Funktionales Alter – Königsweg der Altersmessung ?

Netzwerk AlternsfoRschung Heidelberg 09.10.2014

M. Gogol Klinik für Geriatrie

KRANKENHAUS LINDENBRUNN
Coppenbrügge

Welche Alten ?

60jährige Frau

1514 **Dürer: Painting of his mother**

Sophia Loren **2002**

KRANKENHAUS LINDENBRUNN

Which elderly people ?

Best vs. worst ager ?

BMJ 2004;329:761

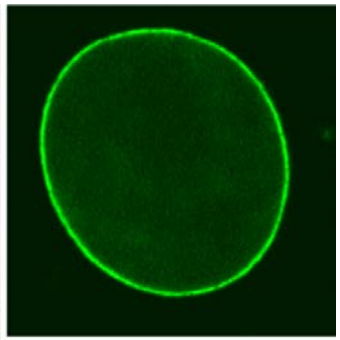
KRANKENHAUS LINDENBRUNN

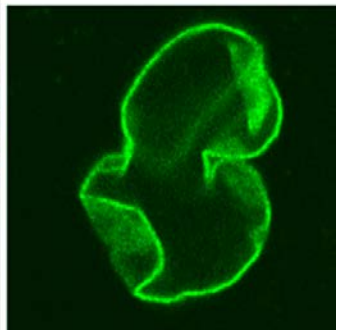
Klinischer Eindruck von jung und alt

Gunn DA et al – PLoS ONE 2009;4:e8021

KRANKENHAUS LINDENBRUNN

Hutchinson-Gilford-Syndrom





KRANKENHAUS LINDENBRUNN

Werner-Syndrom

15 Jahre

48 Jahre

8 Jahre

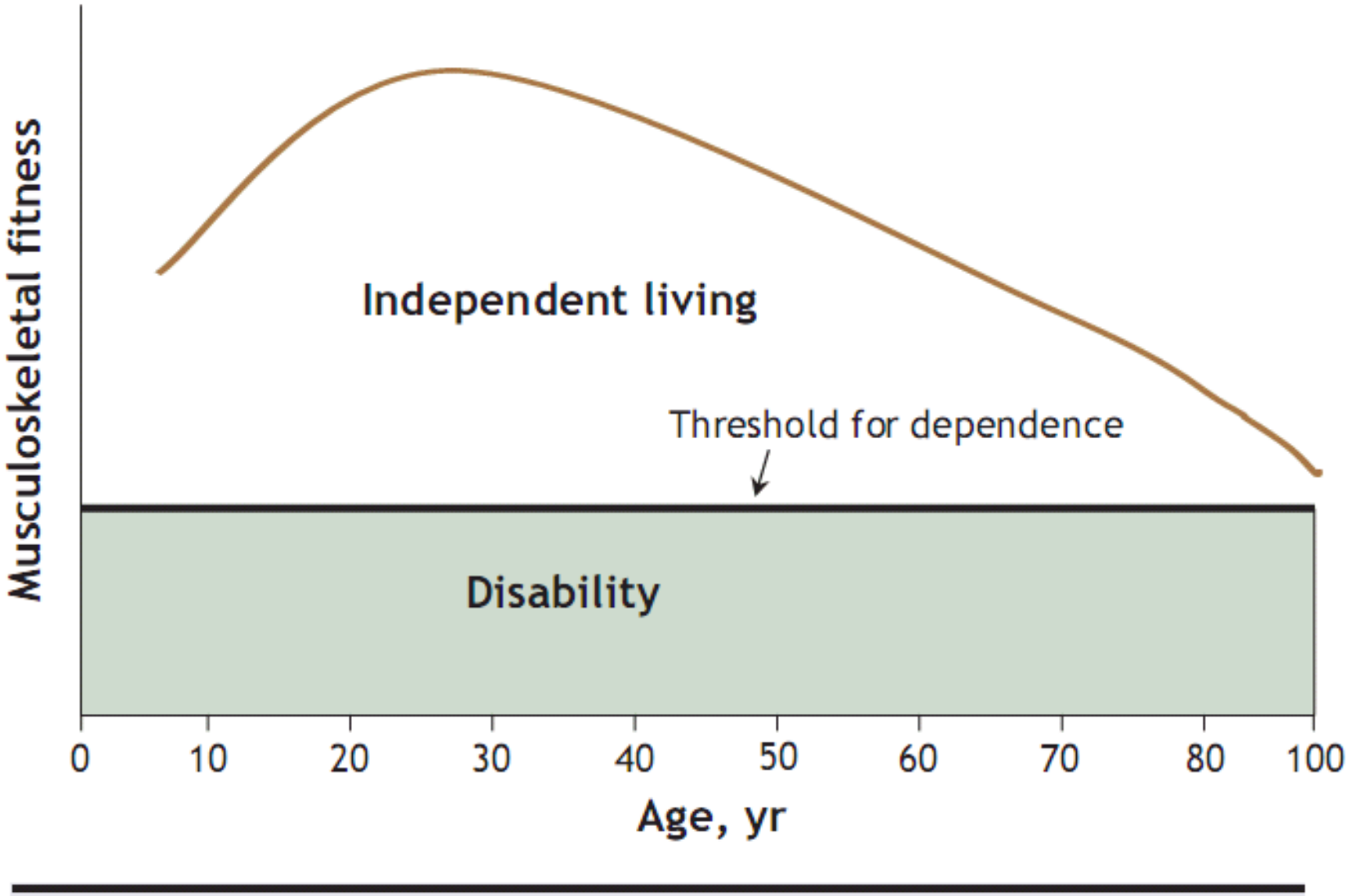
36 Jahre

KRANKENHAUS LINDENBRUNN

Comprehensive Geriatric Assessment (CGA)

- Activities of Daily Living (ADL) – *z.B. Waschen, Anziehen, Gehen, Essen, Ausscheiden*
- Instrumental Activities of Daily Living (IADL) – *z.B. Post, Bank, Einkaufen, Kommunikation*
- Ernährungsstatus und –probleme
- Kraft
- Mobilität
- Kognition
- Stimmung (Depression)
- Soziale Situation

Relation Fitness - Unabhängigkeit



KRANKENHAUS LINDENBRUNN

Warburton DER et al. – CMAJ 2006;174:801-9

CGA Effekte

- Mortalität ↓
- Institutionalisierungsrate ↓
- ADL ↑
- Autonomie ↑
- Re-Hospitalisierung ↓

KRANKENHAUS LINDENBRUNN

Ellis G et al – BMJ 2011;343:d6553

Beispiel: Mobilität

- **Timed Up & go**

- Tandemstand/Semitandemstand
- Mobilitätstest nach Tinetti
- Chair Rising Test
- Gehtest 3 / 6 m
- 6-Minuten-Gehtest
- ……

Timed Up & Go

Aufstehen von einem Stuhl, gehen von 3 m Wegstrecke, Umkehr und Hinsetzen

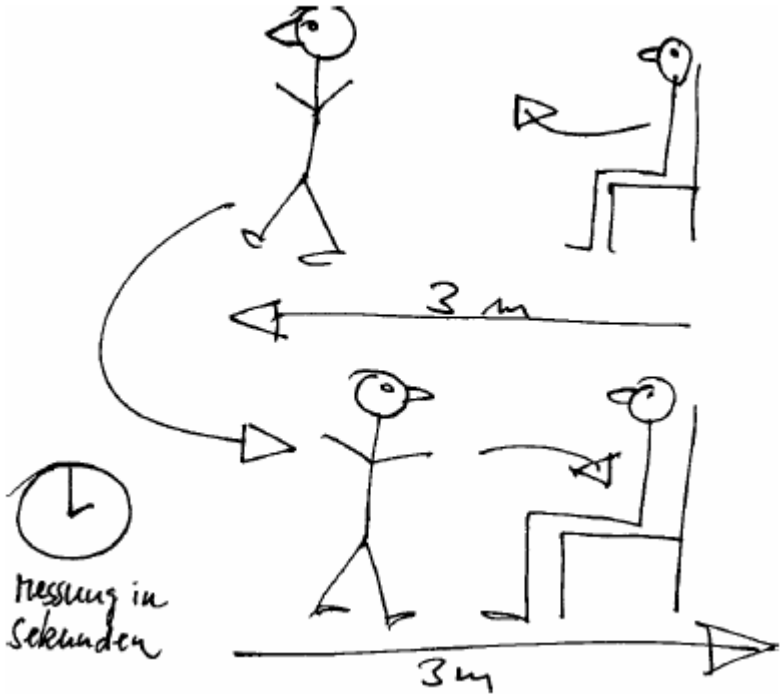


Abbildung aus Hager, 2004

… gemessen wird die Zeit in Sekunden

KRANKENHAUS LINDENBRUNN

Timed Up & Go

Surrogatparameter für

- **Mobilität**
- **Kraft**
- **Funktion**
- **Gebrechlichkeit**
- **Sturzrisiko**
- **Mortalität**

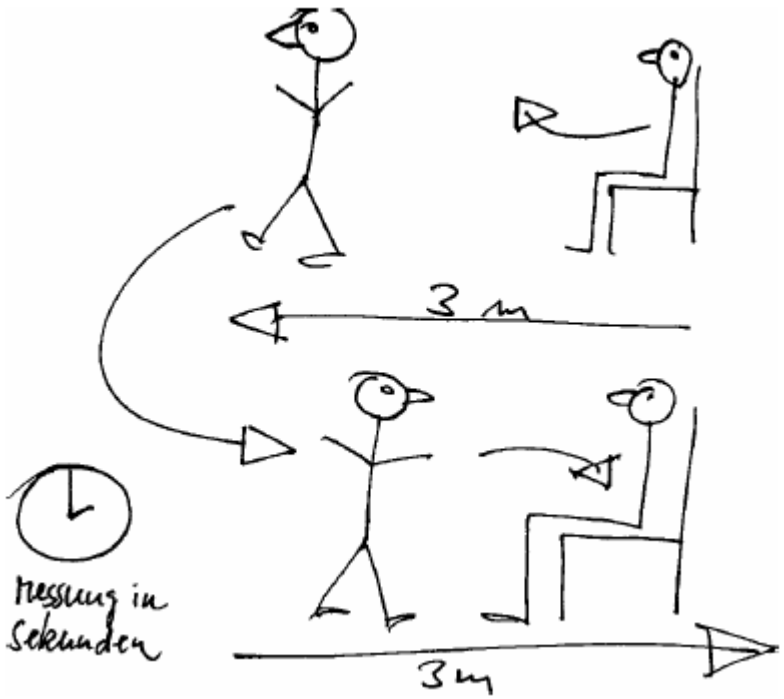


Abbildung aus Hager, 2004

1.705 Männer > 70 a Zu Hause wohnend Follow-up 59,3 Monate

What is already known on this topic

The Grim Reaper, the personification of death, is a well known mythological and literary figure

High quality scientific research linking the Grim Reaper to mortality is limited, despite extensive anecdotal evidence attesting his important role in death

What this study adds

The Grim Reaper prefers to walk at 0.82 m/s (2 miles (about 3 km) per hour), with a maximum estimated speed of 1.36 m/s (3 miles (about 5 km) per hour)

Older men wishing to outrun the Grim Reaper should maintain walking speeds above these levels

KRANKENHAUS LINDENBRUNN

Stanaway FF et al – BMJ 2011;343:d7679

Gait Speed and Survival in Older Adults

Stephanie Studenski, MD, MPH
Subashan Perera, PhD
Kushang Patel, PhD
Caterina Rosano, MD, PhD
Kimberly Faulkner, PhD
Marco Inzitari, MD, PhD
Jennifer Brach, PhD
Julie Chandler, PhD
Peggy Cawthon, PhD
Elizabeth Barrett Connor, MD
Michael Nevitt, PhD
Marjolein Visser, PhD
Stephen Kritchevsky, PhD
Stefania Badinelli, MD
Tamara Harris, MD
Anne B. Newman, MD
Jane Cauley, PhD
Luigi Ferrucci, MD, PhD
Jack Guralnik, MD, PhD

Context Survival estimates help individualize goals of care for geriatric patients, but life tables fail to account for the great variability in survival. Physical performance measures, such as gait speed, might help account for variability, allowing clinicians to make more individualized estimates.

Objective To evaluate the relationship between gait speed and survival.

Design, Setting, and Participants Pooled analysis of 9 cohort studies (collected between 1986 and 2000), using individual data from 34 485 community-dwelling older adults aged 65 years or older with baseline gait speed data, followed up for 6 to 21 years. Participants were a mean (SD) age of 73.5 (5.9) years; 59.6%, women; and 79.8%, white; and had a mean (SD) gait speed of 0.92 (0.27) m/s.

Main Outcome Measures Survival rates and life expectancy.

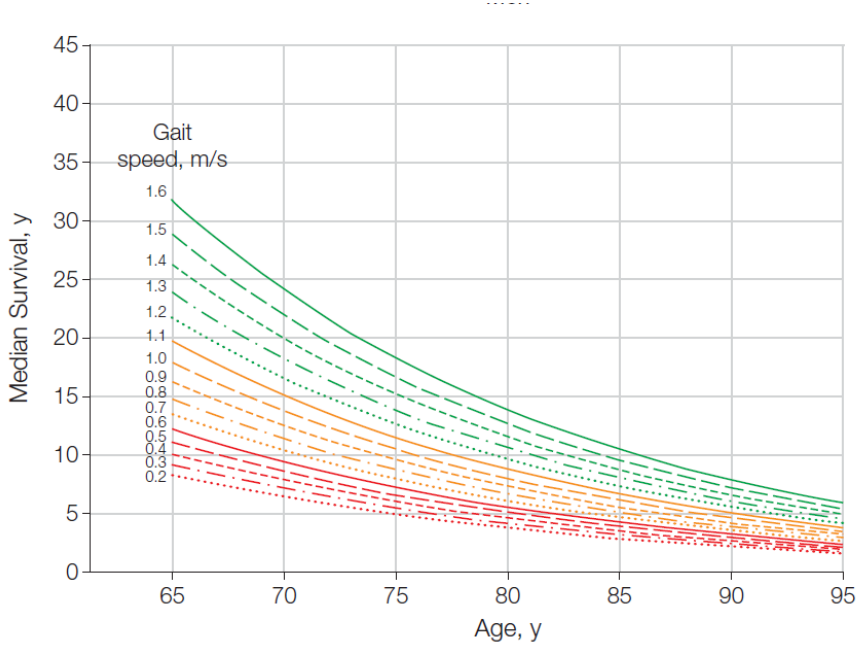
Results There were 17 528 deaths; the overall 5-year survival rate was 84.8% (confidence interval [CI], 79.6%-88.8%) and 10-year survival rate was 59.7% (95% CI, 46.5%-70.6%). Gait speed was associated with survival in all studies (pooled hazard ratio per 0.1 m/s, 0.88; 95% CI, 0.87-0.90; $P < .001$). Survival increased across the full range of gait speeds, with significant increments per 0.1 m/s. At age 75, predicted 10-year survival across the range of gait speeds ranged from 19% to 87% in men and from 35% to 91% in women. Predicted survival based on age, sex, and gait speed was as accurate as predicted based on age, sex, use of mobility aids, and self-reported function or as age, sex, chronic conditions, smoking history, blood pressure, body mass index, and hospitalization.

Conclusion In this pooled analysis of individual data from 9 selected cohorts, gait speed was associated with survival in older adults.

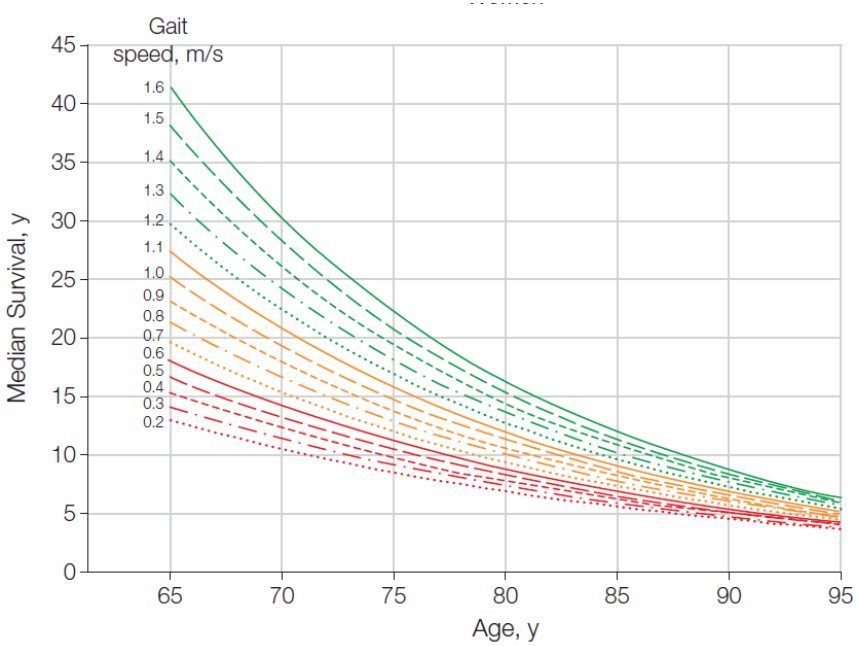
JAMA. 2011;305(1):50-58 www.jama.com

KRANKENHAUS LINDENBRUNN

Predicted Median Life Expectancy by Age and Gait Speed



Frauen



Männer

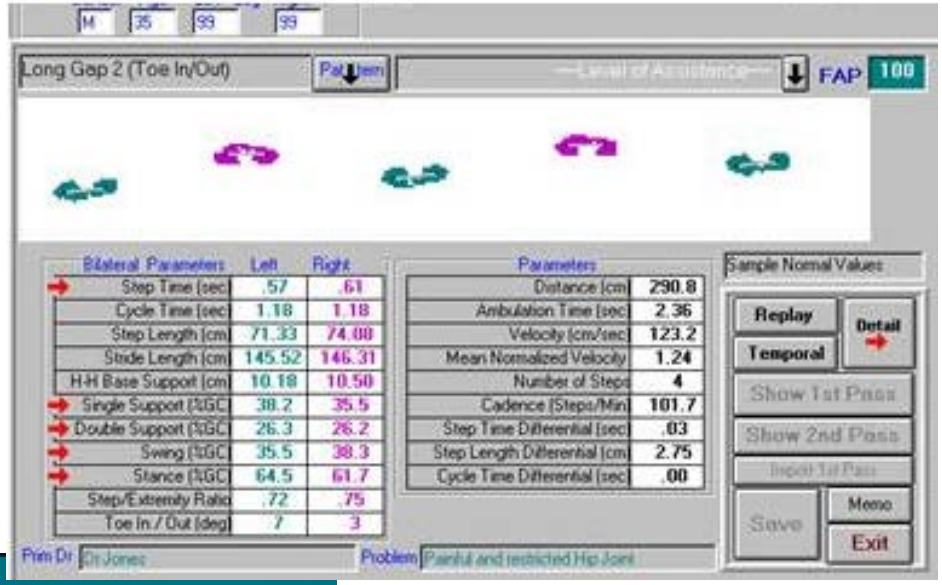
KRANKENHAUS LINDENBRUNN

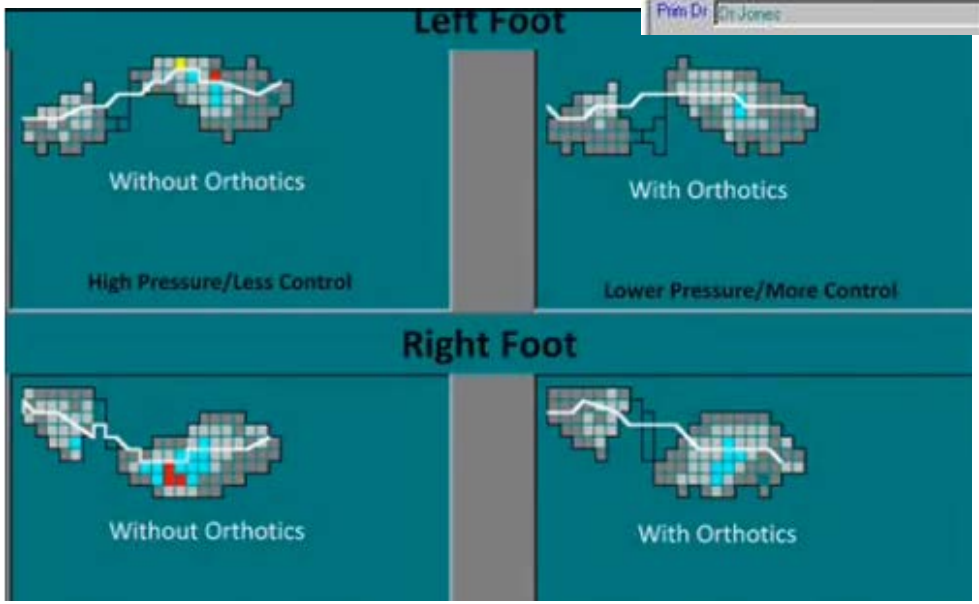
Studenski S et al – JAMA 2011;305:50-58

Fidel Castros Fall

Youtube.com

Gaitrite





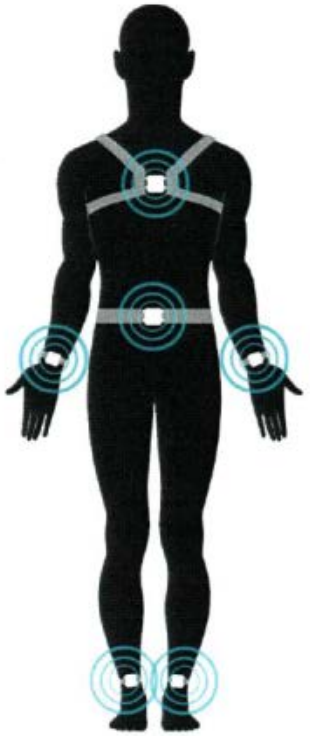
KRANKENHAUS LINDENBRUNN

Silverfit

Sensor Configuration Measures

Postural Sway Only

Postural Sway, Lower Limb Gait, Turning, APA



Postural Sway, Lower Limb Gait, Upper Limb Gait, Turning, APA, Sit and Stand

KRANKENHAUS LINDENBRUNN

Exercise reference guide 1/2

2 Can be done with 2 patients

Seated exercises

	Training form	Indications	Precautions
The Fox	Trains upper trunk control: leaning left and right.	Post-CVA, MS, balance impairments, maintaining upper body flexibility for long-term wheelchair users.	The patients should be able to lean left/right without falling over.
Bingo	Train sit-stand (and stand-sit) transfer	CVA, orthopedic patients, MS, mobilization to restart walking.	Full exercise should only be performed if patient is able to stand up safely. Monitor if patients become overexcited or tired as this may induce fall risk.
Puzzle	Trains sit-stand and leaning left to right	Post-CVA, MS, orthopedic surgery, amputation; retrain sit-stand ability. Calmer pace than the bingo game above	Sit-stand exercise should not be used if patient has insufficient strength to stand up safely without being aided.
Picnic	This game trains strength and agility of the lower extremity for a seated patient	Total joint, Parkinson, MS	Recent total hip patients should play only with 4 squares to prevent torque forces on the hip

Balance exercises

	Training form	Indications	Precautions
The Mole	Trains the dynamic balance of the patient. It can be used as a fall prevention exercise or to train the short-distance mobility of the patient.	Post-orthopedic surgery lower extremity, post-CVA, Parkinson, MS	There is a relatively high risk of falling. A physiotherapist should be behind the patient to catch him/her in case of impaired balance or falling risk.
Puzzle	Trains upper body balance and lateral flexibility.	MS patients, general fitness/ flexibility training of people with good motor and cognitive skills.	Requires good balance, motor skills, and flexibility.

Walking exercises

	Training form	Indications	Precautions
The Fox	Trains lateral (sidewards) walking	Walk training post-orthopedic, post-CVA, fall prevention.	The patients should be able to stand (possibly supported by parallel bars).
A Stroll	Trains walking on the spot, lifting the knee. It trains this in an ADL/ traffic environment.	Total knee, Parkinson, general fitness, alzheimer/dementia.	Patient should be able to stand and bend/lift his knee.
Stop the Wolf	This game trains walking forward and backward.	Walk training, e.g. after stroke or orthopedic surgery. Fall prevention.	Patient should be able to safely walk backwards.
Flower Garden	Trains walking in all directions. It requires very precise navigation in space.	Gait training, improving small-area coordination.	Therapist should ensure safety of patients with increased risk of falling by standing behind them.
City Walk	This game trains walking on the spot, lifting the knee. It trains this in an ADL/ traffic environment..	Total knee, general fitness, alzheimer/dementia.	Patient should be able to stand and bend/lift his knee.

KRANKENHAUS LINDENBRUNN

Measures	1 Opal System	3 Opal System	6 Opal System
Balance			
Sway Area	✓	✓	✓
Sway Range	✓	✓	✓
Sway Velocity	✓	✓	✓
Jerk	✓	✓	✓
Sway Range	✓	✓	✓
Lower Limb Gait Measures			
Stride Velocity		✓	✓
Stride Length		✓	✓
Gait Cycle Time		✓	✓
Double Support		✓	✓
Swing		✓	✓
Stance		✓	✓
Knee Range of Motion		✓	✓
Leg Range of Motion		✓	✓
Lower Limb Gait Measures			
Arm Swing Velocity			✓
Arm Swing Range of Motion			✓
Trunk Range of Motion			✓
Turning			
Duration		✓	✓
Peak Turn Velocity		✓	✓
Number of Step		✓	✓
Step Time		✓	✓
Step Time Before Turn		✓	✓
Sit-to-Stand Measures			
Duration			✓
Velocity			✓
Range of Motion			✓
Turn-to-Sit Measures			
Duration			✓
Velocity			✓
Range of Motion			✓
Anticipatory Postural Adjustment (APA)			
Duration		✓	✓
Stepping Leg RoM		✓	✓
Amplitude		✓	✓
Latency		✓	✓

Akzelerometrie

SenseWear-Bericht Erstellt Do 18 Sep 2014 Seite 1 von 2 enabled by BODYMEDIA

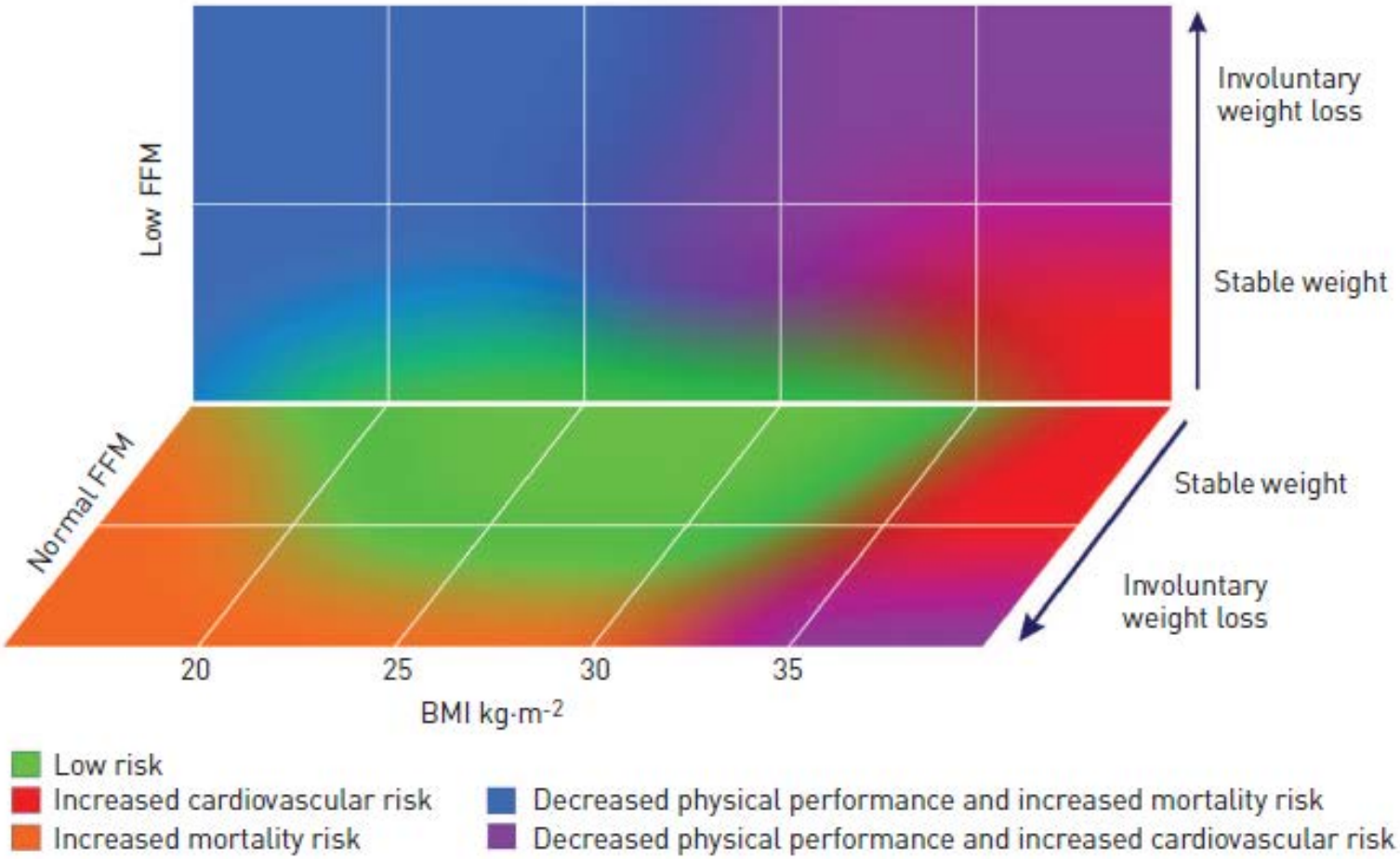
Kliniker/Arzt	Krankenhaus/Einrichtung	Praxis/Abteilung
SMT medical GmbH&Co., Würzburg	www.smt-medical.com	info@smt-medical.com

Person	Geburtsdatum	Geschlecht	Gewicht	Körpergröße	Händigkeit	Raucher	BMI	BSA	WHO R
Sm Christine	03.05.1967 (46)	Weiblich	52,6 kg	167,6 cm	Rechts	Nein	18,7	1,6 m²	1.280,7 k

Startzeit	Endzeit	Dauer der Ansicht	On-Body-Dauer
Do 26 Dez 2013 00:00	Mi 1 Jan 2014 00:00	6 Tage	5 Tage 21 hrs 38 Min (98,4%)

KRANKENHAUS LINDENBRUNN

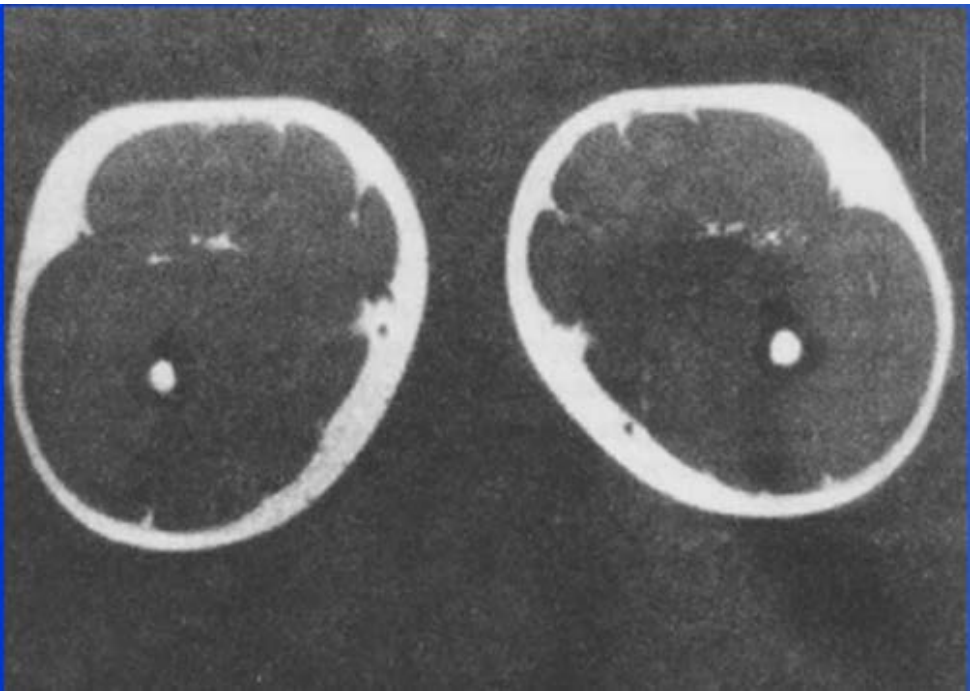
Malnutrition / Sarkopenie / Frailty

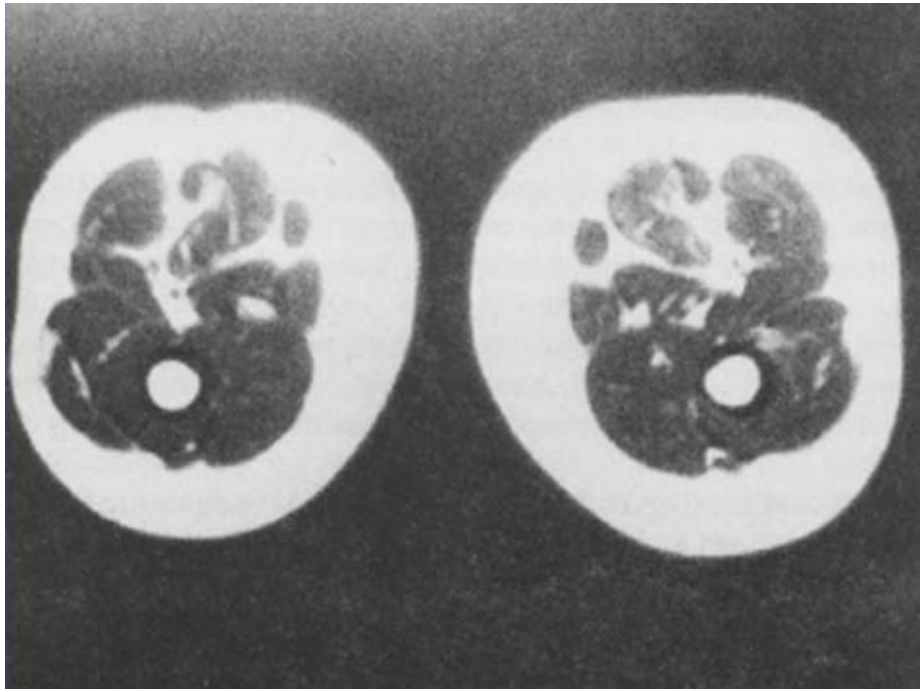


KRANKENHAUS LINDENBRUNN

Schols AM et al – Europ Respir J 2014 Sept 18

Sarkopenie





KRANKENHAUS LINDENBRUNN

Rosenberg ICH -J Nutr 1997;127: 990S–991S

UnitedHealthcare
Healing health care. Together.

Assessment Tools

Please take a look at some of these screening tools by clicking on the links below!

Depression:
- Patient Health Questionnaire (PHQ-9) is a nine item screener easy to use to check for depression.
- Geriatric Depression Scale (GDS) is a 15 item scale testing for late life depression.
- Cornell Scale for Depression and Dementia is a screening tool used to assess for signs and symptoms of depression and dementia.

General assessment tools:
- SPICE Assessment Five item screener geared toward identifying health issues with older adults.
- 20 Minute Medicare visit forms are a set of assessment tools to use to evaluate for health issues in older adults

Functional Status:
- Katz Index is a six item screener that checks the level of independence/dependence in functional status.

Cognitive Impairment/Dementia:
- Mini-Cog is a simple tool that uses three word recalls and a clock drawing to assess for cognitive changes.
- Neuropsychiatric Inventory (NPI) is a tool for assessment of psychopathology in patients with dementia and other neuro-psychiatric disorders.

Pressure Ulcer Risk:
- Braden Scale is a six item screening tool to assess for risk of pressure ulcer frequently occurring in hospitalized, community – dwelling or nursing home patients.

UnitedHealthcare
Healing health care. Together.

Sleep Quality:
- Pittsburgh Sleep Quality Index (PSQI) is a nine item assessment used to measure the quality and patterns of sleep in older adults.
- Epworth Sleepiness Scale (ESS) is a simple screener to assess for excessive sleepiness or excessive daytime sleepiness.

Pain:
- Self-reported pain level experienced by an individual are the most reliable measure of pain intensity. These can be measured by three different scales: Face Pain Scale, Numeric Rating Scale, and Verbal Descriptor Scale.

Nutrition:
- Mini-Nutritional Assessment (MNA) is an assessment used to identify adults 65+ who are at risk for malnutrition.

Sexuality:
- PLISSIT model is used to help guide conversations around sexuality for older adults.

Urinary Incontinence:
- Urinary Incontinence (UI) –Part I assesses for contributing causes for transient UI in older adults, using a bladder diary and a memonic- DIAPERS- to assess for causes of incontinence.
- Urinary Incontinence (UI)- Part II assesses for the type of established UI—urge, stress, overflow, functional or a combination.

Caregiver Strain:
- Modified Caregiver Strain Index (CSI) is a quick screening tool to assess for caregiver strain with long term family caregivers.

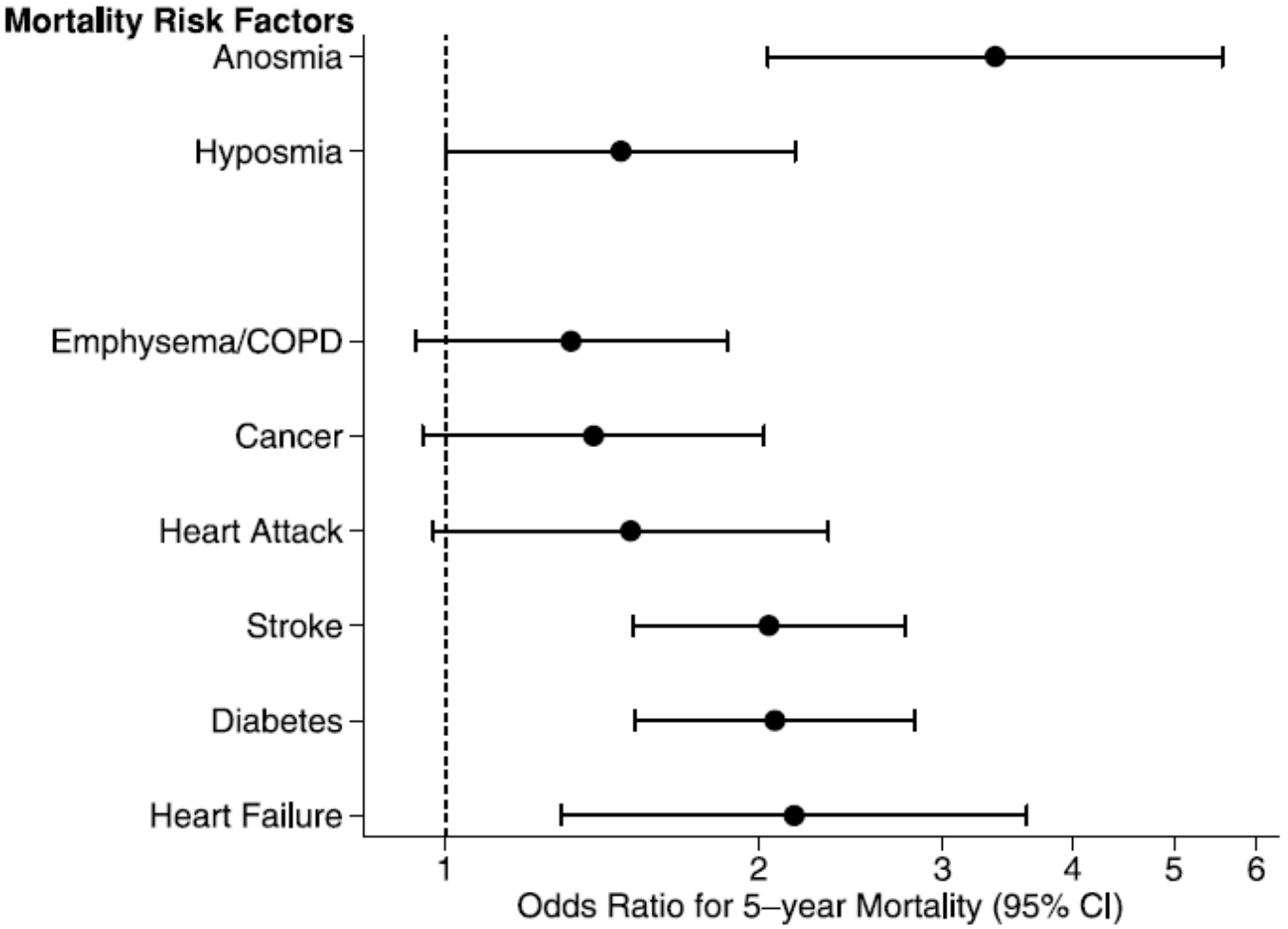
Elder Mistreatment:
- Elder Mistreatment Assessment (EM) is a 41 item screener to assess for elder abuse, neglect and more.

KRANKENHAUS LINDENBRUNN

Mortalitätsrisiken

National Social Life, Health and Aging Project (NSHAP)

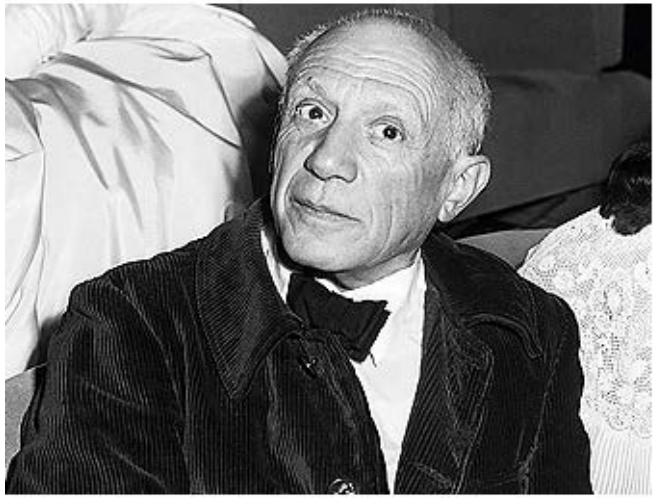
n 3.005, 57-85 Jahre alt, 49 % Männer, 81 % Kaukasier, Follow-up 5 Jahre



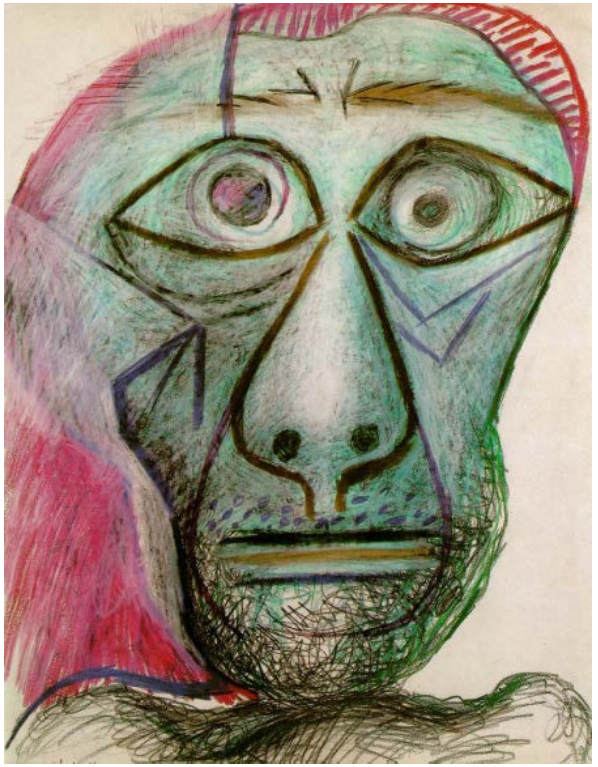
Pinto JM et al – PLoS ONE 2014;9:e107541

KRANKENHAUS LINDENBRUNN

Pablo Picasso - 25.10.1881 - 08.04.1973



Die Umarmung 1972

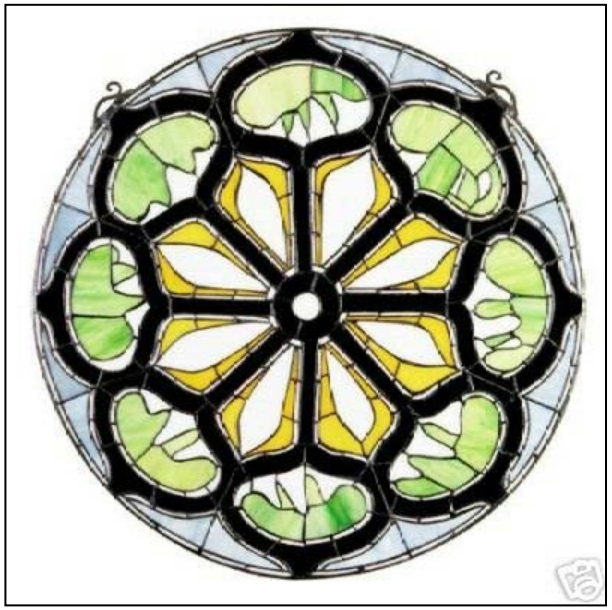


Selbstportrait 1972

KRANKENHAUS LINDENBRUNN

Henri Matisse – 31.12.1869 – 03.11.1954

Snail 1953

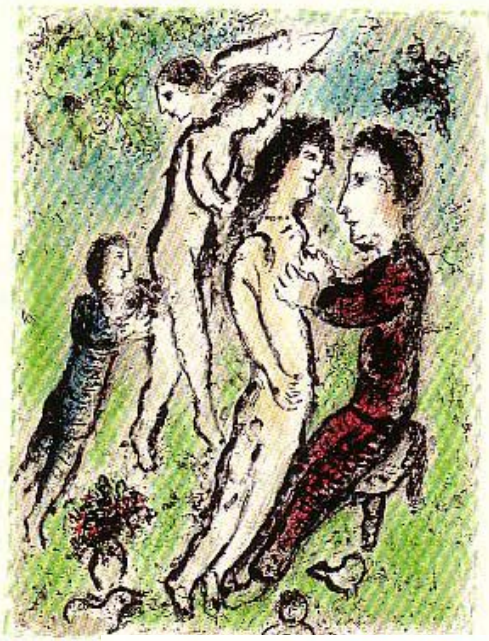


Union Church of Pocantico Hills
Glasfenster gewidmet dem Andenken von Abby Aldrich Rockefeller

Sorrow of the King 1952

KRANKENHAUS LINDENBRUNN

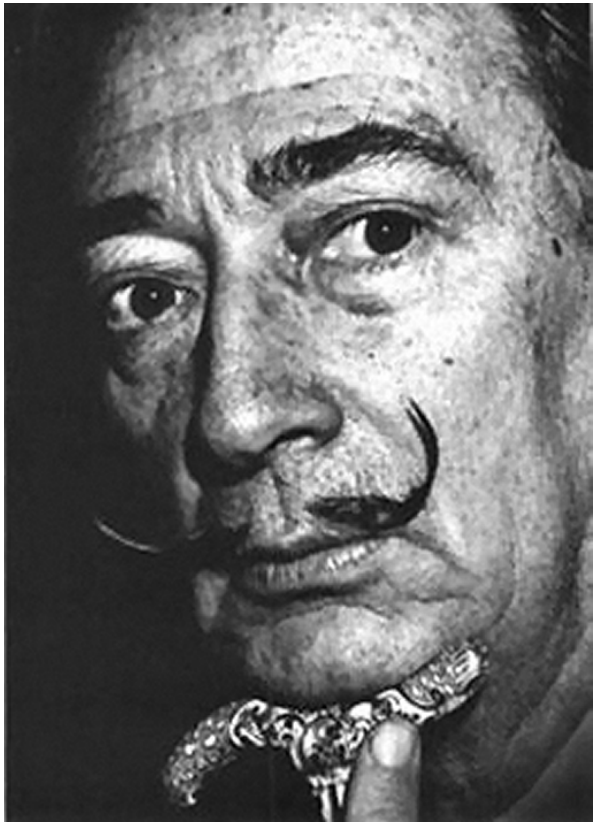
Marc Chagall - 24.06.1887 – 06.07.1985

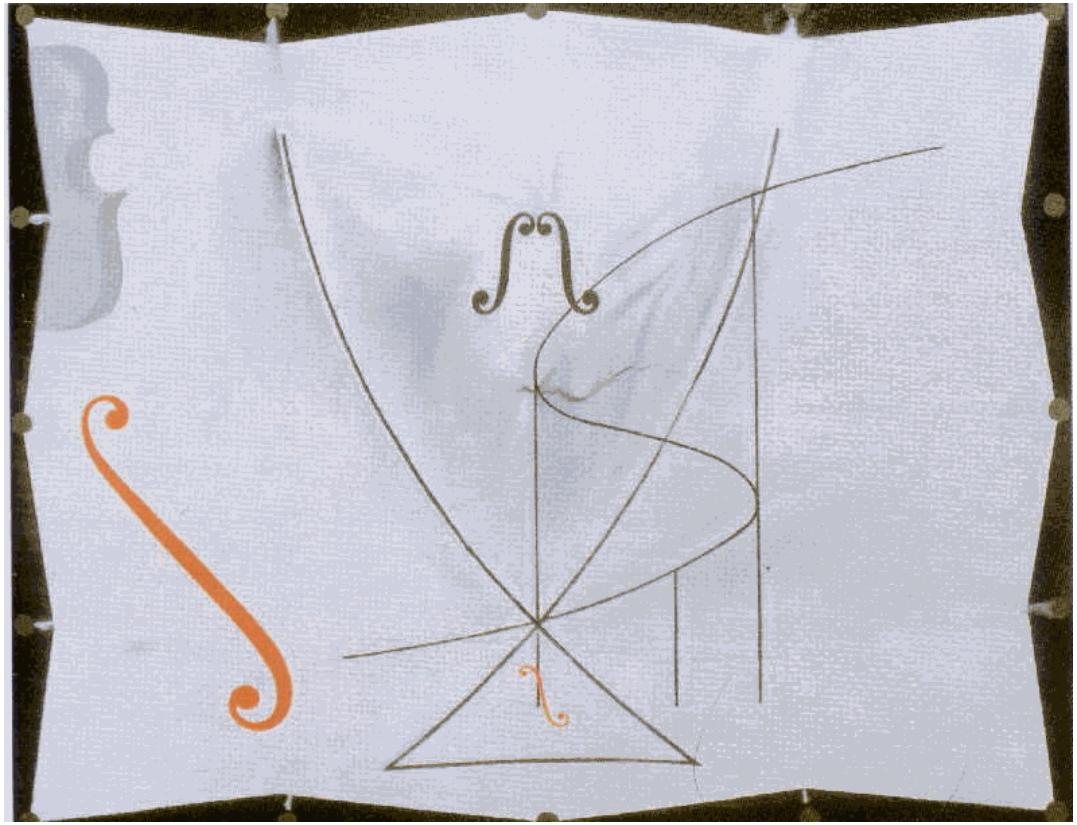


Pfarrkirche St. Stephan, Mainz
1978 ff

KRANKENHAUS LINDENBRUNN

Salvador Dali - 11.05.1904 – 23.01.1989





Der Schwalbenschwanz 1983

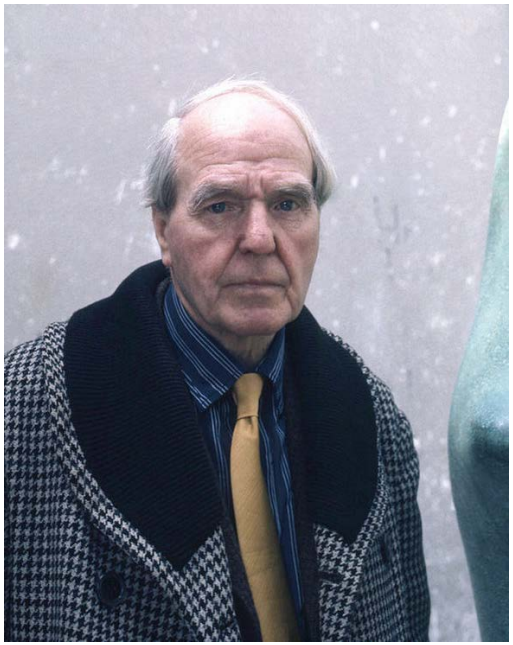
KRANKENHAUS LINDENBRUNN

Auguste-Pierre Renoir - 25.02.1841 – 03.12.1919

Ruhe nach dem Bad 1918/19

KRANKENHAUS LINDENBRUNN

Henry Moore – 30.07.1898 – 31.08.1986



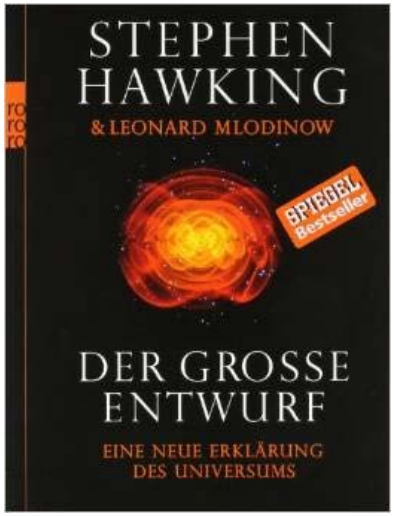
Large two forms 1979

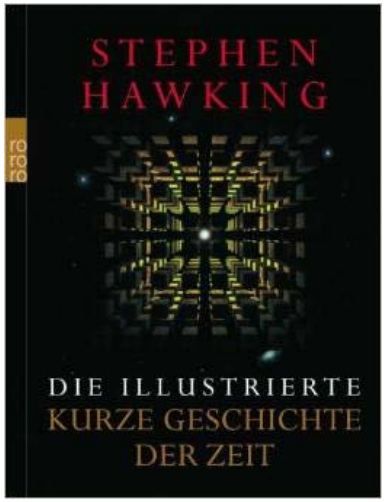
Large Butterfly 1985/86

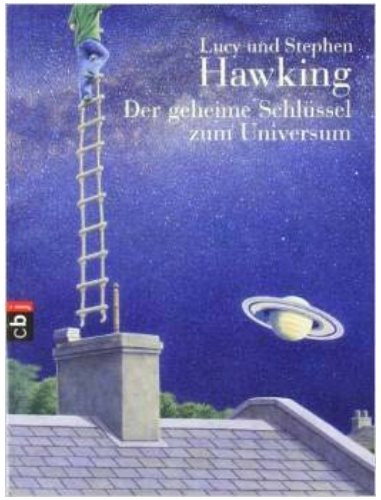
KRANKENHAUS LINDENBRUNN

Stephen Hawking * 08. Jan. 1942
ALS 1963

2009





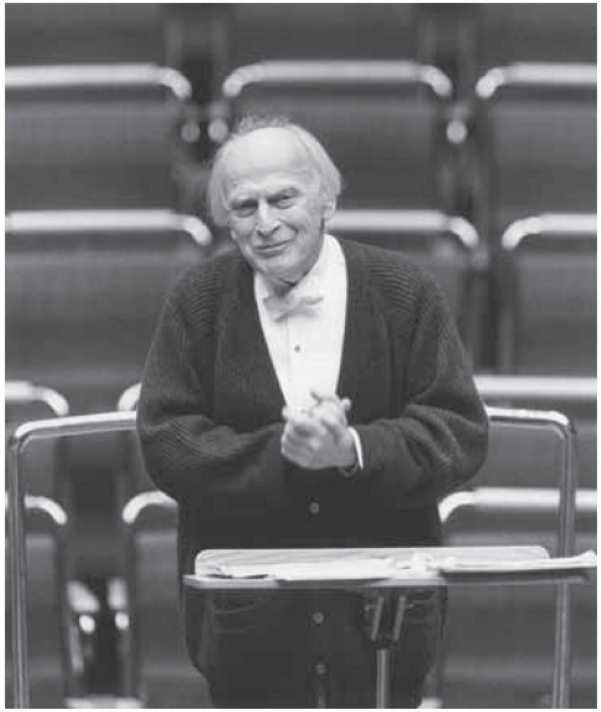


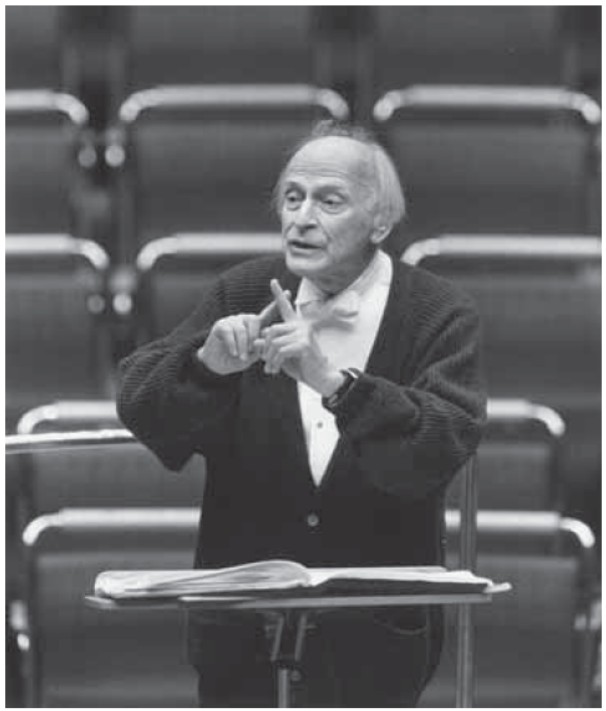
KRANKENHAUS LINDENBRUNN

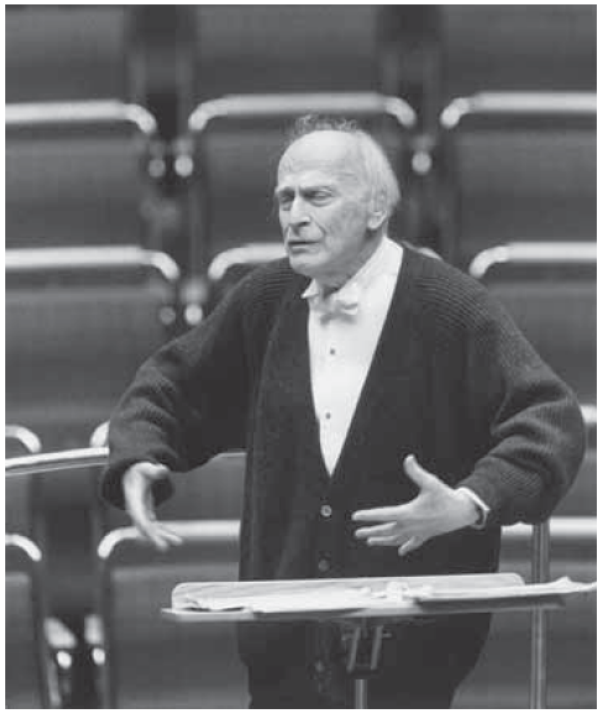
Itzhack Perlman * 1945, Poliomyelitis

Yehudi Menuhin 1913-1999

mit P. Cuelho 1999





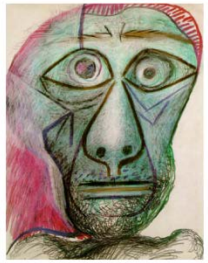


Köln 1996

KRANKENHAUS LINDENBRUNN

Pablo Picasso - 25.10.1881 - 08.04.1973

Die Umarmung 1972



Selbstportrait 1972

Henri Matisse – 31.12.1869 – 03.11.1954

Snail 1953

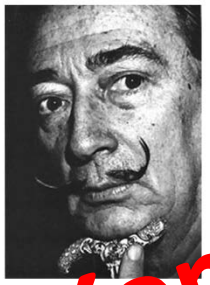
Union Church of Pocantico Hills Glasfenster gewidmet dem Andenken von Abby Aldrich Rockefeller

Sorrow of the King 1952

Marc Chagall - 24.06.1887 – 06.07.1985

Pfarrkirche St. Stephan, Mainz 1978 ff

Salvador Dali - 11.05.1904 – 23.01.1989



Der Schwalbenschwanz 1983

Auguste-Pierre Renoir - 25.02.1841 – 03.12.19[illegible]

Ruhe nach dem Bad 1918/19

Henry Moore – 30.07.19[illegible] – [illegible].1986

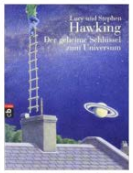
Large two forms 1979

Large Butterfly 1985/86

Stephen Hawking [illegible]n 1942

A[illegible]1963

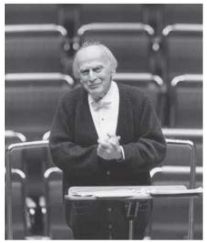
2009

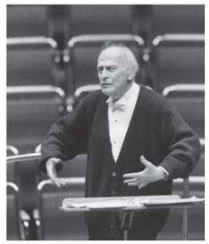


Itzhack Perlman * 1945, Poliomyelitis

Yehudi Menuhin 1913-1999

mit P. Cuelho 1999





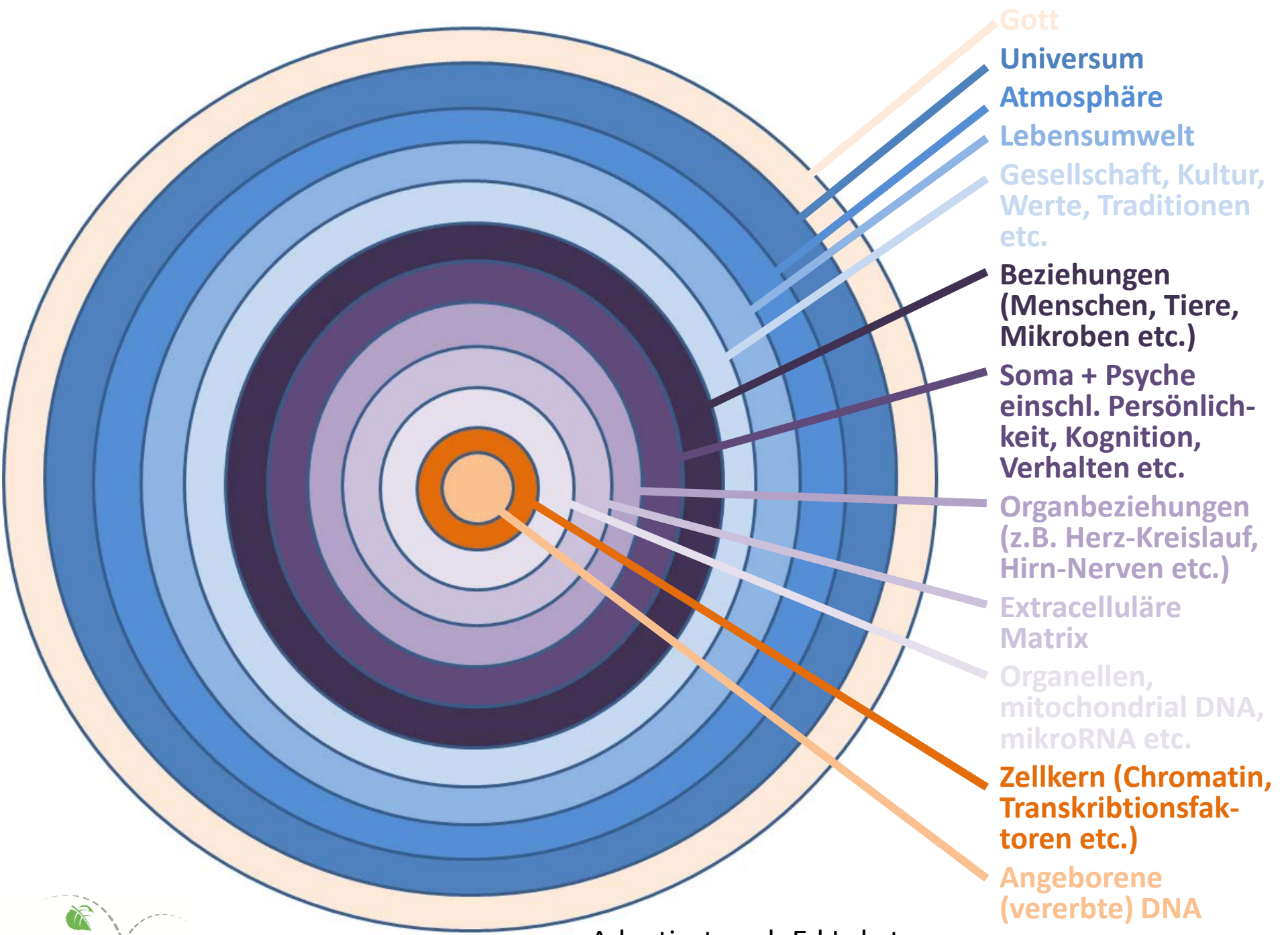
Köln 1996

KRANKENHAUS LINDENBRUNN

Komplexe Situationen herunter-brechen auf 1, 2, 3 Testverfahren ?

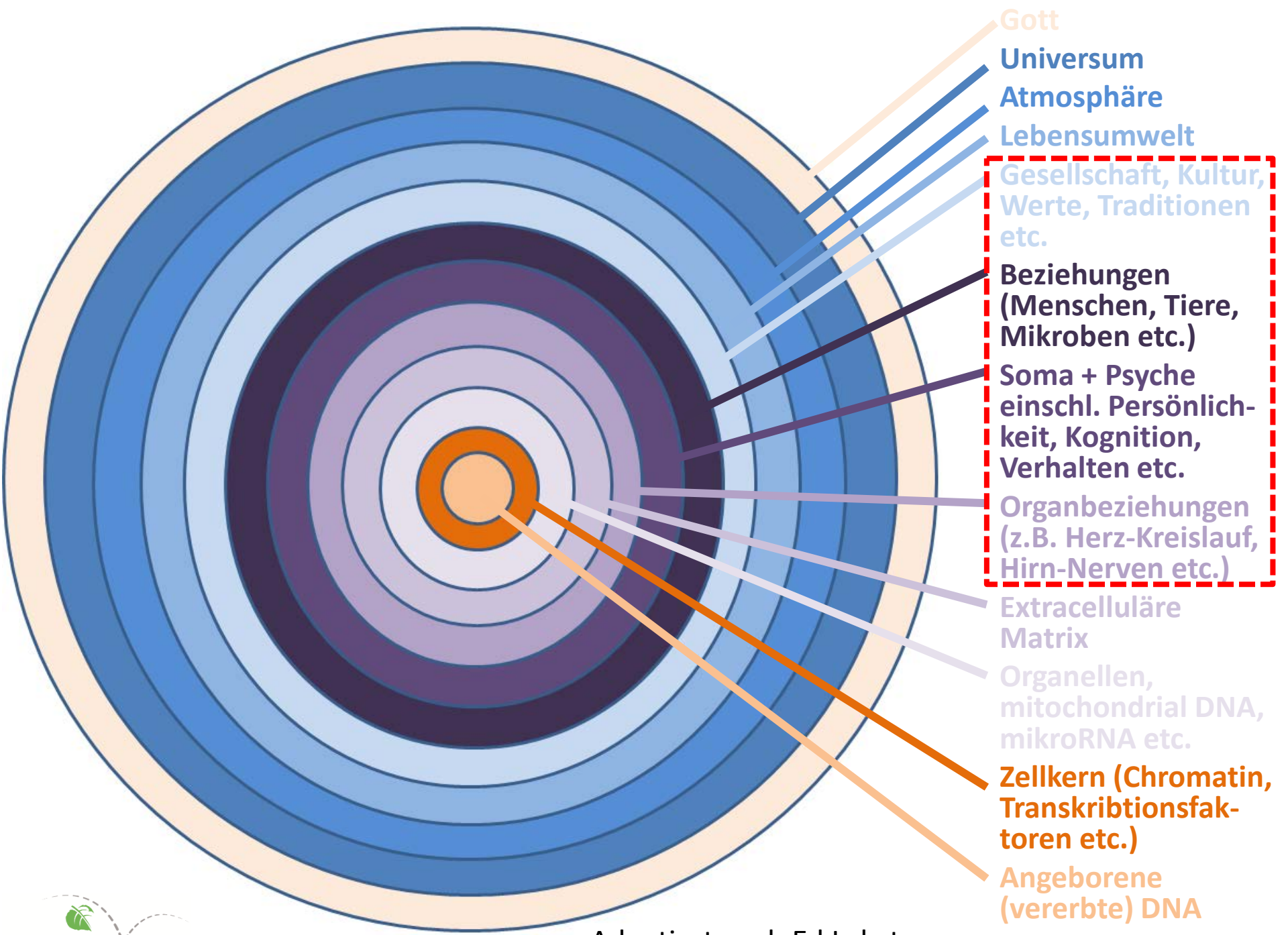
Arne, 8 Jahre (2007)

Komplexität



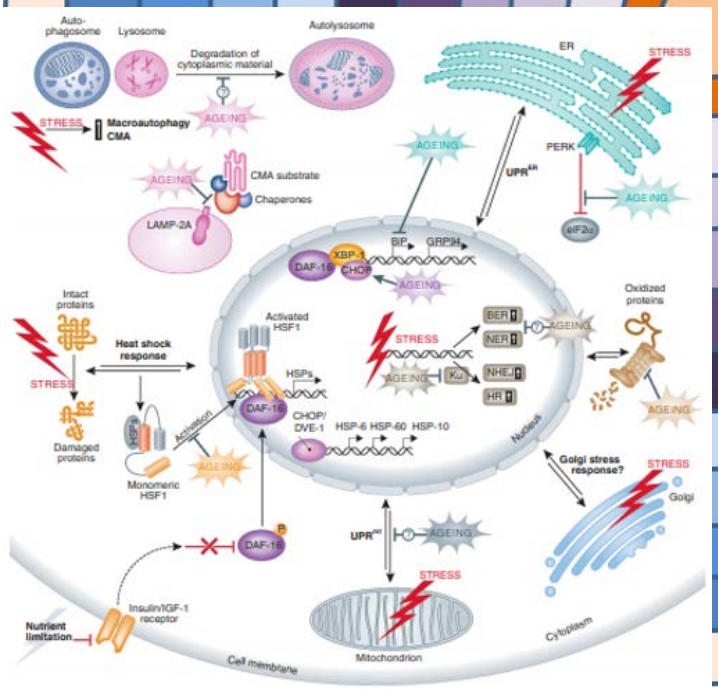
Adaptiert nach Ed Lakata

KRANKENHAUS LINDENBRUNN



Adaptiert nach Ed Lakata

KRANKENHAUS LINDENBRUNN



Kourtis N et al – EMBO Journal 2011;30:2520-2531

Gott

Universum

Atmosphäre

Lebensumwelt

Gesellschaft, Kultur, Werte, Traditionen etc.

Beziehungen (Menschen, Tiere, Mikroben etc.)

Soma + Psyche einschl. Persönlich-keit, Kognition, Verhalten etc.

Organbeziehungen (z.B. Herz-Kreislauf, Hirn-Nerven etc.)

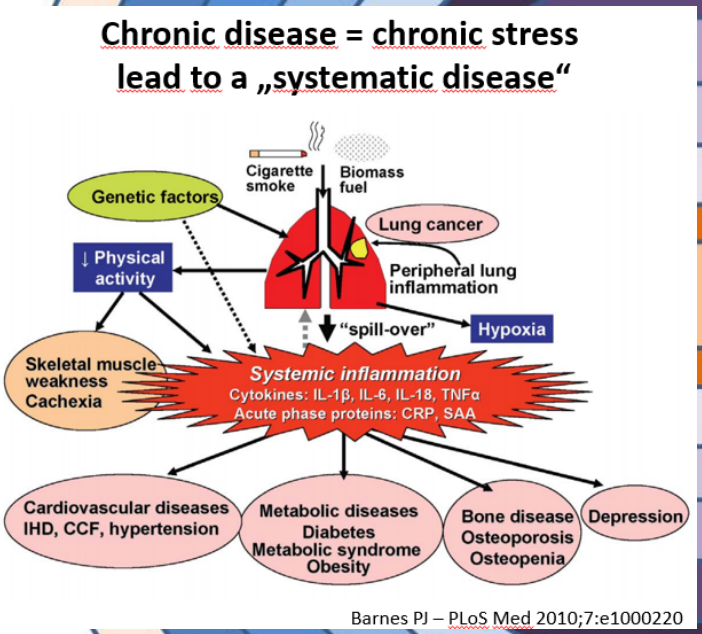
Extracelluläre Matrix

Organellen, mitochondrial DNA, mikroRNA etc.

Zellkern (Chromatin, Transkribtionsfak-toren etc.)

Angeborene (vererbte) DNA

Adaptiert nach Ed Lakata



Gott

Universum

Atmosphäre

Lebensumwelt

Gesellschaft, Kultur, Werte, Traditionen etc.

Beziehungen (Menschen, Tiere, Mikroben etc.)

Soma + Psyche einschl. Persönlich-keit, Kognition, Verhalten etc.

Organbeziehungen (z.B. Herz-Kreislauf, Hirn-Nerven etc.)

Extracelluläre Matrix

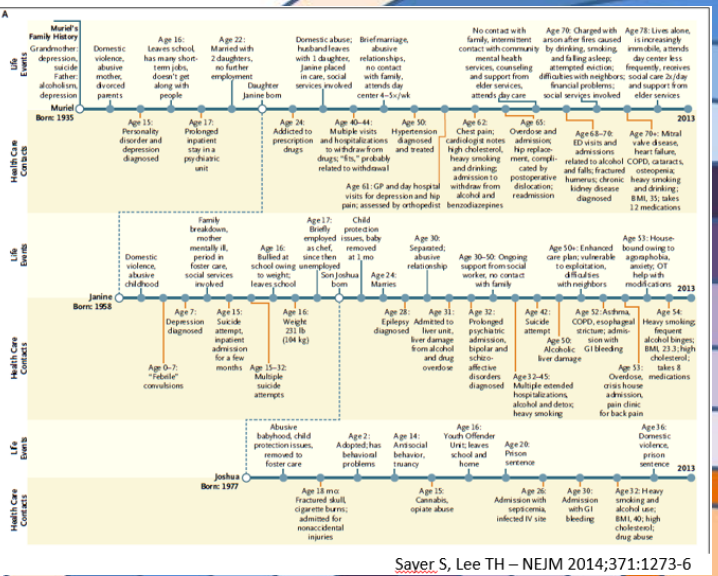
Organellen, mitochondrial DNA, mikroRNA etc.

Zellkern (Chromatin, Transkribtionsfak-toren etc.)

Angeborene (vererbte) DNA

KRANKENHAUS LINDENBRUNN

Adaptiert nach Ed Lakata



Saver S, Lee TH – NEJM 2014;371:1273-6

Gott

Universum

Atmosphäre

Lebensumwelt

Gesellschaft, Kultur, Werte, Traditionen etc.

Beziehungen (Menschen, Tiere, Mikroben etc.)

Soma + Psyche einschl. Persönlichkeit, Kognition, Verhalten etc.

Organbeziehungen (z.B. Herz-Kreislauf, Hirn-Nerven etc.)

Extracelluläre Matrix

Organellen, mitochondrial DNA, mikroRNA etc.

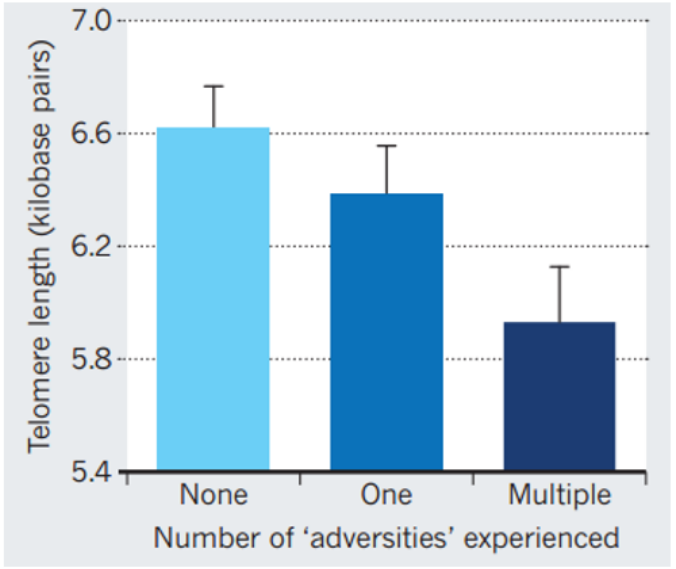
Zellkern (Chromatin, Transkribtionsfaktoren etc.)

Angeborene (vererbte) DNA

Adaptiert nach Ed Lakata

KRANKENHAUS LINDENBRUNN

Stress and telomeres



Blackburn EH et al - Nature 2012;490:169-171

Gott

Universum

Atmosphäre

Lebensumwelt

Gesellschaft, Kultur, Werte, Traditionen etc.

Beziehungen (Menschen, Tiere, Mikroben etc.)

Soma + Psyche einschl. Persönlich-keit, Kognition, Verhalten etc.

Organbeziehungen (z.B. Herz-Kreislauf, Hirn-Nerven etc.)

Extracelluläre Matrix

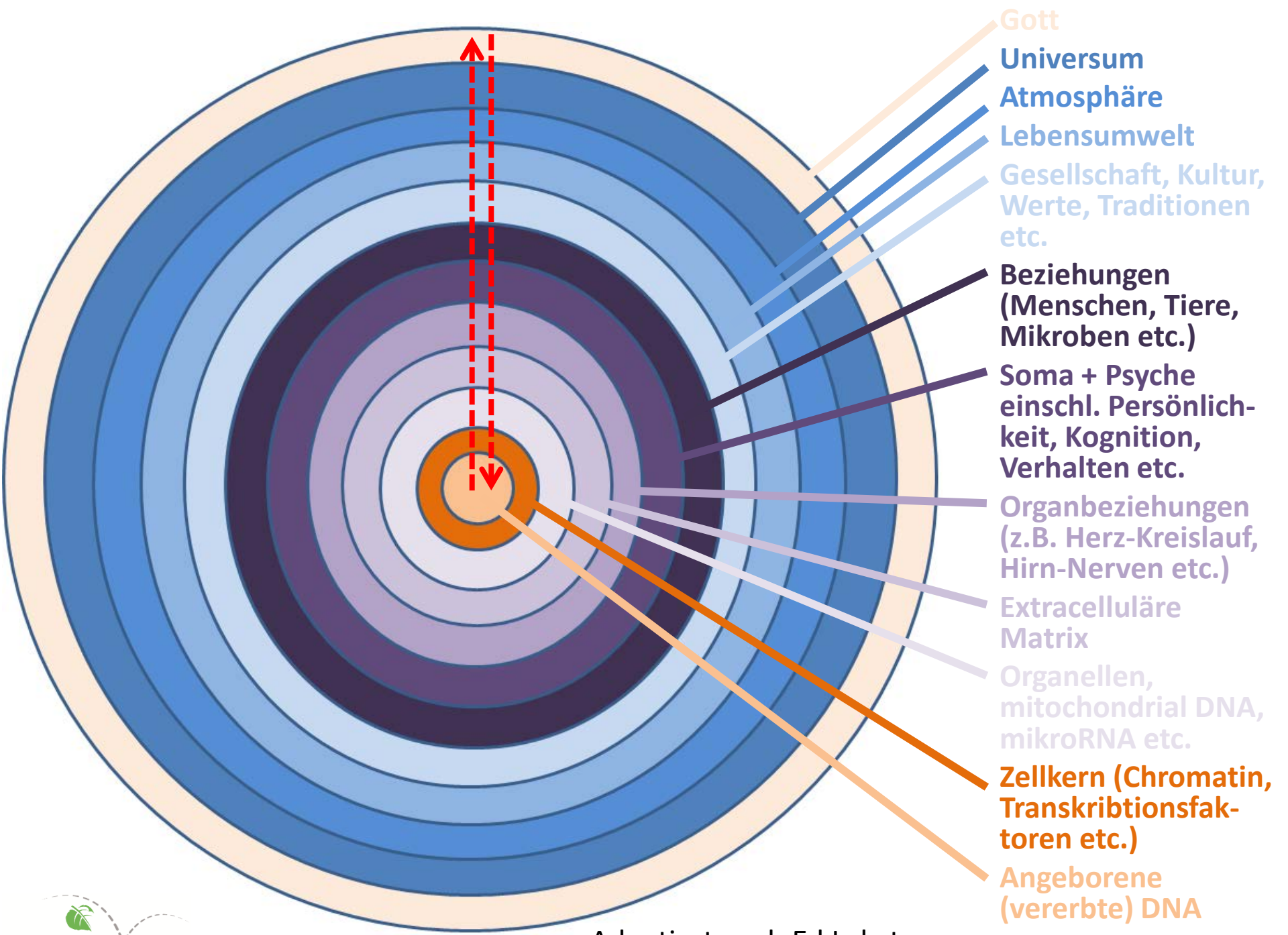
Organellen, mitochondrial DNA, mikroRNA etc.

Zellkern (Chromatin, Transkribtionsfak-toren etc.)

Angeborene (vererbte) DNA

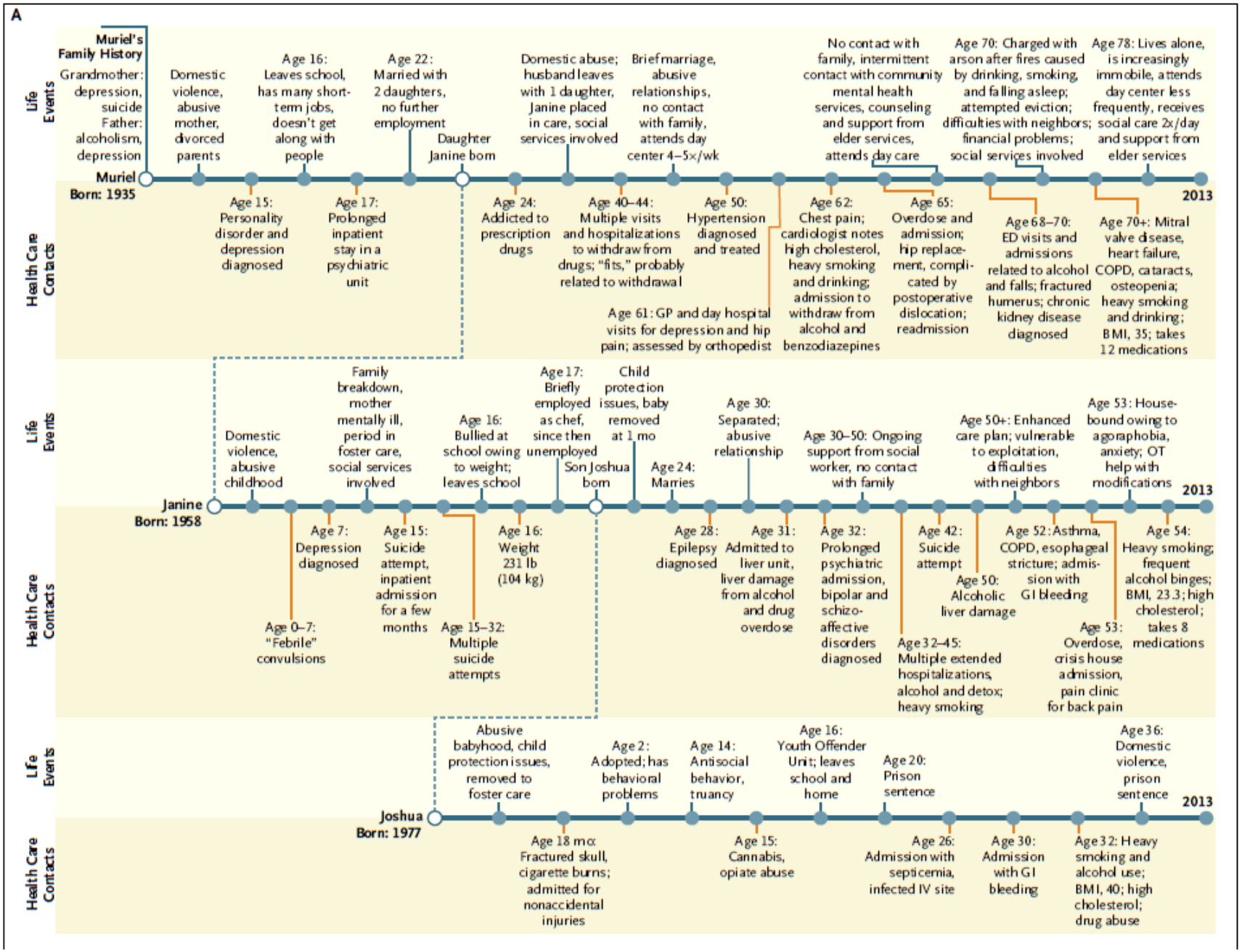
Adaptiert nach Ed Lakata

KRANKENHAUS LINDENBRUNN



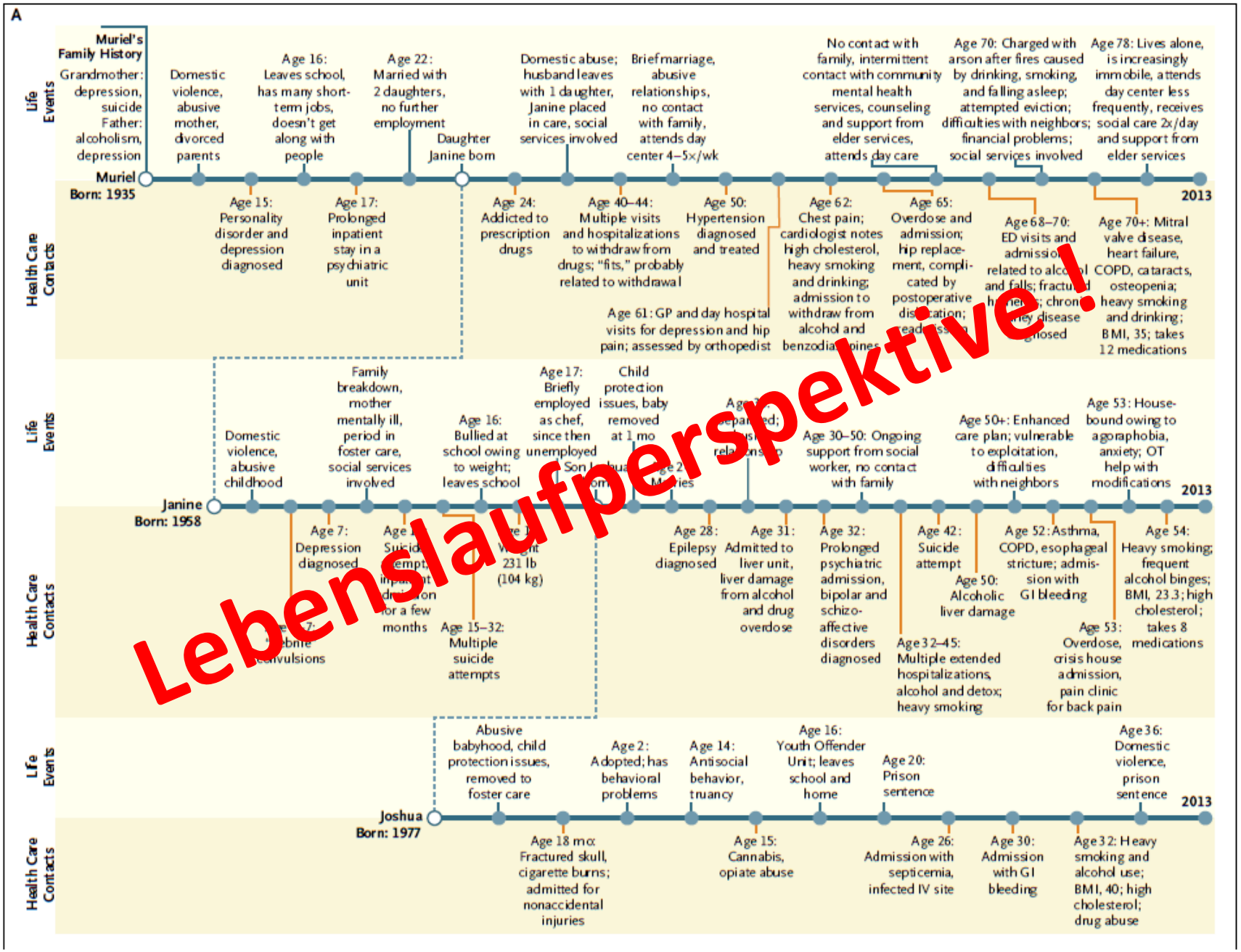
Adaptiert nach Ed Lakata

KRANKENHAUS LINDENBRUNN



KRANKENHAUS LINDENBRUNN

Sayer S, Lee TH – NEJM 2014;371:1273-6



Lebenslaufperspektive!

KRANKENHAUS LINDENBRUNN

Sayer S, Lee TH – NEJM 2014;371:1273-6

Soziale Dimension

Common Current Topics and Proposed Comprehensive Topics for the Patient Social History.

Common current topics

Racial or ethnic background
Marital status and children
Occupation
Highest level of education
Tobacco, ethanol, drugs ("TED")
Seatbelt and helmet use
Firearms in the home
Victim of domestic violence

KRANKENHAUS LINDENBRUNN

Behforouz HL et al – NEJM 2014;371:1277-1279

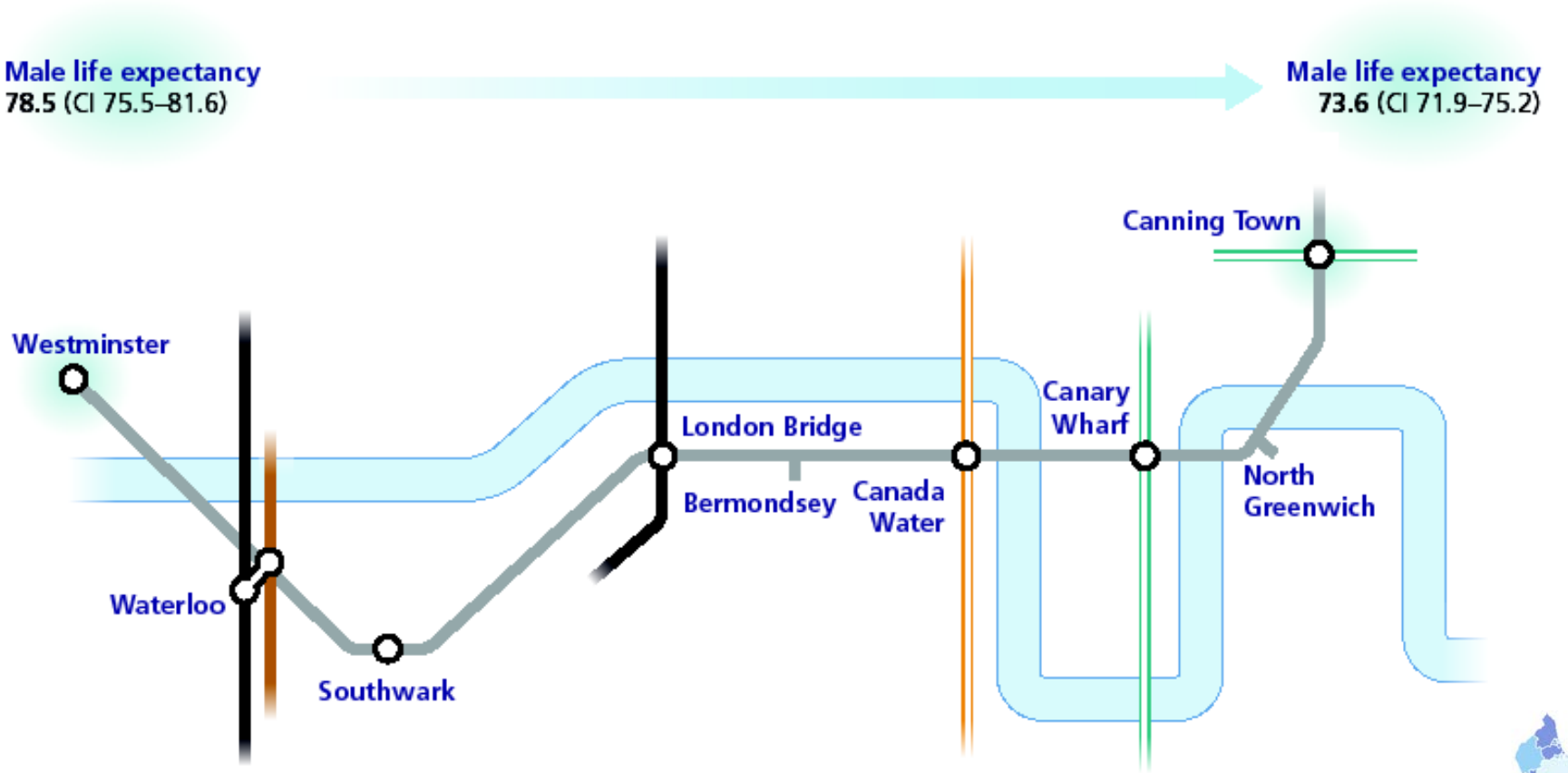
Proposed new topics

- Individual characteristics
  - Self-defined race or ethnicity
  - Place of birth or nationality
  - Primary spoken language
  - English literacy
  - Life experiences (education, job history, military service, traumatic or life-shaping experiences)
  - Gender identification and sexual practices
  - Leisure activities
- Life circumstances
  - Marital status and children
  - Family structure, obligations, and stresses
  - Housing environment and safety
  - Food security
  - Legal and immigration issues
  - Employment (number of jobs, work hours, stresses or concerns about work)
- Emotional health
  - Emotional state and history of mental illness (e.g., depression, anxiety, trauma, post-traumatic stress disorder)
  - Causes of recent and long-term stress
  - Positive or negative social network: individual, family, organizational
  - Religious affiliation and spiritual beliefs
- Perception of health care
  - Life goals and priorities; ranking of health among other life priorities
  - Personal sense of health or fears regarding health care
  - Perceived or desired role for health care providers
  - Perceptions of medication and medical technology
  - Positive or negative health care experiences
  - Alternative care practices
  - Advance directives for cardiopulmonary resuscitation
- Health-related behaviors
  - Sense of healthy or unhealthy behaviors
  - Facilitators of health promotion (e.g., healthy behaviors among close social contacts)
  - Triggers for harmful behaviors and motivation to change (may be determined through motivational interviewing)
  - Diet and exercise habits
  - Facilitators or barriers to medication adherence
  - Tobacco, alcohol, drug use habits
  - Safety precautions: seatbelts, helmets, firearms, street violence
- Access to and utilization of health care
  - Health insurance status
  - Medication access and affordability
  - Health literacy and numeracy (may be ascertained with specific tools; e.g., "The Newest Vital Sign")
  - Barriers to making appointments (e.g., child care, work allowance, affordability of copayment, transportation)

Behforouz HL et al – NEJM 2014;371:1277-1279

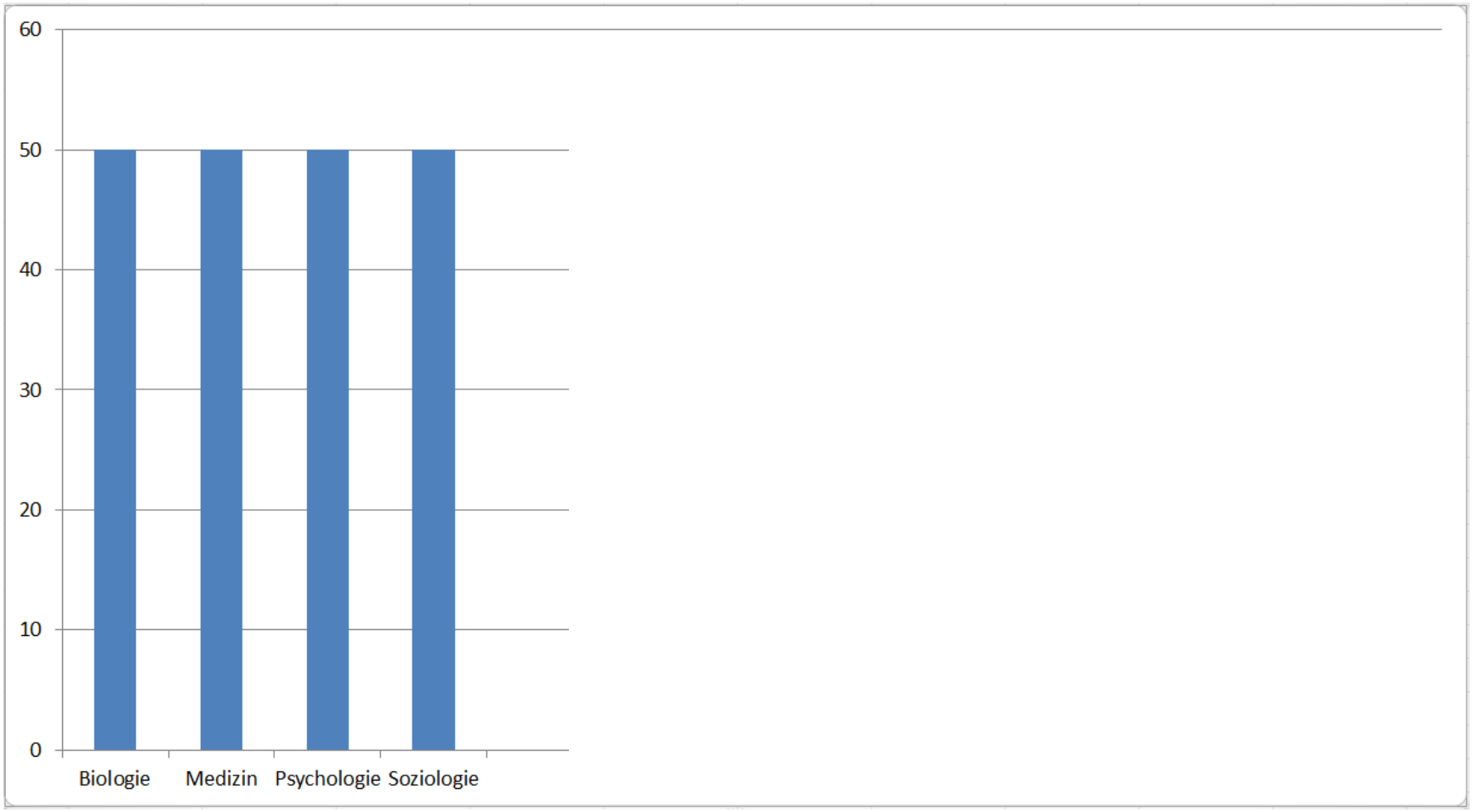
Is EBM evidence-based ?

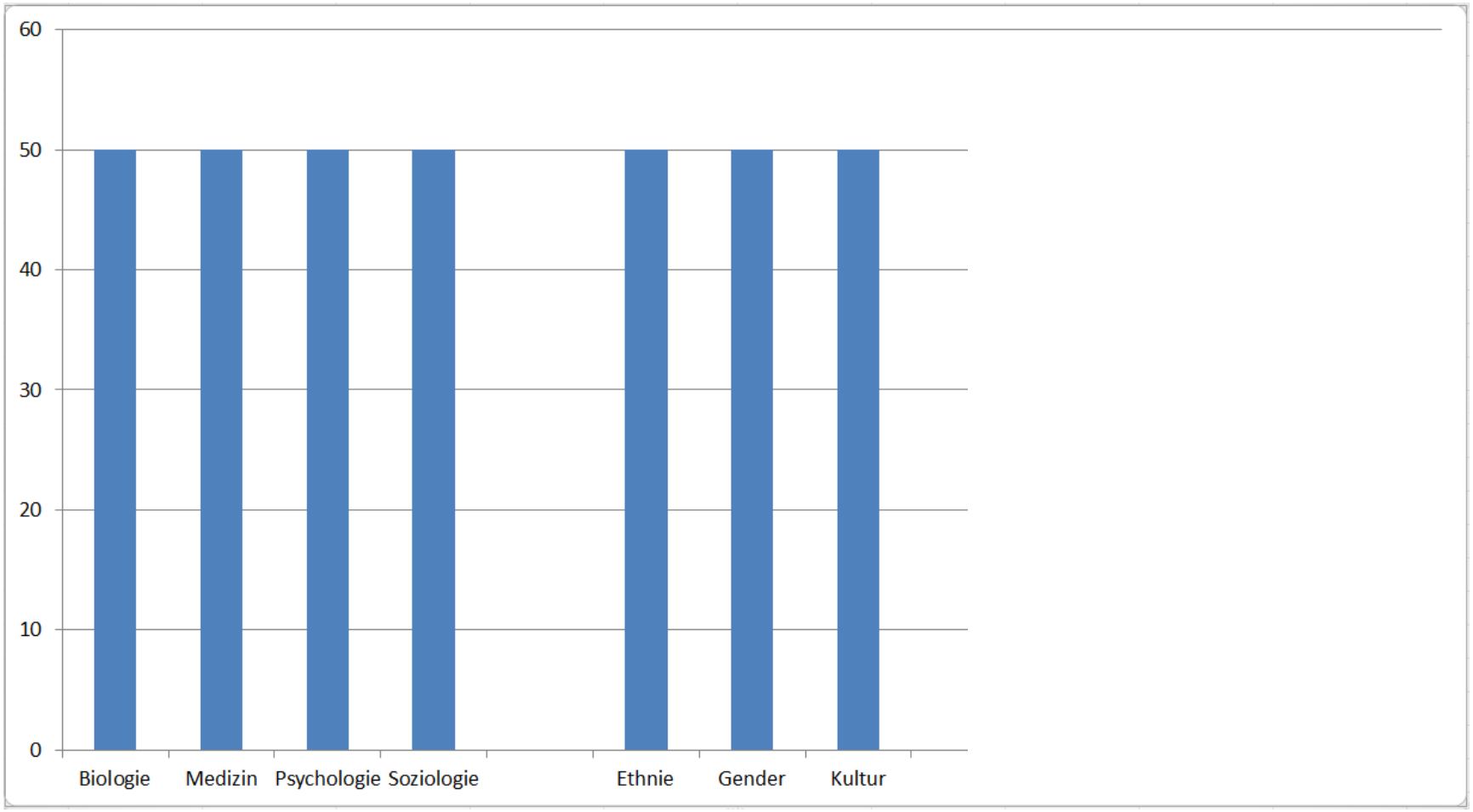
FIGURE 1: DIFFERENCES IN MALE LIFE-EXPECTANCY WITHIN A SMALL AREA OF LONDON: TRAVELLING EAST FROM WESTMINSTER, EVERY TWO TUBE STOPS REPRESENT OVER ONE YEAR OF LIFE-EXPECTANCY LOST (DATA REVISED TO 2004–2008)[3]



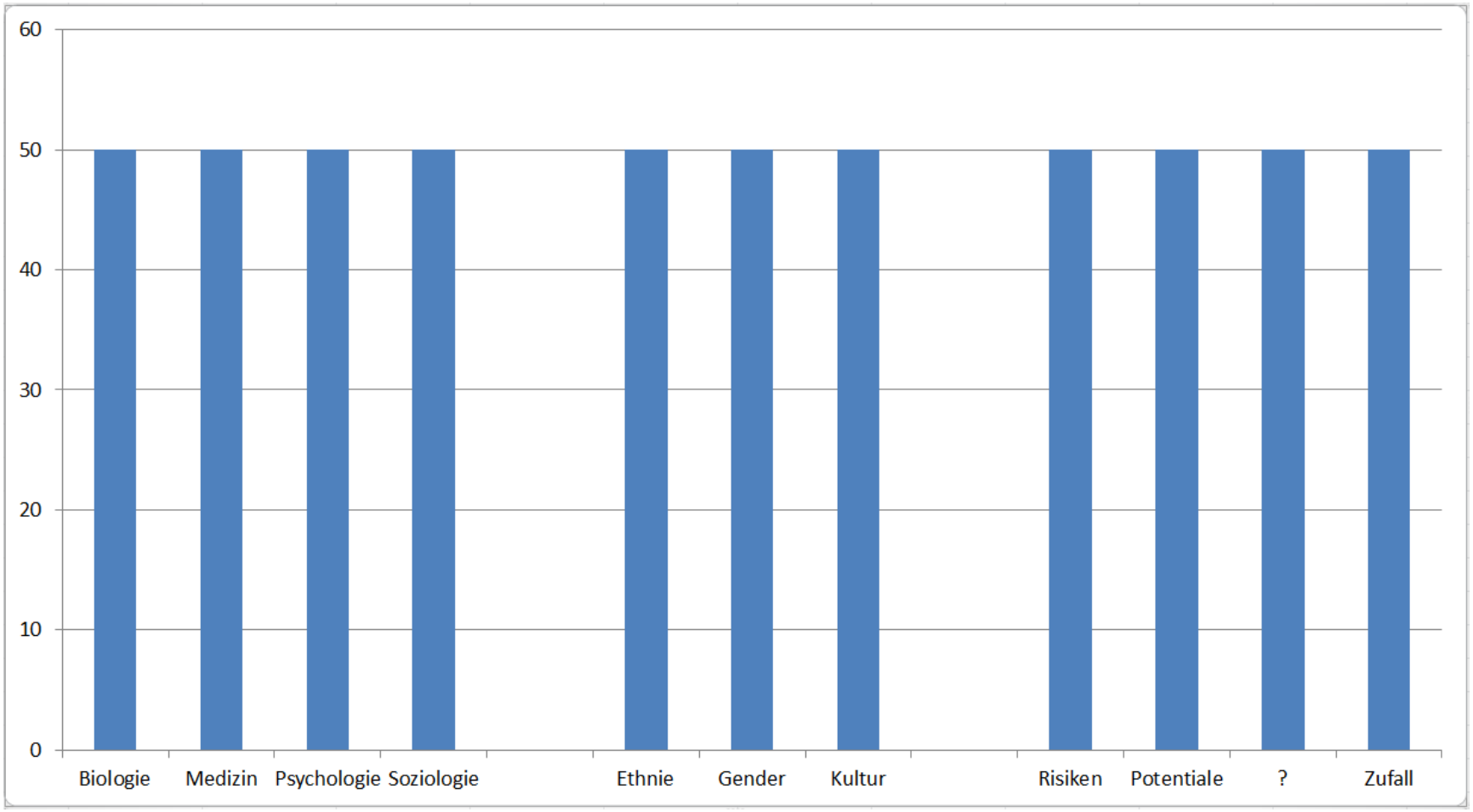
KRANKENHAUS LINDENBRUNN

http://www.rightcare.nhs.uk

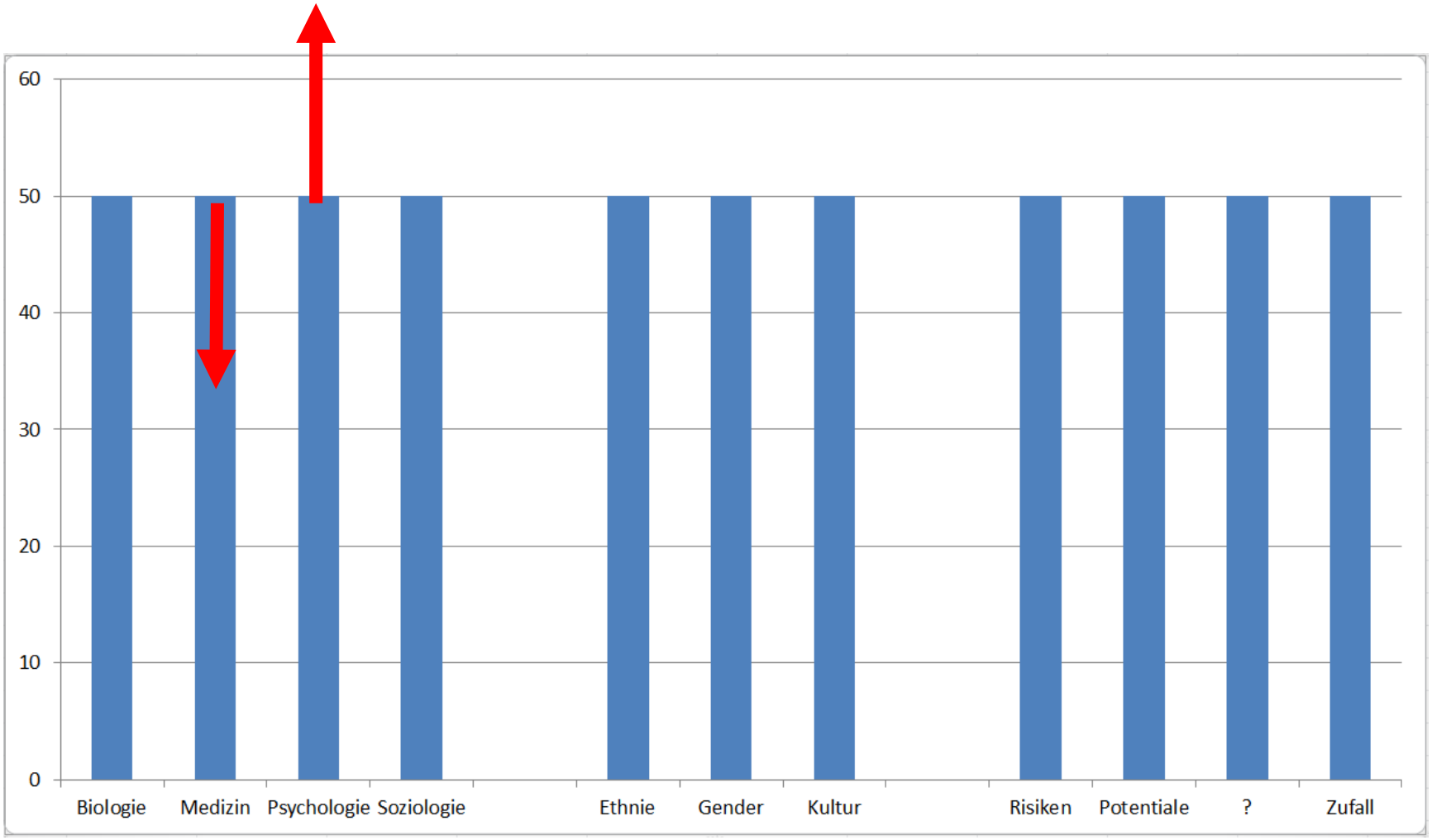

60
50
40
30
20
10
0
Biologie
Medizin
Psychologie
Soziologie



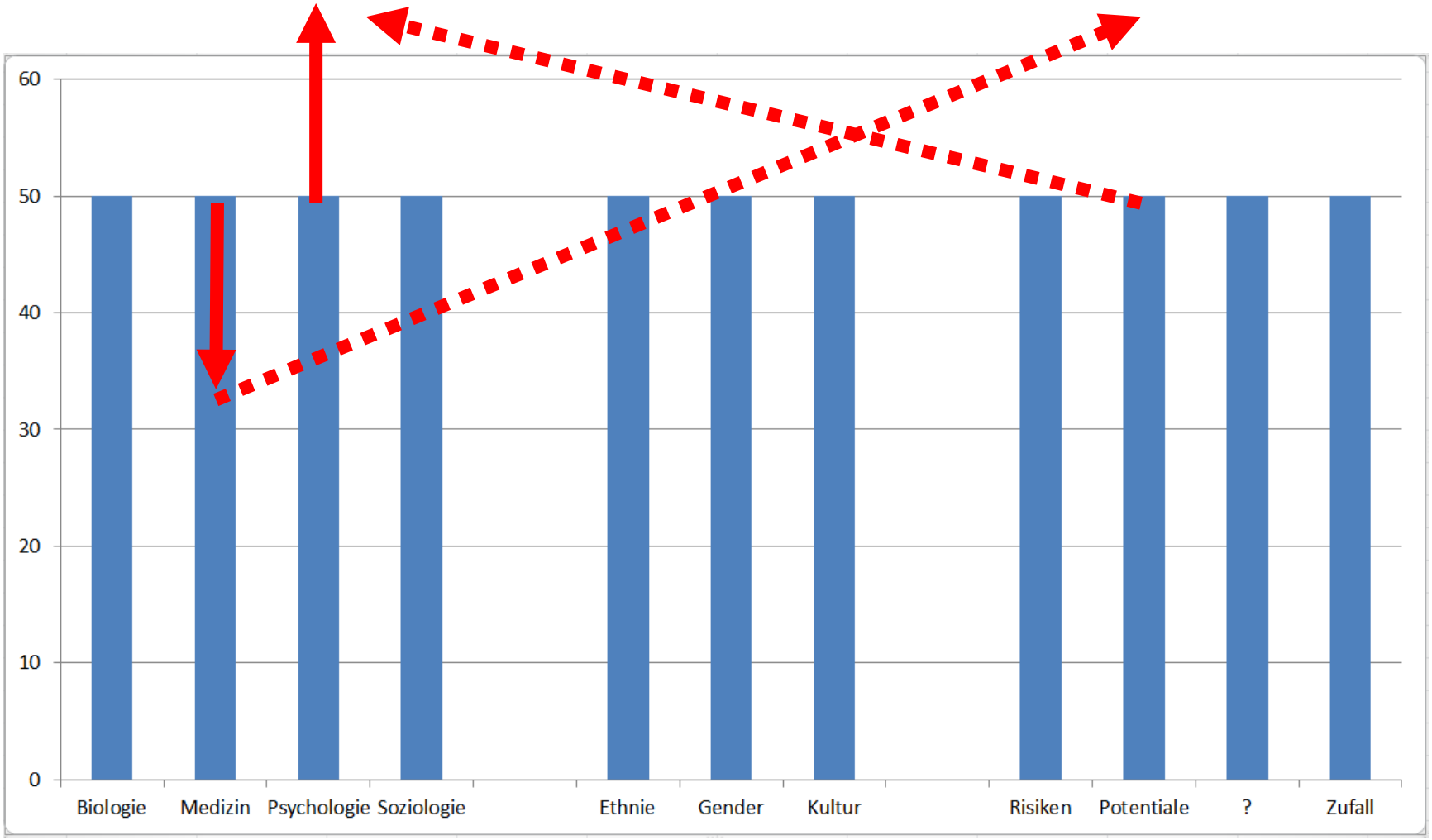
KRANKENHAUS LINDENBRUNN



KRANKENHAUS LINDENBRUNN



KRANKENHAUS LINDENBRUNN



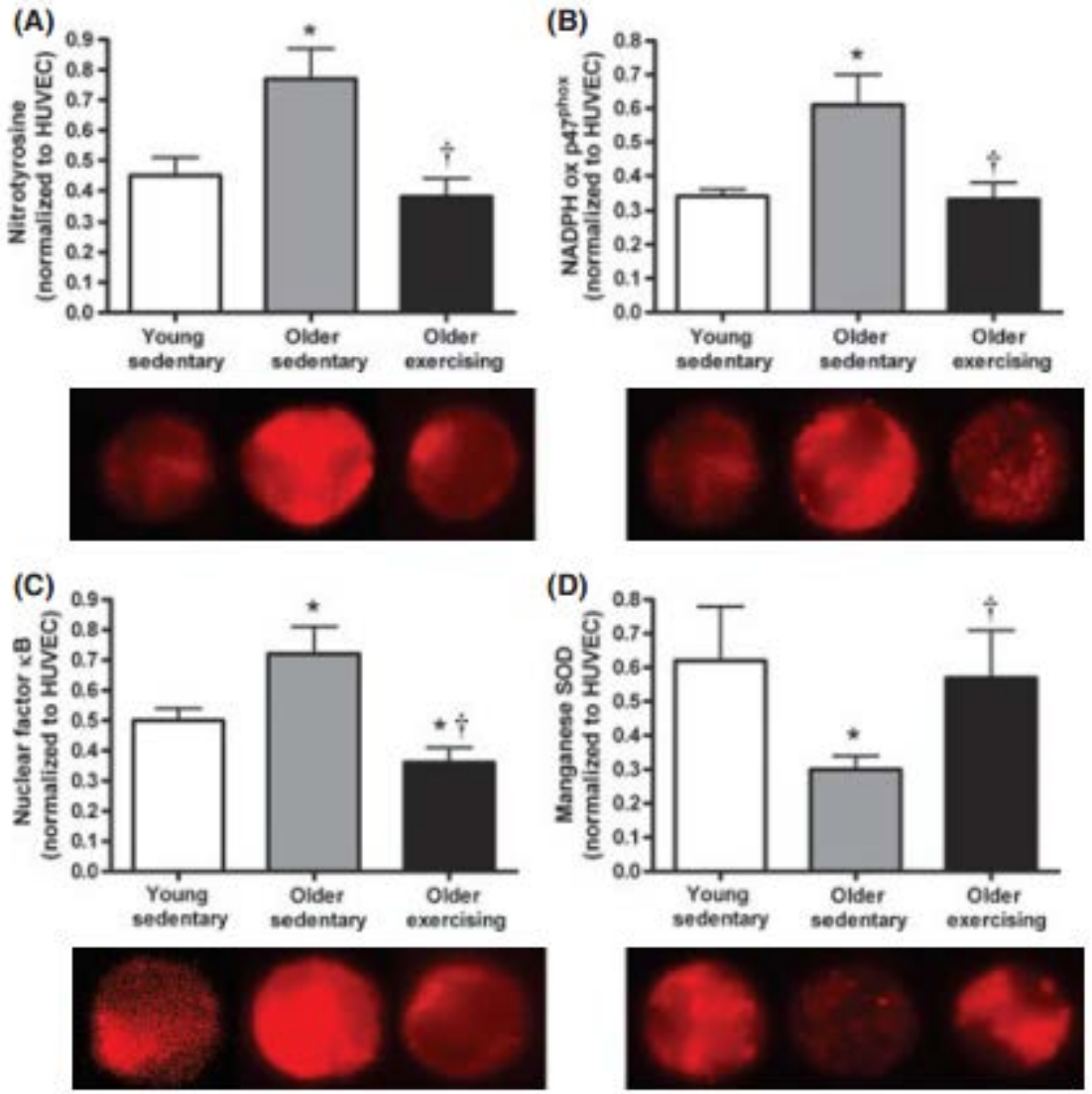
KRANKENHAUS LINDENBRUNN

KRANKENHAUS LINDENBRUNN

KRANKENHAUS
LINDENBRUNN

KRANKENHAUS LINDENBRUNN

Physical activity + vascular stress



Pierce GL et al – Aging Cell 2011;10:1032-1037

KRANKENHAUS LINDENBRUNN

© Matt James, Australia/Royal Observatory Greenwich

KRANKENHAUS LINDENBRUNN

Zusammenfassung

- Funktionale Altersmessung ist zzt max. ein Prinzenweg
- Potentiell relevante Domänen werden nicht einbezogen
- Es gilt als Gerontologe von den anderen Disziplinen / wechselseitig zu lernen
- und die verschiedenen Dimensionen des Menschsein zusammen zu führen
- und in messbare Zielgrößen zu übersetzen (Risiken / Defizite / Potenziale / Fähigkeiten)

© Matt James, Australia/Royal Observatory Greenwich