„Du bist, was Du isst!“

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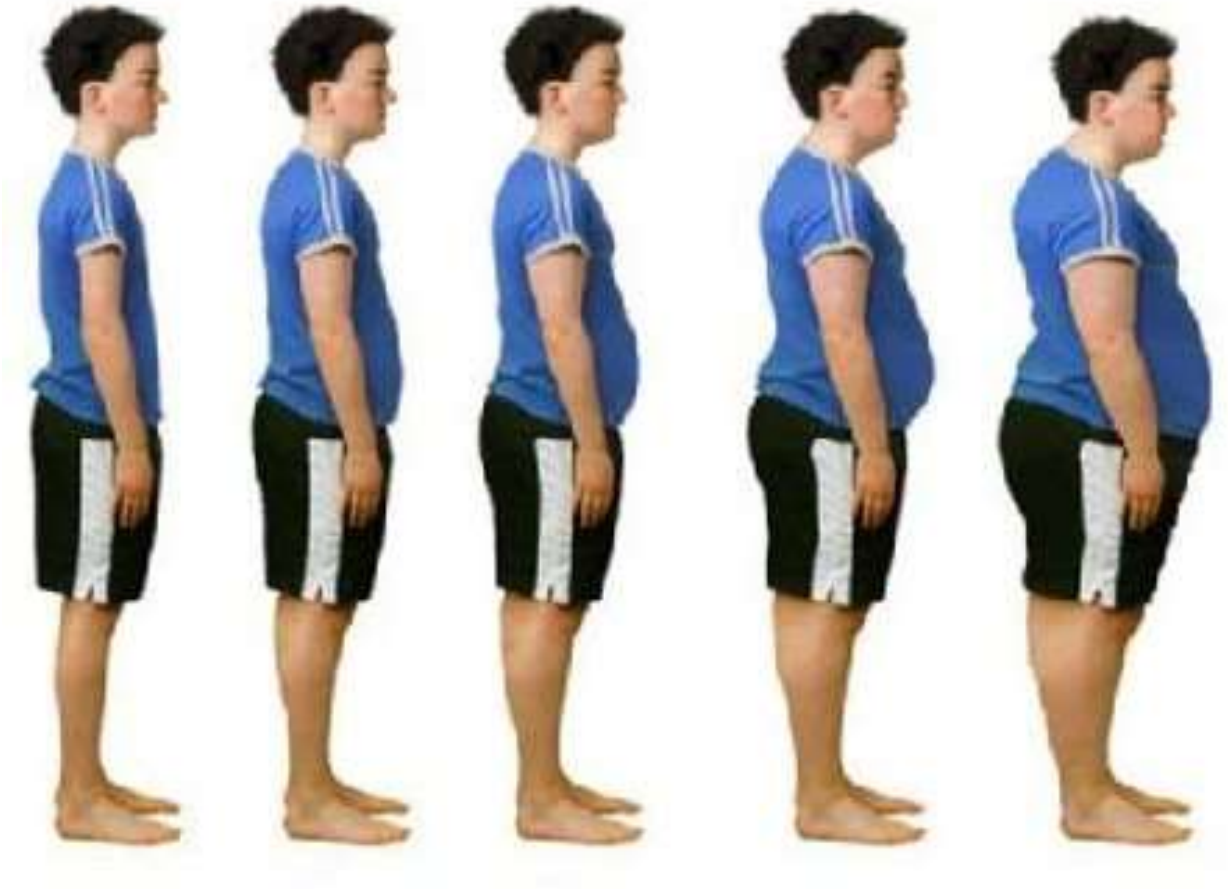
EOS-Klinik für Psychotherapie

Münster, Waschküche am 22.11.2016

Stimmt wirklich!

Wo kommt die Körpermasse her?

Du bist, was Du isst: quantitativ



Du bist, was Du isst: qualitativ

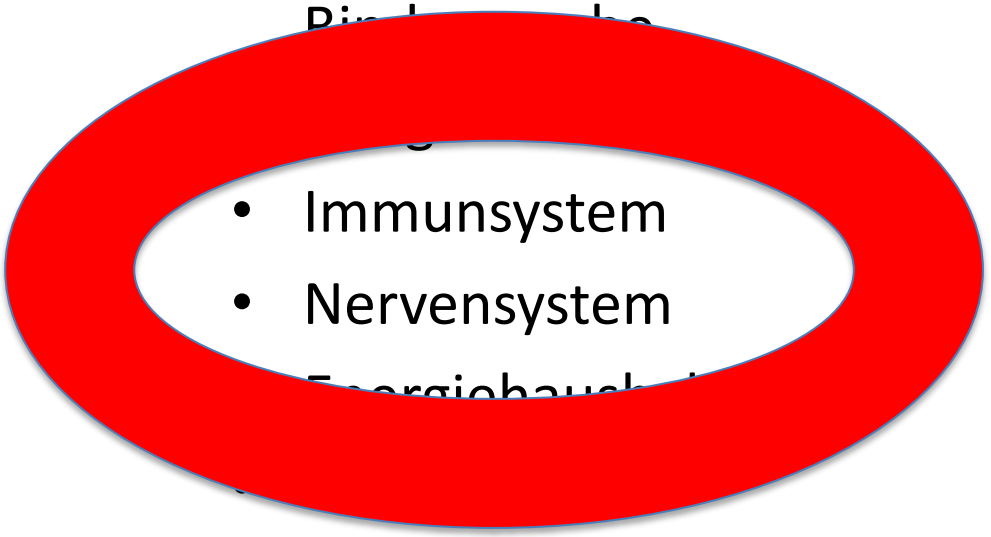
Was heißt *qualitativ*?

Nahrung: Zusammensetzung

- „macro-nutrients“:
  - Kohlenhydrate
  - Proteine
  - Fette
- „micro-nutrients“:
  - Vitamine
  - Spurenelemente
- Wasser
- Gifte, Erreger

Organismus: Organsysteme

- Verdauungssystem
- Skelett, Knochen,
- Immunsystem
- Nervensystem



ENTWICKLUNG: Ausschöpfung von Möglichkeiten

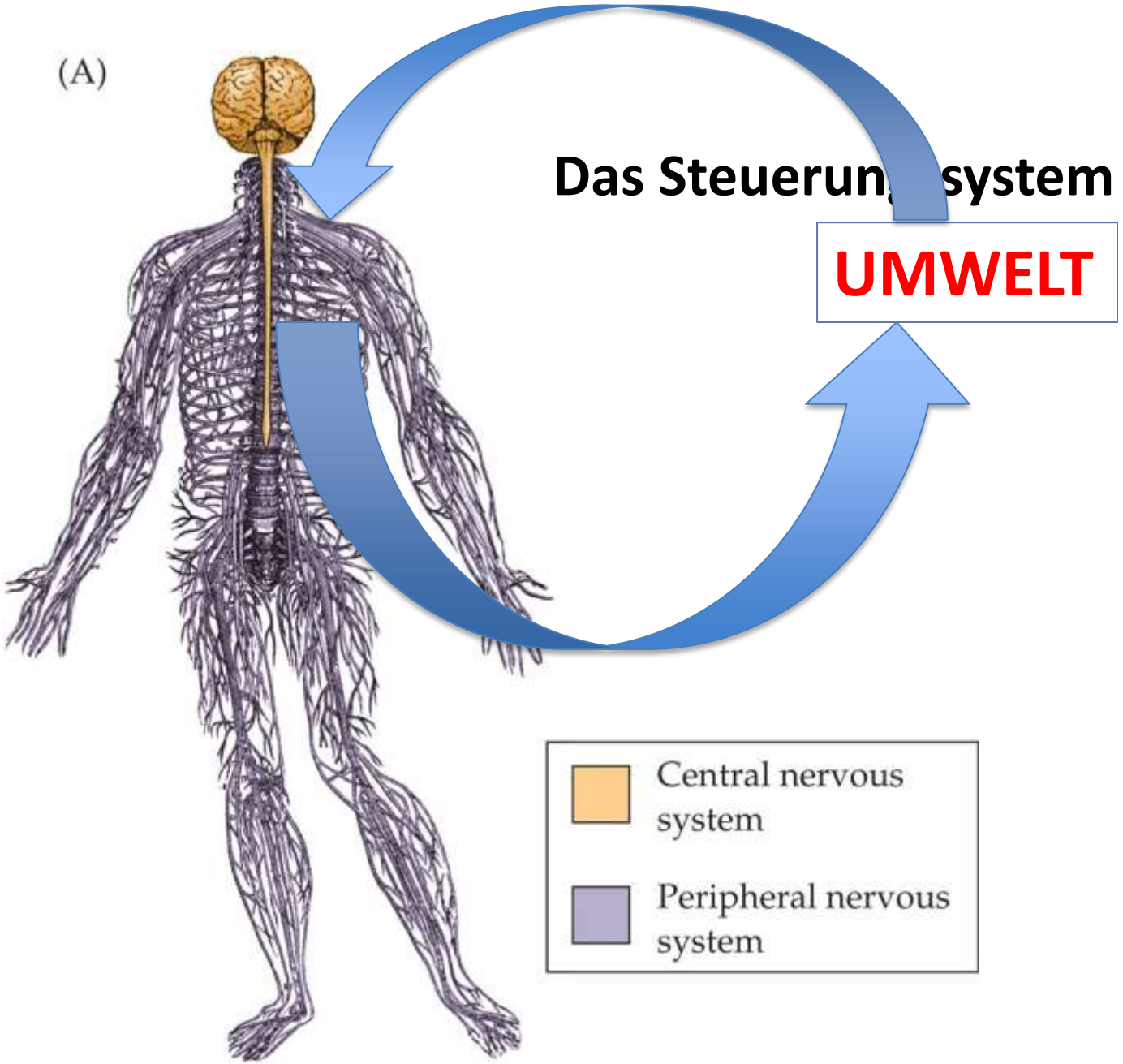
Wer bist Du, (der da isst)?

- Ein Körper: Figur, Vitalität, Leistungsfähigkeit, ...
- Eine Seele: Stimmungen, Gefühle, Gedanken, Erinnerungen, ... geistige Integrität, ...
- Nein, ich bin ich selbst: „ein virtuelles Zentrum narrativer Gravität“
- „Ich“ als Subjekt: Erlebens- & Handlungsfähigkeit
- „Ich“ als Objekt: Selbstbild
  - Sozialer Status, Rolle(n), Handlungsmöglichkeiten
- Person-handelt-in-Umwelt-Perspektive: Lernen, Muster/Gewohnheiten, Rituale, soziales Feedback, Beziehungen, ...
  - Status, Organisation, Ablauf, ... der Mahlzeiten

Wer bist Du, (der da isst)?

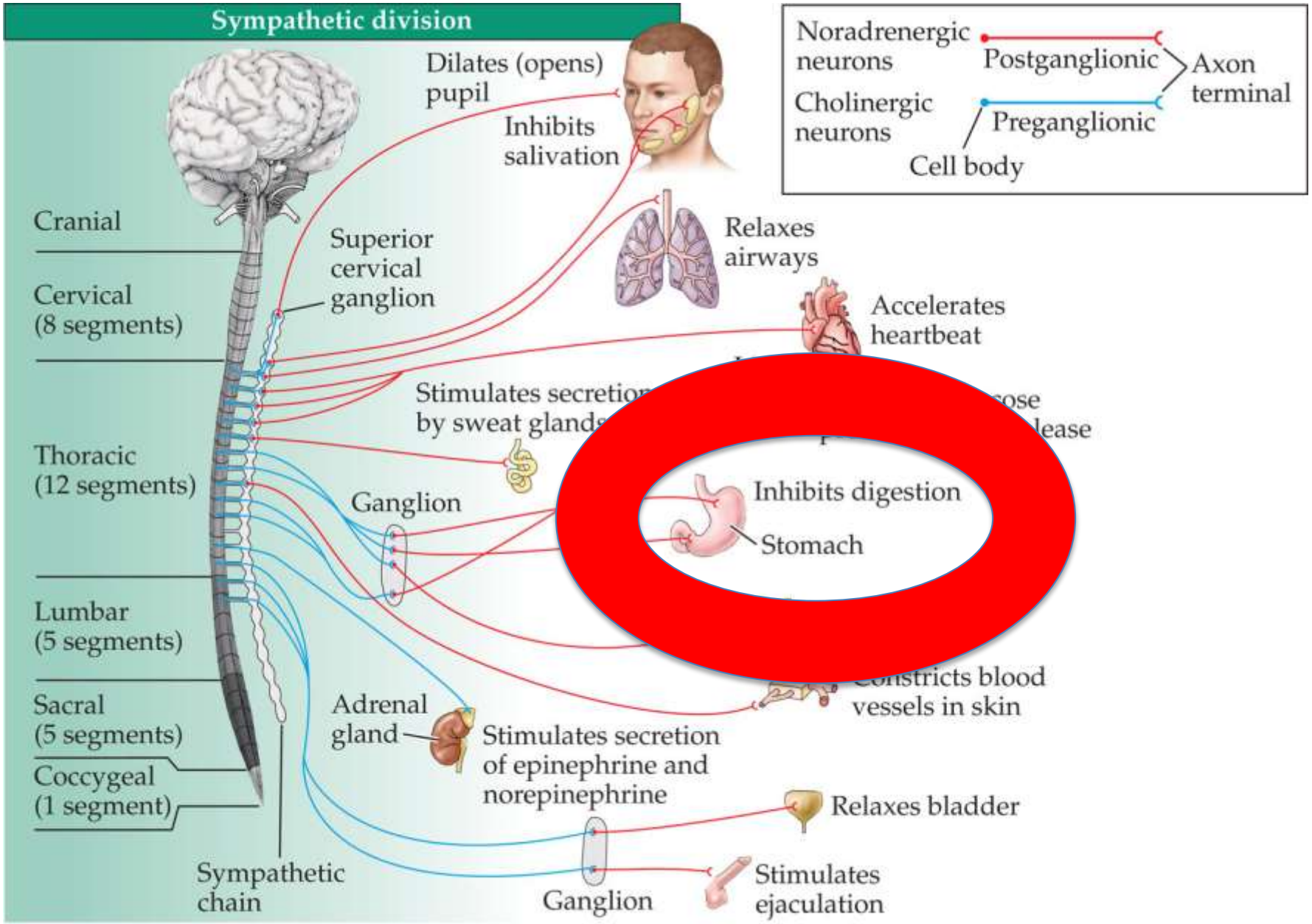
Das Ich hängt von Vielem ab, u.a. ...

- ... der strukturellen und funktionellen Integrität des Organismus bzw. des Gehirns
  - Große Bedeutung sozialer & kultureller Einbettung
- ... vom Mikrobiom (und entsprechenden Mikrobiom-Darm-Gehirn-Immunsystem- ... Wechselbeziehungen)
  - Darmwand: Außengrenze (Immunantwort)
  - Mikrobiom: mehr Zellen als eigener Körper
  - Haut, Schleimhäute etc.: von Biofilm bedeckt
  - 100 Billionen „Fremdzellen“; ca. 3 kg
  - Genom: ca. 10% stammt von Vieren
- Ergo: Du bist viele, sehr viele!



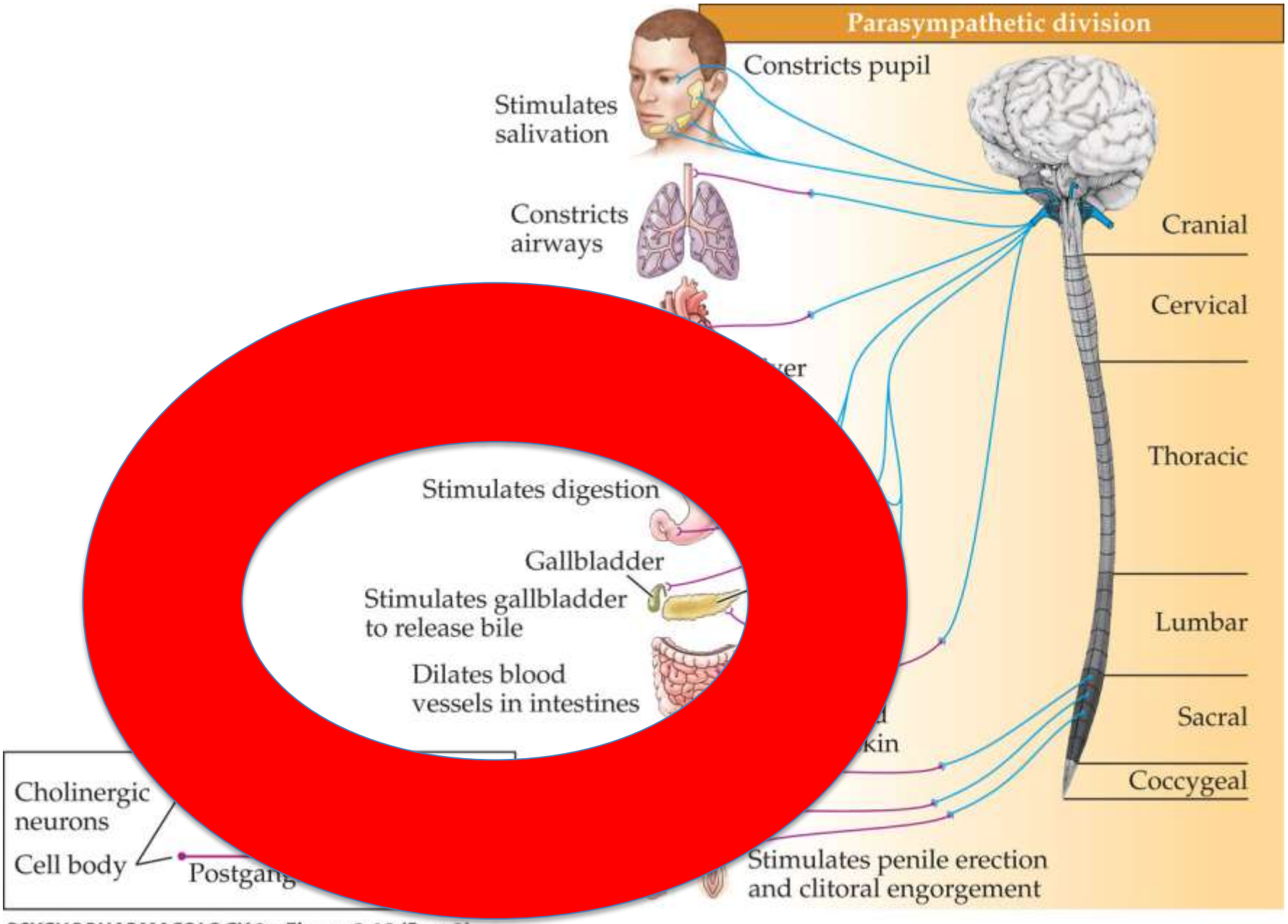
PSYCHOPHARMACOLOGY 2e, Figure 2.16 (Part 1)

Figure 2.18 Autonomic nervous system (ANS) (Part 1)



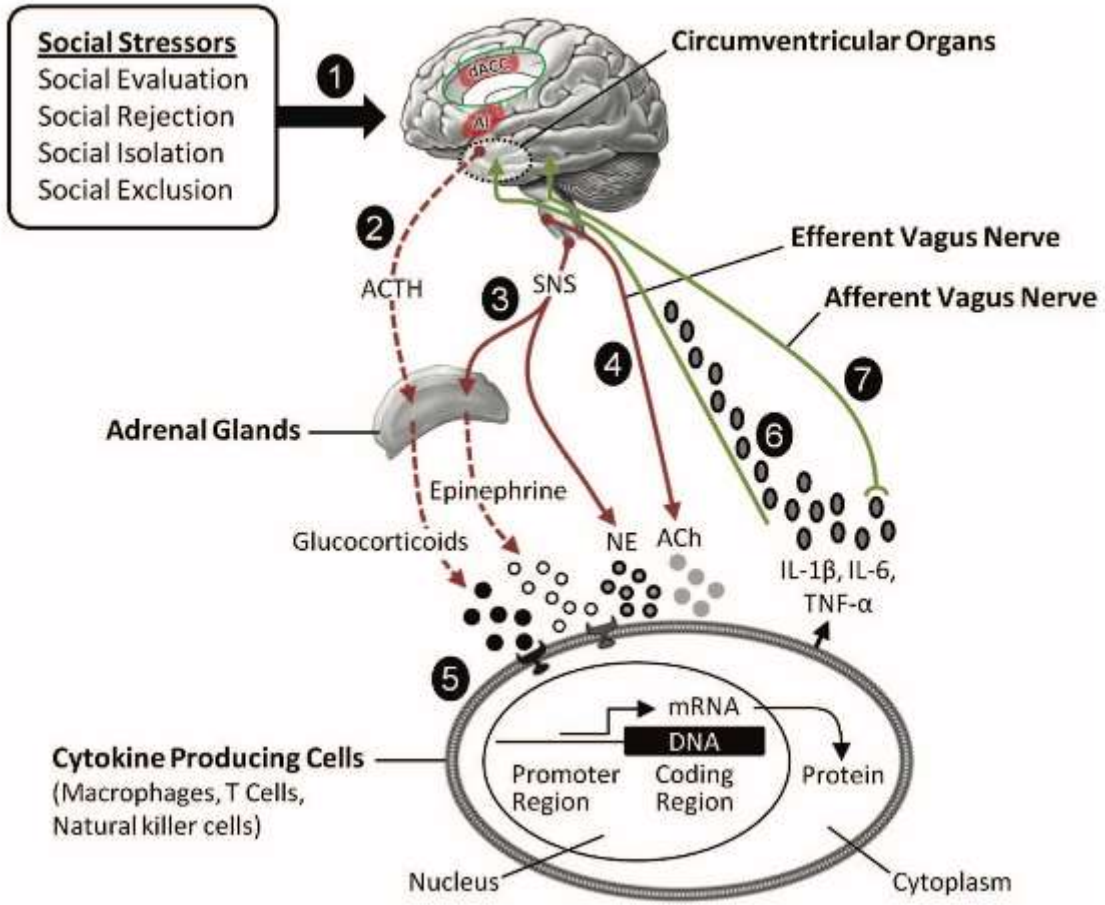
***PSYCHOPHARMACOLOGY 2e*, Figure 2.18 (Part 1)**

Figure 2.18 Autonomic nervous system (ANS) (Part 2)

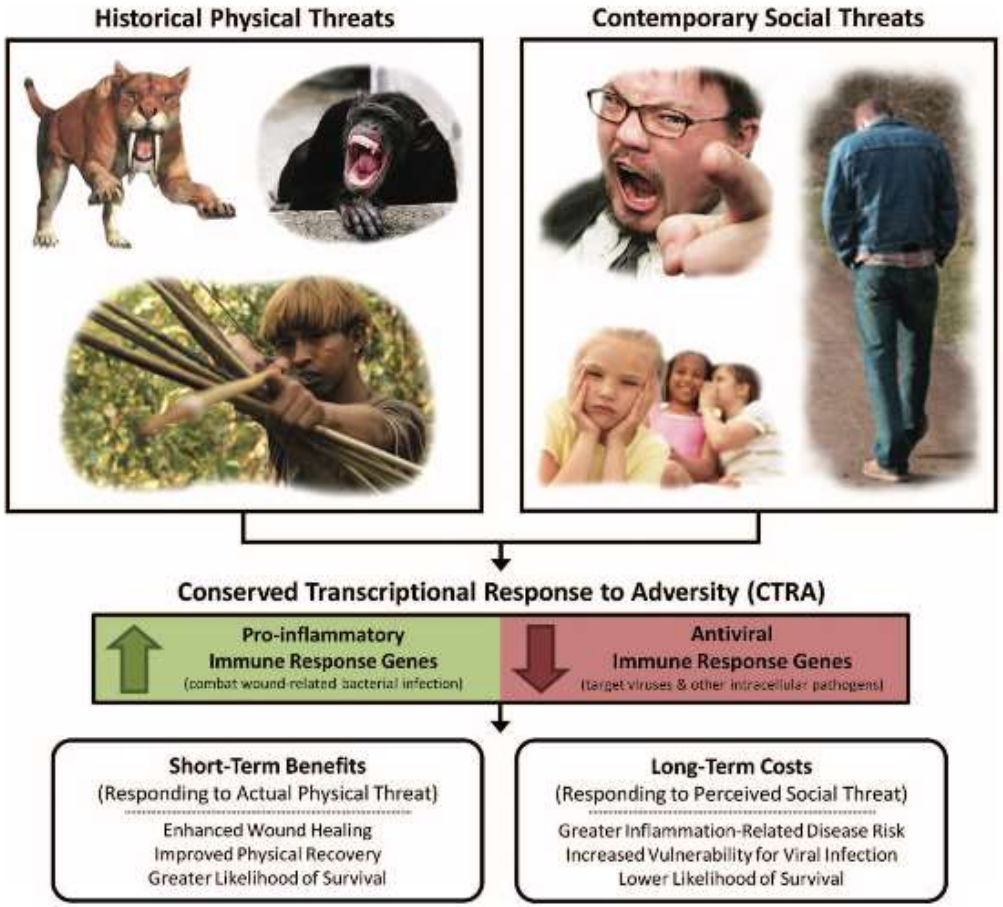


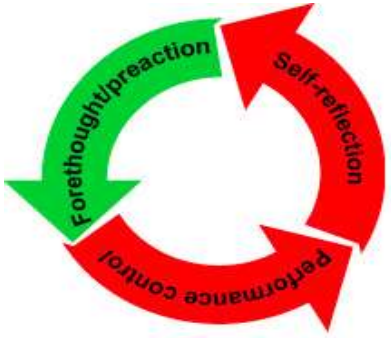
***PSYCHOPHARMACOLOGY 2e*, Figure 2.18 (Part 2)**

Stressreaktion: ANS, HPA-Achse, Immunreaktion, ...



Stress ist gut, muss aber reguliert werden!

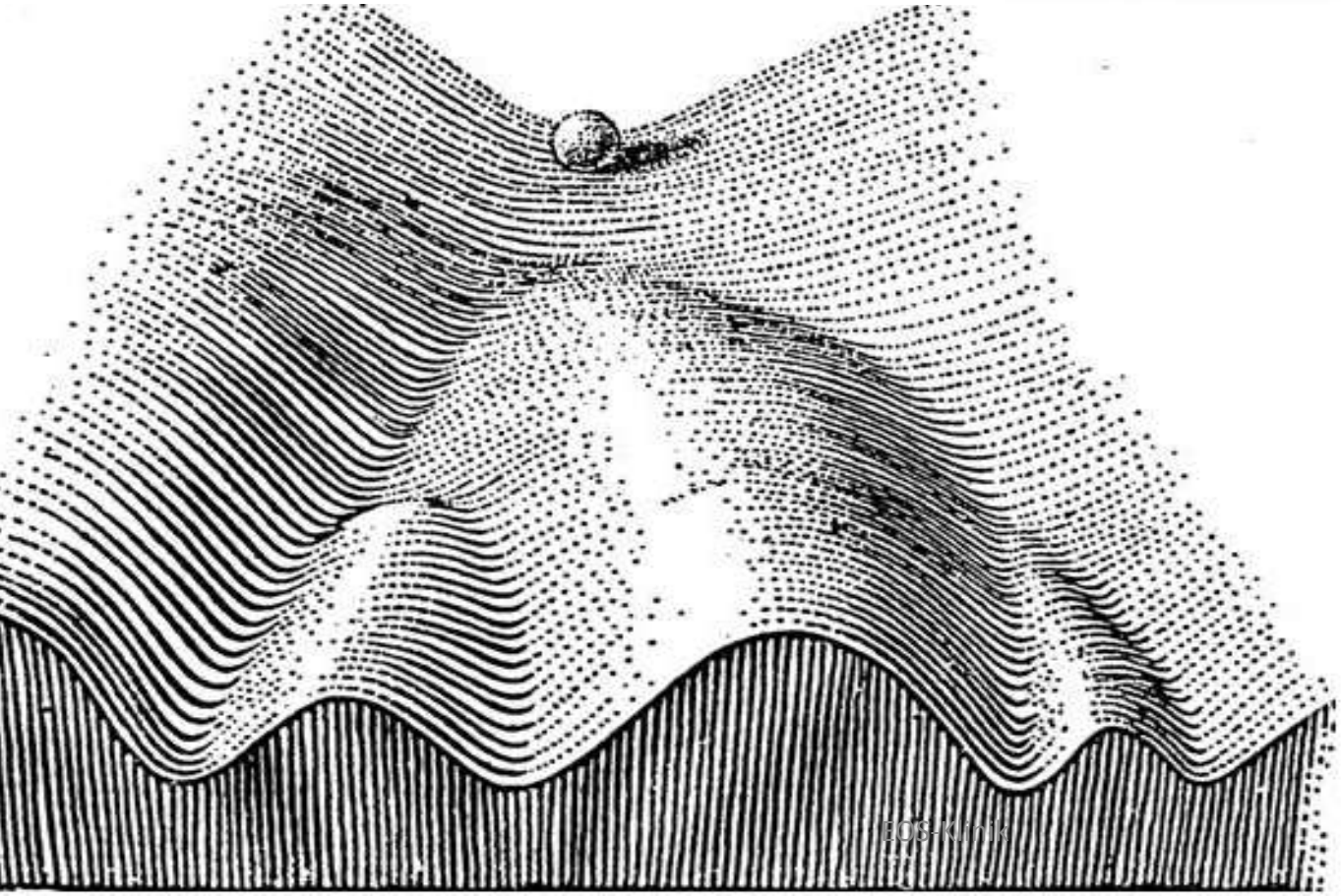




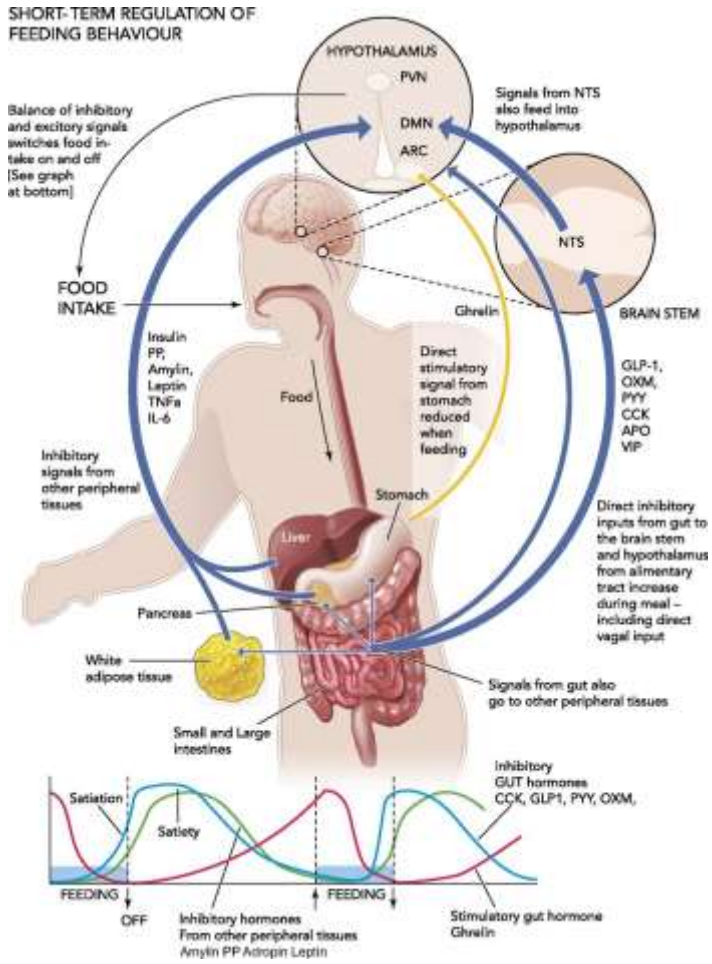
Der Mensch ist ein hyperkomplexes, dynamisches, vielfach eingebettetes Verhaltenssystem, dass sowohl „bottom up“ als auch „top down“ gesteuert wird!

EBENE	DOMÄNE	BEISPIEL
Gesellschaft	Kultur	Muttersprache, Normen, soziale Praktiken, ... Alltagspsychologie
Gruppe	Familie ... haft ...	Gruppenzugehörigkeit
Dyade	2-Perso ... ngen	Mutter-Kind, Lebenspartnerschaft
Organismus / Subjekt	Mechanistisch / begründet	Verhalten / Handeln
Organ	Gehirn als Verhalte ... r	Situierte Netzwerkaktivierungen, funktionelle Modellierungen
Gewebe	Zellinter ...	Rezeptorbindung
Zelle	Zellstoff ...	Gen-Expression

Dynamische Systeme

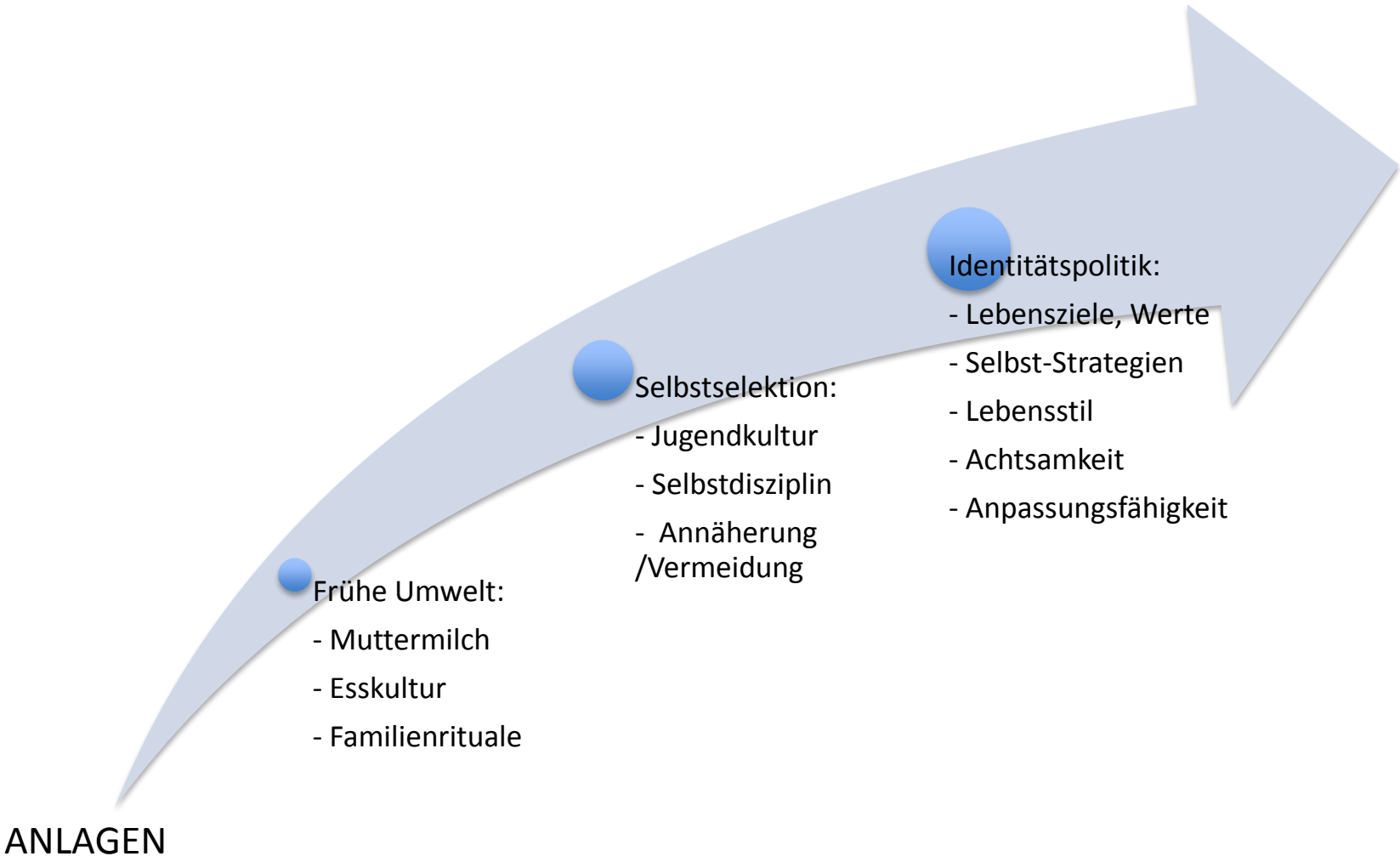


Auf den richtigen Rhythmus kommt es an!

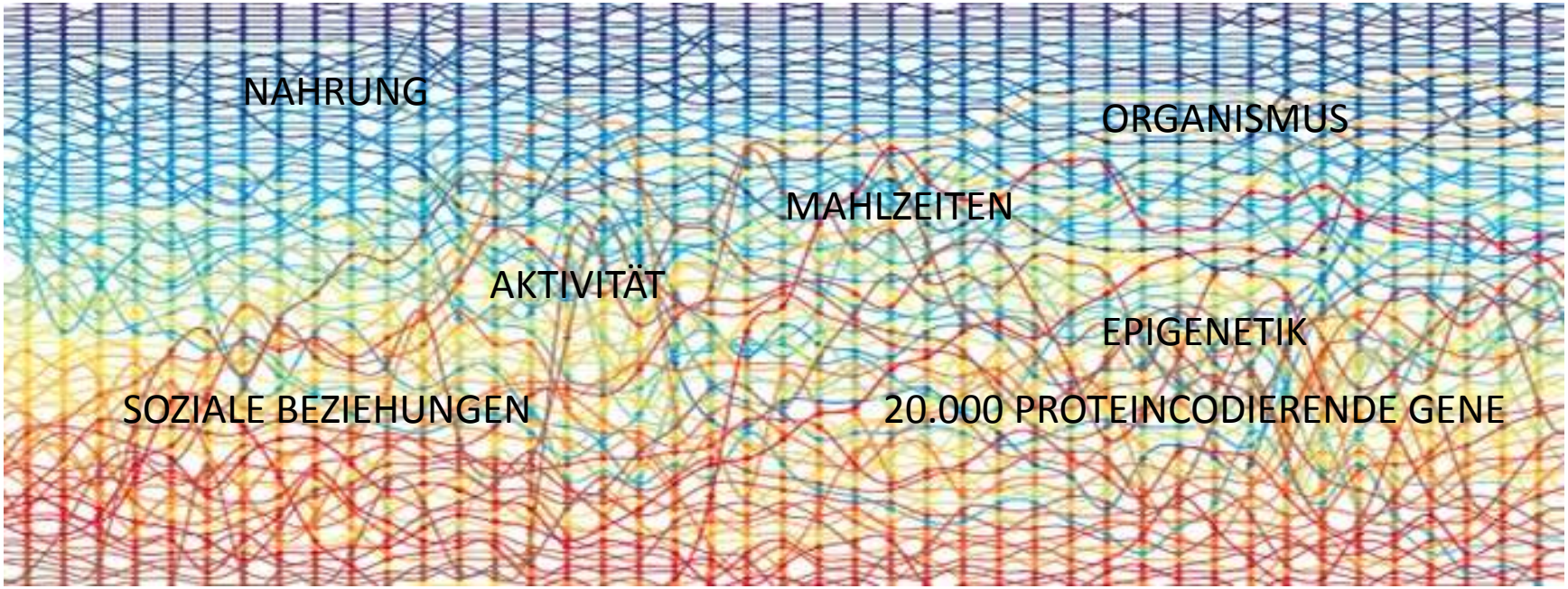


Steuerung:
Hunger/Sättigung
Werden eingeübt

Ernährung: eine Entwicklungs-, Lern- und Selbstselektionsgeschichte



Vorsicht: nicht-lineares, selbstorganisierendes System



A ist nicht einfach ***die Ursache*** von B.
Lineares Denken: „Risikofaktoren“ („mereologische Fehlschlüsse“)

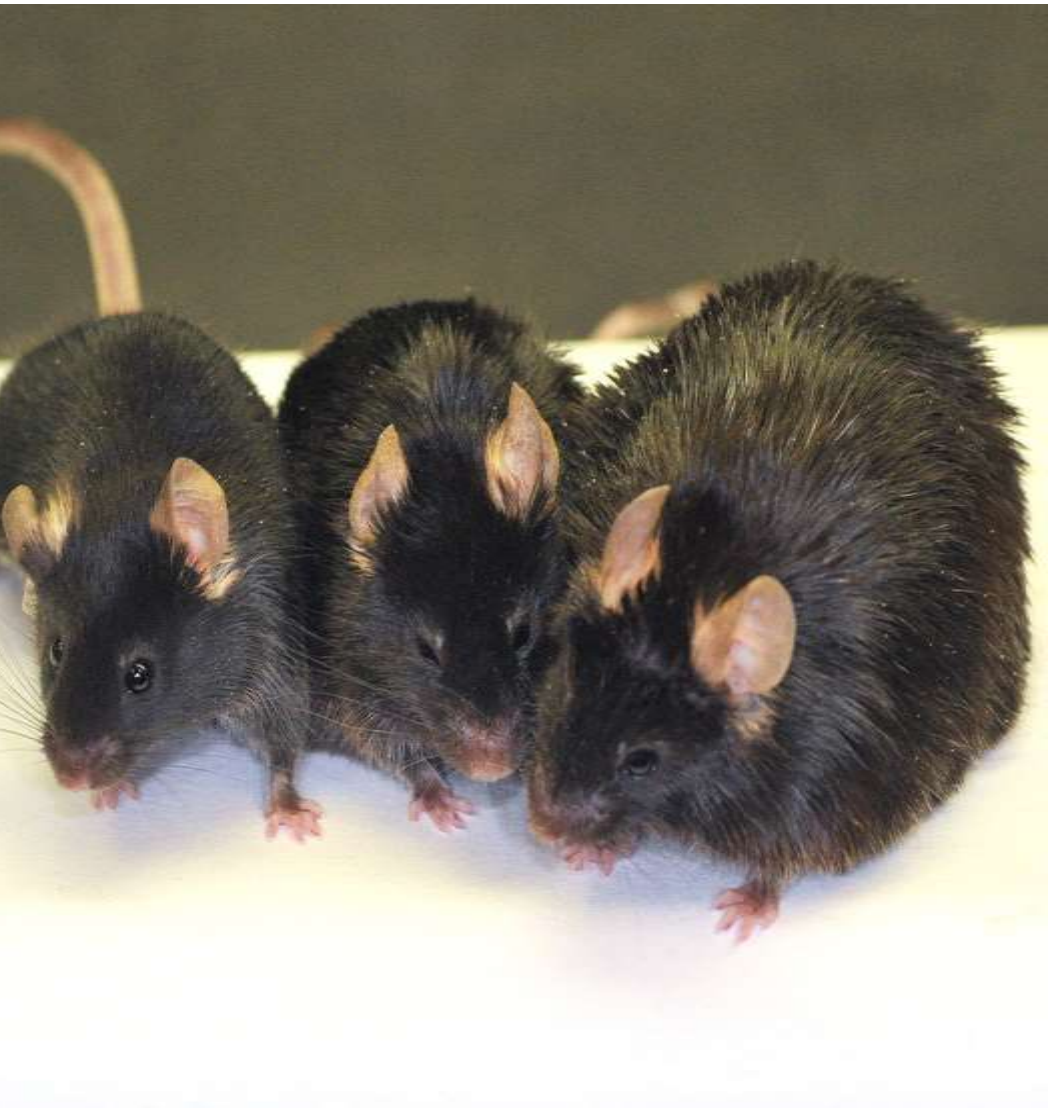
Übersicht

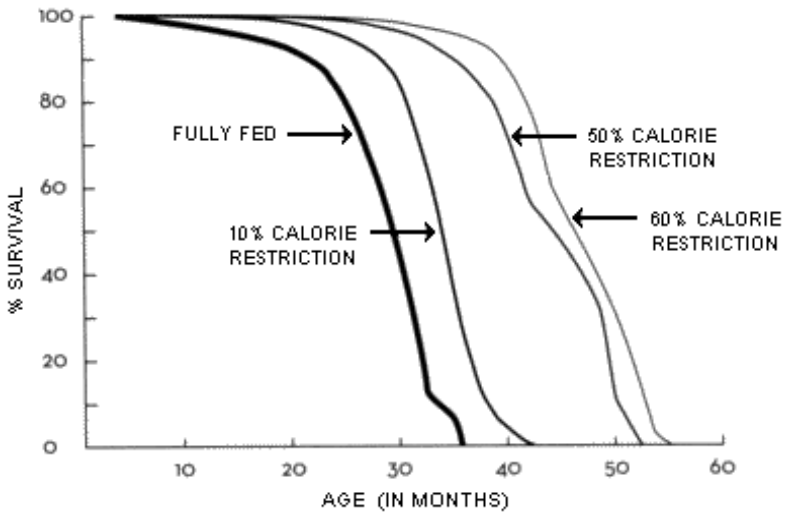
- Ernährung, quantitativ
  - „Kalorienrestriktion macht gesünder & langlebiger!“
    - Negativbeispiel: Fettsucht (Adipositas)
      - Neuroinflammation
      - Insulinrezeptorenresistenz („metabolisches Syndrom“)

- Ernährung, qualitativ
  - „Ausgewogene“ Ernährung hält gesund.
    - Mangelernährung
      - Vitamine: Vitamin D
    - Gehirn-Darm-Beziehung
      - Einfluss des Mikrobioms

- Beispiel: Der Reizdarm („IBS“)

Kalorienbeschränkung verlängert die Lebensspanne





Dies gilt für viele Lebewesen

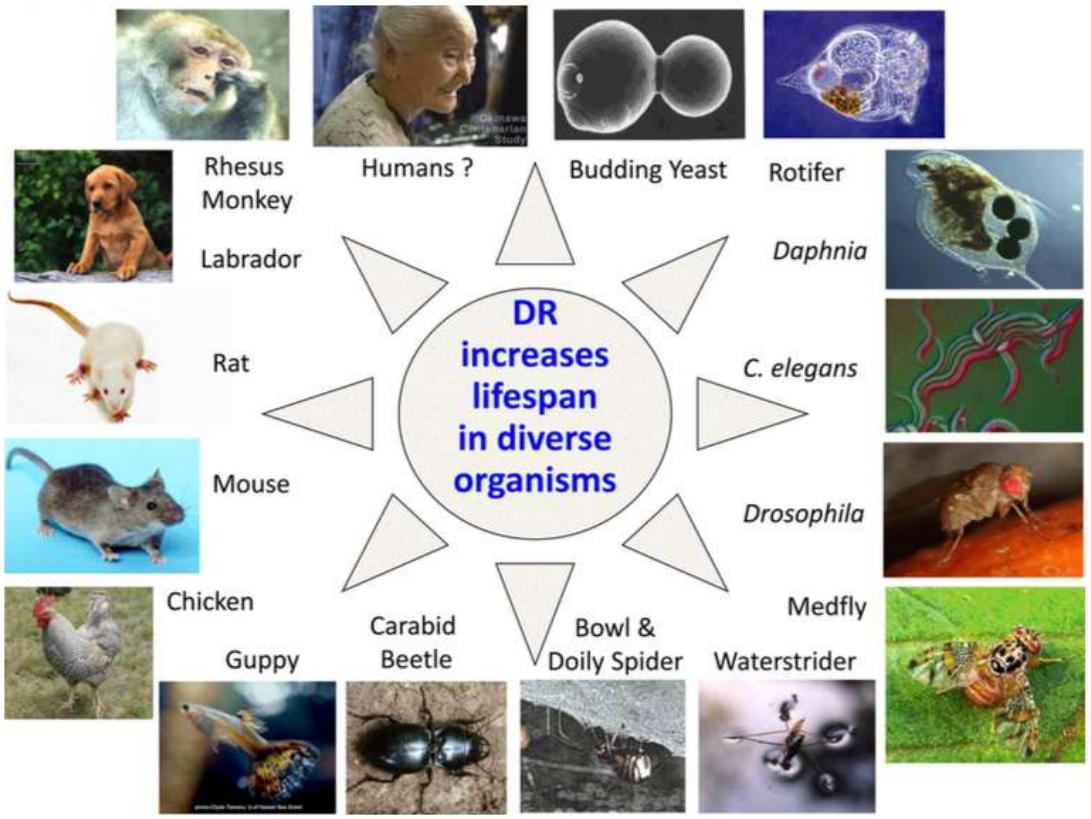
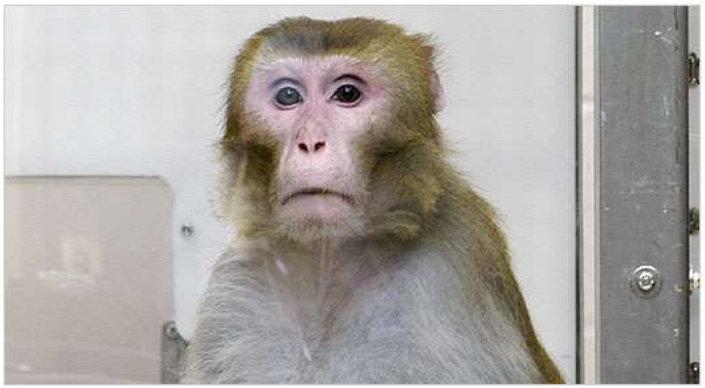


Figure 1.
Dietary restriction increases healthy lifespan in diverse single-celled, invertebrate and vertebrate animals.

Langzeitversuche an nächsten Verwandten



CALORIE RESTRICTION DIET

Canto, 25

Although a senior citizen — the average rhesus monkey lifespan in captivity is 27 — Canto, above, is aging fairly well. Outwardly, he has a nice coat, elastic skin, a smooth gait, upright posture and an energetic demeanor. His bloodwork shows he is as healthy as he looks.

MONKEY MENU

Daily calories

445 **885**

Monkeys also receive an apple each day.

NORMAL DIET

Owen, 26

He gets more food, but Owen, above, isn't aging as well. His posture has been affected by arthritis. His skin is wrinkled and his hair is falling out. Owen is frail and moves slowly. His bloodwork shows unhealthy levels of glucose and triglycerides.

Human equivalent Meals prepared by Mike Linksvayer, 36

Diet of an average, active human male of 36

Breakfast fermented soybeans and garlic

Lunch tofu, konyakku and carrots

Dinner vegan sausage, kale, tomato sauce and salad

HUMAN MENU

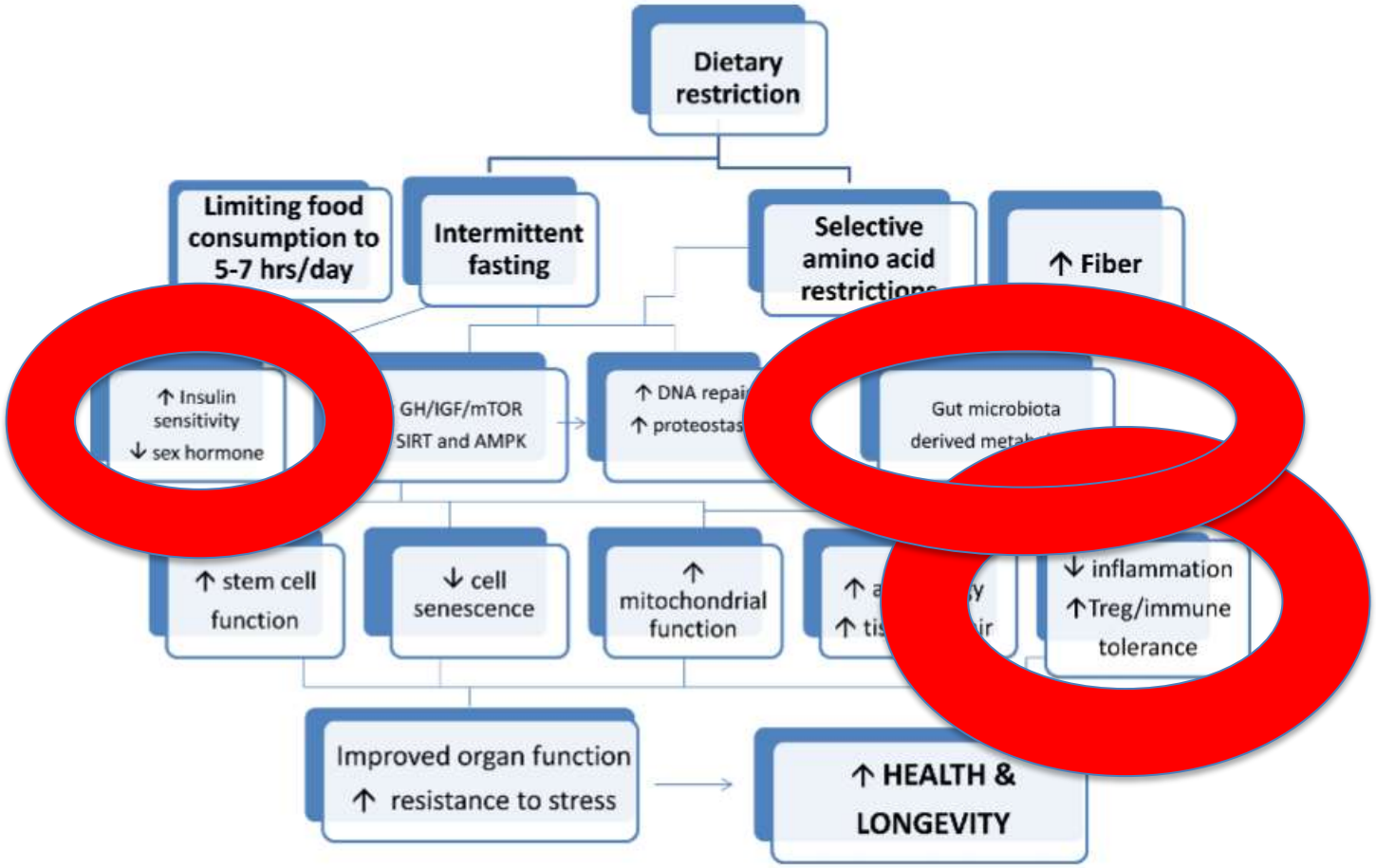
Daily calories

2,000 **3,000**

Beverages, snacks and desserts not shown. Diet varies according to body type, sex and activity level.

Photos by Jim Wilson and Tony Cenicola/The New York Times and Lars Klove for The New York Times

Wie wirkt Kalorienrestriktion?



Und die Psyche?

- Neuroinflammation
- Ins.rez.resistenz

Adipositas wirkt pro-inflammatorisch

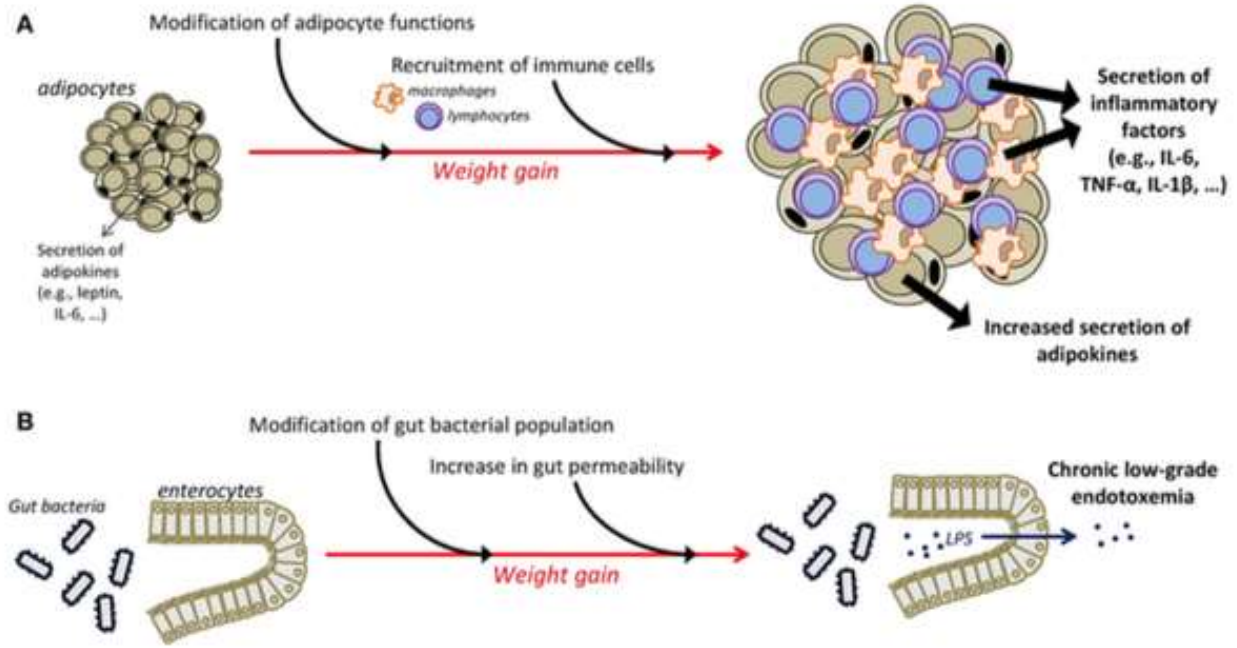
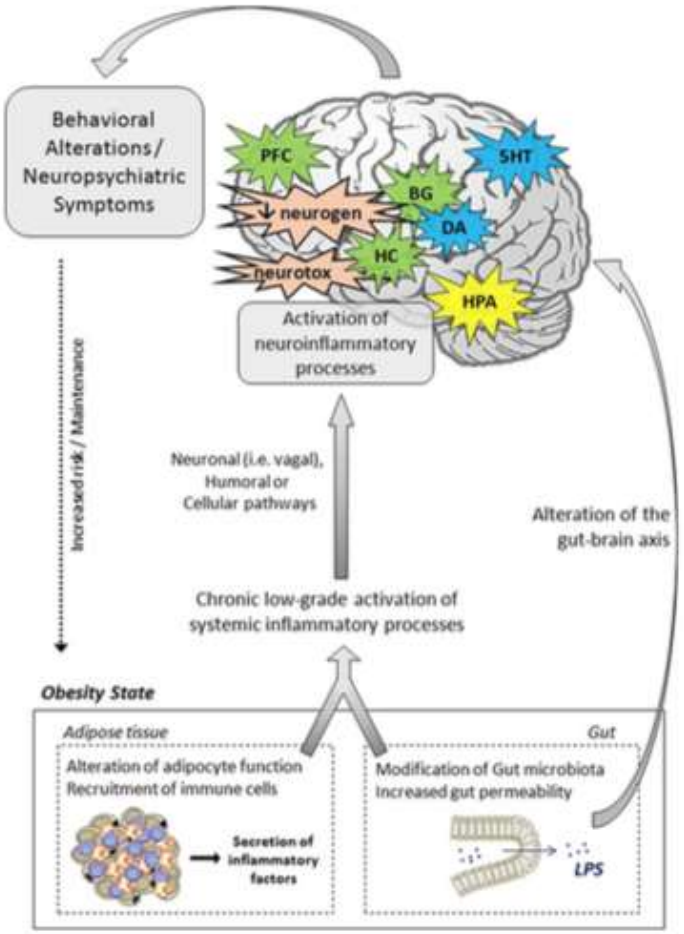
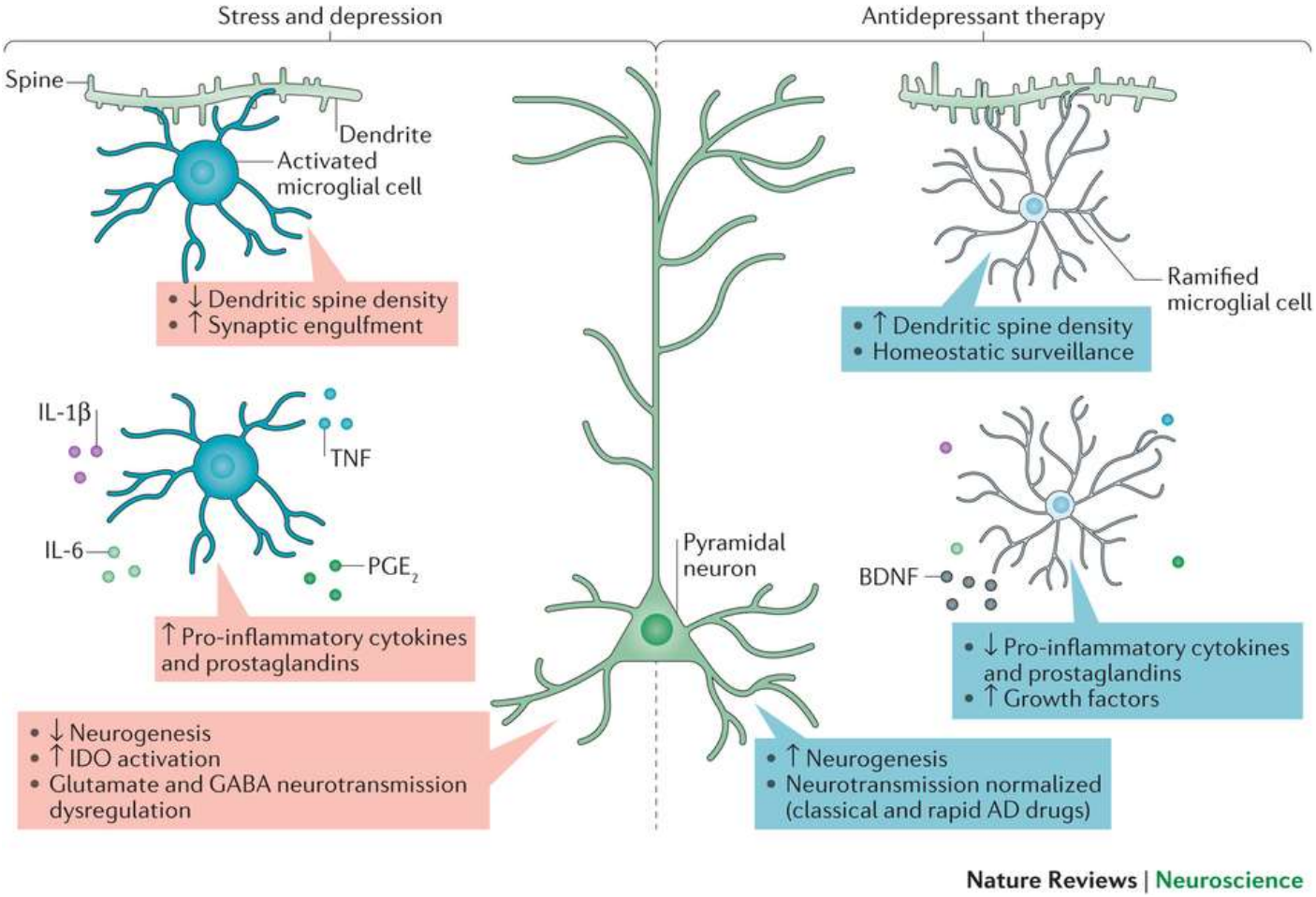


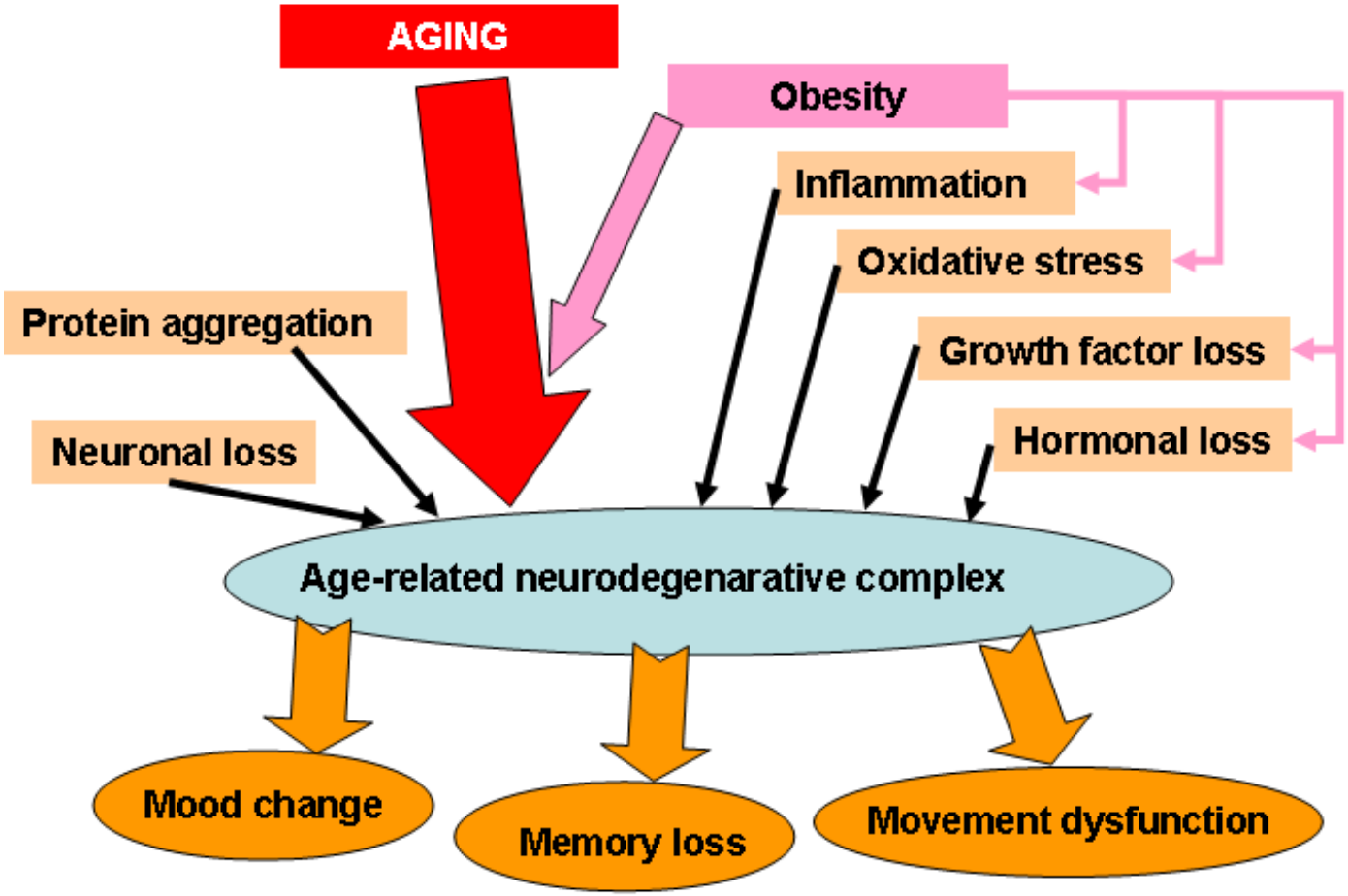
FIGURE 1 | Mechanisms underlying chronic low-grade inflammatory state in obesity. The adipose tissue is an important contributor of chronic low-grade inflammation in obesity **(A)**. Weight gain is associated with substantial changes in the function of adipocytes that increase their secretion of adipokines, including inflammatory factors. Moreover, infiltration of immune cells, i.e., macrophages and T cells, in the adipose tissue is also responsible for the adipose secretion of inflammatory cytokines. Additional mechanisms, including alterations in the gut microbiota, contribute also to the instauration of obesity-related inflammation **(B)**. Obesity is associated with modifications in gut microbial population and with an increased permeability of the intestinal wall that promotes the passage of LPS in the circulation, leading thus to the development of chronic low-grade endotoxemia and the increased production of inflammatory factors. IL-1β, interleukin-1β; IL-6, interleukin-6; LPS, lipopolysaccharide; TNF-α, tumor necrosis factor-α.

Hirn-Darm-Achse



Beispiel: Depression

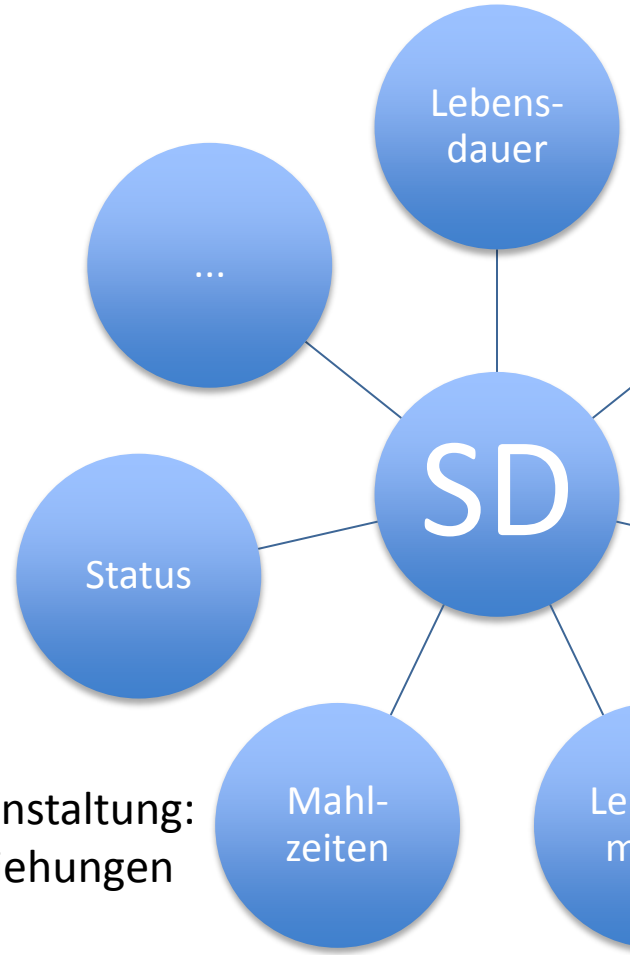



AGING
Obesity
Inflammation
Oxidative stress
Growth factor loss
Hormonal loss
Protein aggregation
Neuronal loss
Age-related neurodegenarative complex
Mood change
Memory loss
Movement dysfunction

Ca. 4000 Jahre Ackerbau: KH-Mast

Wozu dieser „Bauplan“?

(> 200.000 Jahre Homo sapiens sapiens; „reverse engineering“)



„2 mal Geschlechtsreife“

„Geh- & Lauftier“

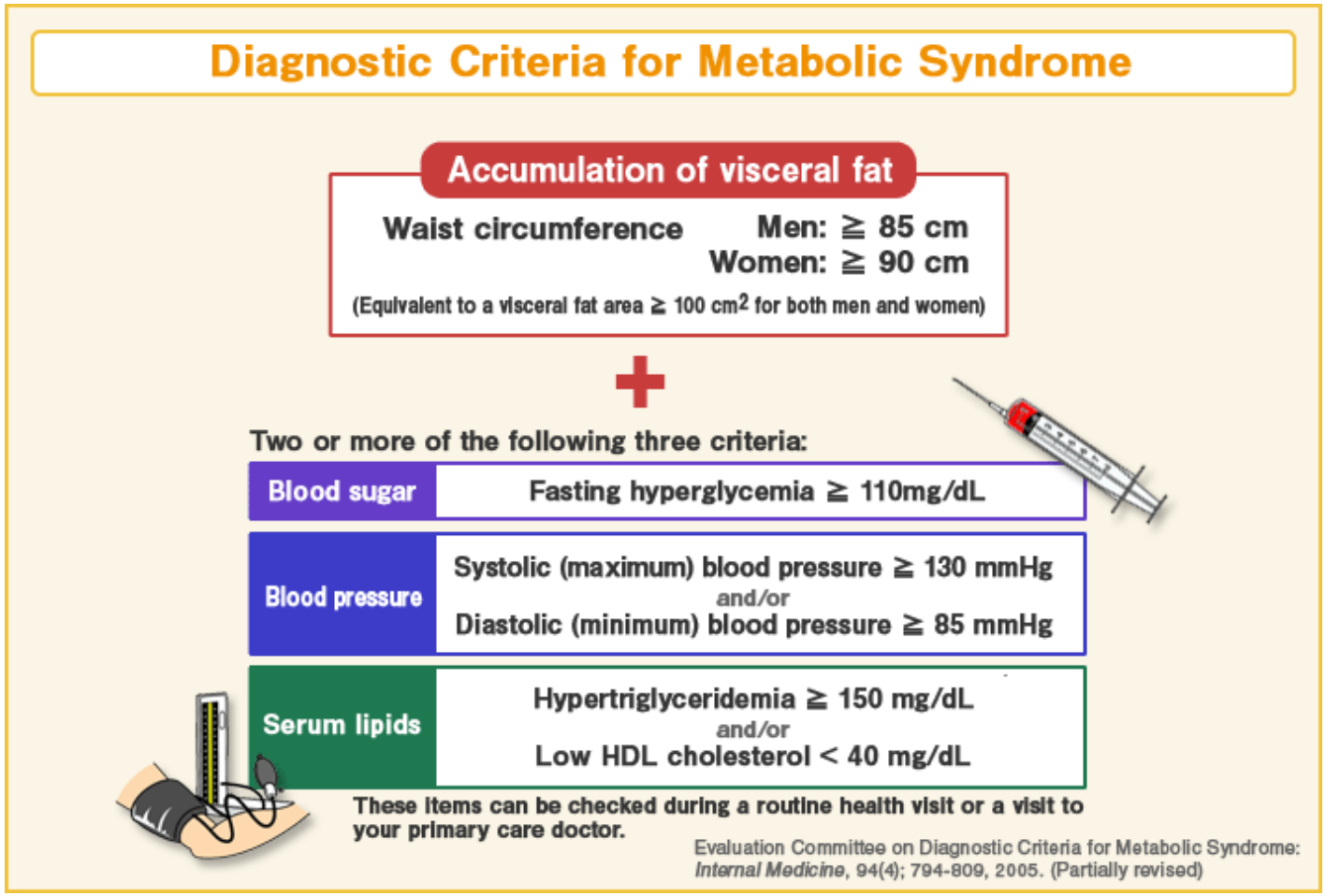
Wo? Was? Mit
Wem? Wer zahlt?

Lange Nahrungskarenzen
(„Hungerleider“)

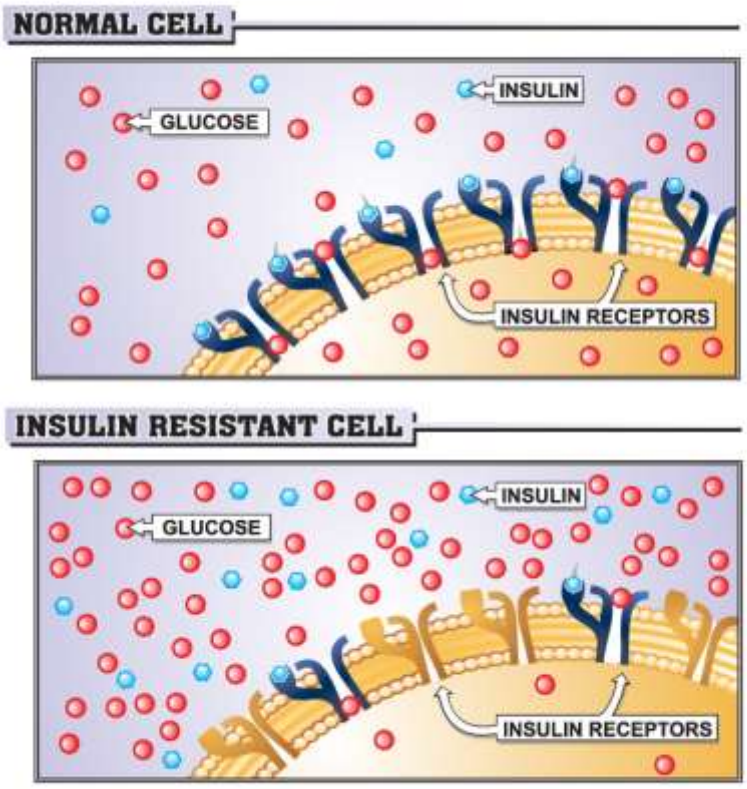
Soziale Veranstaltung:
Fördert Beziehungen

„Paläodiät“

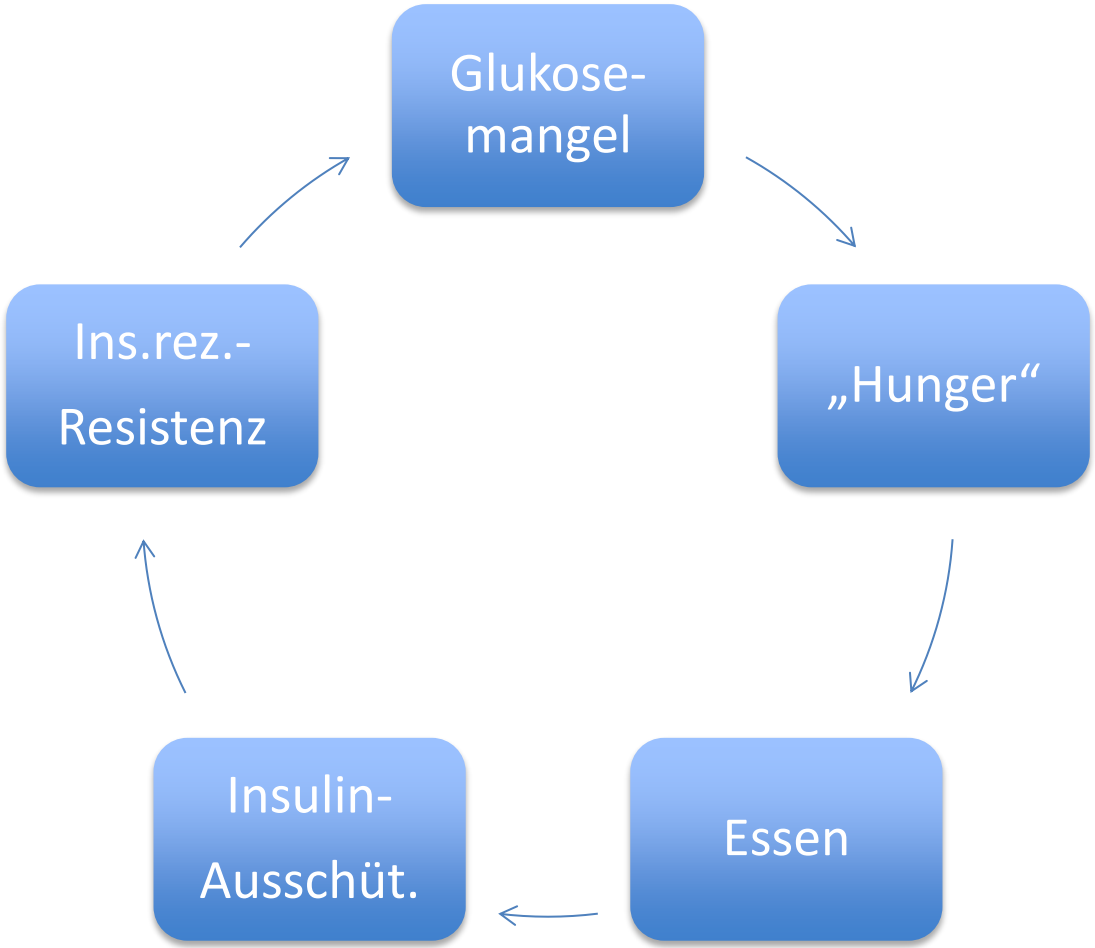
Das metabolische Syndrom

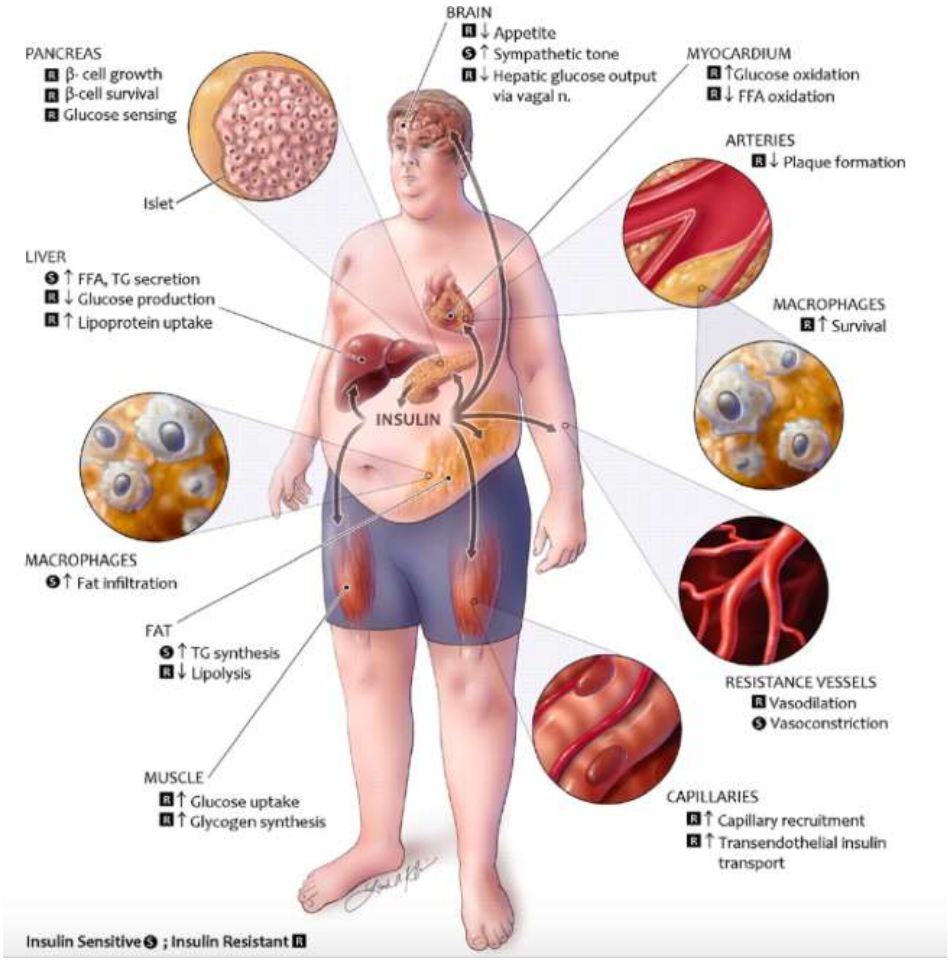


KH↑ → Insulin↑ → Sensitivität ↓



Ein metabolischer Teufelskreis




BRAIN
R ↓ Appetite
S ↑ Sympathetic tone
R ↓ Hepatic glucose output via vagal n.
PANCREAS
R β- cell growth
R β-cell survival
R Glucose sensing
Islet
MYOCARDIUM
R ↑Glucose oxidation
R ↓ FFA oxidation
ARTERIES
R ↓ Plaque formation
LIVER
S ↑ FFA, TG secretion
R ↓ Glucose production
R ↑ Lipoprotein uptake
MACROPHAGES
R ↑ Survival
INSULIN
MACROPHAGES
S ↑ Fat infiltration
FAT
S ↑ TG synthesis
R ↓ Lipolysis
RESISTANCE VESSELS
R Vasodilation
S Vasoconstriction
MUSCLE
R ↑ Glucose uptake
R ↑ Glycogen synthesis
CAPILLARIES
R ↑ Capillary recruitment
R ↑ Transendothelial insulin transport
Insulin Sensitive S ; Insulin Resistant R

Homeostasis Model Assessment (HOMA-) Index

- Nüchtern-Insulin x Nüchtern-Glukose / 405 =

- > 2: Hinweis auf INS-Rezeptoren-Resistenz
- > 5: Durchschnitt bei Typ II Diabetes

Therapie der Insulinrezeptoren-Resistenz

- Pausen (insbes. Kohlenhydratpausen)
- Sport (sensibilisiert INS-Rezeptor)
- KH-Reduktion, z.B. durch weniger insulin-ausschüttungsprovozierende Lebensmittel („glykogener Index“)
- Lebensstiländerung

- Diabetologe

Lebenserwartung vs. „Fettlebe“

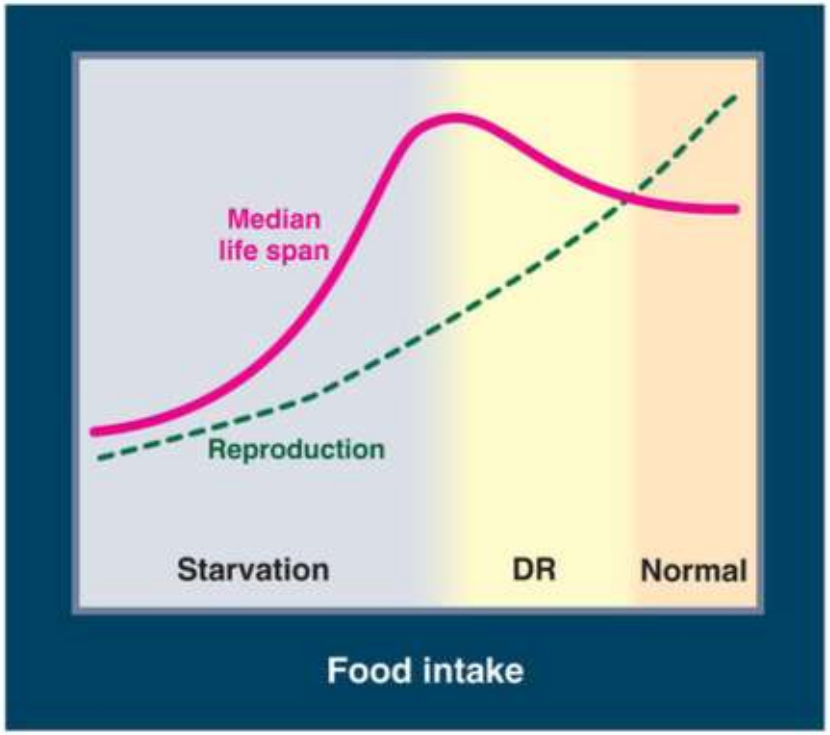


Figure 2.
Food level, fecundity and longevity. Median life span and fecundity are negatively affected by a very low nutrient concentration in higher eukaryotes. However, life span but not fecundity is optimized by DR.

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- Ernährung, qualitativ
  - „Ausgewogene“ Ernährung hält gesund.
    - Mangelernährung
      - Vitamine: Vitamin D
    - Gehirn-Darm-Beziehung
      - Einfluss des Mikrobioms

- Beispiel: Der Reizdarm („IBS“)

Qualitative Mangelernährung: Vitamine

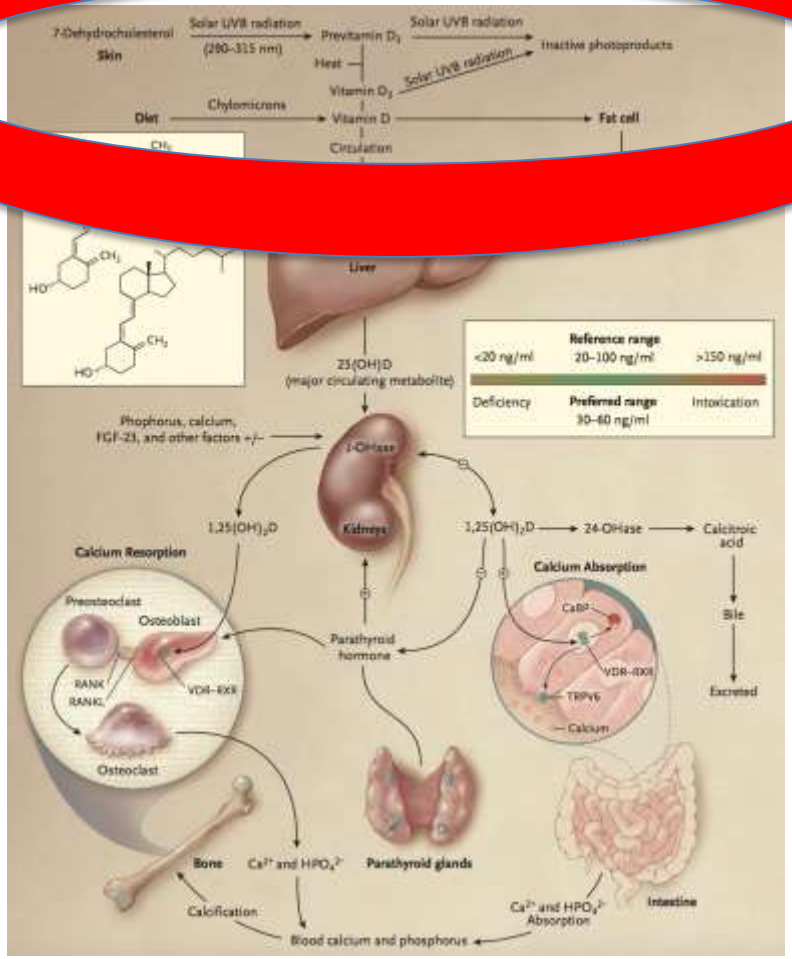
Vitamin Information

Vitamin	Vitamer Chemical Name	Year of Discovery	Food Source	Solubility	Recommended Dietary Allowance	Deficient Disease	Upper Intake Level (UL/Day)*	Overdose Disease
Vitamin A	Retinol, Retinal, and four carotenoids including beta carotene	1913	Cod Liver Oil	Fat	900 uG	Night Blindness, Hyperkeratosis, and Keratomalacia	3,300 ug	Hypervitaminosis A
Vitamin B1	Thiamine	1910	Rice Bran	Water	1.2 mg	Beriberi, Wernicke-Korsakoff syndrome	Not Determined	Drowsiness or muscle relation with large doses
Vitamin B2	Riboflavin	1920	Meat, Eggs	Water	1.3 mg	Ariboflavinosis	Not Determined	
Vitamin B3	Niacin, Niacinamide	1936	Meat, Eggs, Grains	Water	16.0 mg	Pellagra	35.0 mg	Liver damage (doses >2g/day)
Vitamin B5	Panthotehic Acid	1931	Meat, Whole Grains, in many foods	Water	5.0 mg	Paresthesia	Not Determined	Diarrhea; possibly nausea and heartburn
Vitamin B6	Pyridoxine, Pyridoxamine, Pyridoxal	1934	Meat, Dairy Products	Water	1.3 - 1.7 mg	Anemia peripheral neuropathy	100 mg	Impairment of proprioception, nerve damage (doses > 100 mg/day)
Vitamin B7	Biotin	1931	Meat, Dairy Products, Eggs	Water	30.0 ug	Dermatitis, enteritis	Not Determined	
Vitamin B9	Folic Acid, Folinic Acid	1941	Leafy Green Vegetables	Water	400 ug	Megaloblast and Deficiency during pregnancy is associated with birth defects, such as	1,000 ug	may mask symptoms of vitamin B12 deficiency
								ash [causality
Vitamin C	Ascorbic Acid	1920	Citrus, Most Fresh Foods	Water	90.0 mg	Scurvy	2,000 mg	Vitamin C megadosage
Vitamin D	Cholecalciferol	1920	Cod Liver Oil	Fat	5.0 -10 ug	Rickets and Osteomalacia	50 ug	Hypervitmainosis D
	Tocotrienols	1922	Wheat Germ Oil, Unrefined	Fat	15 mg	Deficiency is very rare, mild hemolytic	1,000 mg	Increased congestiv
Vitamin K	Menaquinones							coagulation in patients in warfarin

* (male, age 19–70)

Source: Wikipedia

Vitamin D


7-Dehydrocholesterol
Skin
Solar UVB radiation
(280–315 nm)
Previtamin D3
Heat
Vitamin D3
Solar UVB radiation
Inactive photoproducts
Solar UVB radiation
Diet
Chylomicrons
Vitamin D
Circulation
Fat cell
Liver
25(OH)D
(major circulating metabolite)
Reference range
<20 ng/ml
20–100 ng/ml
>150 ng/ml
Deficiency
Preferred range
30–60 ng/ml
Intoxication
Phosphorus, calcium,
FGF-23, and other factors +/–
1-OHase
Kidneys
1,25(OH)2D
1,25(OH)2D
24-OHase
Calcitroic acid
Bile
Excreted
Calcium Resorption
Preosteoclast
Osteoblast
RANK
RANKL
VDR–RXR
Osteoclast
Parathyroid hormone
Calcium Absorption
CaBP
VDR–RXR
TRPV6
Calcium
Bone
Ca2+ and HPO4 2–
Parathyroid glands
Intestine
Calcification
Ca2+ and HPO4 2–
Absorption
Blood calcium and phosphorus

Gehirn, Verhalten & Vitamin D

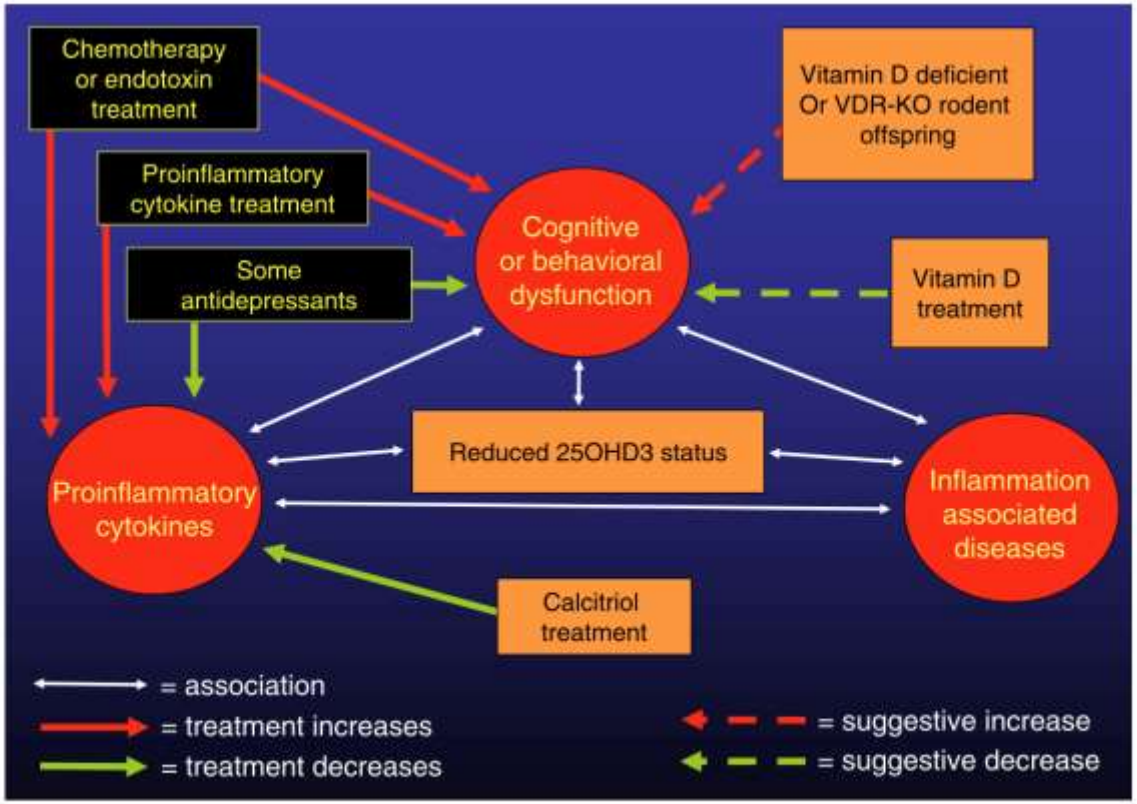
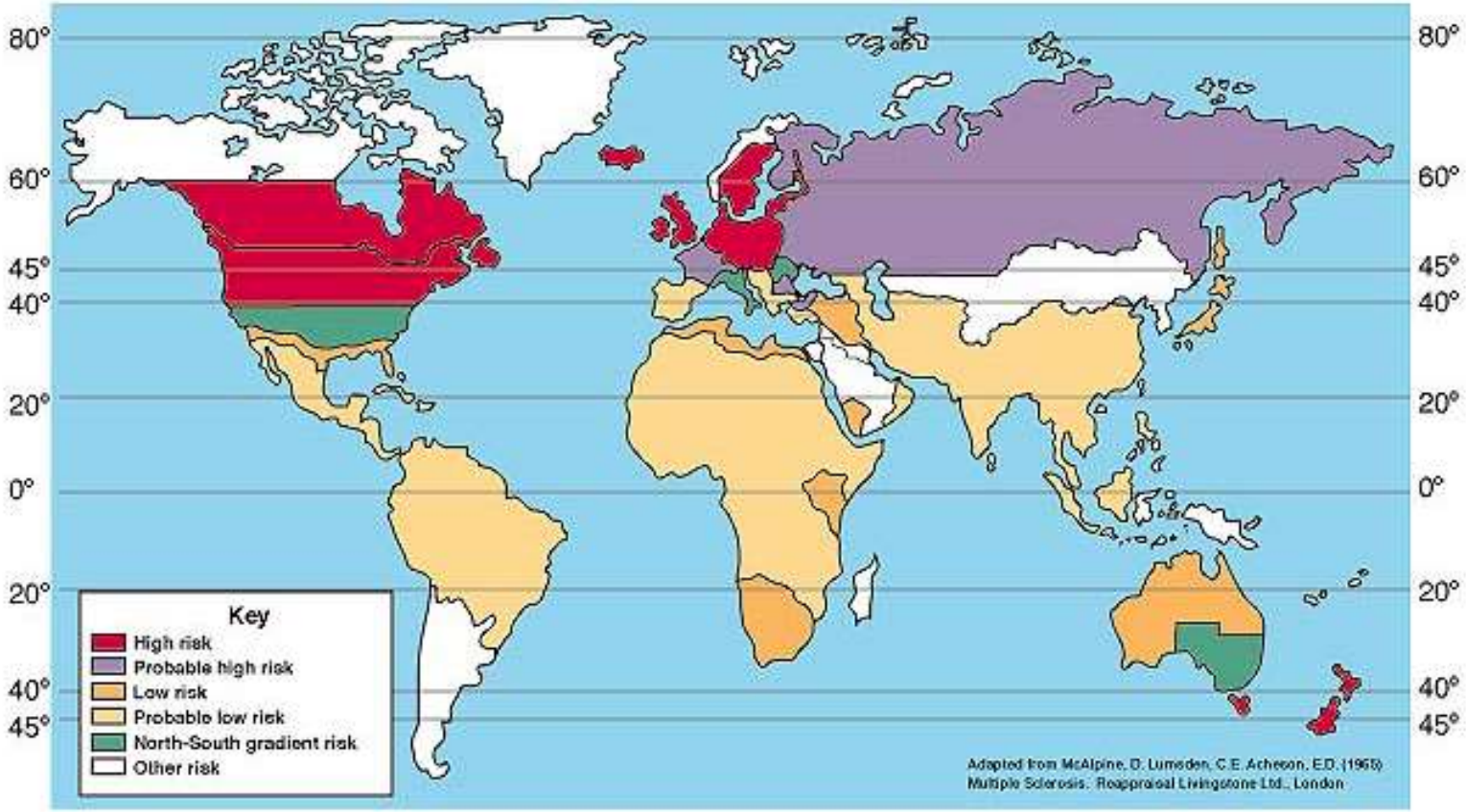
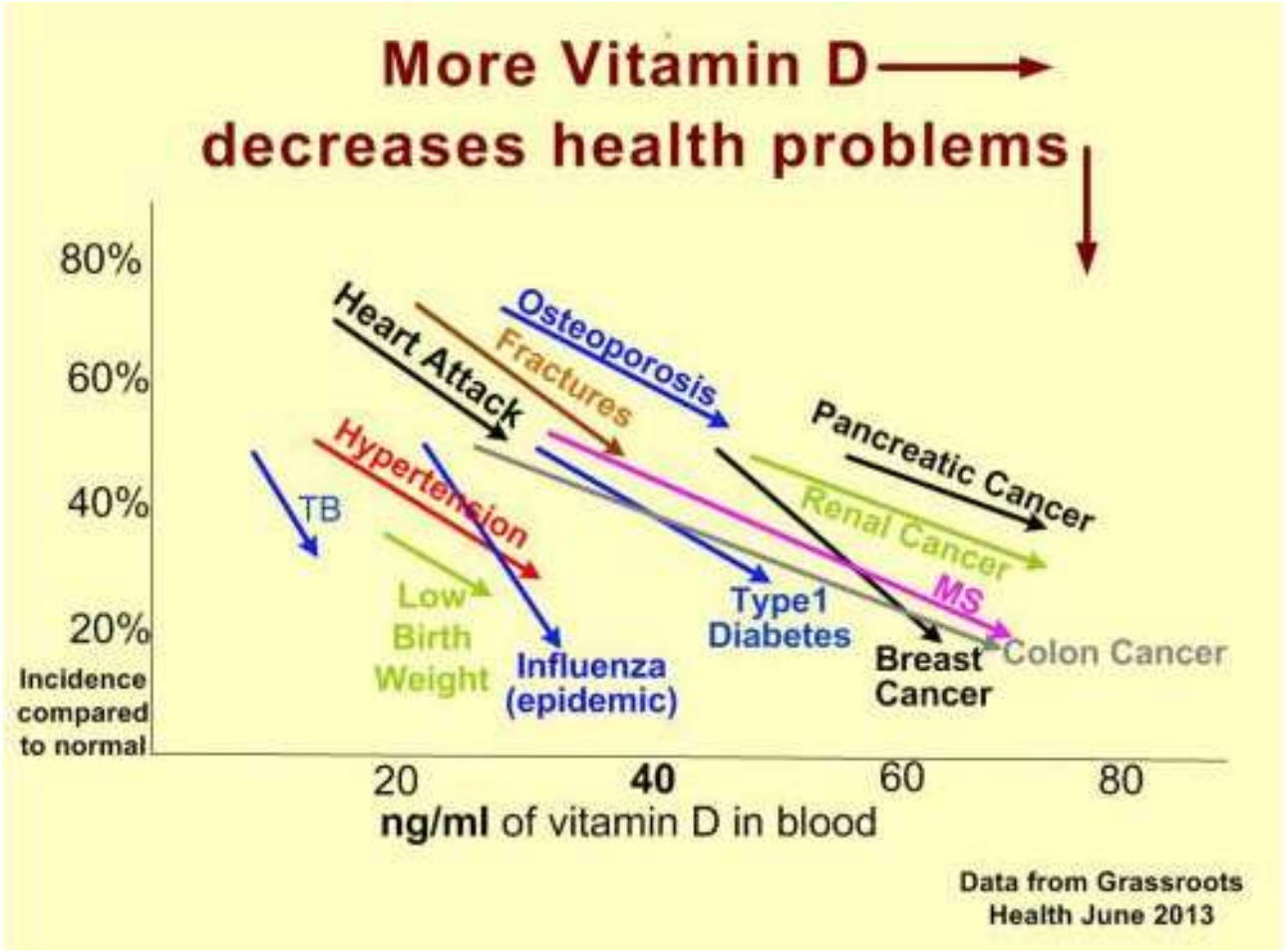


Figure 1. Vitamin D, proinflammatory cytokines, and cognitive or behavioral dysfunction. Types of evidence from human or rodent studies that link cognitive and behavioral performance to vitamin D adequacy, proinflammatory cytokine status, and inflammation-associated diseases. See text for discussion and citations.

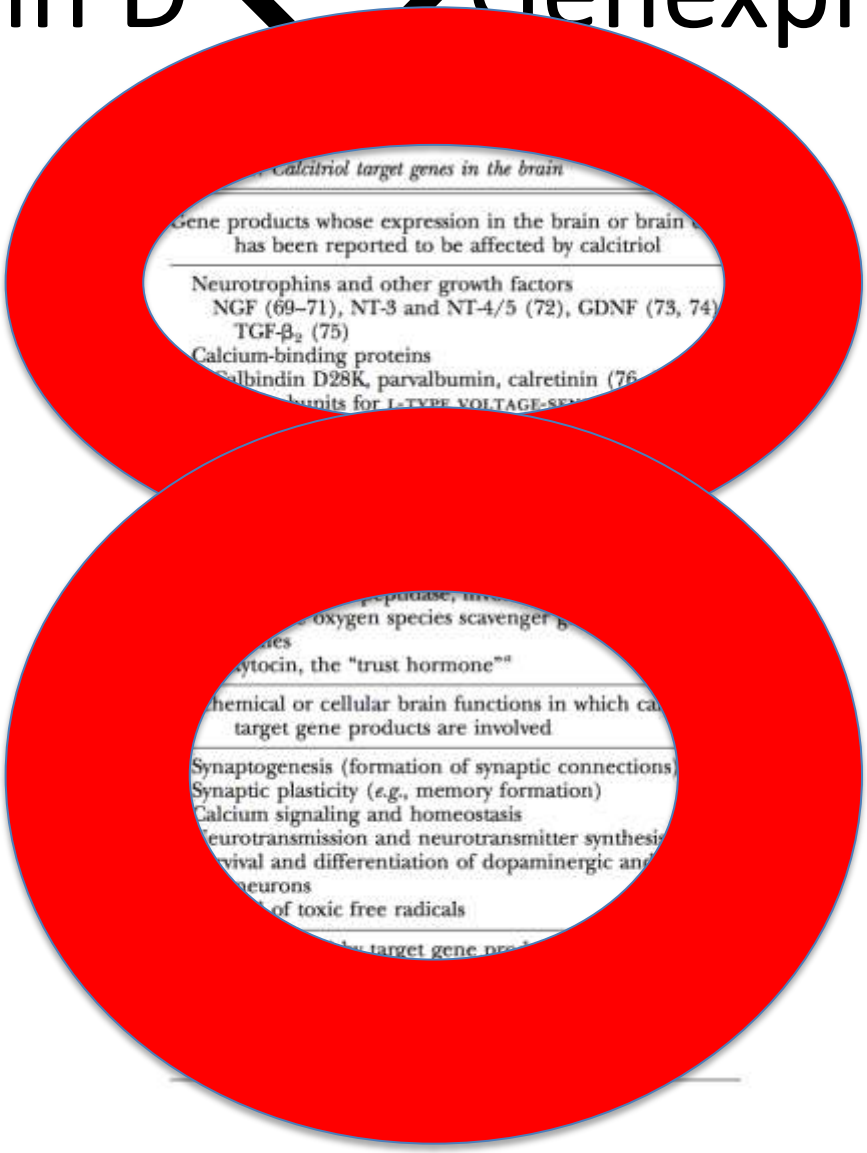
World Distribution of Multiple Sclerosis



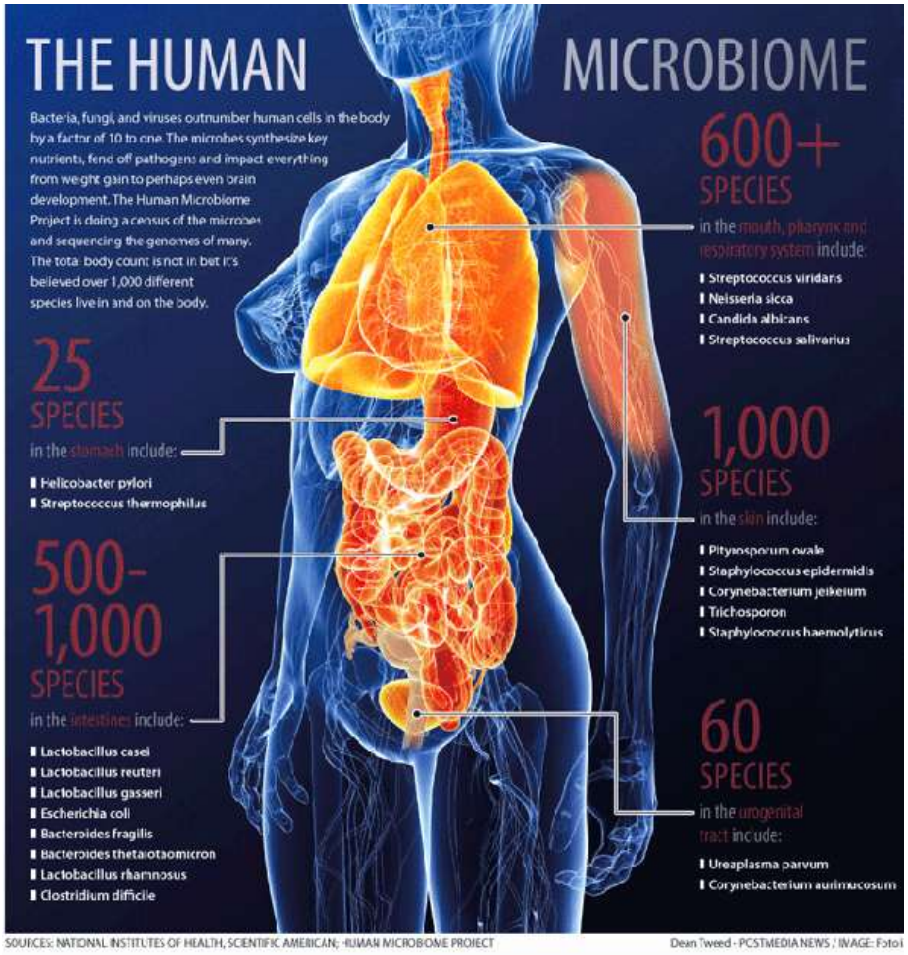
Vitamin D senkt das Risiko für ...?



Vitamin D ⟷ Genexpression



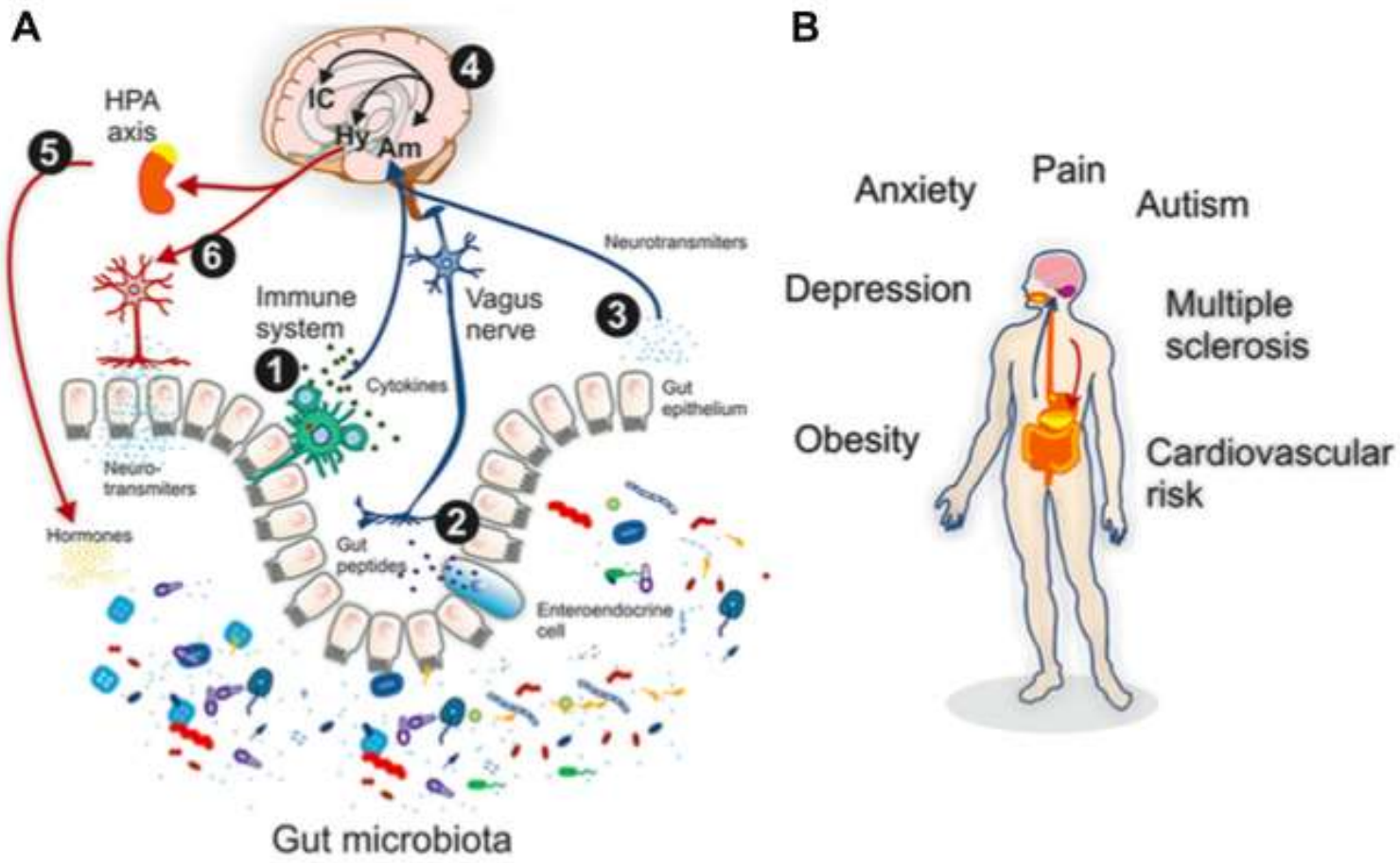
Mikrobiom: Gesamtheit aller den Menschen besiedelnden Organismen (bzw. deren Genom)



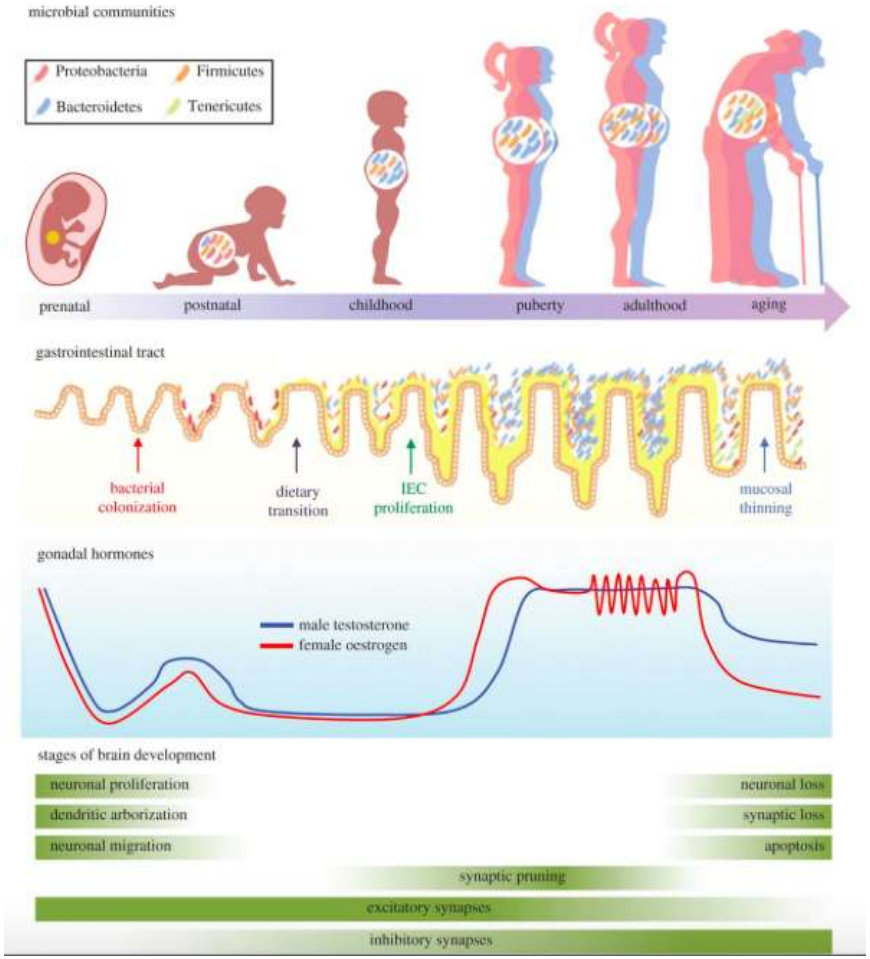
Die Mikrobiom-Darm-IS-NS-Beziehung

- Bi-direktionale Wirkungsbeziehungen
- Ernährung selektiert Mikrobiom
  - Adipöse verwerten bis zu 100% der Kalorien.
- Fehlernährung ... „einseitiges“ Mikrobiom ... chronische Darmentzündung ... Immunreaktion („leaky gut“) ... Neuroinflammation etc. ... Chronische Krankheiten
- „fecal transplant“ (4. Jh.: Ge Hong: „gelbe Suppe“)

Hirn-Immunsystem-Darm-Teufelskreis?



„Der Zahn der Zeit“



Darm-Psyche-Zusammenhang

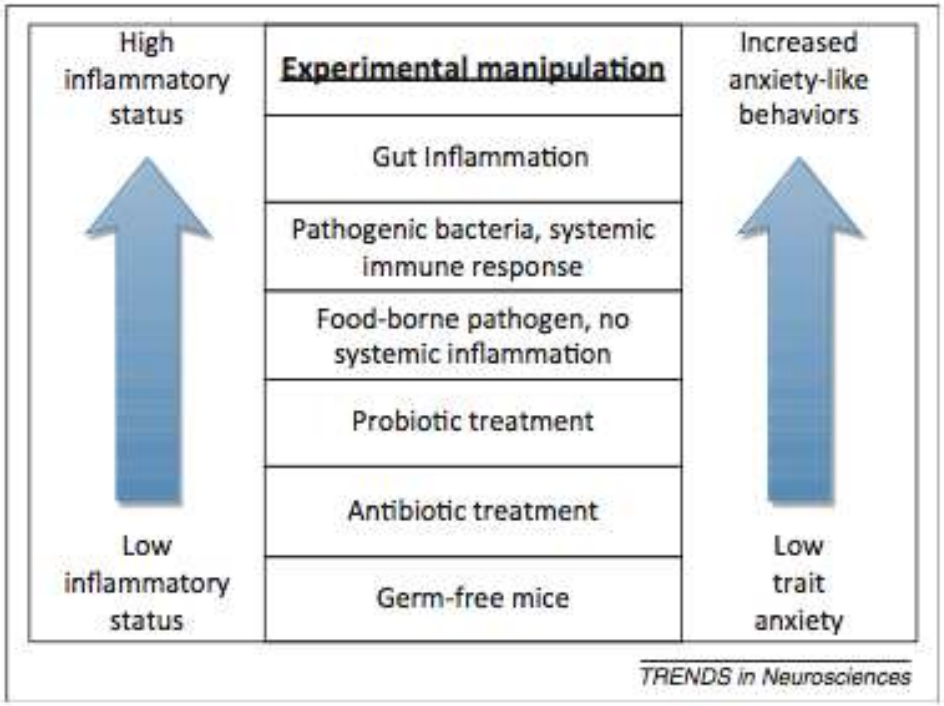


Figure 3. Microbiota may play a role in the relation between inflammation and anxiety-like behaviors. Several reports show that experimental manipulations that alter intestinal microbiota impact anxiety-like behavior. In relation to this, the observed behavioral changes relate to inflammatory status and are associated with differences in the microbiota profile in the gastrointestinal tract. This figure is based on data across many animal studies and represents generalized trends in these studies [2–4,6,41,42,52–57,80].

Unsere kleinen Freunde spielen eine viel größere Rolle, als lange Zeit gedacht.

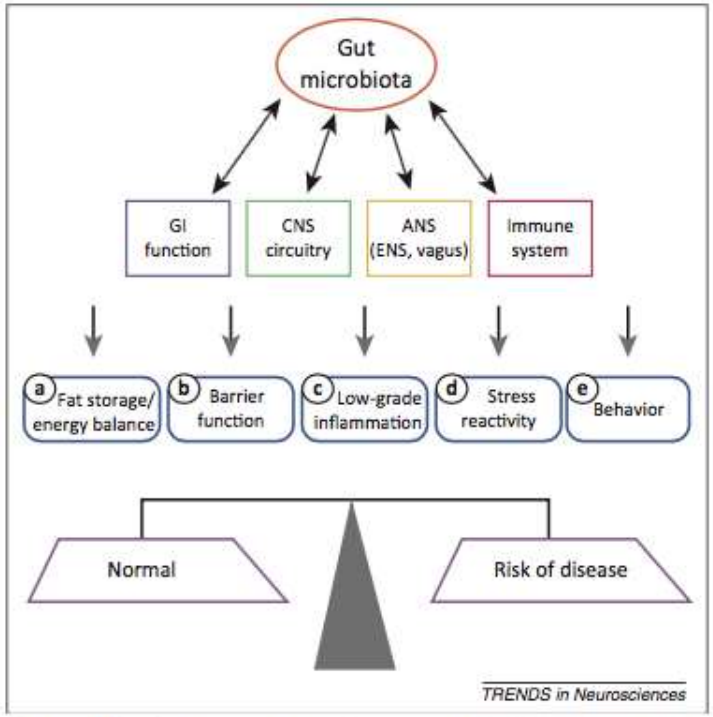


Figure 1. Bidirectional communication between gut microbiota and components of the gut–brain axis influence normal homeostasis and may contribute to risk of disease. Alterations in gastrointestinal (GI), central nervous system (CNS), autonomic nervous system (ANS), and immune systems by microbiota may lead to alterations in **(a)** fat storage and energy balance; **(b)** GI barrier function; **(c)** general low-grade inflammation (GI and systemic); **(d)** increased stress reactivity; and **(e)** increased anxiety and depressive-like behaviors. Each of these mechanisms is implicated in the pathophysiology of mood and anxiety disorders. Abbreviation: ENS, enteric nervous system.

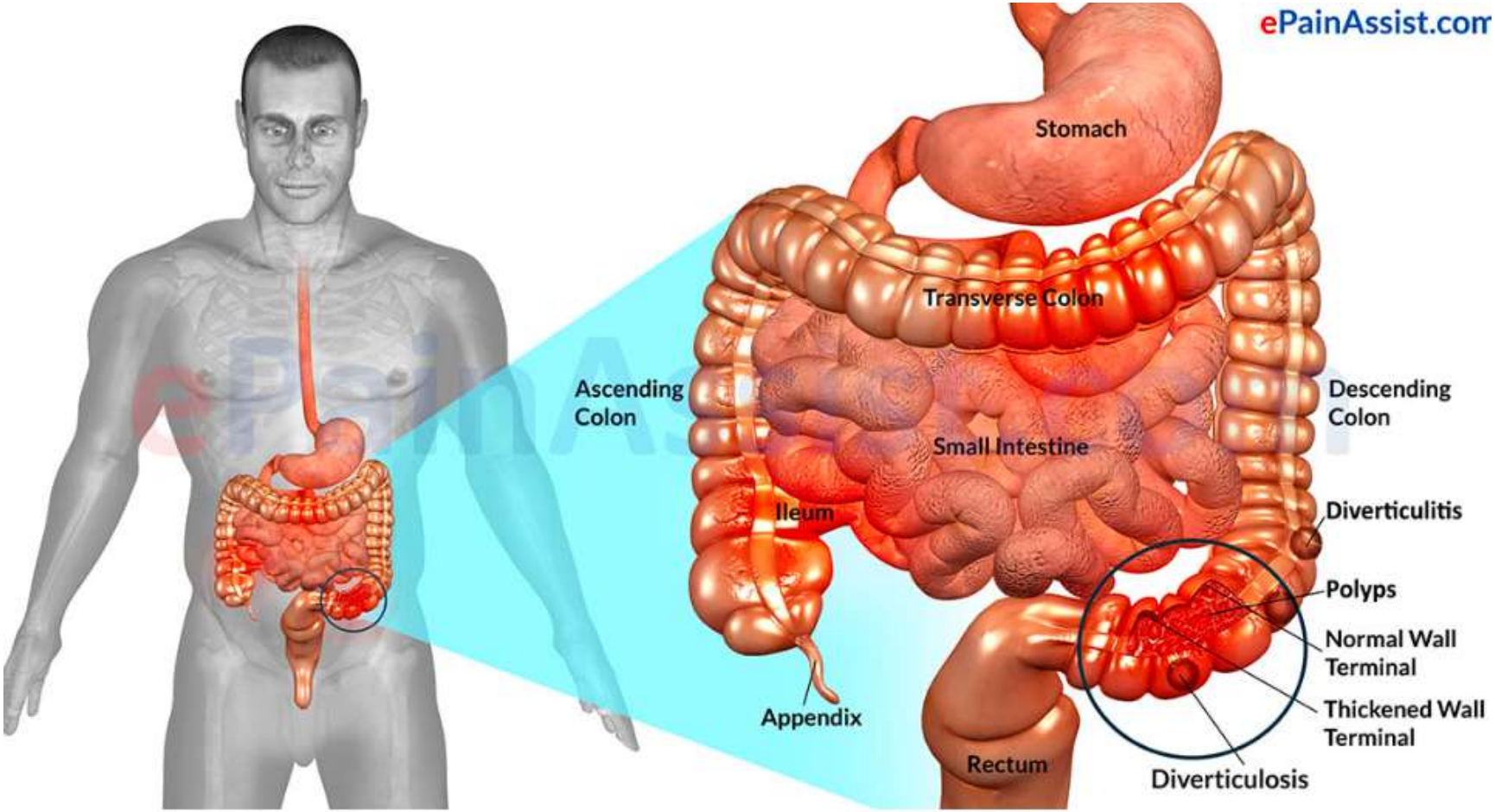
Übersicht

- Ernährung, quantitativ
  - „Kalorienrestriktion macht gesünder & langlebiger!“
    - Negativbeispiel: Fettsucht (Adipositas)
      - Neuroinflammation
      - Insulinrezeptorenresistenz („metabolisches Syndrom“)

- Ernährung, qualitativ
  - „Ausgewogene“ Ernährung hält gesund.
    - Mangelernährung
      - Vitamine: Vitamin D
    - Gehirn-Darm-Beziehung
      - Einfluss des Mikrobioms

- Beispiel: Der Reizdarm („IBS“)

Vom Freund, zum Feind, ja zum Diktator



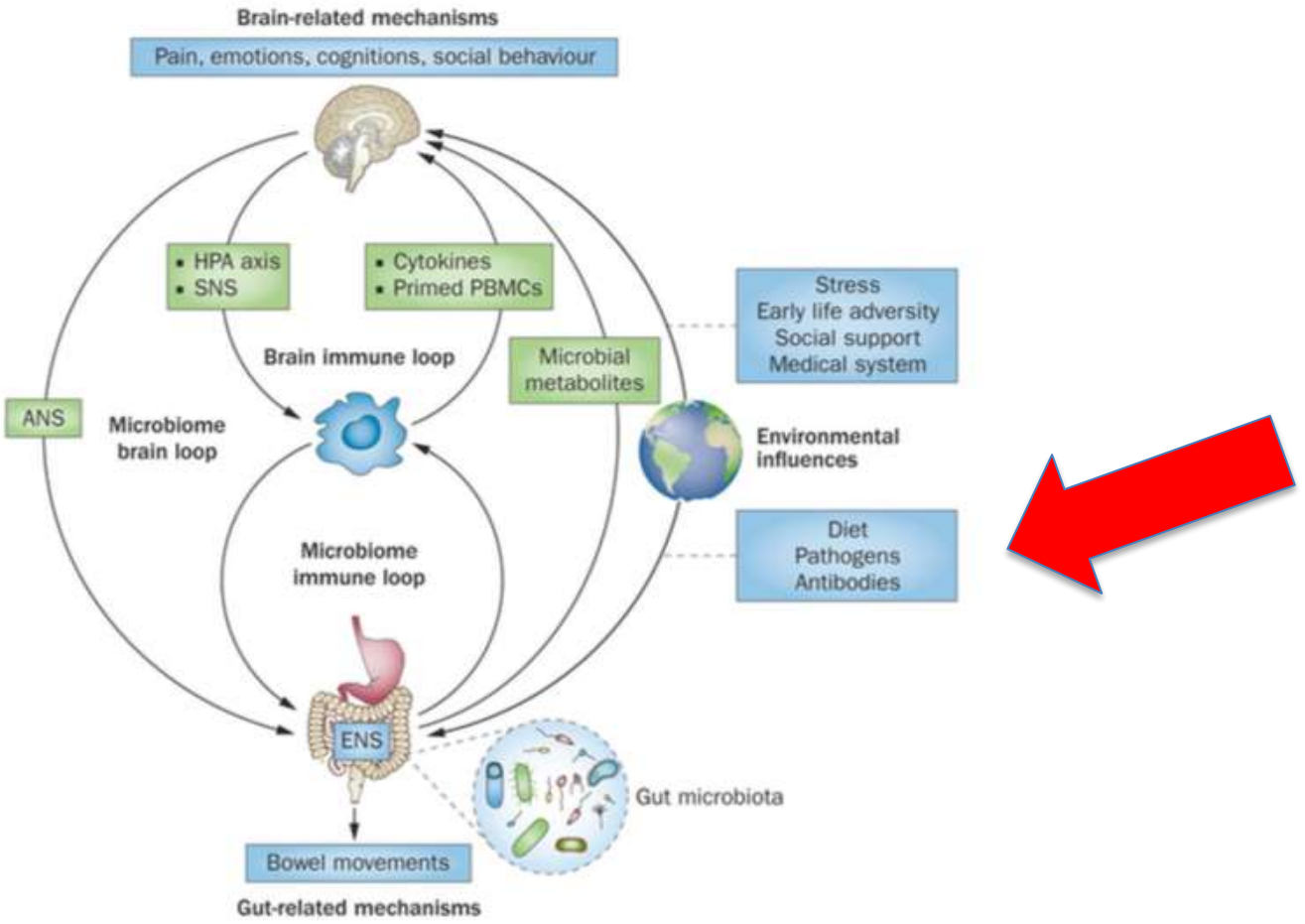
Reizdarm

- Häufig: bis 15% der Bevölkerung
- Beschwerden: Variabel, oft diffus
  - Chronischer, ständiger wiederkehrender Bauchschmerz bzw. Bauchbeschwerden
  - Veränderte Stuhlgewohnheiten: Blähungen, Durchfall, Verstopfung
  - Kein Hinweis auf organische Genese
  - Sensibilität gegenüber Randbedingungen: Nahrung, soziale Beziehungen etc.
  - Gesteigerte Ängstlichkeit & psychiatrische Ko-Morbidität

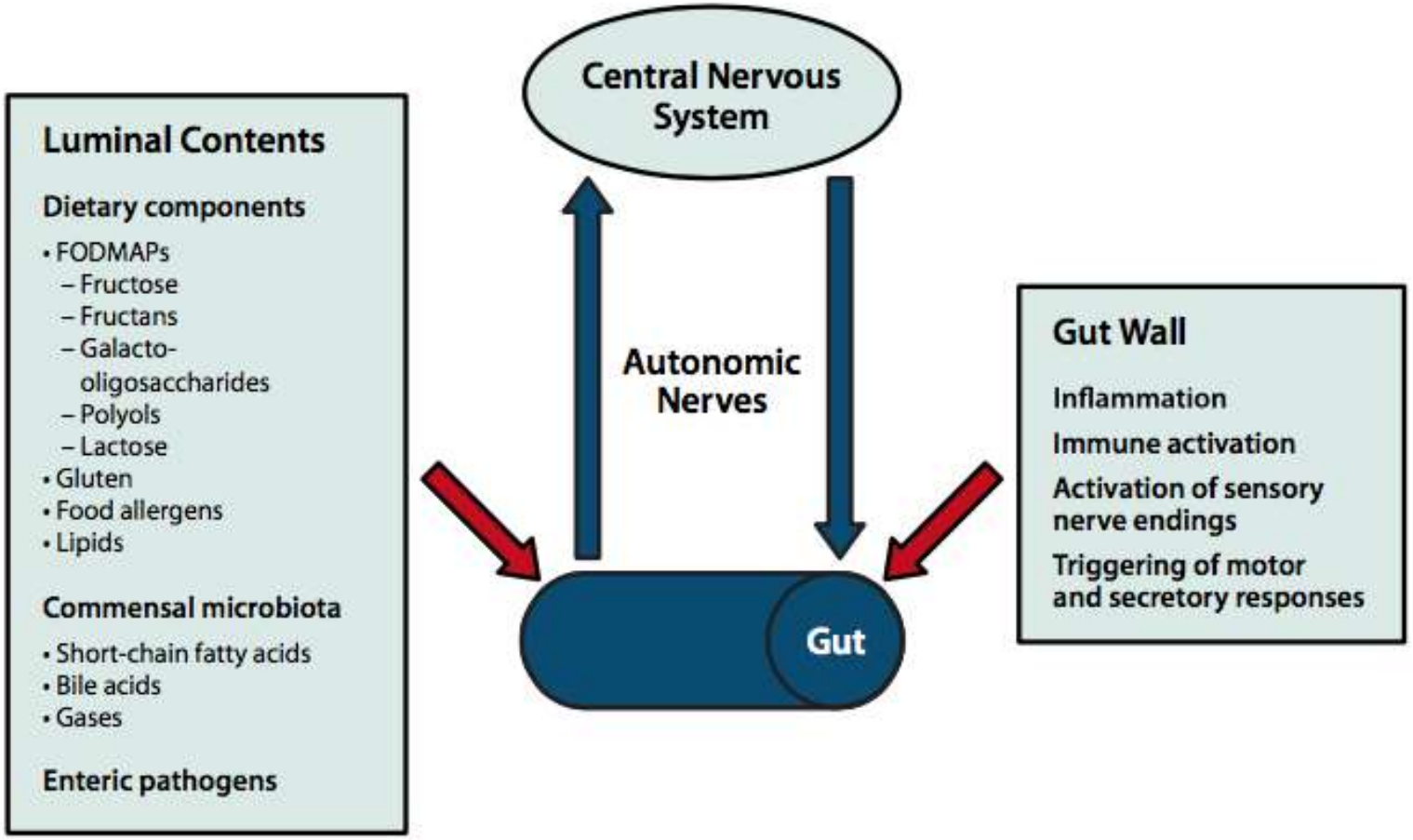
Reizdarm (2)

- Ursache unbekannt
- Vielfältige Befunde auf allen Ebenen
  - Mikrobiom
  - Darmepithel, -motorik
  - Immunsystem: lokal, systemisch
  - Neuroendokrine Prozesse
  - Gehirnaktivierungen
  - Stressreaktion
  - Affektive & kognitive Reaktionen
  - Schmerzverarbeitung
  - Genpolymorphismen
  - …

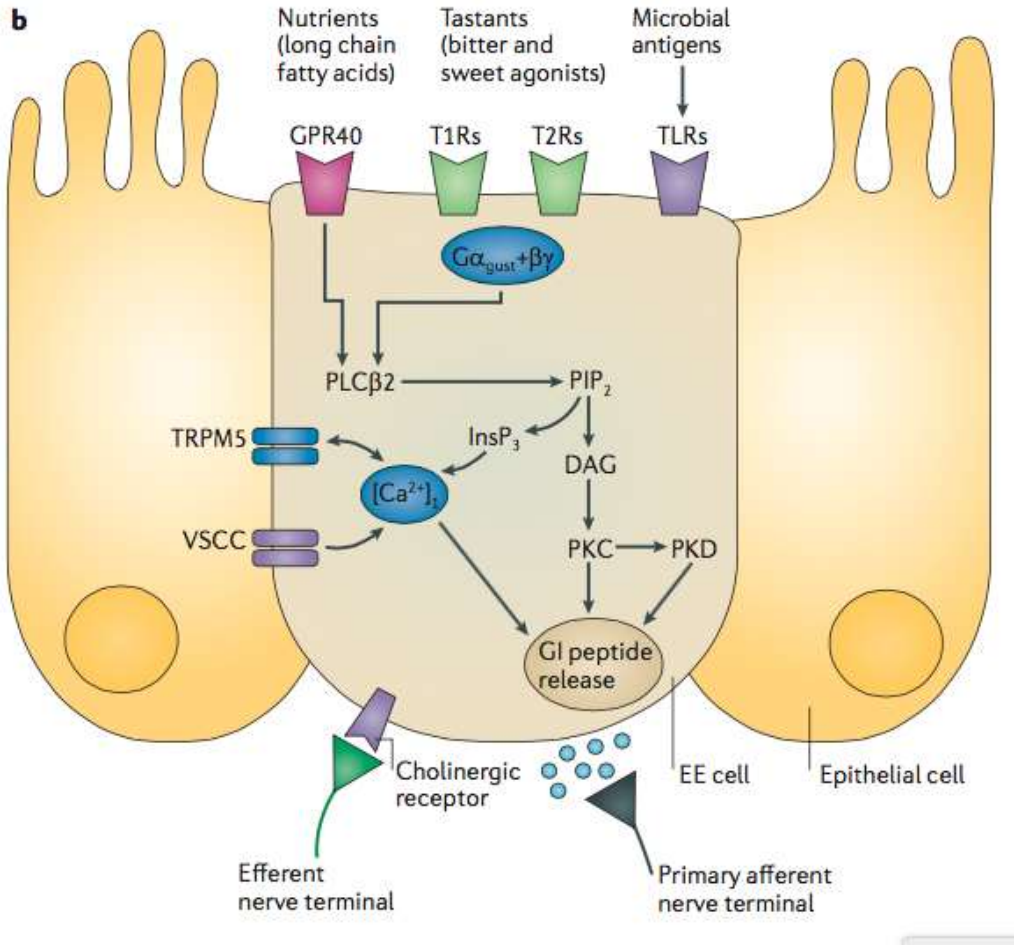
Darm-Gehirn-Achse bei IBS



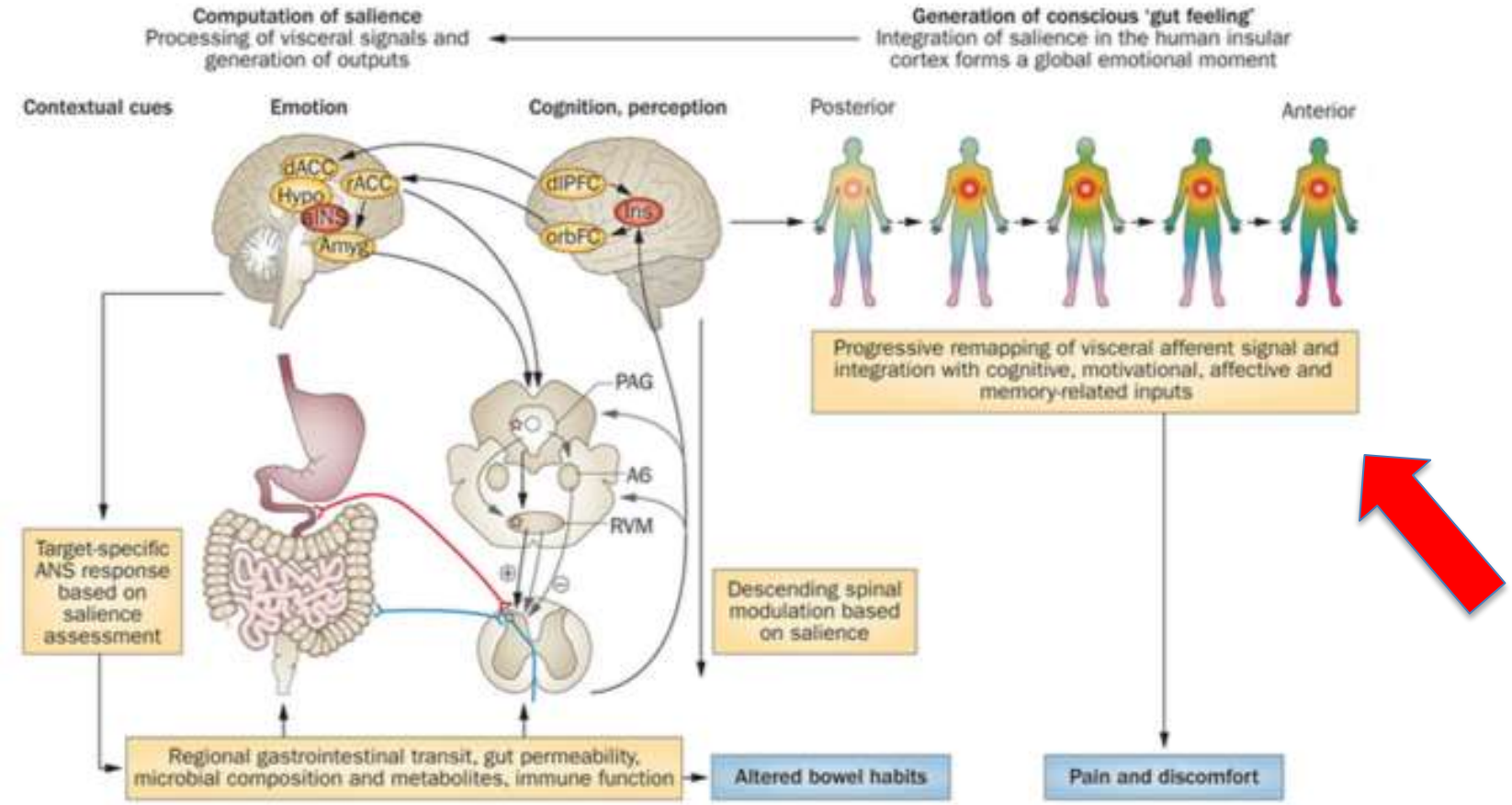
Die wichtigsten „Spieler“ des IBS



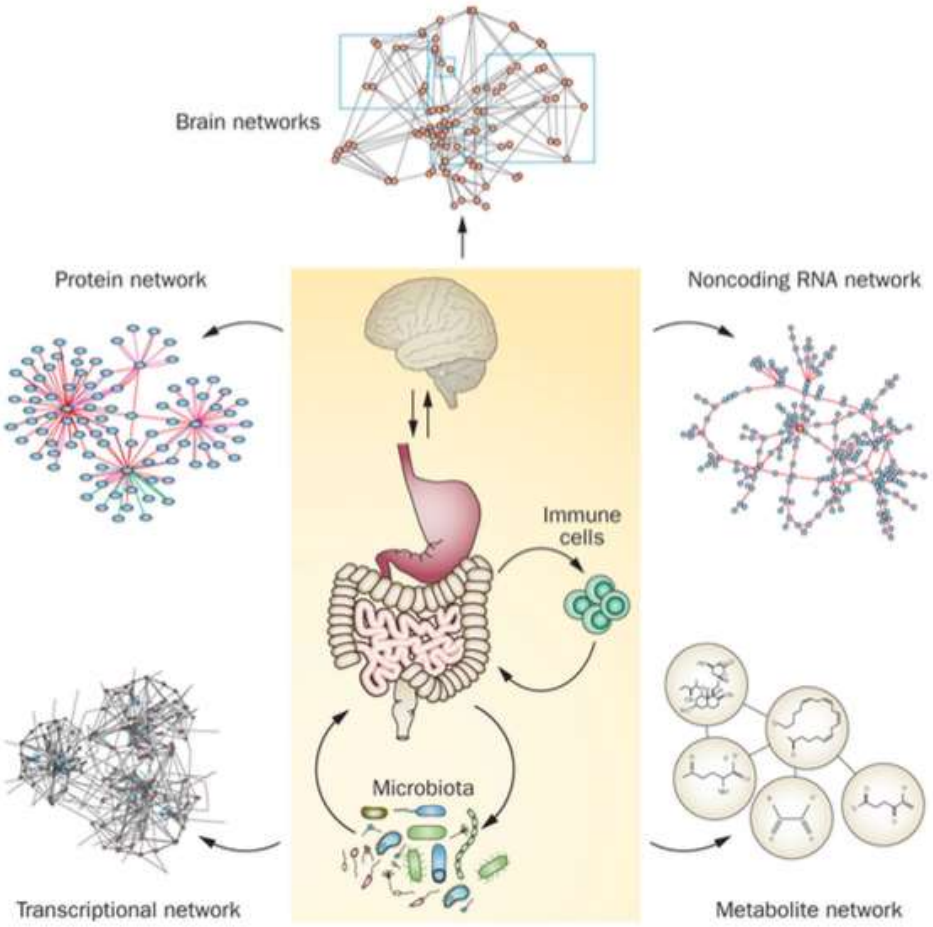
Die Rolle des enterischen Nervensystems



Wahrnehmung und affektive Salienz spielen eine wichtige Rolle



Die System-Perspektive: Einübung & Sensitivierung



Sind Zucker schuld? Etwa fermentierbare Oligo-, Di-, Monosacharide und Polyole

Table 2. Treatment Modalities for Irritable Bowel Syndrome

First-Line Treatment
• Establishment of a regular eating pattern and a healthy eating lifestyle • High intake of noncaffeinated, noncarbonated, alcohol-free fluids throughout the day • Dietary assessment of the impact of milk and lactose, dietary fiber, and fatty foods
Second-Line Treatment
• Symptom-specific dietary interventions – Addition of linseed products – Addition of probiotics • Low-FODMAP diet
Third-Line Treatment
• Elimination diets, which are used for 3 to 4 months, including the food reintroduction phase

FODMAP, fermentable oligo-, di-, and monosaccharide and polyol.

Ist einen Versuch wert

Eliminate foods containing fodmaps

excess fructose	lactose	fructans	galactans	polyols
fruit apple, mango, nashi, pear, tinned fruit in natural juice, watermelon **sweeteners** fructose, high fructose corn syrup **large total fructose dose** concentrated fruit sources, large serves of fruit, dried fruit, fruit juice **honey** corn syrup, fruisana	**milk** milk from cows, goats or sheep, custard, ice cream, yoghurt **cheeses** soft unripened cheeses eg. cottage, cream, mascarpone, ricotta	**vegetables** asparagus, beetroot, broccoli, brussels sprouts, cabbage, eggplant, fennel, garlic, leek, okra, onion (all), shallots, spring onion **cereals** wheat and rye, in large amounts eg. bread, crackers, cookies, couscous, pasta **fruit** custard apple, persimmon, watermelon **miscellaneous** chicory, dandelion, inulin	**legumes** baked beans, chickpeas, kidney beans, lentils	**fruit** apple, apricot, avocado, blackberry, cherry, lychee, nashi, nectarine, peach, pear, plum, prune, watermelon **vegetables** cauliflower, green capsicum (bell pepper), mushroom, sweet corn **sweeteners** sorbitol (420) mannitol (421) isomalt (953) maltitol (965) xylitol (967)

Vielen Dank für Ihre Aufmerksamkeit!