microbiota Encroachment Correlates With Dysglycemia in Humans



Benoit Chassaing, Shreya M. Raja, James D. Lewis, Shanthi Srinivasan, Andrew T. Gewirtz  
Cellular and Molecular Gastroenterology and Hepatology (September 2017)

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## Metformin alters gut metabolism



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Published by Beverly Thomassian [?] · May 24 ·

Metformin boosts good gut bacteria! Great news!



Benefits of metformin may involve gut bacteria

Researchers have shown the type 2 diabetes drug metformin helps boost good gut bacteria, according to a new study. The treatment is commonly used to control people's blood sugar levels and Swedish...

DIABETES.CO.UK

Especially increases Akkermansia and Bifidobacterium.

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## Keeping blood sugar in target may reduce risk of Alzheimer's

Like

In a recent panel discussion moderated by David Holtzman, Chairman of Neurology at Washington University in St. Louis, researchers discussed the association between blood sugar and Alzheimer's. It seems that keeping blood glucose in target may reduce risk of developing Alzheimer's.



"The risk for dementia is elevated about twofold in people who have diabetes or metabolic syndrome," Holtzman says. "But what's not been clear is, what's the connection?"

To explore this link, one team experimented on two different groups of mice. In one group, they fed the mice only sugar and fat dense foods. In the other, they gave them a protein called ApoE2. ApoE2 positively affects glycolysis, which allows brain cells to turn sugar into energy. That increase in energy helps brain cells to get rid of toxins associated with Alzheimer's.

After the treatments were put into place, the mice who were fed a high fat and sugar diet were more lethargic and developed memory loss. In contrast, the mice who were fed ApoE2 were much more energetic and their brains even seemed healthier than before.

YOUR HEALTH

Keeping Your Blood Sugar In Check Could Lower Your Alzheimer's Risk

October 21, 2016 10:07 AM ET

## Quick Question

▶ How many teaspoons of added sugar are Americans eating a day

- a. 3 Tablespoons
- b. 22 Teaspoons
- c. 3 servings
- d. 75 gms (5 serving)



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## Sugar, Sugar, everywhere



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## Quick Question

▶ How many grams of sugar in one teaspoon of sugar?

- a. 2 gms
- b. 4 gms
- c. 5 gms
- d. 15 gms (one serving)



30 teaspoons x 4 gms = 120 gms  
4 cal per gm sugar – 4 x 120 = 480 Cals per day  
from white sugar ~ 25% of our daily cal

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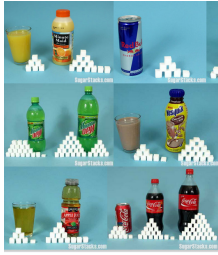
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## Dietary Sugar Affects Gut Colonies?

- ▶ Daily sugary beverage increases type 2 risk by 18%.
- ▶ After accounting for weight, type 2 diabetes risk 13%
- ▶ Diet Soda alters gut bacteria?
- ▶ Dietary sugar affecting "healthy" gut microbial colonies



Dr. Steven Smith, Mayo Clinic in Rochester, MN.  
Online issue of BMJ, July 2015



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## Quick Question

What is the daily added sugar goal as stated by the World Health Organization and the American Heart Association?

- Limit added sugar intake to less than 50 gms a day
- Limit added sugar intake to about 6 teaspoons a day
- Limit added sugar intake to less than 300 calories a day
- Avoid all added sugar and high fructose corn syrup.



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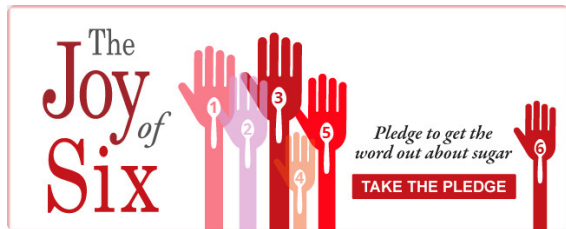
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## Lots of Resources at DiabetesEd.Net



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## How Many Teaspoons of Sugar?

Nutrition Facts	
8 servings per container	
Serving size 2/3 cup (59g)	
Amount per serving	
<b>Calories</b>	<b>230</b>
% Daily Value*	
<b>Total Fat</b> 0g	0%
Saturated Fat 1g	5%
Trans Fat 0g	
<b>Cholesterol</b> 0mg	0%
<b>Sodium</b> 15mg	7%
<b>Total Carbohydrate</b> 57g	13%
Dietary Fiber 4g	14%
Total Sugars 12g	
Incl. 10g Added Sugars	20%
<b>Protein</b> 3g	
Vitamin D 2mcg	40%
Calcium 260mg	20%
Iron 1mg	45%
Potassium 235mg	6%

Each 4gms = 1  
teaspoon of  
sugar



The Fooducate Sugar Rush App allows you to see how much sugar has been added to foods! Just scan the barcode of any product and instantly see a breakdown of naturally occurring and added sugars.

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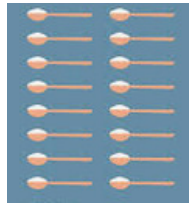
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## How many Teaspoons added sugar?

Nutrition Facts	
Serving Size 1 Bottle	
Amount Per Serving	
<b>Calories</b>	<b>240</b>
% Daily Value	
<b>Total Fat</b> 0g	0%
<b>Sodium</b> 75mg	3%
<b>Total Carb.</b> 65g	24%
Total Sugars 65g	
Incl. 65g Added Sugars	130%
<b>Protein</b> 0g	



$65 / 4 =$   
16 teaspoons  
sugar



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## How many teaspoons added sugar?



None!  
Enjoy 3  
servings  
of fruit  
daily : -)

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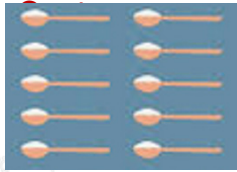
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### How many teaspoons added sugar?



Nutrition Facts	
Serving Size	1 muffin (162.4 g)
Amount Per Serving	
<b>Calories</b>	<b>612</b>
% Daily Values*	
Total Fat	32.10g 41%
Saturated Fat	6.000g 30%
Trans Fat	-
Cholesterol	125mg 43%
Sodium	591mg 26%
Total Carbohydrate	71.00g 26%
Dietary Fiber	2.0g 7%
<b>Sugars</b>	<b>40.15g</b>
Protein	0.00g
Vitamin D	-
Calcium	-
Iron	-
Potassium	-

40 gms = 10 teaspoons sugar

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### How many teaspoons added sugar?



None!  
Each corn tortilla is one serving of starch

Your gut bacteria love this meal!

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### Nutrition Tips

- ▶ Frozen fruits and veggies just as healthy as fresh
- ▶ Beans are loaded with fiber and affordable
- ▶ Indoor or porch gardens good idea
- ▶ Canned fruit can be rinsed of extra sugar
- ▶ Look for fiber on the label – Aim for foods with at 2-3 gms of fiber per serving
- ▶ Soups are filling and nourishing
- ▶ Meet with a dietitian and diabetes educator – they are super smart and helpful.



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## Lots of Resources at DiabetesEd.Net



- Look at labels
- Eat whole foods
- Veggies, fruits, beans and whole grains have no added sugar

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## Emerging new theory Gut – Lung Axis

- ▶ Gut microbiota potentially affects pulmonary health
- ▶ Gut-Lung cross talk between 2 mucosal sites in body
- ▶ **Bi-Directional conversation**
- ▶ Significant GUT-LUNG Axis dysfunction in the elderly population with COVID infections?
- ▶ Elderly population have less diverse gut microbiota
  - ▶ Most vulnerable for COVID
  - ▶ Loss of Gut bacterial diversity (**dysbiosis**)



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## Personalized Nutrition Strategies

D. Dhar and A. Mohanty

Vnu Research 285 (2020) 196018

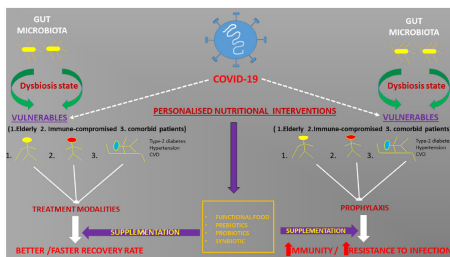


Fig. 2. Personalized nutritional strategies as prophylaxis and in treatment supplementation. Personalized nutritional strategies may be adopted for the Covid-19 vulnerable sections both as prophylaxis and supplementation to current treatment modalities.

Review  
Gut microbiota and Covid-19: possible link and implications  
Debojyoti Dhar<sup>1,2</sup>, Abhishek Mohanty<sup>1,2\*</sup>  
<sup>1</sup> Institute of Health and Biomedical Innovation, Queensland University of Technology, Australia  
<sup>2</sup> Diabetes Education Services, Queensland University of Technology, Australia

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## Improving Gut Microbiota May Save Lives

- ▶ Personalized nutrition and supplementation known to improve immunity
- ▶ One strategy to reduce mortality and morbidity and improve outcomes in older people and those who are immune-compromised



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## Take Home Messages

- ▶ What can we pass on and promote healthy microbiomes?



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## Keeping our Gut Bacteria Happy

### 7 steps to Pamper our gut bacteria

- ▶ Limit sugar intake
- ▶ Enjoy a rainbow of food
- ▶ Keep active
- ▶ Spend time in nature
- ▶ Get enough sleep
- ▶ More whole food – less processed foods
- ▶ Add yogurt, kefir, or other fermented foods to your daily foods



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## GUT MICROBIOME AND SLEEP




All of the microbes that live in our intestines are known as the gut microbiome. Some even call it our "second brain."




Taking special care of your gut health can have great effects on the quality of your sleep. This is true even if you are going through a stressful period which would normally disrupt your sleep length and quality.


### HOW ARE SLEEP AND MICROBIOME CONNECTED?



Elderly get better sleep with better microbial composition



Better sleep showed a increase in Verrucomicrobia strain which is believed to be linked with better cognitive function.



Study authors hope that improving gut microbiome could lead to a new way of cognitive decline treatment in older adults.

www.sleepline.com Diabetes Education SERVICES

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## Reunite with "Old Friends"

But while your inherited genes are more or less fixed, it may be possible to reshape, even cultivate, your "second genome"

photos - health news

**Staying Healthy May Mean Learning To Love Our Microbiomes**

July 22, 2013 • Scientists are investigating the microscopic world that lives in and on our bodies. It's becoming clear that these tiny companions play a much more complex and important role in human health than thought. But we don't yet know enough about the microbiome to use it to prevent and treat disease.

Listen 8:59

Playlist Download Embed




Centre For Infections/Science Photo Library/Corbis

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## Getting to Better Gut Bacterial Health

**Eat more PREbiotics**

- ▶ Foods with indigestible fibers that nourish the good bacteria:
  - ▶ High fiber foods like, whole grains, fruits, veggies, nuts
  - ▶ High in prebiotic fibers include: Jerusalem artichokes, onions, kale, Brussels sprouts, bananas, dandelion greens & more

**PRObiotics**

- ▶ These foods contain healthy bacteria like *Bifidobacterium* and *lactobacillus*.
  - ▶ Yogurt, Kefir – look for "live or active cultures"
  - ▶ Fermented foods like: Sauerkraut, Kimchi, Miso soup, kombucha

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## 12 Super Foods to Enjoy

- ▶ Beans
- ▶ Dark Green Leafy Veggies
- ▶ Citrus Fruit
- ▶ Sweet Potatoes
- ▶ Berries
- ▶ Garlic
- ▶ Tomatoes
- ▶ Onions
- ▶ Fish High in Omega-3 Fatty Acids
- ▶ Whole Grains
- ▶ Nuts
- ▶ Fat-Free Milk and Yogurt




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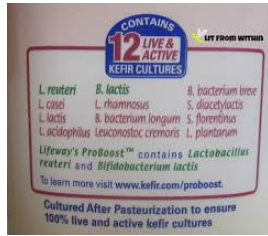
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## Kefir – Fermented Milk

From the Turkish word *keyif*, which means “feeling good” after eating



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## GET Lots of Diverse Fiber Foods

Goal is 25 – 30 gms day

American Food Project Full Plate Diet



- ▶ Helps increase fiber in usual meals

Fiber is suddenly hip. Grandma, it turns out, was just ahead of her time.



—Health of Nutrition Letter Tufts University February 2009

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## No Defeat

### ▶ Or KNOW Da FEET



Look for your Diabetes Foot Mirror within about a week

- ▶ Daily feet inspections save limbs
- ▶ Report any sores or unusual findings right away
- ▶ Wear good fitting shoes
- ▶ Avoid going barefoot
- ▶ Treat dry skin with lotion

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## 100 Trillion Friends to Call Your Own

From way back when, to current time man and bacteria have been intertwined.

Start with your head, it's a happening place, there's staphylococcus all over your face.

Next up is gums, teeth and mouth, You'll find streptococcus inside and out!

Now to your stomach, to keep the pH, H. pylori is on the case!

Inside the intestines, 30 feet of tube, 3 pounds of bacteria digesting your food.

From Bacteroidetes to keep you lean, to Firmicutes, a junk food digesting machine!

Prevotella another bug on the scene, breaks down fiber, veggies and beans!

Lactobacillus is a newborn's friend, lining birth canal from tip to end. Down to your feet, in-between the toes, that's where lots of pseudomonas grows!

Short chain fatty acids, you wanna keep them around Protects gut mucous lining from breakin' down

So here's my message, always nourish your gut With fresh fruit, grains, veggies, beans and nuts

More kefir, miso, sauerkraut, kimchi Less sugar and fast foods to keep away disease

Breast feed, get dirty, limit antibiotic use Let newborns come out through the natural shoot

Be reassured that you're never alone You've got 100 trillion friends to call your own!



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100 Trillion Friends to Call Your Own by Beverly Thomassian, RN, MPH, CDE, BC-ADM to the tune "Yeah" in the style of Usher.

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## Thank You



- ▶ Email [info@diabetesed.net](mailto:info@diabetesed.net)
- ▶ Web [www.diabetesed.net](http://www.diabetesed.net)



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