

Digestion, Fibers and the Gut Microbiome



dr. Peter HANTZ

Fibervar LLC.

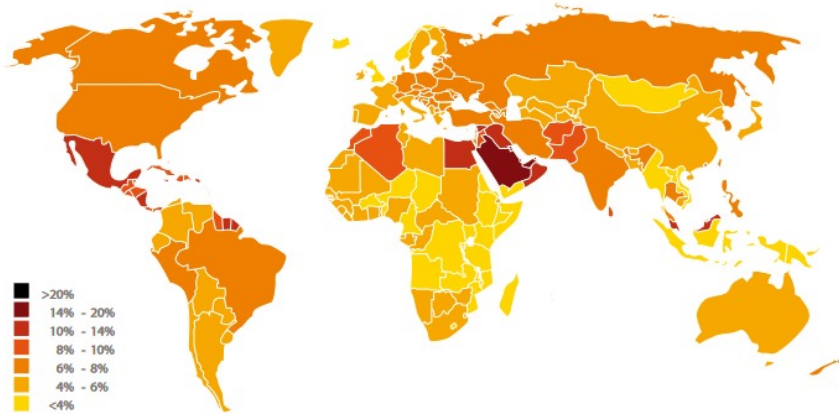
Klausenburg, Transylvania

www.fibervia.com

www.juutee.eu

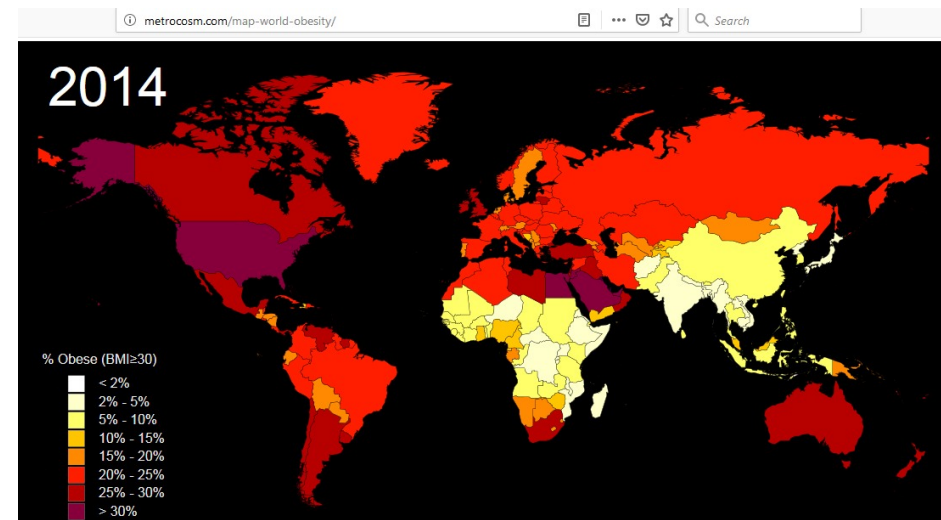
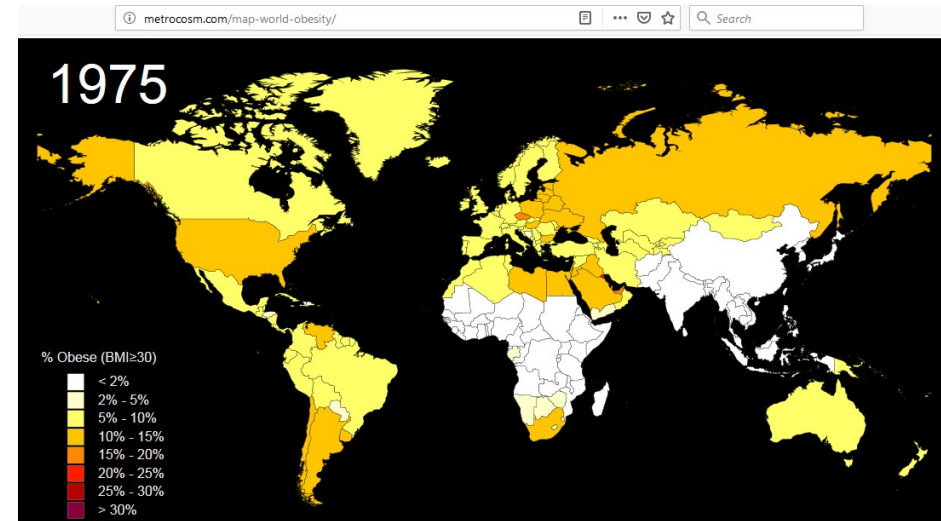
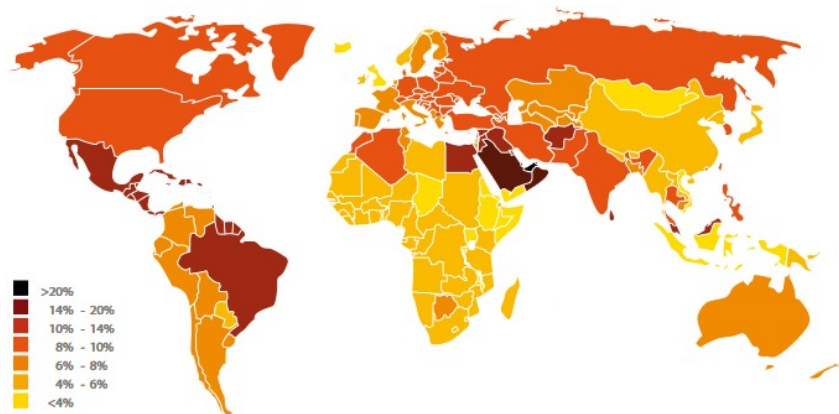
Diabetes and Obesity

Prevalence estimates of diabetes, 2007

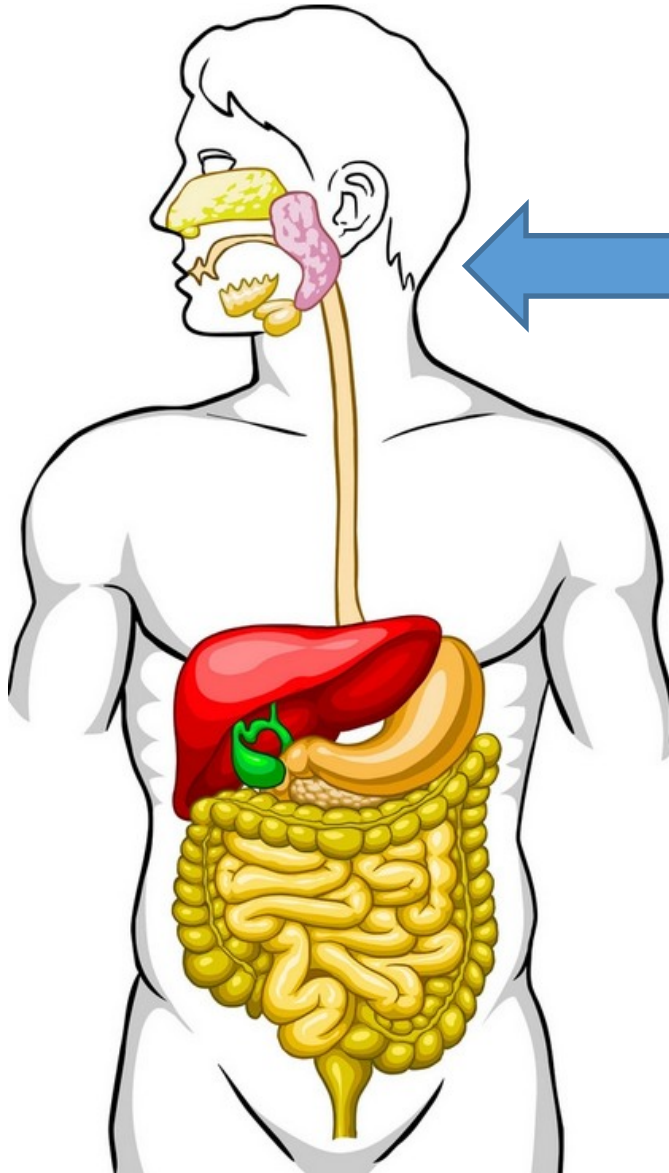


MAP 1.2

Prevalence estimates of diabetes, 2025



Overview of the Digestion Processes



chewing

consistency

surface growth

-stomach / bowel issues

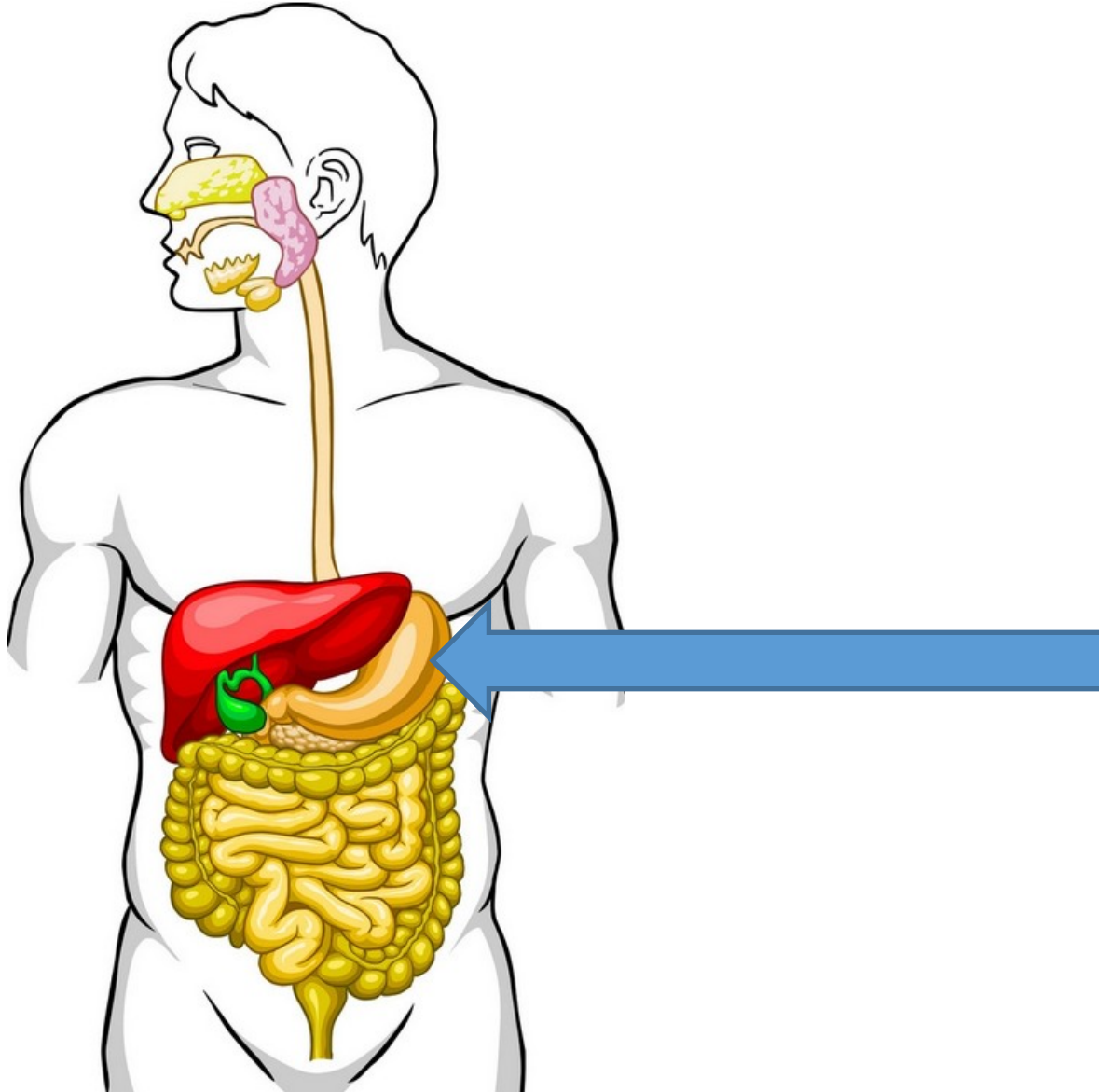
salivary ingredients

alpha-amylase: why?

-cephalic phase insulin release

-sweeteners!

Overview of the Digestion Processes



Stomach

- acid - antibacterial role
- gherlin hormone, 1999: hunger

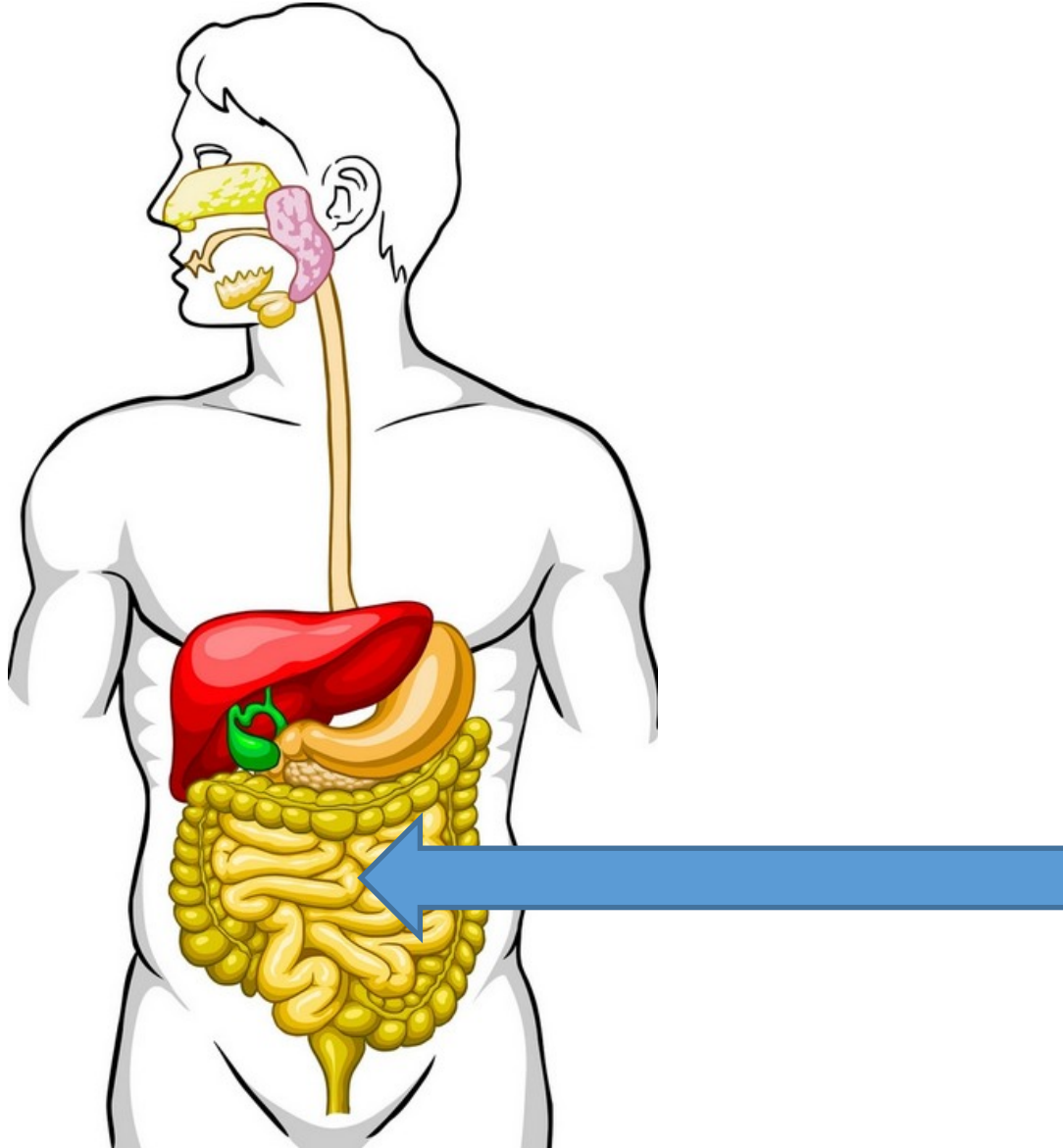
pepsine enzyme

- breakup of proteins

- stress-induced gastritis
- reflux disease (GERD)

(leptin, antihunger: adipose tissue)

Overview of the Digestion Processes



Duodenum and small intestine

-Liver/bile: emulsifiers

-pancreas:

insulin → bloodstream

amilase → starch/glycogen breakdown

lipase → triglyc. to monoglyc. & FA

protease → activated @ duodenum (Trypsin)

-small intestine

disaccharidases

peptidases

nucleases

ABSORBING NUTRIENTS AND WATER

duodenal ulcer

coeliac disease / gluten sensitivity

Overview of the Digestion Processes Fuctose , Glucose and Saccharose

1 Ein Glas Apfelsaft wird getrunken. Der Saft enthält die Zuckerarten Fructose (Fruchtzucker) und Glucose (Traubenzucker). Etwa 70 % des Zuckers in Äpfeln ist Fructose.



Fructose
wird auch Fruchtzucker genannt; ist in Obst und Gemüse enthalten.



Glucose
wird auch Traubenzucker genannt und ist Bestandteil von Stärke, z. B. in Brot und Nudeln.

Saccharose*
ist „normaler“ Haushaltszucker. Sie besteht aus Fructose und Glucose.

5 Von der Leber aus wandert ein Teil des gebildeten Fetts ab und lagert sich als gefährliches Fett im Bauchraum um die inneren Organe herum ab.

4 **Fructose** gelangt mit dem Blut direkt in die Leber, wo sie in Fett umgewandelt und gespeichert wird und so zu einer Fettleber führen kann.

3 **Glucose** wird leicht verbrannt. Es ist der Hauptbrennstoff des Körpers. Wenn man mehr isst, als man verbraucht, sammelt sich das Fett in der Regel an Gesäß und Oberschenkeln an und ist relativ „harmlos“.

2 Glucose und Fructose gelangen in den Darm, wo sie in das Blut aufgenommen werden, aber ab hier trennen sich die Wege der Moleküle.

Glucose:

- triggers insulin and leptin
- quick absorption

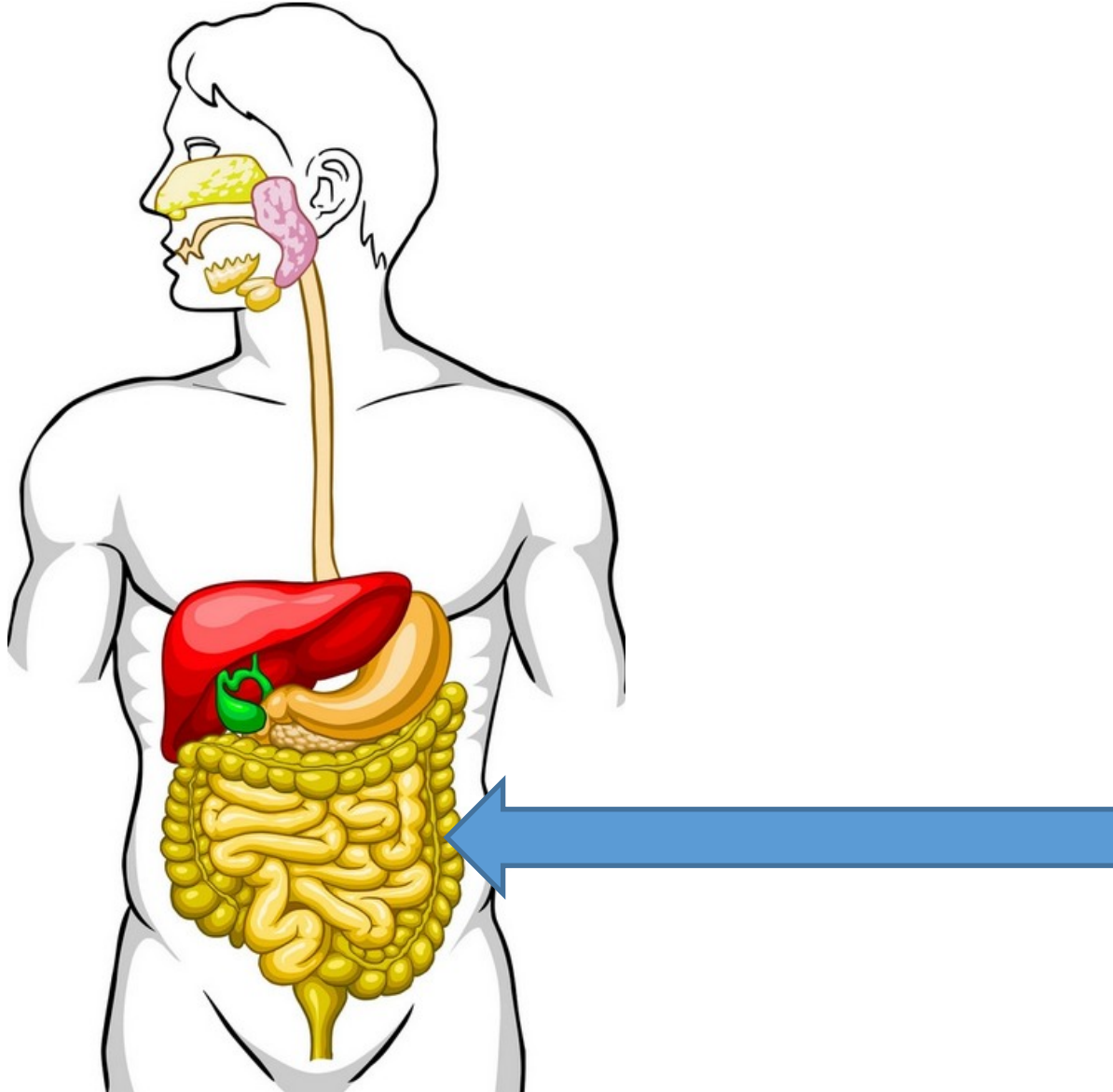
Fructose:

- much less insulin and leptin trigger
- fats in liver

“crystal sugar” – saccharose:

dissacharidase @ small intestine

Overview of the Digestion Processes



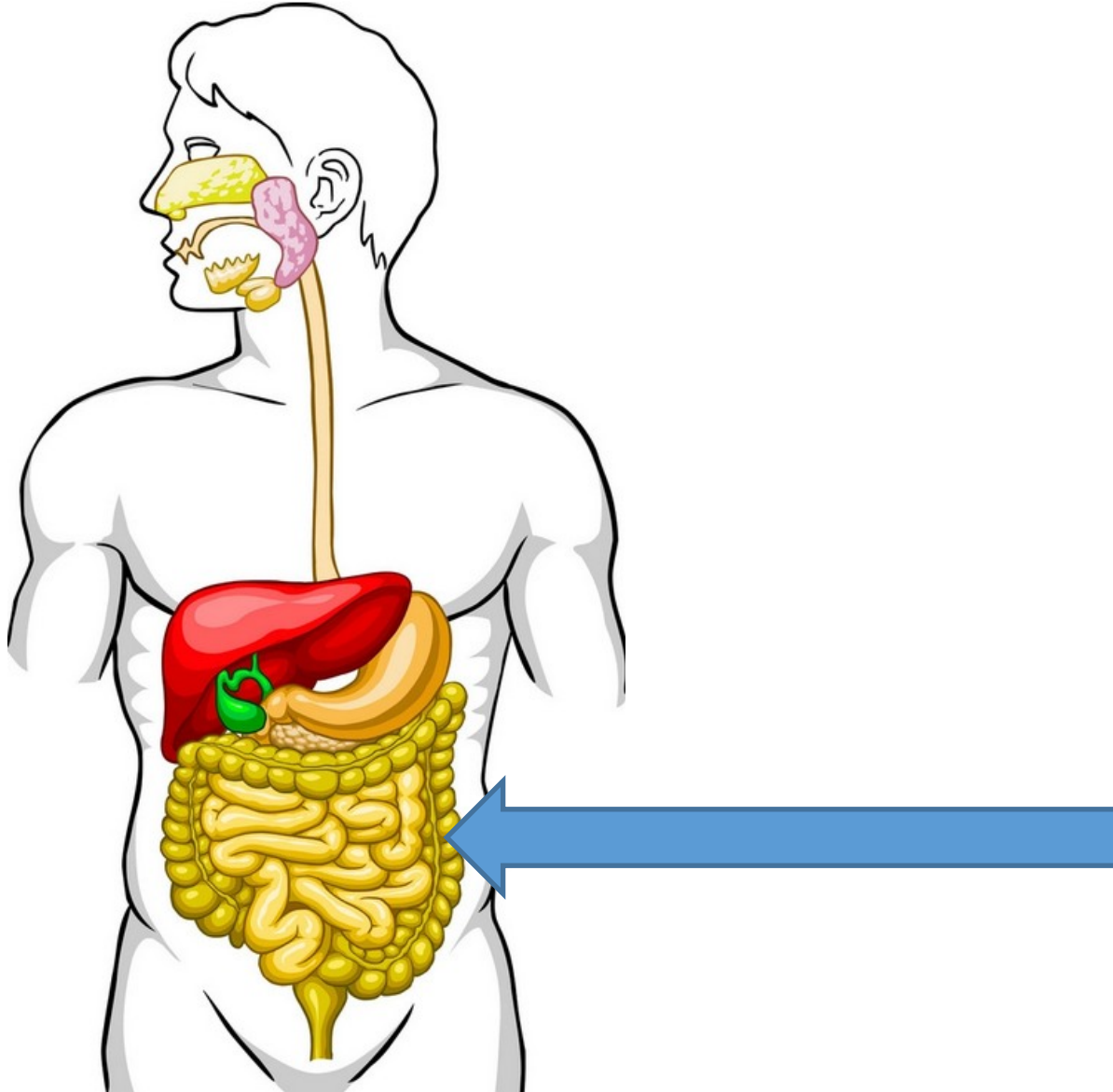
Large intestine and its microbiome

Leftover (complex) carbohydrates
Fermentable (@ bacteria) / not
prEbiotics and **prObiotics**

Absorbing water/electrolytes

IBS
C. ulcerosa
Morbus Crohn

Gut microbiome



Bacterial/archeal DIVERSITY - >500 species

Bacteroidetes, Firmicutes, ...,

-gut mucosal barrier

-immunomodulation

-against pathogens

Important fermentation product: butyrate

colon cells nourishment

...

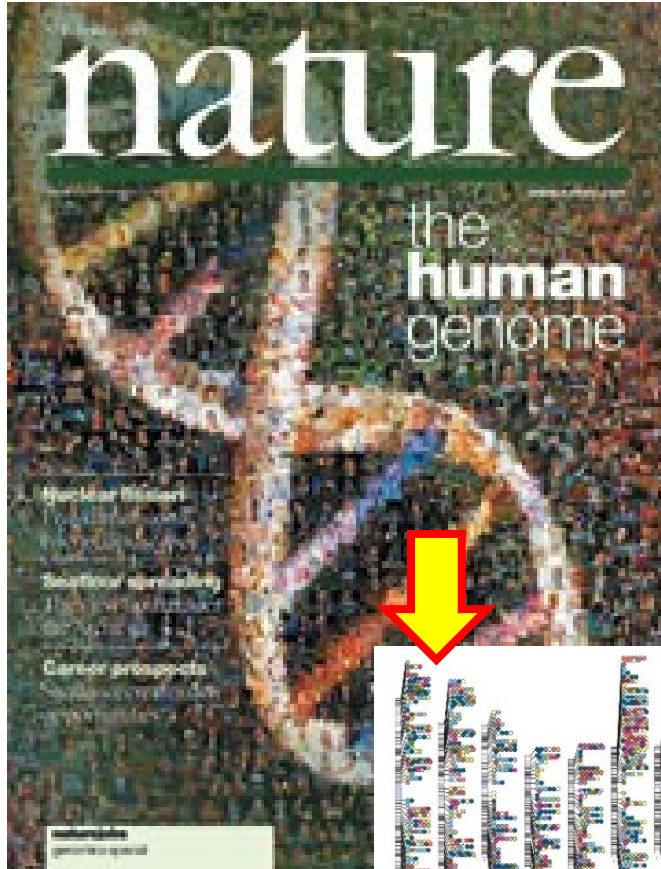
INFLUENCE ON ALL

e.g. immune system

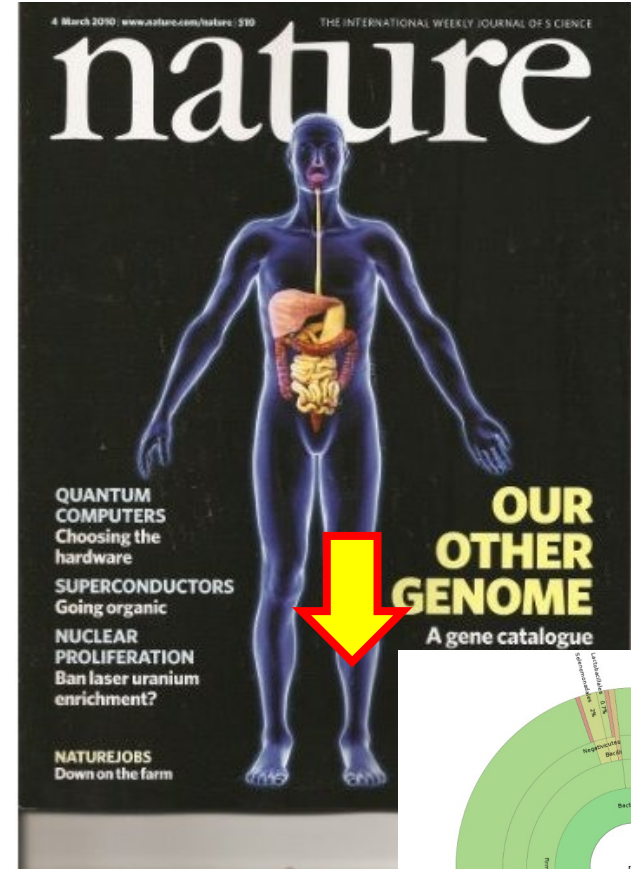
e.g. "gut-brain axis"

dysbiosis

Our two genomes



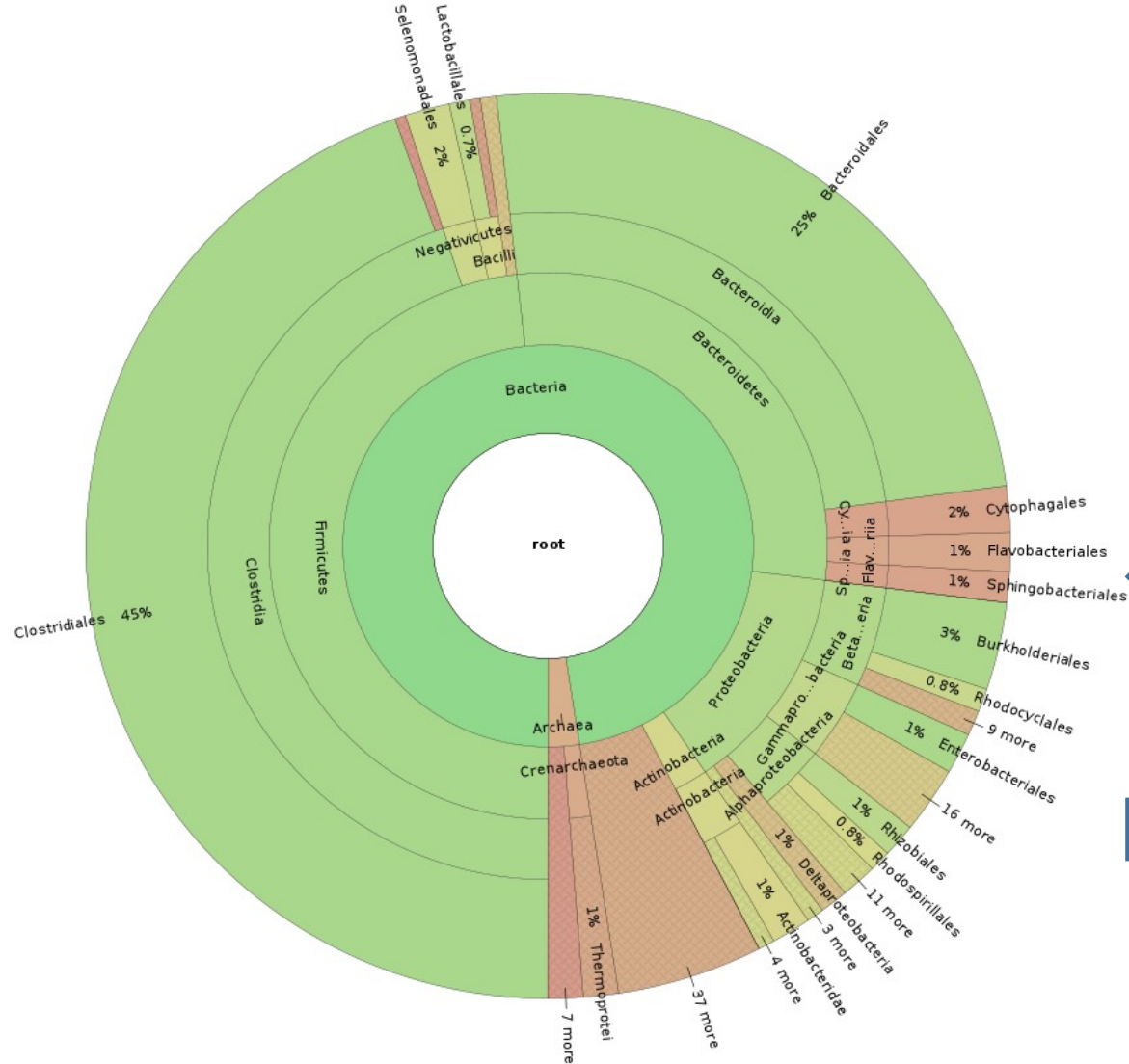
2001



2010



Gut Microbiome Analyses and Therapy



Collection tubes



Specialized company:
"16S rRNA amplicon sequencing"

No real targeted therapies yet
-special diet, pre/probiotics
-lifestyle change
-fecal transplant
(-Metformin)

Gut Microbiome

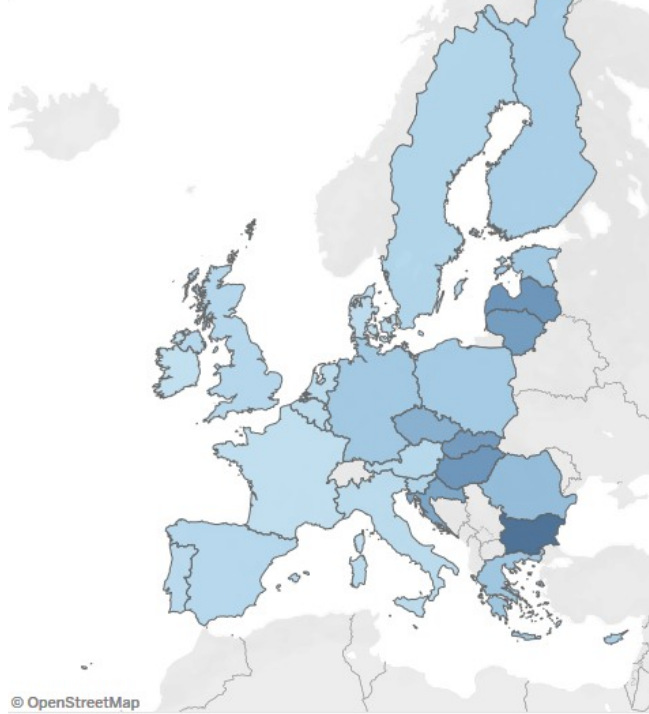
- Fermentation
 - SCFAs (butyrate, ...) → barrier cells
- Immune
 - large immune organ
- Vitamins
 - K, B12, B7
- Barrier
 - mucus, tight junctions
- Pathogens
 - competitive exclusion
- Neurotransmitters
 - serotonin (90%), GABA

Group	Typical healthy abundance (rough)	Main role	Generally favorable when...
Firmicutes	30–60%	Includes many butyrate producers; gut barrier support	Contains abundant butyrate producers
Bacteroidetes	20–50%	Degrade complex carbohydrates and fiber	Present in substantial amounts
Prevotella	0–40%	Specialized fiber/carbohydrate degradation	High-fiber diets often increase it
Akkermansia	0.1–5%	Mucus turnover, gut barrier support	Detectable to moderately abundant
Bifidobacterium (Actinobacteria)	1–10%	Ferments prebiotic fibers, cross-feeds butyrate producers	Moderate abundance
Proteobacteria	<1–5%	Normal minor residents	Low abundance

Enterotypes (Arumugam et al., 2011)

More on Fibers

Disease related to low-fiber diet



© OpenStreetMap

<https://ec.europa.eu/jrc/en/page/fibre-180276>

Fiber sources:

Vegetables
Fruits
Whole grains

Fermentable/Nonfermentable Fiber benefits:

- feeding gut microbiome
- promote gastrointestinal transit
- moderating sugar absorption / blood sugar
- binding cholesterol

only ~50% of recommended fiber intake
we discard a lot of pomace!

Fiber Consumption: ideally 30-50g/day

Soluble: polydextrose, **pectin, beta-glucan, alginate, inulin**

Insoluble: cellulose, lignin, **resistant starch, hemicellulose**

Fermentable: **pectin, beta-glucan, resistant starch, alginate, inulin**

Non-fermentable: **lignin, most cellulose, polydextrose**

:) Grass? Straw? Wood?: Lignin. Cellulose. Silicon

Some Recent Results

Red meat derived glycans may cause chronic inflammation?
(plants, fish and poultry ~ no Neu5Gc)

Importance of food matrix

Again and again:

PHYSICAL EXERCISE

PSYCHOSOMATICS

Amino acids

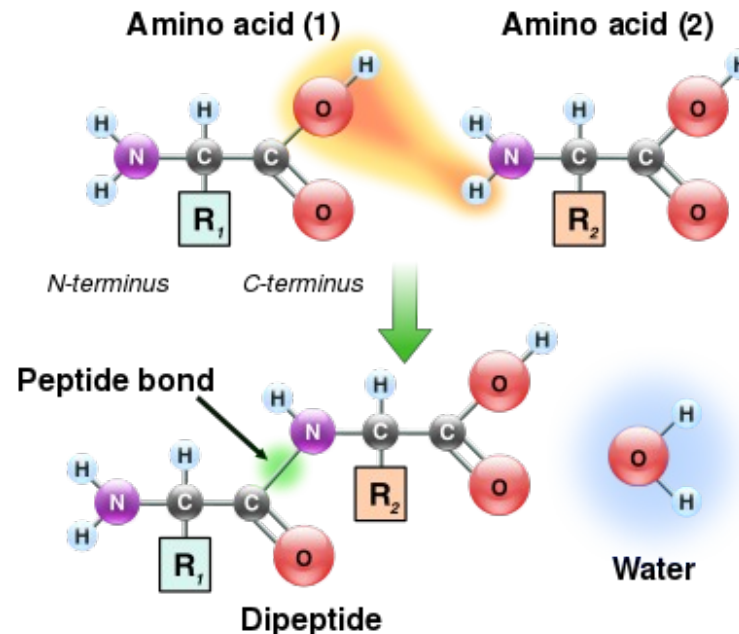
Essential	Conditionally essential ^{[3][4]}	Non-essential
Histidine (H)	Arginine (R)	Alanine (A)
Isoleucine (I)	Cysteine (C)	Aspartic acid (D)
Leucine (L)	Glutamine (Q)	Asparagine (N)
Lysine (K)	Glycine (G)	Glutamic acid (E)
Methionine (M)	Proline (P)	Serine (S)
Phenylalanine (F)	Tyrosine (Y)	Selenocysteine (U)
Threonine (T)		Pyrrolysine* (O)
Tryptophan (W)		
Valine (V)		

Low in plants:

Lysine, Methionine, Threonine, and Tryptophan

Plants with all 9 essential amino acids (in proteins):

Quinoa, Hemp (low Lys), **Soy** (low in Met)

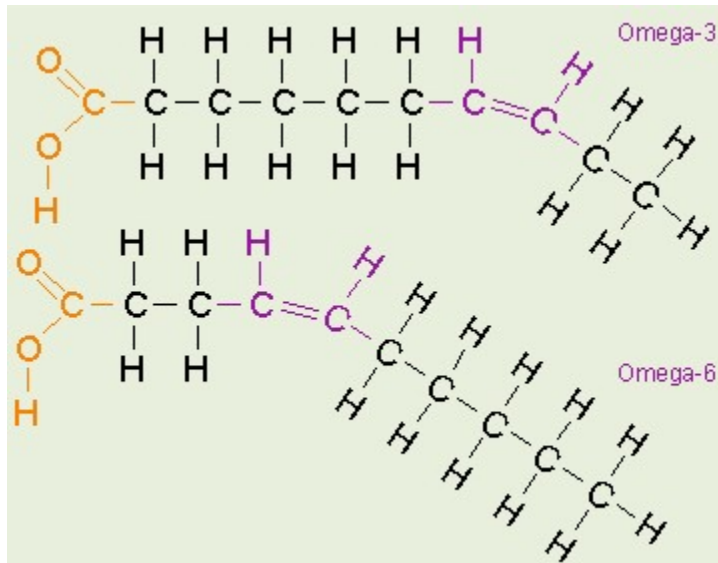


Fats

Essential fatty acids:

α -Linolenic acid (omega-3)

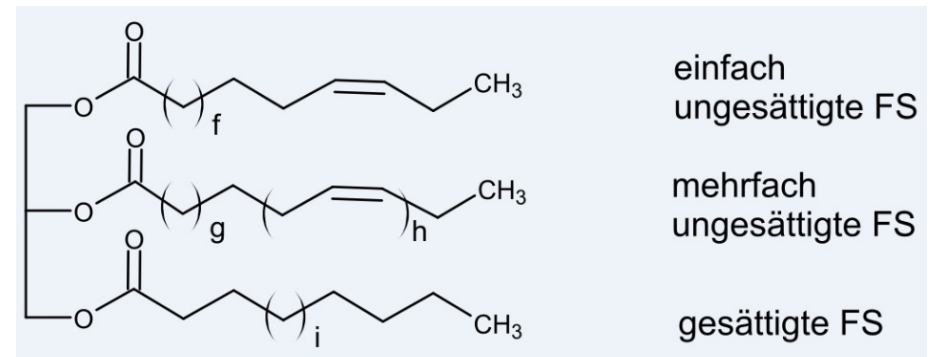
Linoleic acid (omega-6)



more unsaturated than saturated fats:
plants, fishes

Balance
omega-3 : omega-6
1:2-1:4

much more omega-6: inflammation

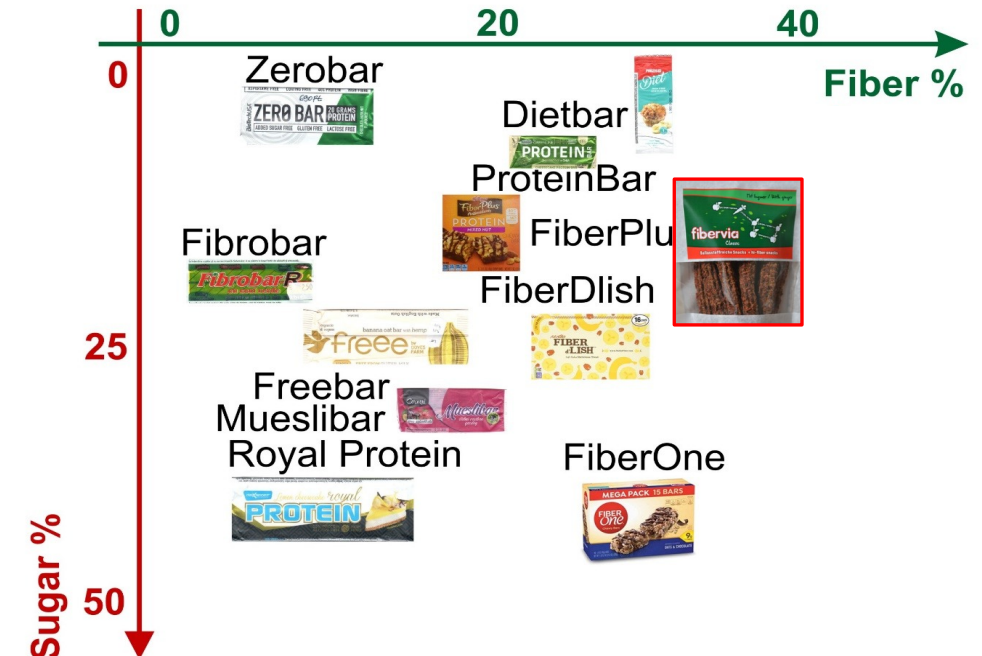


Thank you for your attention!

FiberVia



High-fiber low-sugar bars
... of upcycled pomace
apple, carrot, beetroot, hemp, oat bran



SIDE-PRODUCT: JuuTee



A NATURAL ENERGY DRINK

Tea-guarana extract:
polyphenols, caffeine
Long-term energizing effect

Special condiments (3 tastes)

With special marketing @ companies

