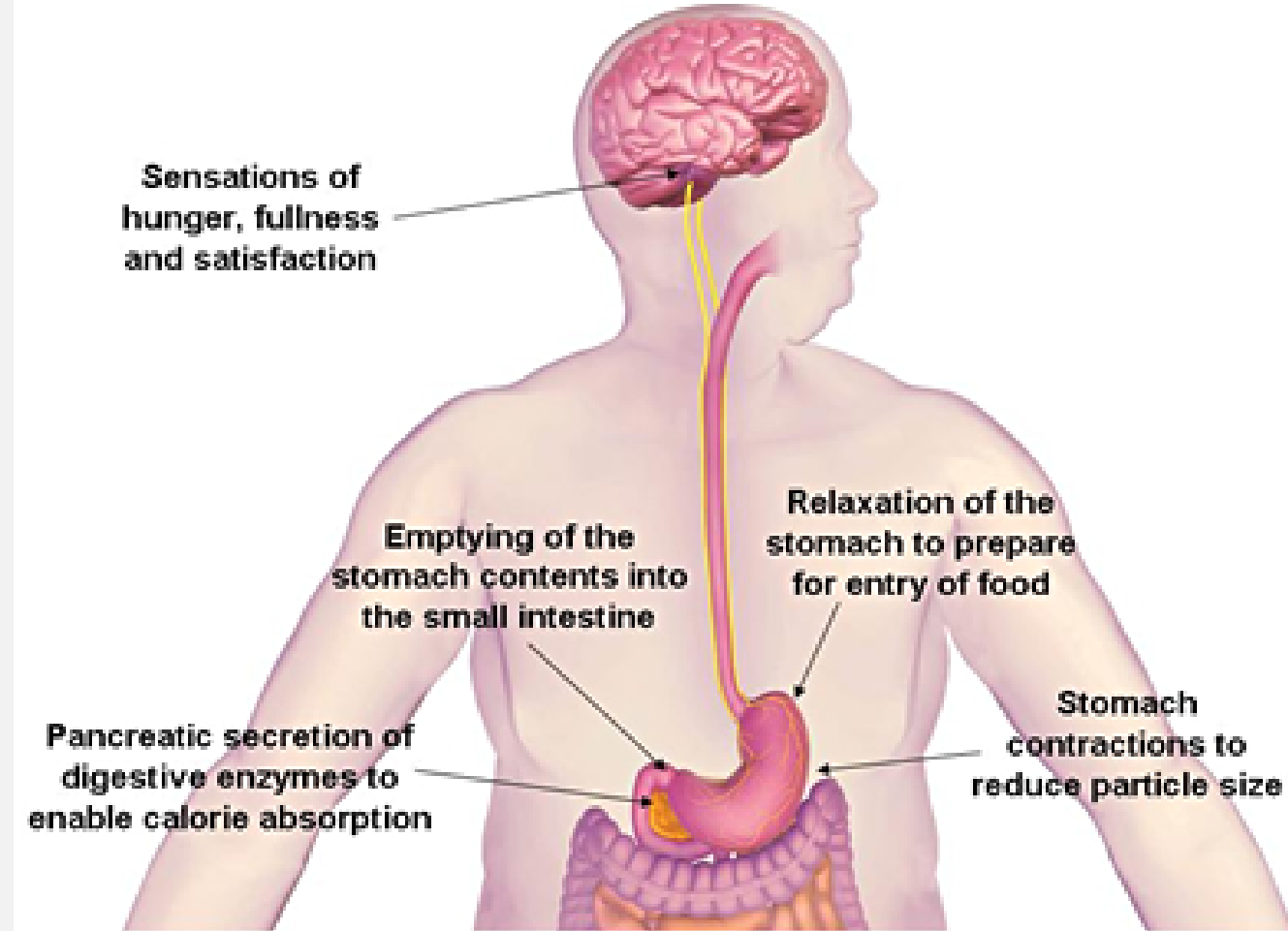


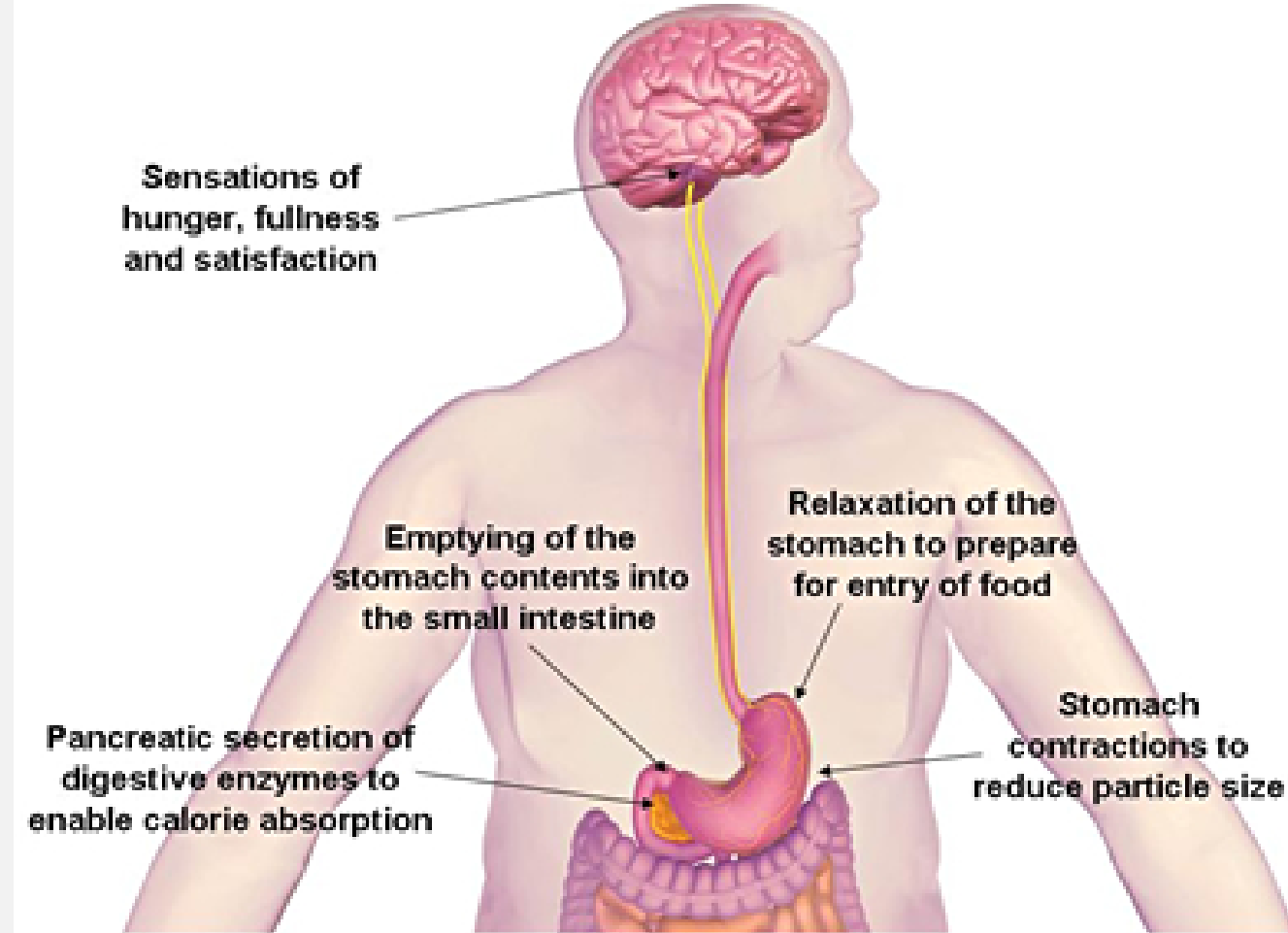
We are constantly learning more about the multiple communication pathways between the brain and the gastro-intestinal tract. For example:

We now know that gut microbes produce neurotransmitters

The Vagus Nerves & Gut Function



The Vagus Nerves & Gut Function



An explosion of new studies are showing (in mice or other research organisms) that changes in gut microbes cause altered behavior, altered mood and altered neurocognitive function.

Why is gut health is so compromised today?

One reason: The shocking diminishment of food variety since the advent of industrial food production.

Of the 250,000 plant species on the planet:

30,000 are edible

7,000 are used for food

120 are cultivated today

9 provide 75% of human food

3 provide more than 50% of human food

(guess which?)

Shannon KL, Kim BF, McKenzie SE, Lawrence SL. "Food System Policy, Public Health , and Human Rights in the US." Annu Rev Pub Health 2015. 36:151-73

Top 3 cultivated foods today:

WHEAT CORN RICE

While rare to see rice sensitivities, GI irritation by wheat and corn is legion.

What happened?

Local varieties were replaced by universal hybrids

Urbanization

Climate change

Legislation, policy and economic pressure to produce more food, easily and cheaply

Agricultural practices

Pests, and the resultant pesticides.

**A century ago we grew 208 varieties of beets.
Today there are 17 commercial varieties.**

**A century ago we grew 341 varieties of squash.
Today there are 40 commercial varieties.**

**A century ago we grew 430 varieties of peas.
Today there are 25 commercial varieties.**

How else have we messed up our microbiome?

- Through use of industrial levels of antibiotics in medicine and farmed animal feed for 50 years. Germ phobia has led to over-sterilization.
- By a steady diet of highly processed ingredients which lack vitality.

The FDA has approved over 3,000 chemical food additives including:

- *Preservatives (ie benzoate)*
- *Sweeteners (ie HFCS, aspartame)*
- *Dyes (ie FD&Cs, caramel color)*
- *Flavorings (“natural flavoring”, MSG)*
- *Fat additives (olestra, modified food starch)*
- *Emulsifiers (soy lecithin, polyglycerol ester)*

These chemicals may be GRAS for human consumption, but are they “safe” for our microbiome?

**Gut microbes don't change the FACTS
which inform our thinking.**

**They don't change our spouse, the
weather or our responsibilities.**



Gut microbes don't change the FACTS in our thinking.

They don't change our spouse, the weather or our responsibilities.

But our gut bugs CAN change our feelings (mad, sad, glad, afraid) and thus how we relate to the facts of our lives.



**Our gut bugs CAN change our feelings
(mad, sad, glad, afraid) and how we relate to
the facts of our lives.**

**90-95% of human serotonin
is produced in the gut by
certain microbiota.**



Yano J, Yu K, Donaldson GP, Shastri GG, Ma L, Ann P, Nag Ed CR, Ismagilov RF, Mazmanian, Hsiao EY. "Indigenous bacteria from the gut microbiota regulate host serotonin biosynthesis," Cell 2015 April 9; 161(2): 264-276

The nexus of the gut-brain bi-directional communication is the microbiome's ability to sense, respond and adapt to the environment.

Germs are us!



Those microbes co-existing with us live within our gut, on our skin, *and in a little germ cloud extending about 6 inches away from our bodies.*

A well nourished, diverse, microbiome will greatly help our ability to detox foreign chemicals coming into our inner space, and thus minimize the potential for that substance to trigger dysfunctional behaviors, such as addiction.



Bottom line:

In order to promote happiness and optimal functioning of the gut-brain axis we need to enhance gut integrity, and also not jack up our nervous system.



**Gut integrity depends
on each individual
discerning the best
possible diet for
themselves.**



Many of us in first world countries eat too much.

I like the Japanese saying “Eat to 80% full”

Eat slowly, and eat less to live longer.

Practice IF (intermittent fasting) at least 12 hours daily. Extend as feasible.



**Eat less to live longer.
Make your diet plant-based.
as Michael Pollan says
“Eat real food, mostly
plants.”**



My top 6 tips for improving your gut bacteria's health and diversity

Eat a diverse range of foods

Eat lots of vegetables, legumes, beans, and fruits

Eat fermented foods

Avoid artificial sweeteners

Eat foods rich in polyphenols

Take a PREbiotic supplement

