aek.b

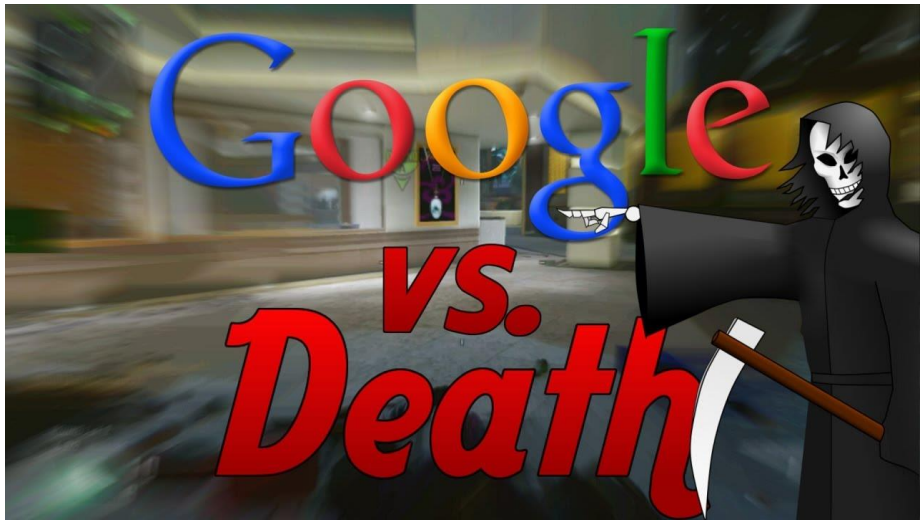
41. BURGENLÄNDISCHER ÄRZTETAG

Bildnachweis: istockphoto - Rawpixel - 964136500

13. September 2025
Lisztzentrum Raiding
Thema:
„Oldies but Goldies“

ZUR THEORIE DER ZWEITEN JUGEND

DIE NEUE KOALITION

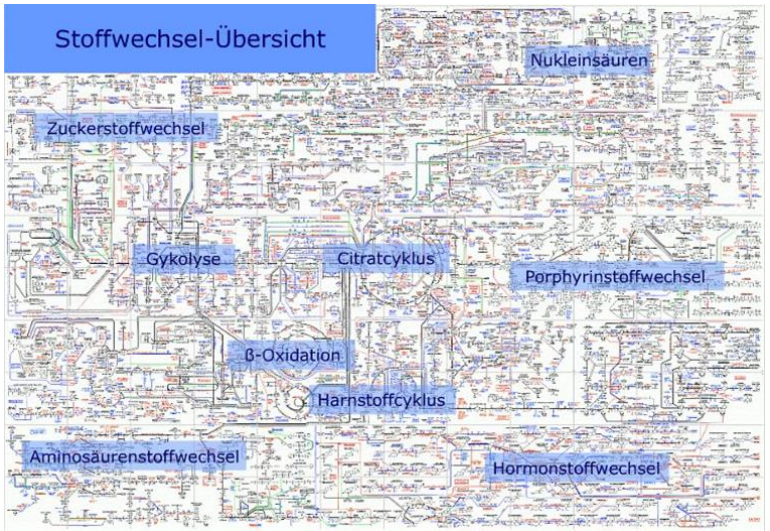


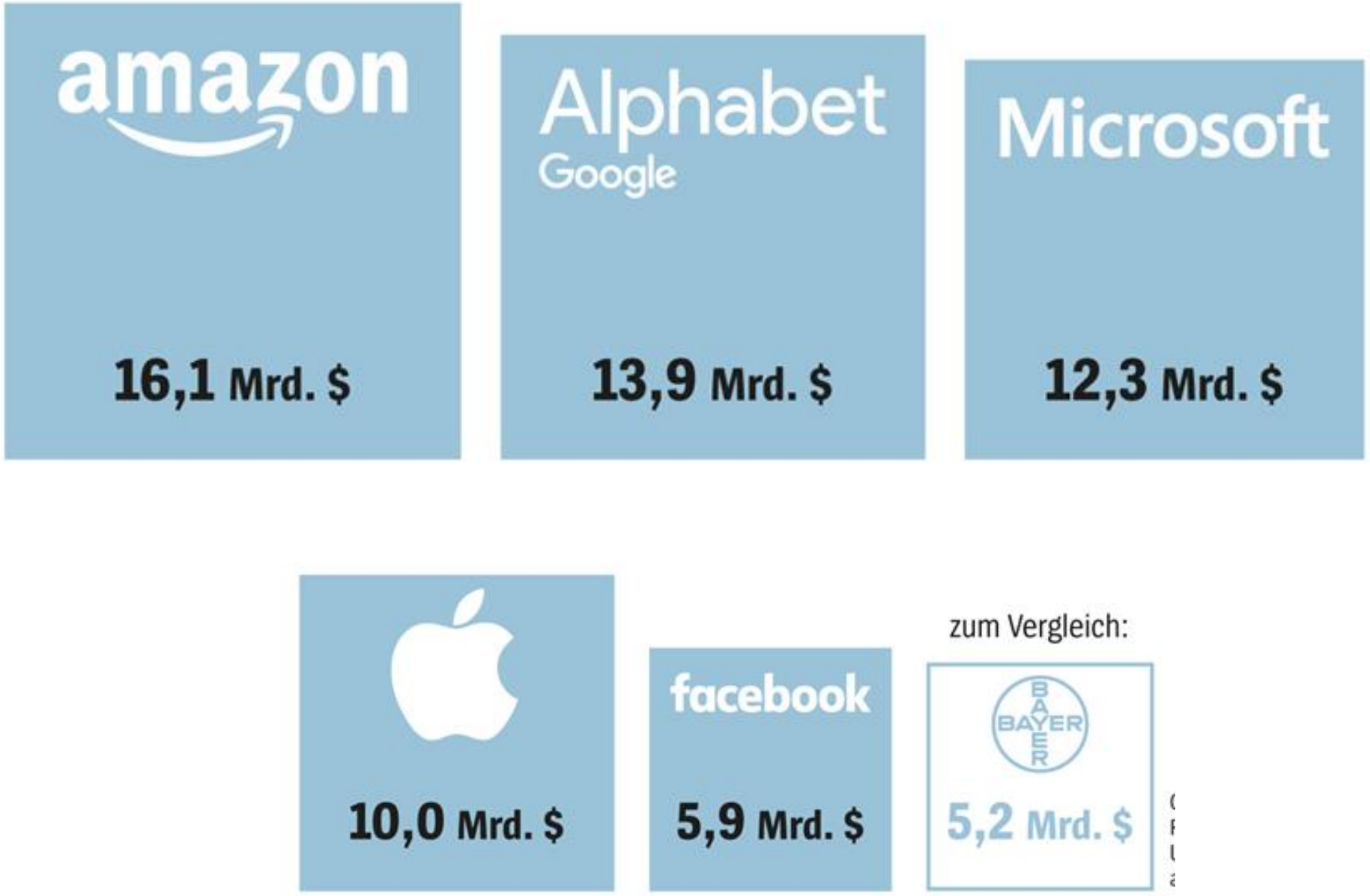
Calico is an independent biotech company established in 2013 by Google Inc. with the stated goal of focusing on the challenge of curing aging and associated diseases.

The name Calico is shorthand for California Life Company.

Alles ist eine Rechenaufgabe- auch der Mensch

„Es ist die nächste Weltveränderungsidee im Silicon Valley, dass die Entschlüsselung der Biologie und das Verständnis von Krankheiten am Ende ein Datenproblem sei und deswegen zumindest teilweise von Softwareexperten gelöst werden könne. „ DER SPIEGEL




amazon
16,1 Mrd. $
Alphabet
Google
13,9 Mrd. $
Microsoft
12,3 Mrd. $
10,0 Mrd. $
facebook
5,9 Mrd. $
zum Vergleich:
BAYER
5,2 Mrd. $

Nobelpreisträger
und
Stammzellpionier
Shinya Yamanaka

Crispr-Cas-Mitentdeckerin
Jennifer Doudna

Frances Arnold

Genpionier David Balimore

Steve Horvarth dem Entdecker der biologischen Alterungsuhr

Präsidentin des Europäischen
Forschungsrates ERC,
Entwicklungsgenetikerin Maria Leptin.

1. Stress und Altern
   Senolyse

2. Reproduktion und Altern

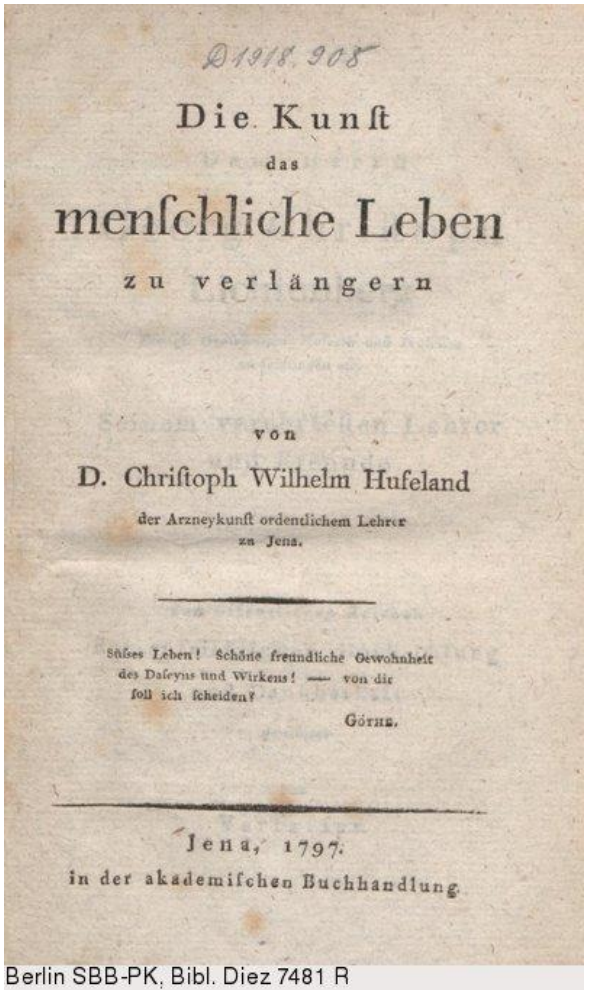
3. Mitochondrales Altern

4. Epigenetisches Altern

5. Die Supermedizin und
   das Altern

Im Jahre 1566 starb in Padua ein Mann mit drei bemerkenswerten Geheimnissen.

Der Arzt hilft, die Natur heilt“



D 1918. 908

Die Kunſt
das
menſchliche Leben
zu verlängern

von
D. Chriſtoph Wilhelm Hufeland
der Arzneykunſt ordentlichem Lehrer
zu Jena.

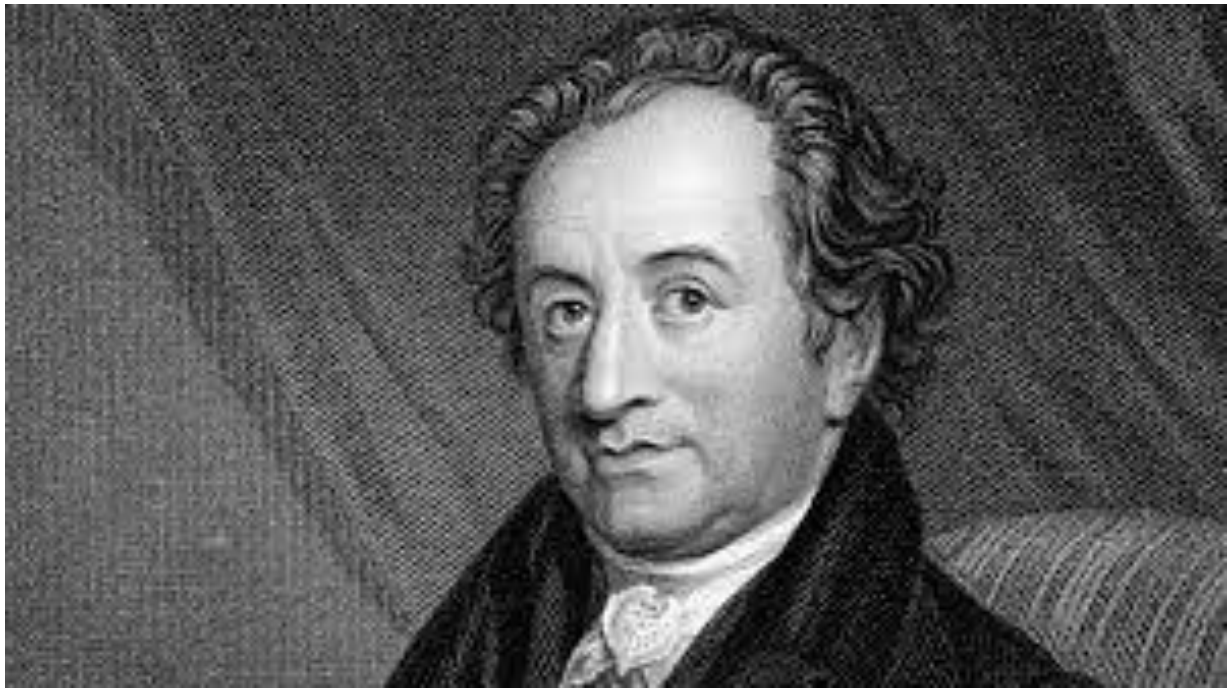
Süſses Leben! Schöne freundliche Gewohnheit
des Daſeyns und Wirkens! — von dir
ſoll ich ſcheiden?
Görne.

Jena, 1797.
in der akademiſchen Buchhandlung.

Berlin SBB-PK, Bibl. Diez 7481 R

MAKROBIOTIK

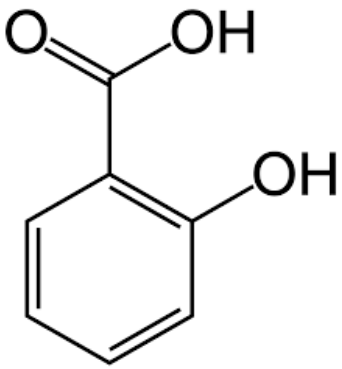
Christoph Wilhelm Hufeland

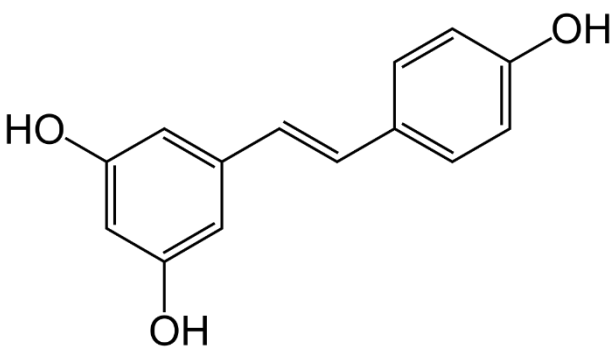


Wasser allein macht stumm, das zeigen im Bach die Fische. Wein allein macht dumm, siehe die Herren am Tische. Da ich keins von beiden will sein, trink ich Wasser mit Wein.

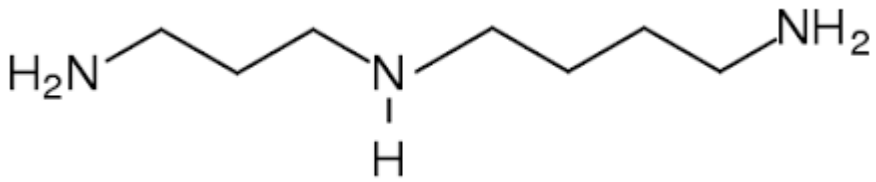
Quelle: Goethe, J. W., Gedichte. Soll Goethe auf eine Tischplatte im Wirtshaus an der Lahn (Dausenau) geschrieben haben

I. stress and life style




HO
OH
OH


GENANTE
GENANTE™
Integratore alimentare a base di Revifast trans-Resveratrolo, Extrafolate-S, Vitamina B6, B12 e Vitamina D
FORMULA BREVETTATA
S&R FARMACEUTICI
30 Compresse da 500 mg


H2N
N
H
NH2

Unser größter Stress - Verhungern

The NEW ENGLAND JOURNAL of MEDICINE

REVIEW ARTICLE

Dan L. Longo, M.D., *Editor*

Effects of Intermittent Fasting on Health, Aging, and Disease

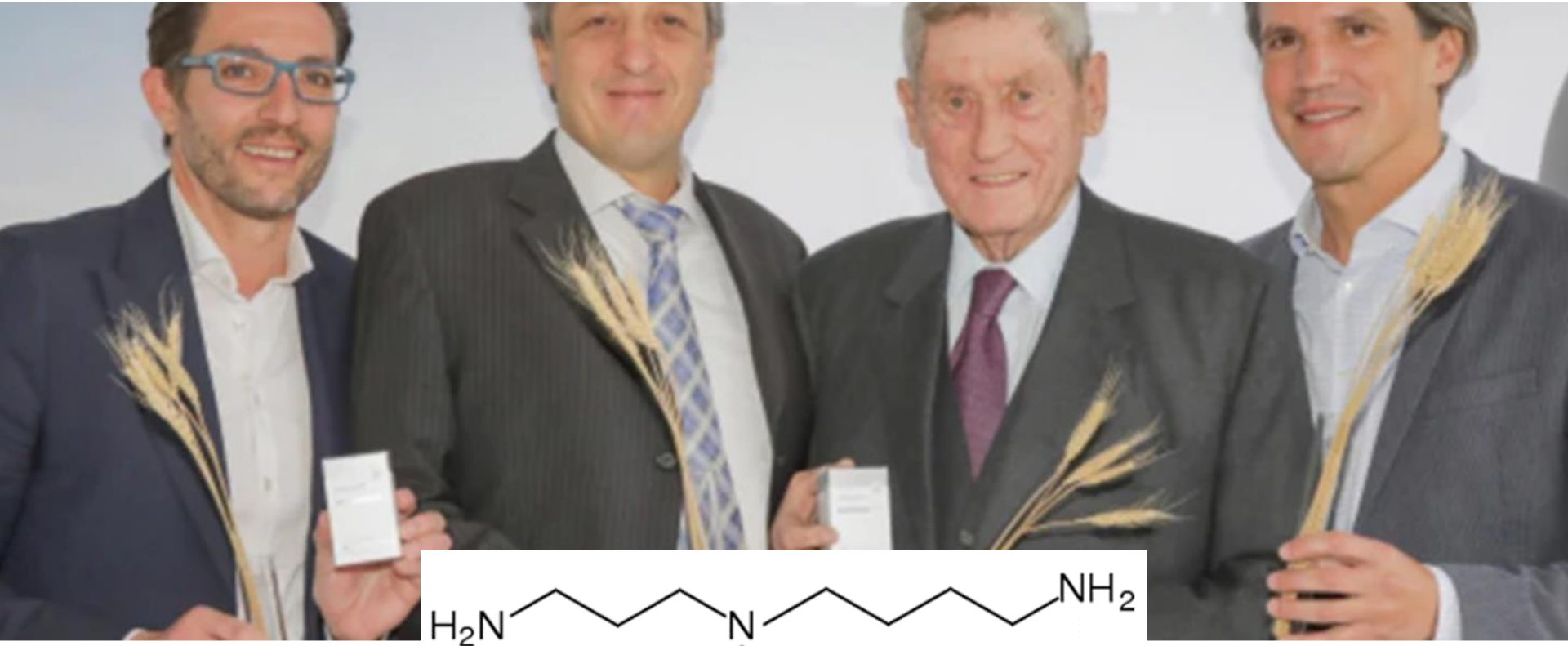
Rafael de Cabo, Ph.D., and Mark P. Mattson, Ph.D.

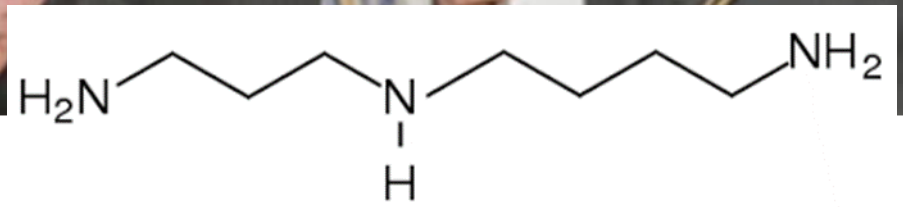
DER GROSSE HUNGER STRESS AUTOPHAGIE - RECYCLING

Jack Dorsey, Mitgründer und Vorstandsvorsitzender von zwei prominenten Technologieunternehmen, dem **Kurznachrichtendienst Twitter** und der Bezahlplattform Square.

Ich esse nur sieben Mal pro Woche

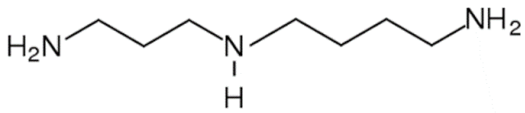
caloric restriction mimetics (CRMs)





Hannes Androsch investiert in Longevity

NA:TO

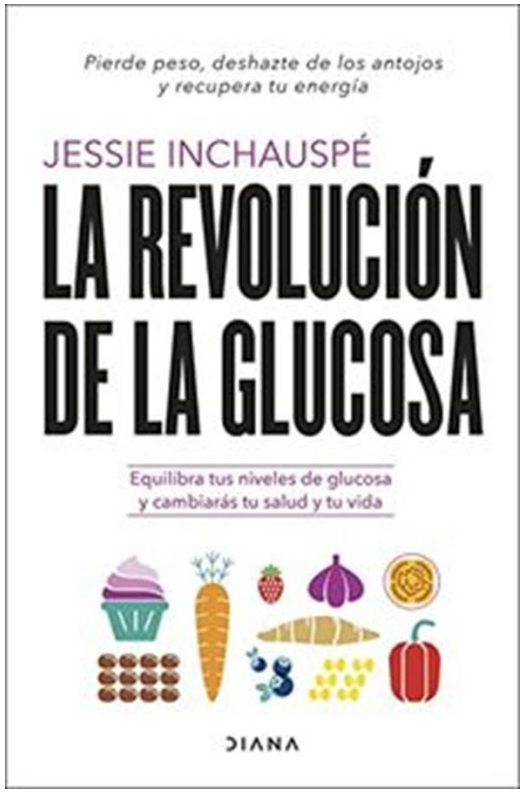


Indeed, daily intake of 50 to100 g of natto over a 2-month period significantly increased the whole-blood spermine content of healthy human

Zur Herstellung werden die Bohnen gekocht und anschließend durch Einwirkung des Bakteriums Bacillus subtilis ssp. natto fermentiert. Dadurch bildet sich ein fädenziehender Schleim

S. Pucciarelli et al , Spermidine and spermine are enriched in whole blood of nona/centenarians. Rejuvenation Res. 15, 590–595 (2012). 10.1089/rej.2012.1349

Jessie Inchauspé
Französische Biochemikerin



Neue Zürcher Zeitung

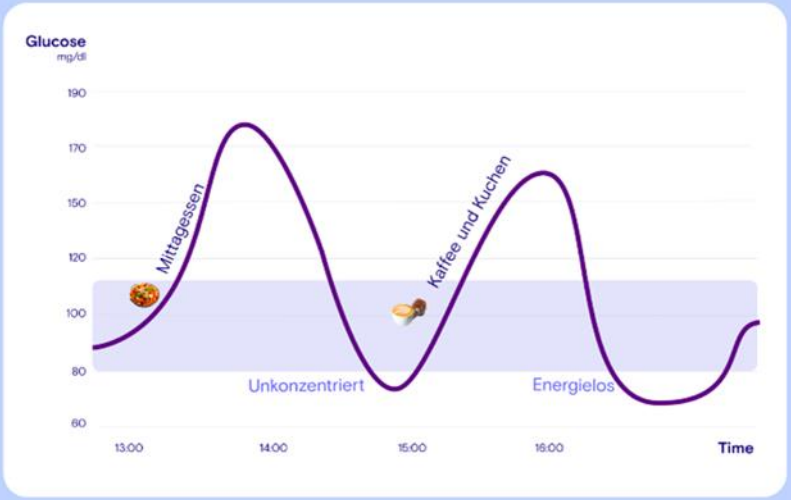
Ideale Blutzuckerwerte schützen laut der Bestsellerautorin Jessie Inchauspé vor Krebs und Demenz. Kann das wirklich sein?

Ein Millionenpublikum befolgt die Tricks der selbsternannten Glukose-Göttin Jessie Inchauspé, um rundum gesund zu bleiben.
Fachleute sind skeptisch. Denn viele Behauptungen der französischen Biochemikerin lassen sich nicht belegen.

Michael Brendler

17.10.2024, 08.56 Uhr 7 min

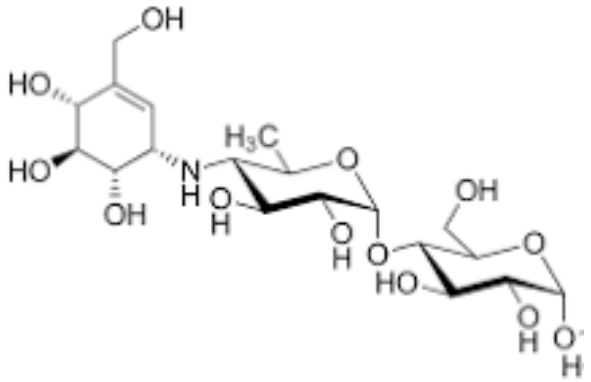
Die Blutzucker Achterbahn



HI

ACARBOSE

Acarbose is a bacterial product that inhibits α-glucosidases in the intestine, thus slowing the breakdown of starch and disaccharides to glucose**. It is used clinically to prevent post-prandial hyperglycemia** and generally causes weight loss and improved glycaemic control. Acarbose can rescue age-related glucose intolerance has been considered as a potential mimetic of DR



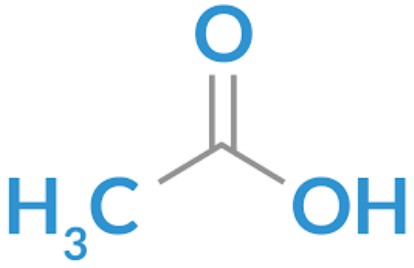
Aging and Disease
www.aginganddisease.org
Volume 13, Number 4; 1005-1014, August 2022
http://dx.doi.org/10.14336/AD.2022.0117

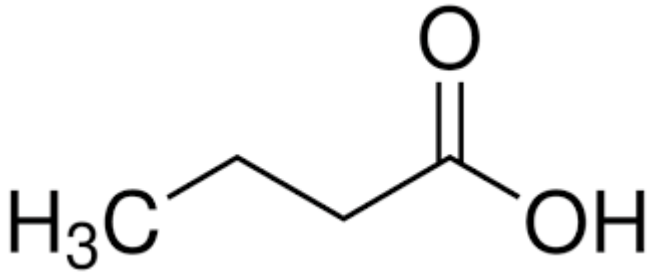
Commentary

Extension of the Life Span by Acarbose: Is It Mediated by the Gut Microbiota?

Baiyun Wu[1,2], Jiai Yan[1,3], Ju Yang[1,3], Yanping Xia[1,3], Dan Li[1,3], Feng Zhang[1,3*], Hong Cao[1,3,4*]

[1]Nutritional Department, Affiliated Hospital of Jiangnan University, Wuxi, China. [2]School of Medicine, Nantong University, Nantong, China. [3]Clinical Assessment Center of Functional Food, Affiliated Hospital of Jiangnan University, Wuxi, China. [4]Department of Endocrinology, Affiliated Hospital of Jiangnan University, Wuxi, China.





The **acetic acid and butyric acid** levels were found to increase after acarbose treatment in most populations in Germany and the United States, but no significant difference was observed in the butyric acid level after acarbose treatment in diabetic populations in China.

In nondiabetic people in the United States, the butyric acid levels increased, whereas the acetic acid levels did not significantly change after acarbose treatment.

FECES OF CENTENARIANS

In feces of centenarians in China, seven characteristic compounds (i.e., total SCFA; manganese; cobalt; and acetic, propionic, butyric, and valeric acids) were identified.

This metabolic pattern, particularly the increase in the levels of total bile acids and SCFAs, may have an important and positive effect on longevity .

EDITORIAL ARTICLE

Front. Endocrinol., 06 December 2019 | https://doi.org/10.3389/fendo.2019.00851

Editorial: Metformin: Beyond Diabetes

 **Frédéric Bost**[1*],  **Graham Rena**[2*] and  **Benoit Viollet**[3*]

[1]Université Nice Côte d'Azur, Inserm U1065, Nice, France

[2]University of Dundee, Dundee, United Kingdom

[3]Université de Paris, Institut Cochin, CNRS UMR8104, INSERM U1016, Paris, France

Erfrieren - der Kälte Stress

NEWS & VIEWS

OBESITY

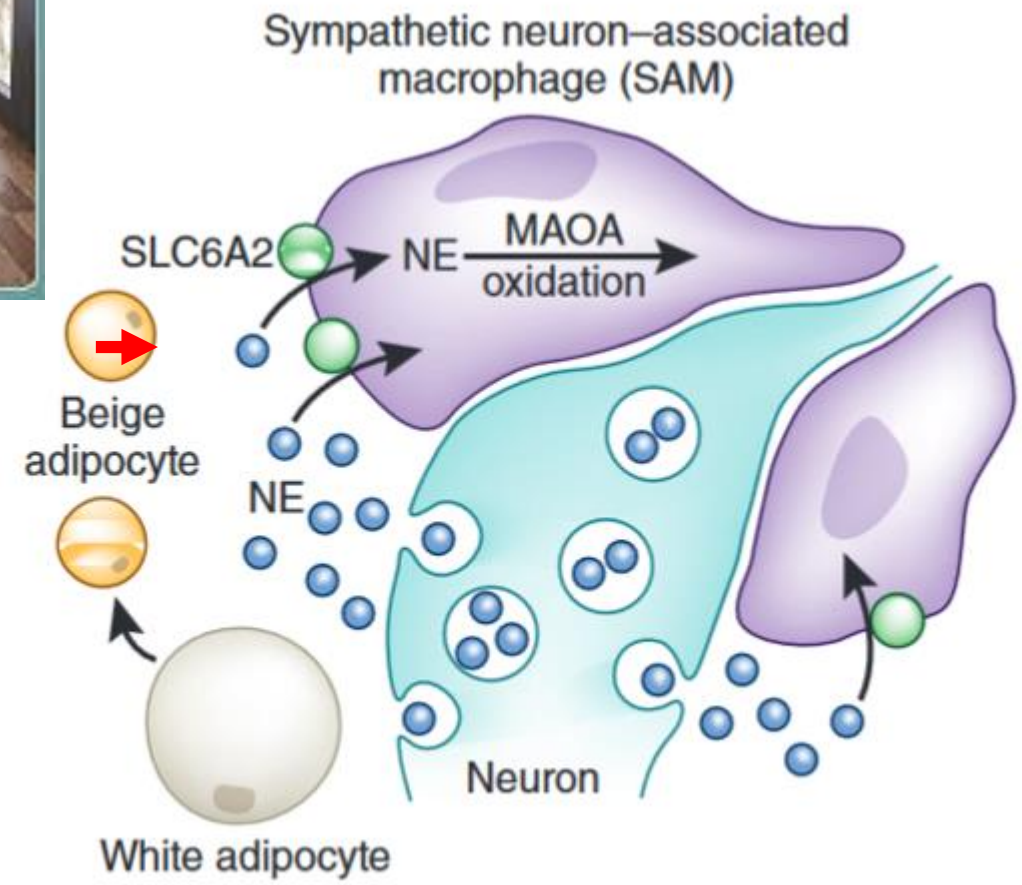
Be cool, lose weight

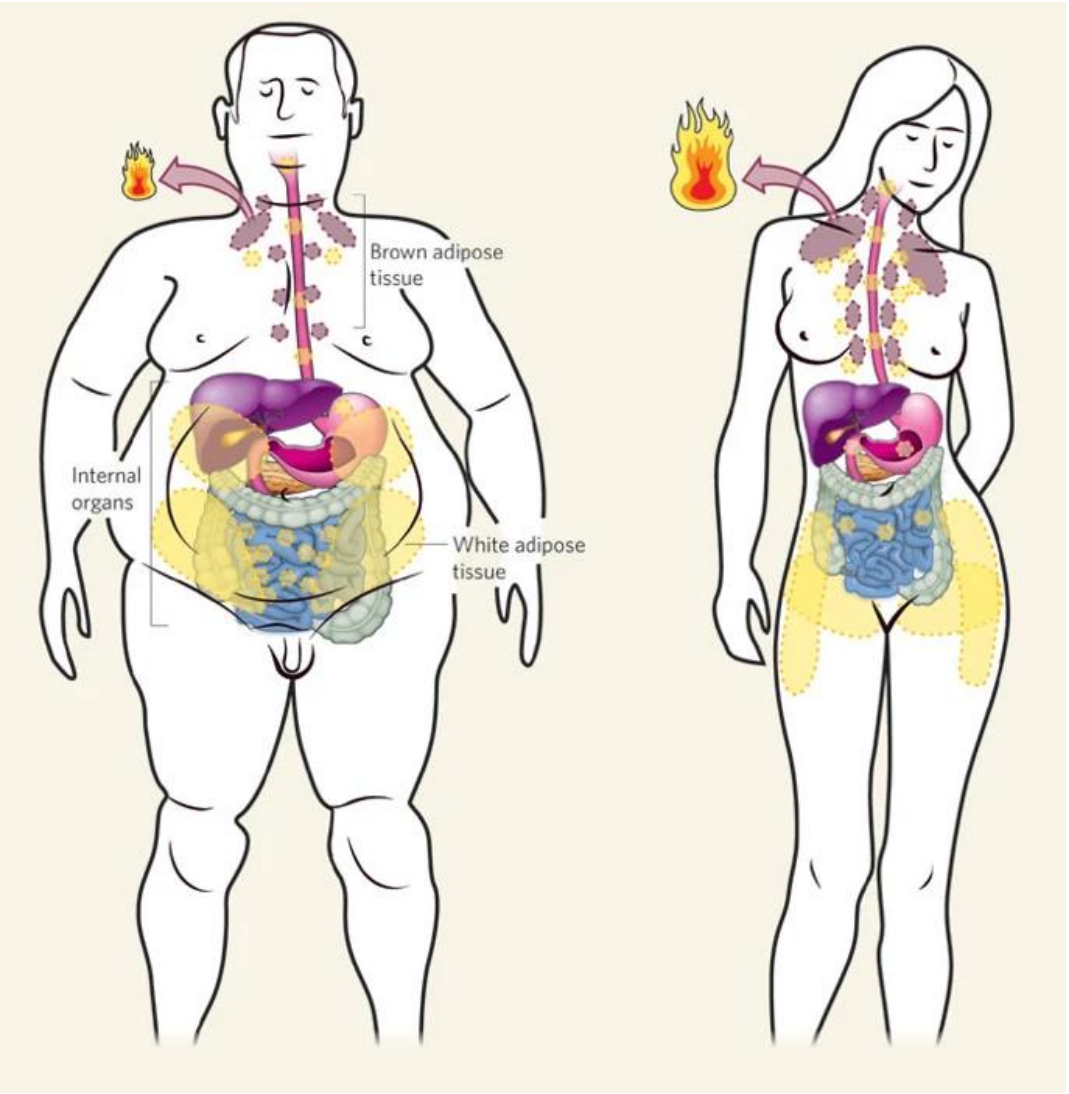
Stephen R. Farmer

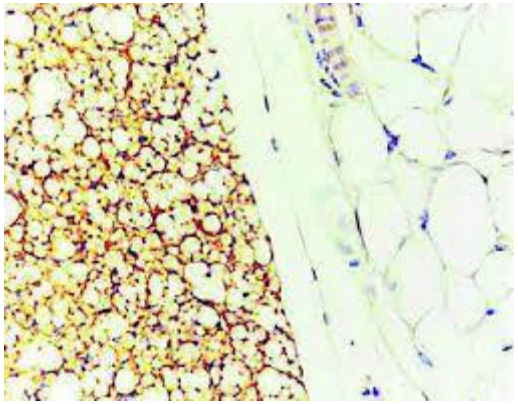
To lose weight, would you rather diet, exercise or subject yourself to cool temperatures? The last choice is not such an odd one, as adult humans have brown fat tissue that burns calories in response to cold.

In einem Podcast sagte Jack Dorsey unlängst, nichts gebe ihm so viel Selbstvertrauen wie morgens **vom warmen Bett direkt ins Eisbad** zu gehen. "Es mag wie eine Kleinigkeit erscheinen, ist aber sehr schmerzhaft, und wenn ich mich dazu überwinden kann, dann traue ich mir fast alles zu."


Improved circulation
Stress relief
Boost immunity
Help muscle spasms
Wound healing
Weight management


Sympathetic neuron–associated macrophage (SAM)
SLC6A2
NE
MAOA
oxidation
Beige adipocyte
NE
Neuron
White adipocyte



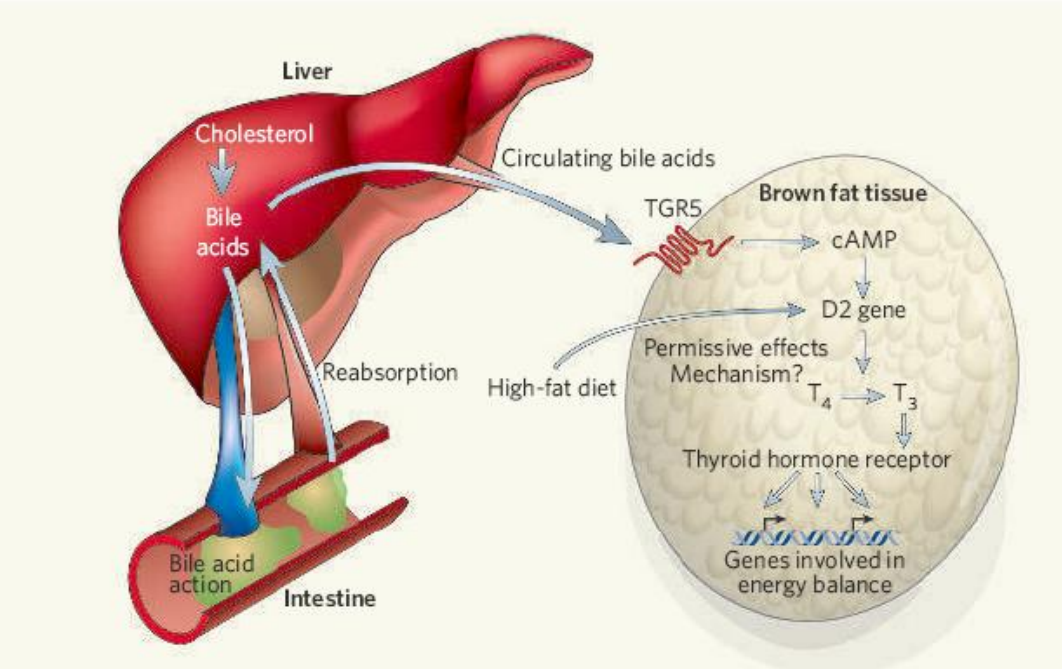


Stephen R. Farmer Nature volume 458, pages 839–840 (2009)

nature medicine

Cold-induced conversion of cholesterol to bile acids in mice shapes the gut microbiome and promotes adaptive thermogenesis

Anna Worthmann[1,7], Clara John[1,7], Malte C Rühlemann[2], Miriam Baguhl[1], Femke-Anouska Heinsen[2], Nicola Schaltenberg[1], Markus Heine[1], Christian Schlein[1], Ioannis Evangelakos[1], Chieko Mineo[3], Markus Fischer[4], Maura Dandri[5], Claus Kremoser[6], Ludger Scheja[1],



Blasenmittel bewirkt Wunder

Frankfurter Allgemeine
Wissen
Montag, 28. März 2016

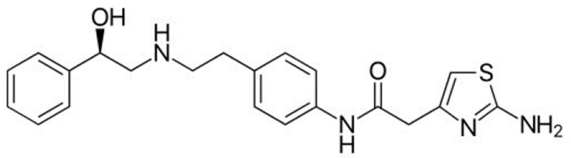
Schutz vor Übergewicht

Den Speck mit braunem Fett verheizen

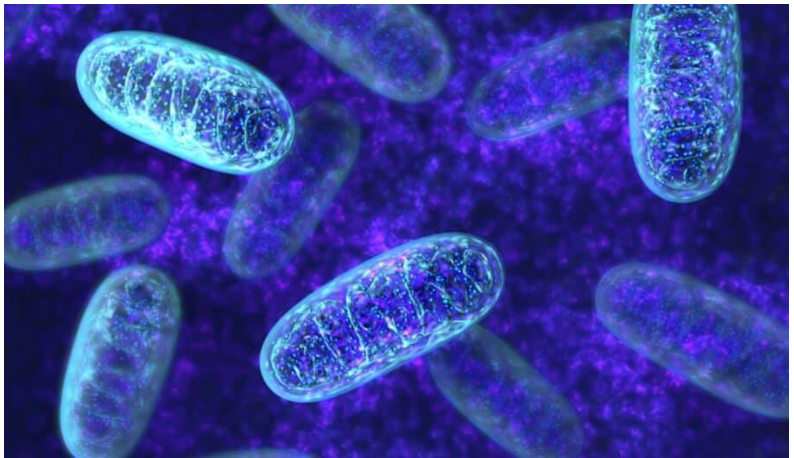
Es klingt paradox: Wer dick ist, hat weniger braunes Fett. Das Gewebe scheint gegen Übergewicht zu helfen. Jetzt werden erste Mittel getestet, mit denen man die hilfreichen Zellen aktivieren will.

24.02.2016, von NICOLA VON LUTTEROTTI

Mirabegron



Verfolgung - der Muskel Stress



nature communications

Article

https://doi.org/10.1038/s41467-023-39873-9

Platelet-derived exerkine CXCL4/platelet factor 4 rejuvenates hippocampal neurogenesis and restores cognitive function in aged mice

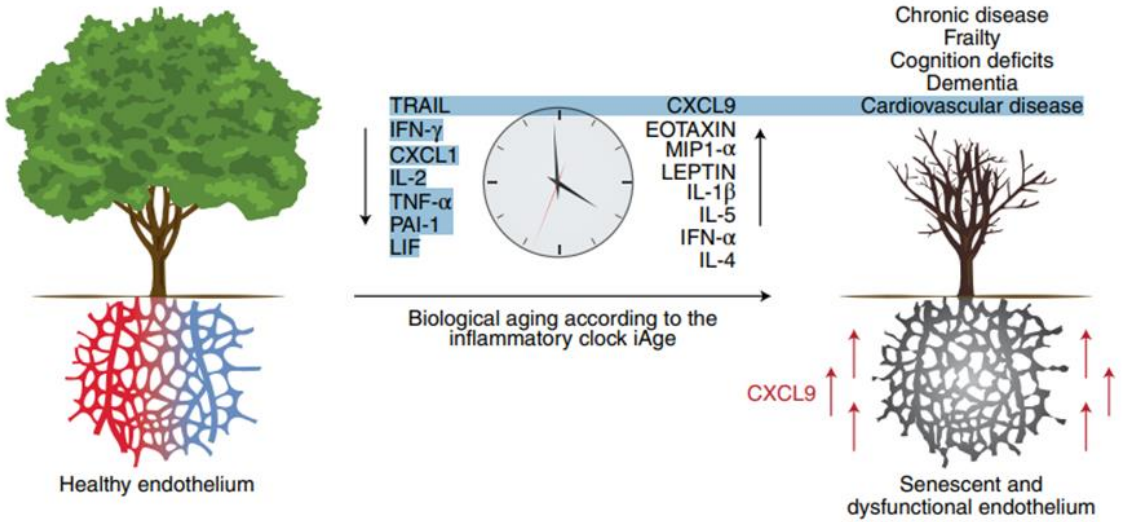
Received: 28 September 2022

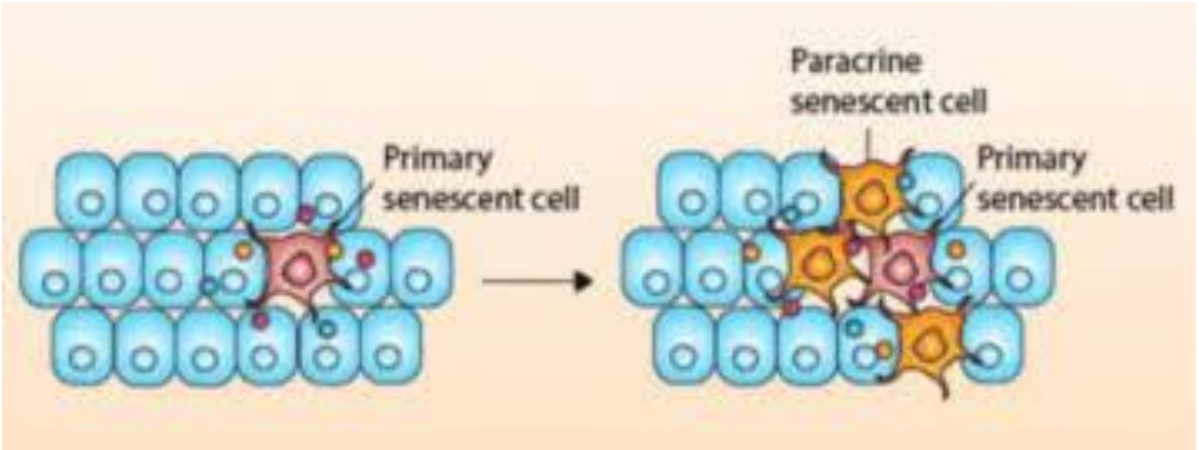
Accepted: 20 June 2023

Published online: 16 August 2023

Odette Leiter[1], David Brici[1], Stephen J. Fletcher[2], Xuan Ling Hilary Yong[1], Jocelyn Widagdo[1], Nicholas Matigian[3], Adam B. Schroer[4], Gregor Bieri[4], Daniel G. Blackmore[1], Perry F. Bartlett[1], Victor Anggono[1], Saul A. Villeda[4,5,6] & Tara L. Walker[1]

Immunologische Senolyse



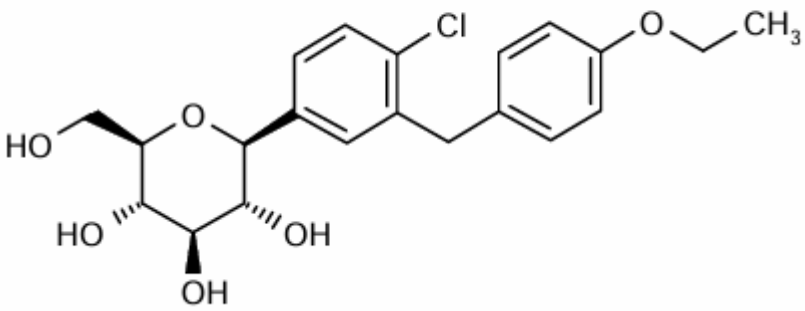


Drugs of the Future 2008, 33(9): 745-751

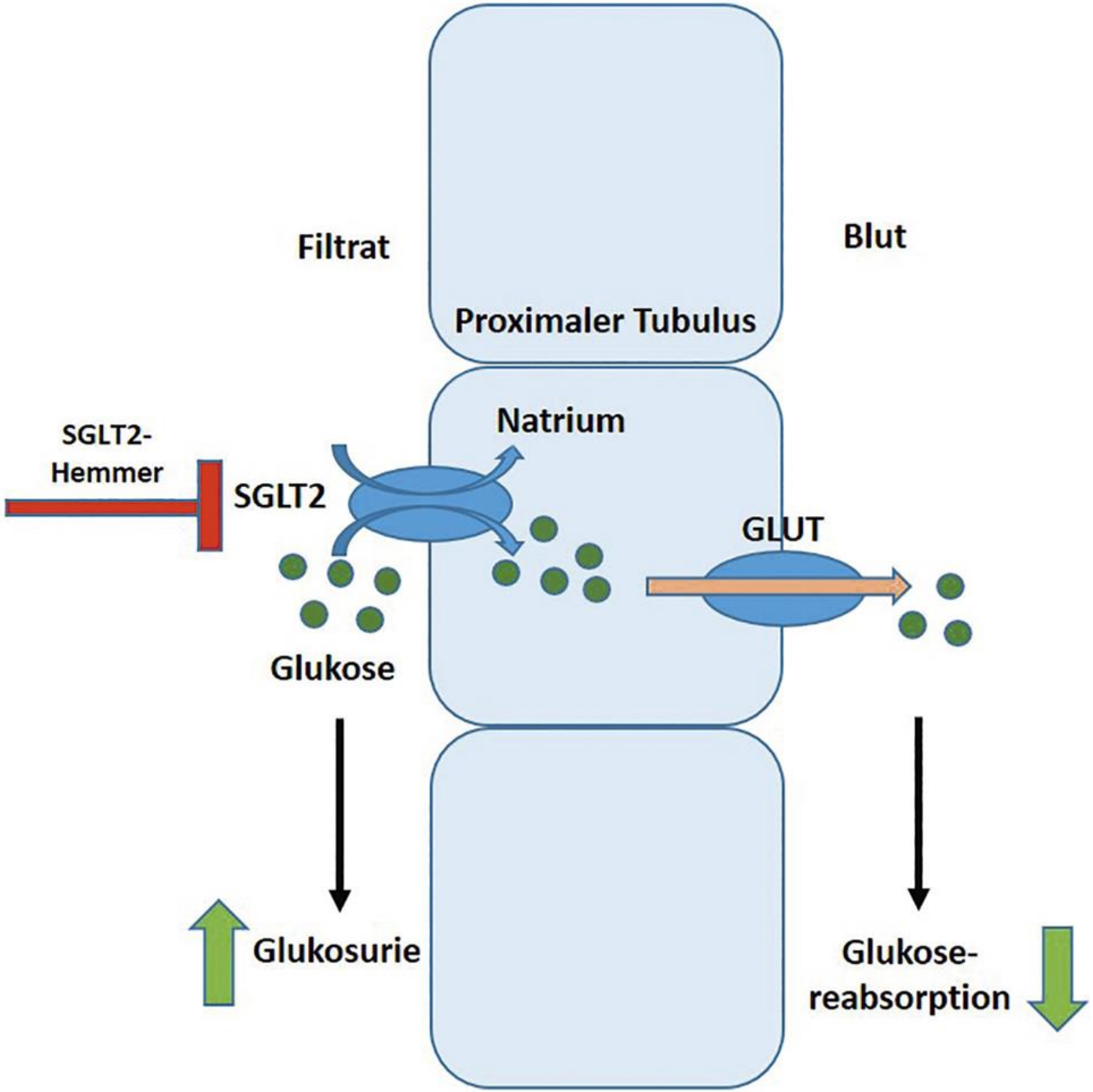
CCC: 0377-8282/2008
DOI: 10.1358/dof.2008.033.09.1251351

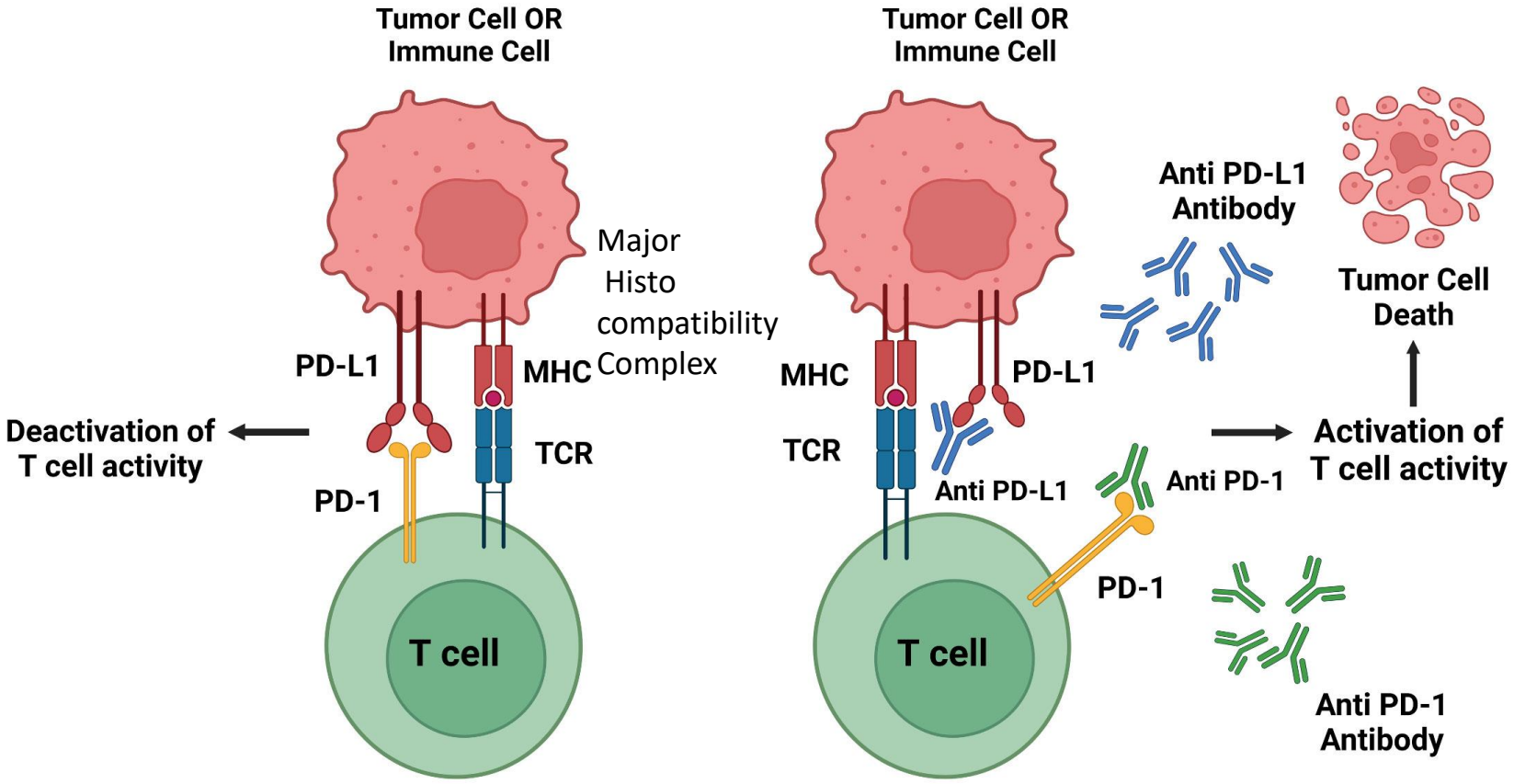
Dapagliflozin

Prop INN; USAN

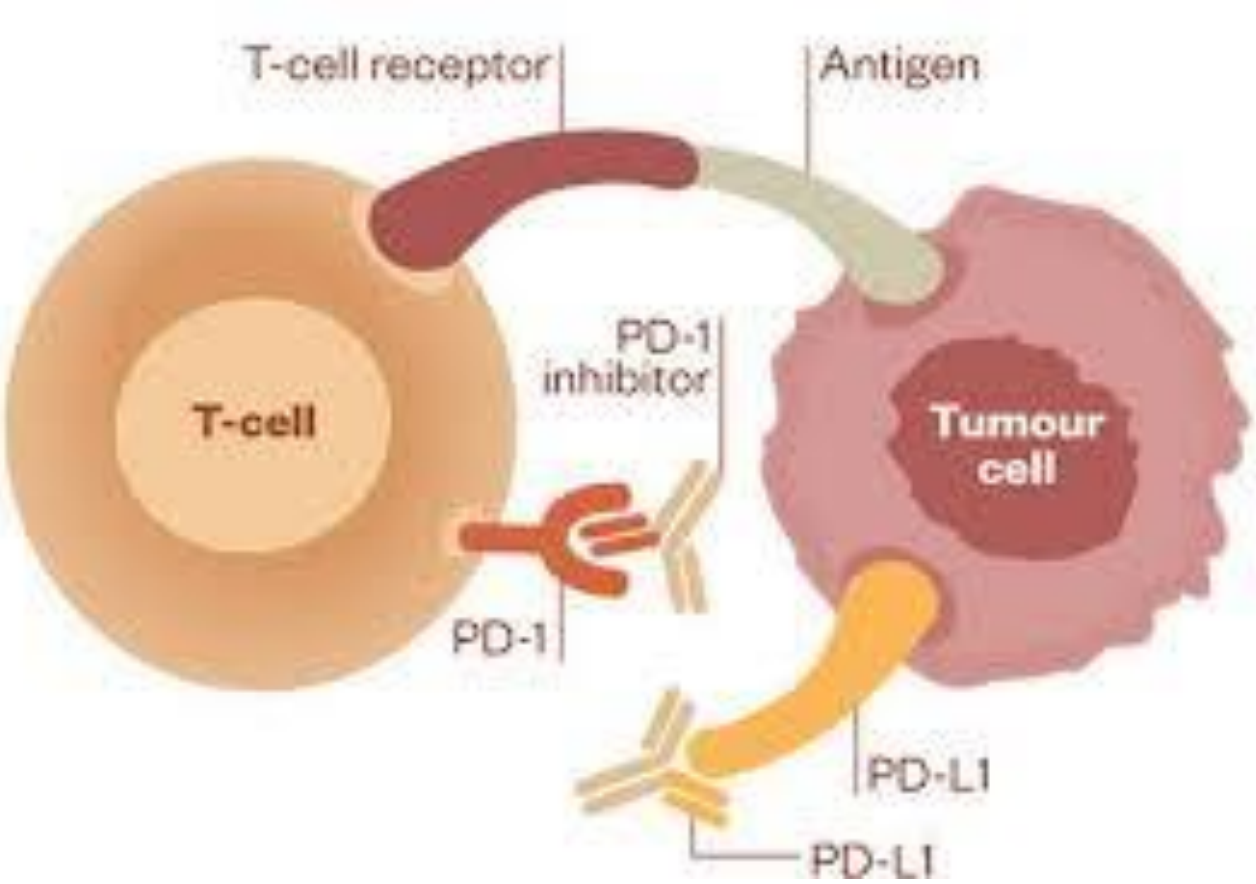


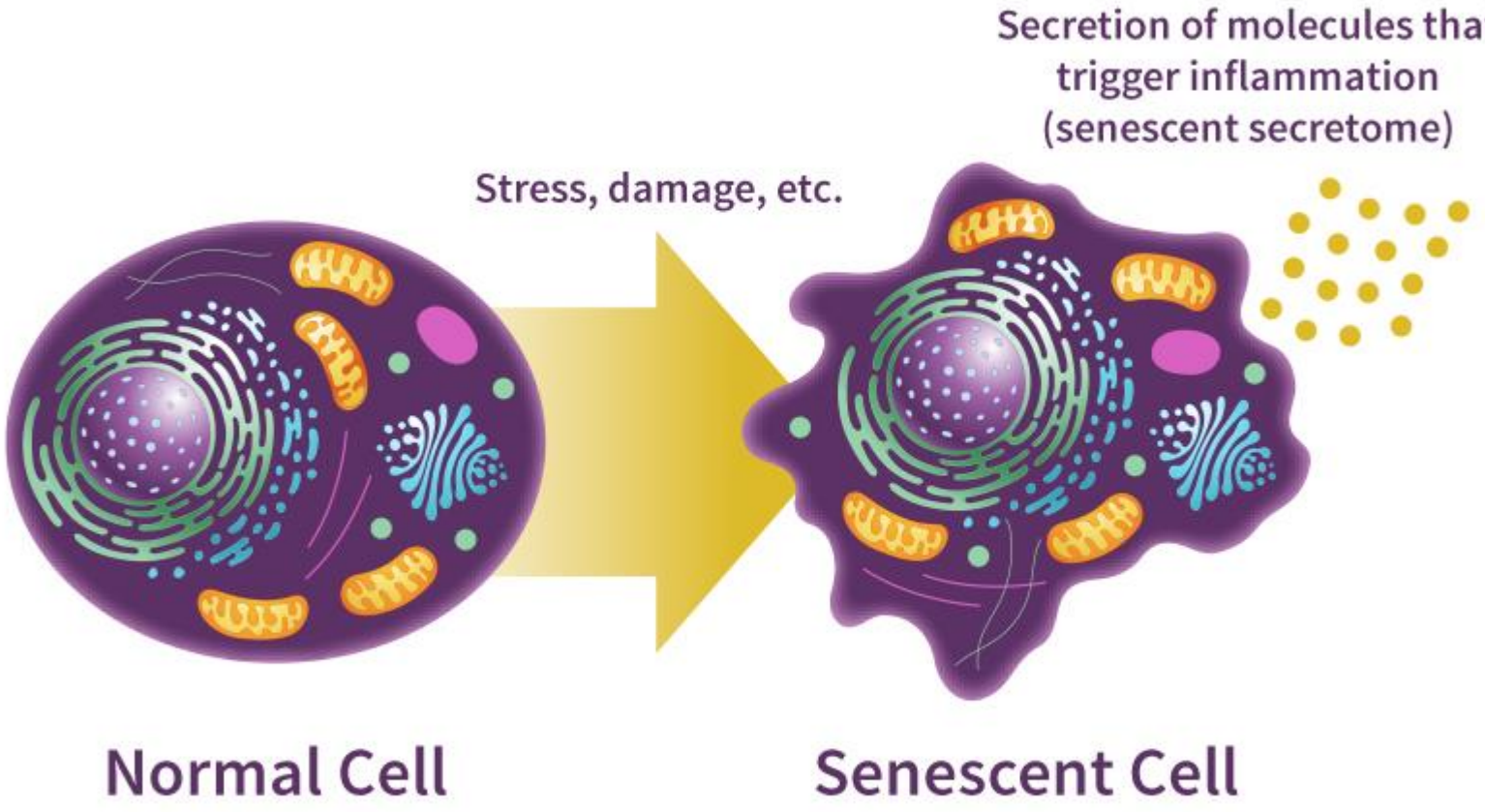
Sodium-glucose Cotransporter-2 (SGLT2) Inhibitors


Filtrat
Blut
Proximaler Tubulus
Natrium
SGLT2-
Hemmer
SGLT2
GLUT
Glukose
Glukosurie
Glukose-
reabsorption

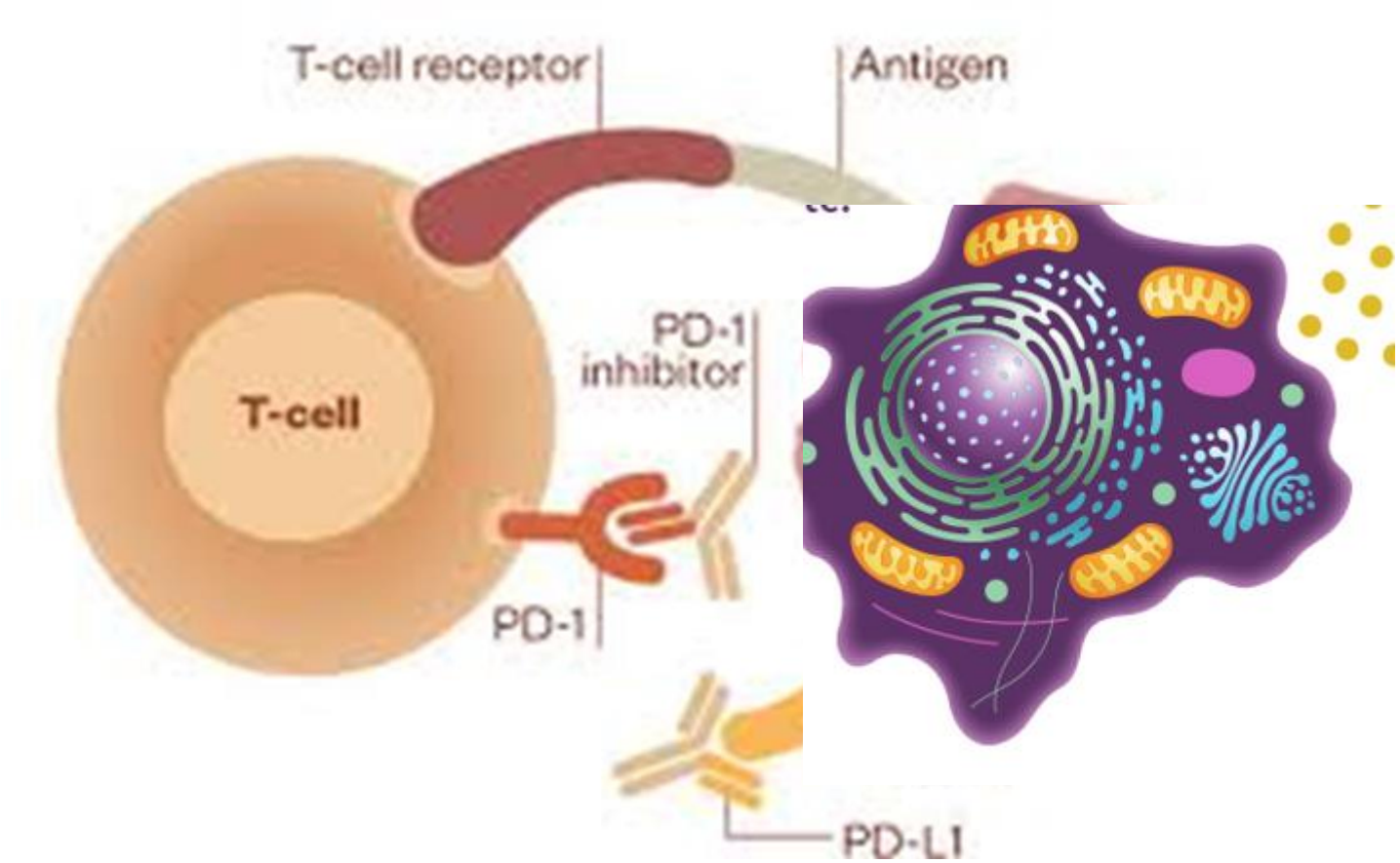


Programmed cell death 1 ligand 1 ist ein Oberflächenprotein und beteiligt an der Hemmung der Immunantwort.


T-cell receptor
Antigen
T-cell
PD-1
inhibitor
Tumour
cell
PD-1
PD-L1
PD-L1



Studies have reported that SGLT2 inhibitors inhibit the accumulation of senescent cells


T-cell receptor
Antigen
T-cell
PD-1
inhibitor
PD-1
PD-L1

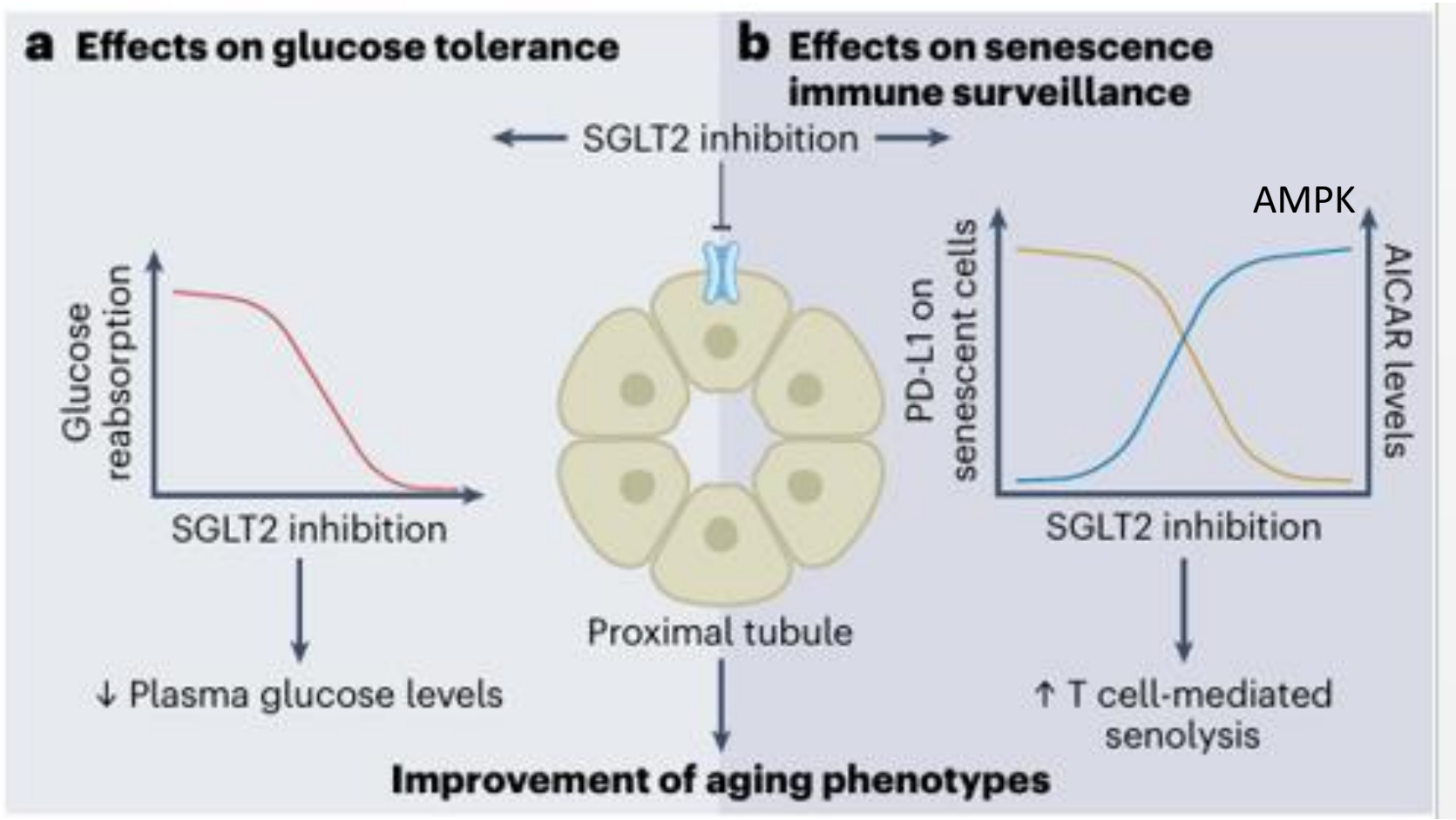
nature

Article | Published: 02 November 2022

Blocking PD-L1–PD-1 improves senescence surveillance and ageing phenotypes

Teh-Wei Wang, Yoshikazu Johmura ✉, Narumi Suzuki, Satotaka Omori, Toshiro Migita,

DAS NEUE SENOLYTICUM



II. ERHALTUNG DER ART - HORMONE

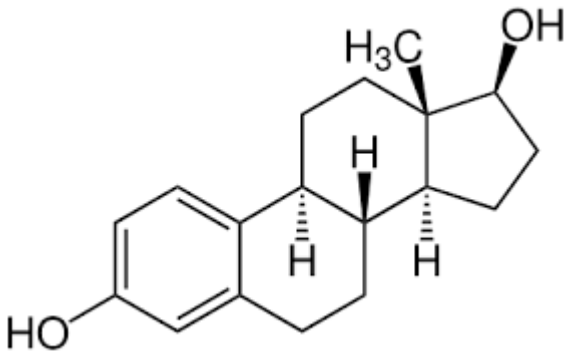
JAMA Network Open

Original Investigation | Obstetrics and Gynecology

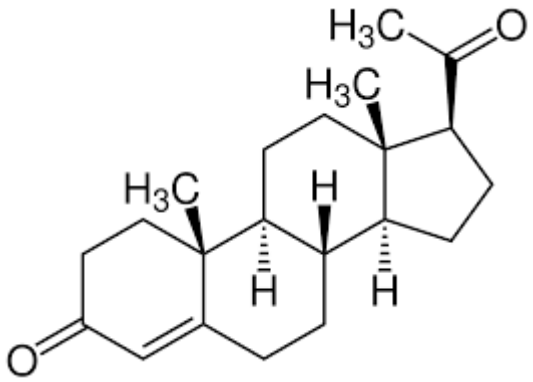
Hormone Therapy and Biological Aging in Postmenopausal Women

Yufan Liu; Chenglong Li, PhD

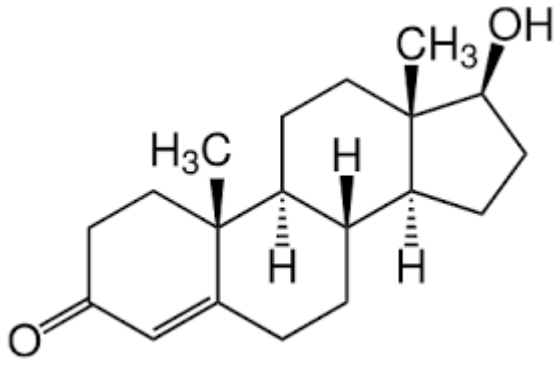
JAMA Network Open. 2024;7(8):e2430839.



ÖSTROGEN
Das Hormon der Schönheit



PROGESTERON
Das Hormon der Weisheit



TESTOSTERON
Das Hormon der Stärke

Solving an age-old problem

Western governments need to rethink their approach to dealing with an ageing population.

Conjugated equine oestrogen and breast cancer incidence and mortality in postmenopausal women with hysterectomy: extended follow-up of the Women's Health Initiative randomised placebo-controlled trial

Garnet L Anderson, Rowan T Chlebowski, Aaron K Aragaki, Lewis H Kuller, JoAnn E Manson, Margery Gass, Elizabeth Bluhm, Stephanie Connelly, F Allan Hubbell, Dorothy Lane, Lisa Martin, Judith Ockene, Thomas Rohan, Robert Schenken, Jean Wactawski-Wende

Lancet Oncol 2012; 13: 476–86

Published Online
March 7, 2012
DOI:10.1016/S1470-2045(12)70075-X

Summary

Background By contrast with many observational studies, women in the Women's Health Initiative (WHI) trial who were randomly allocated to receive oestrogen alone had a lower incidence of invasive breast cancer than did those who received placebo. We aimed to assess the influence of oestrogen use on longer term breast cancer incidence and mortality in extended follow-up of this cohort.

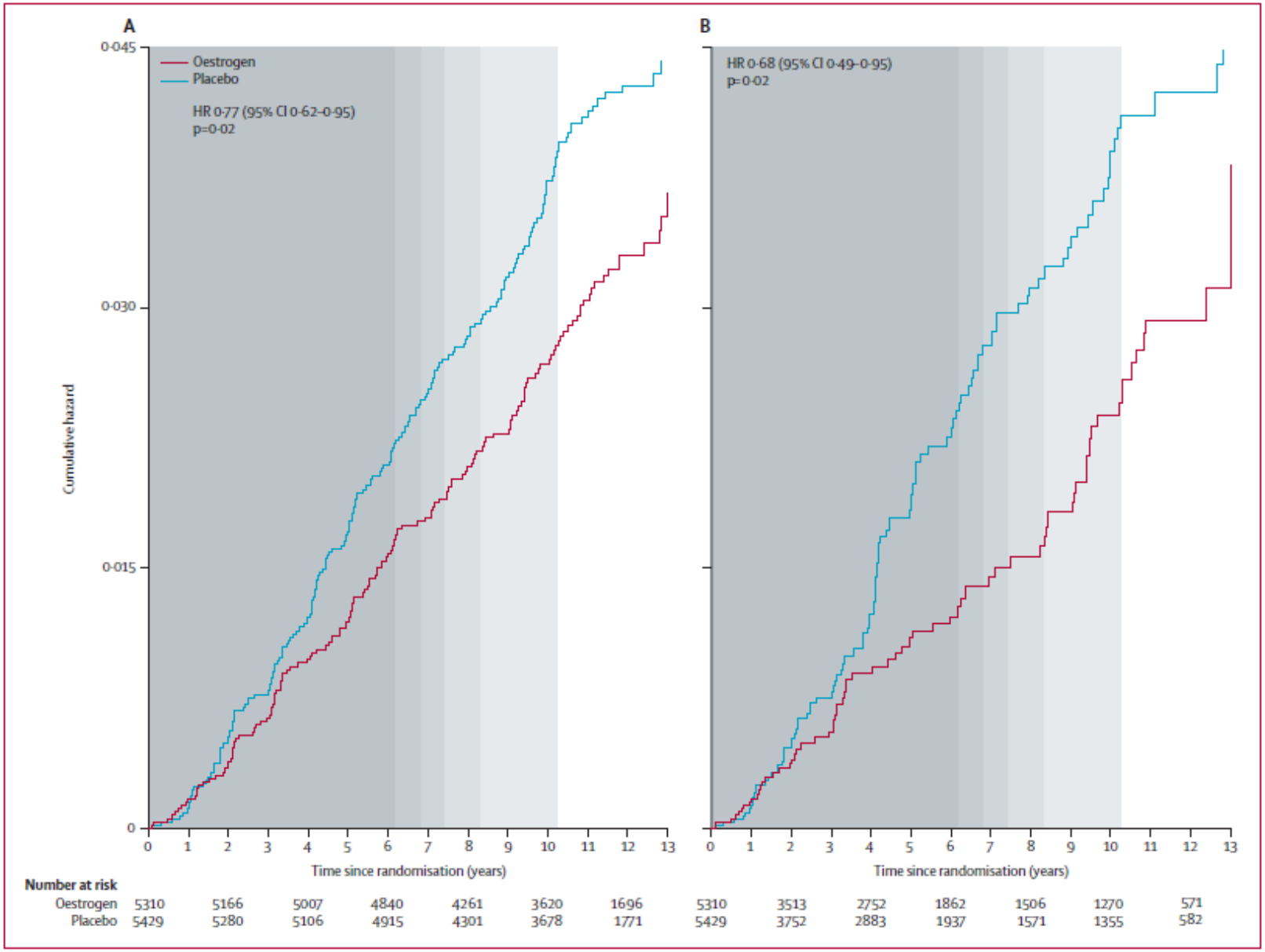


Figure 1: **Kaplan-Meier estimates of cumulative hazards of invasive breast cancer in the WHI randomised trial of conjugated equine oestrogen with the intention-to-treat principle (A) and with adjustments for adherence (B)**

Background shading shows the distribution of the duration of intervention (in quintiles). HR=hazard ratio.

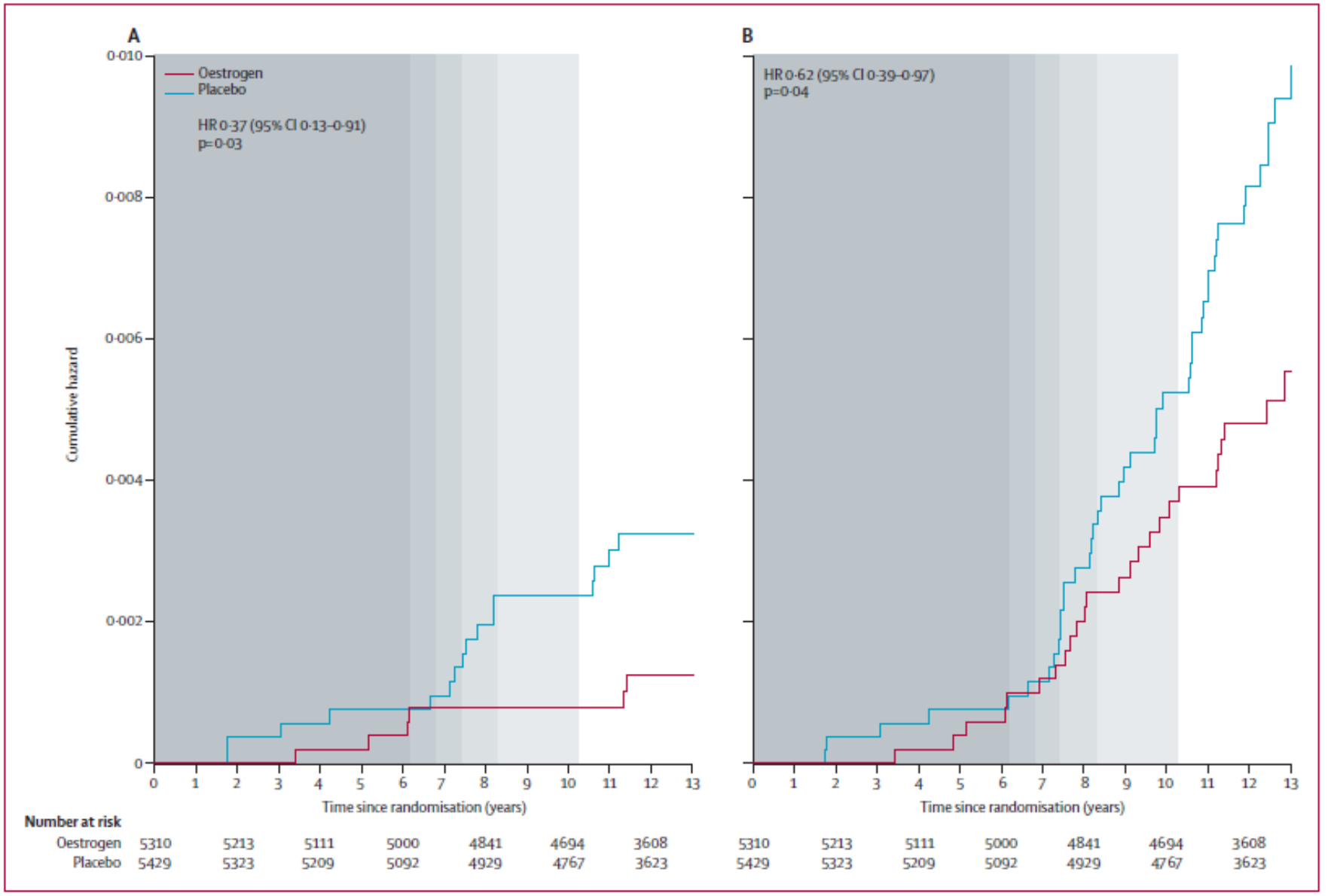


Figure 2: **Kaplan-Meier estimates of cumulative hazards for breast cancer deaths (A) and all-cause mortality after breast cancer (B) in the WHI randomised trial of conjugated equine oestrogen**
Background shading shows the distribution of the duration of intervention (in quintiles). HR=hazard ratio.

III. SENOLYSE
Altern ist ansteckend

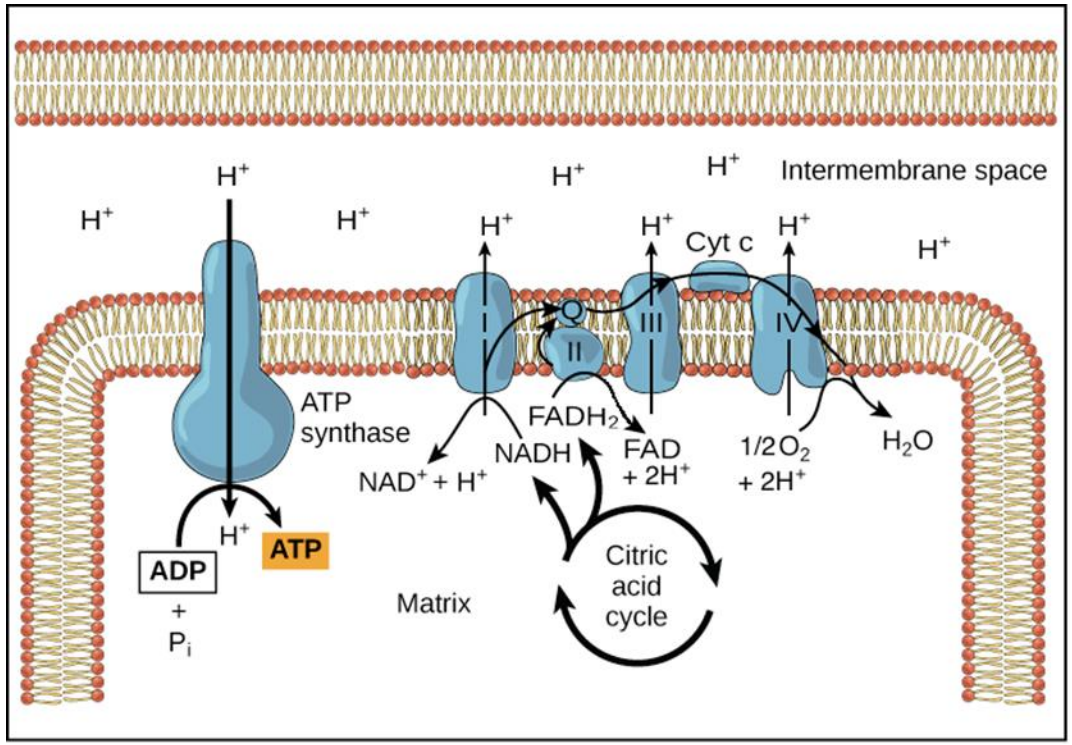
CELL METABOLISM

The resurgence of NAD⁺

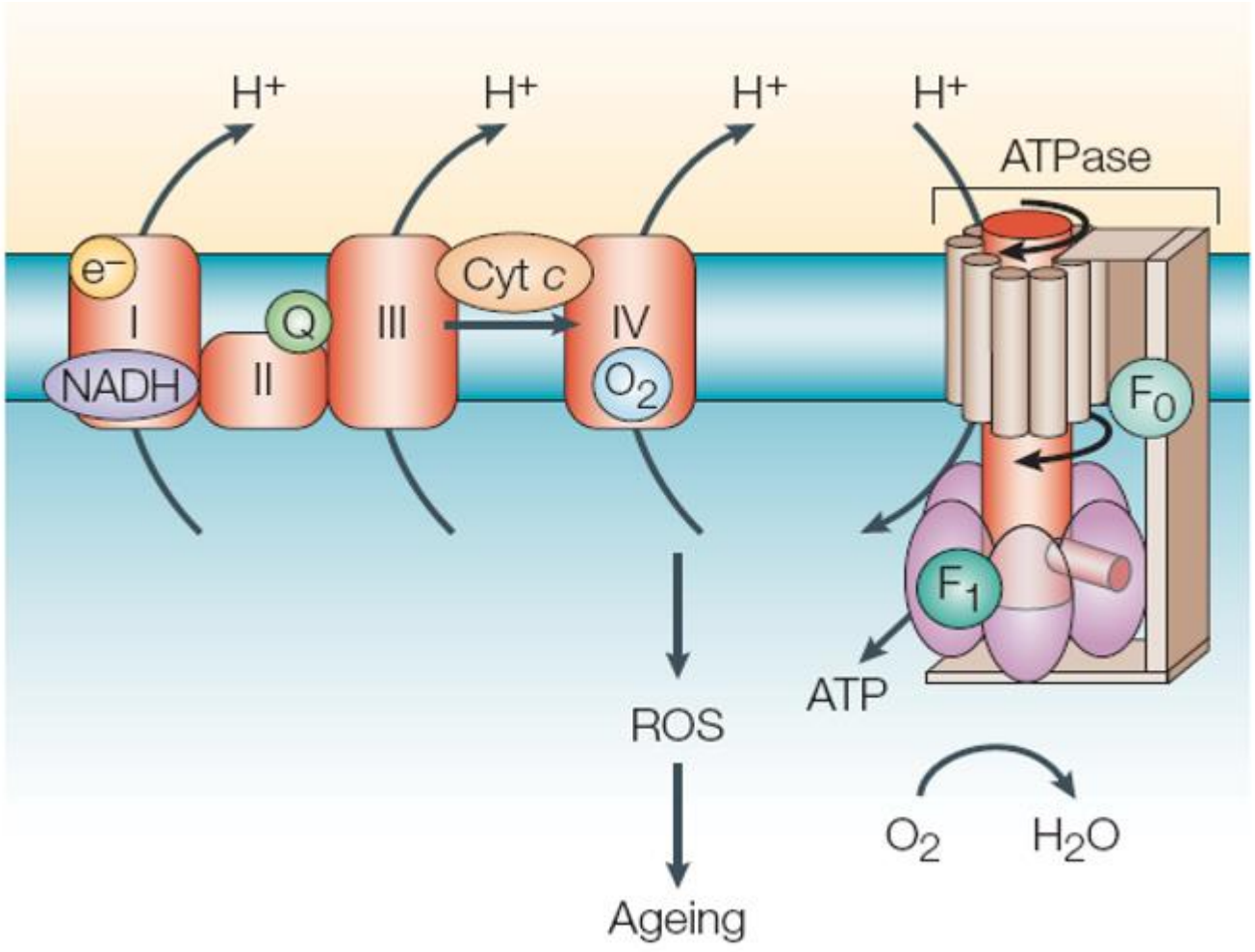
Restoring a mitochondrial metabolite slows stem cell loss and aging

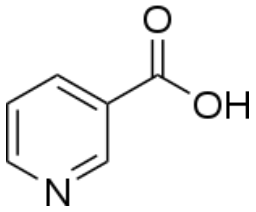
By **Leonard Guarente**

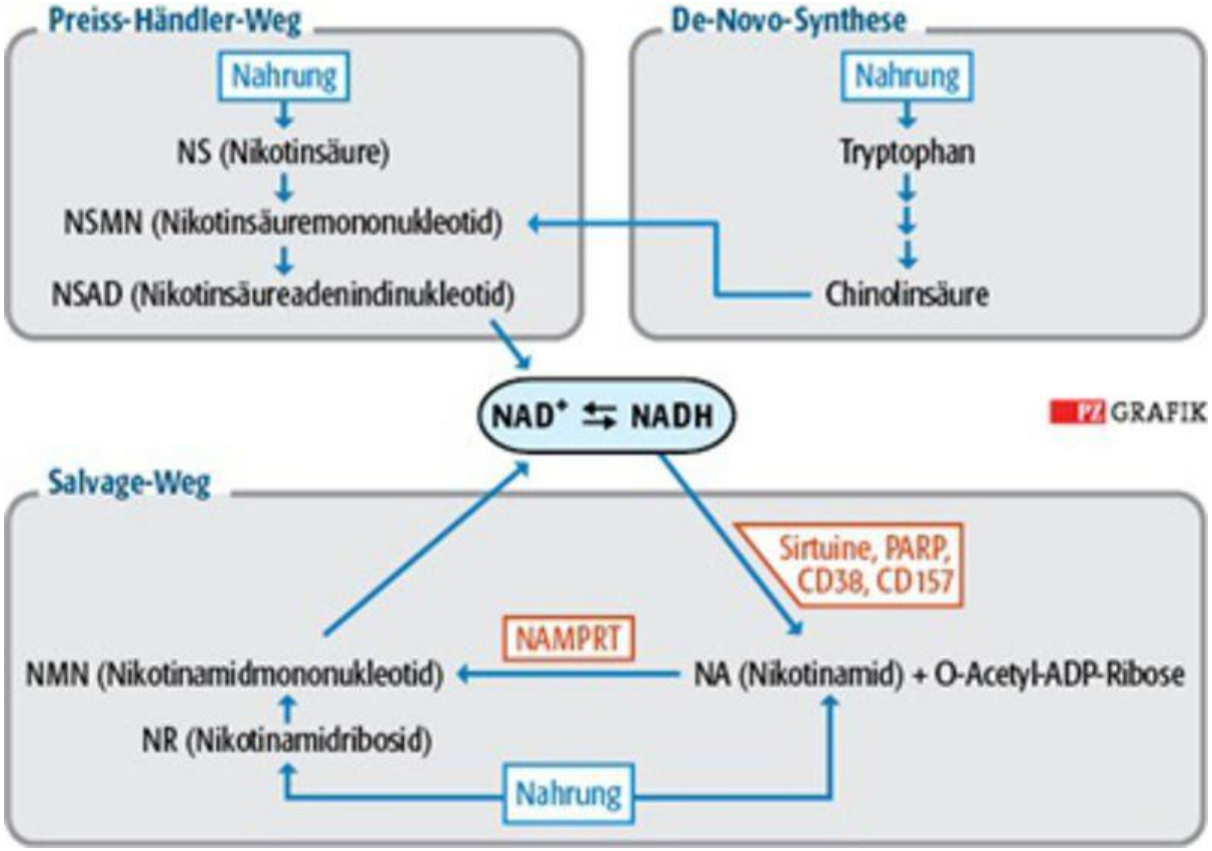
Interventions that can slow mammalian aging have been rare. On pages 1436 and 1474 of this issue, Zhang *et al.* (*1*) and Cambronne *et al.* (*2*), respectively, highlight nicotinamide adenine dinucleotide (NAD^+) as a major intervention point to slow or ameliorate phenotypes of aging.



LEBEN IST ELEKTRONIK





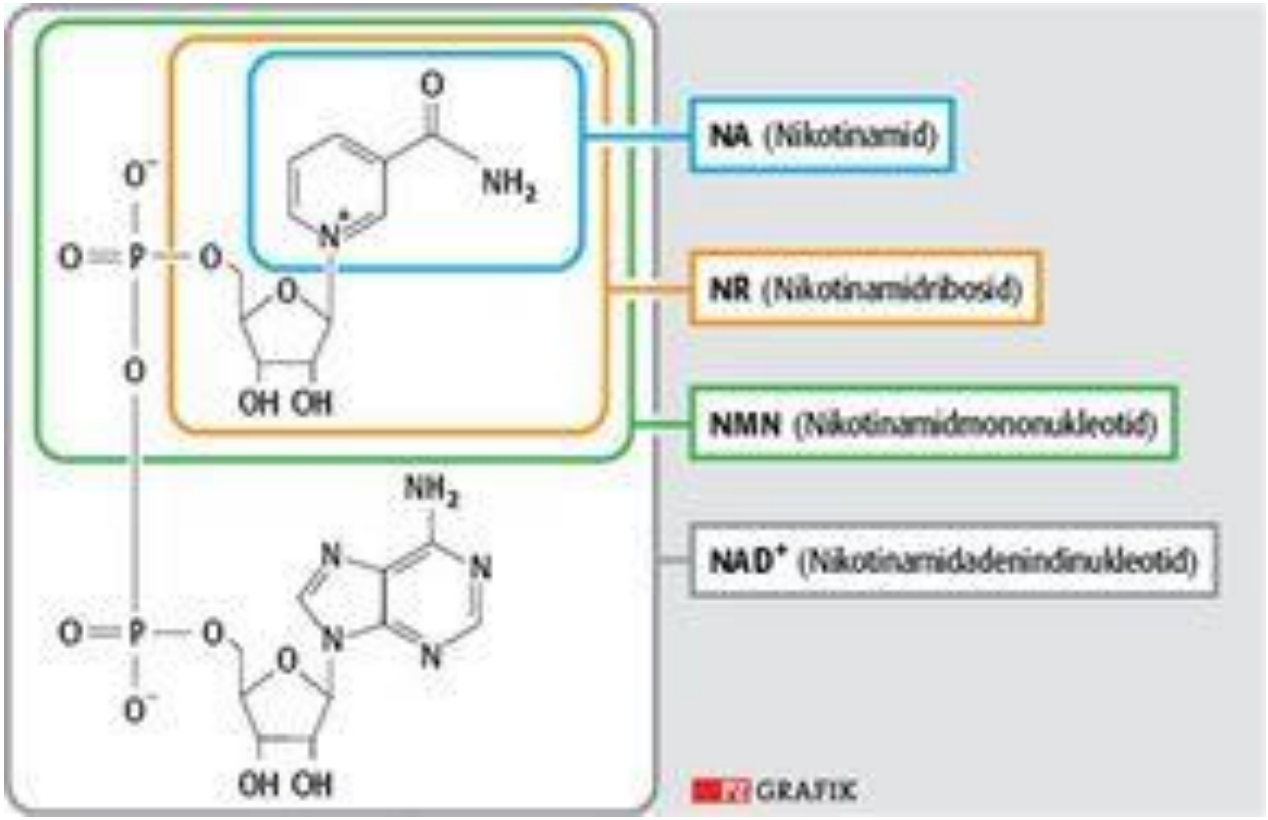


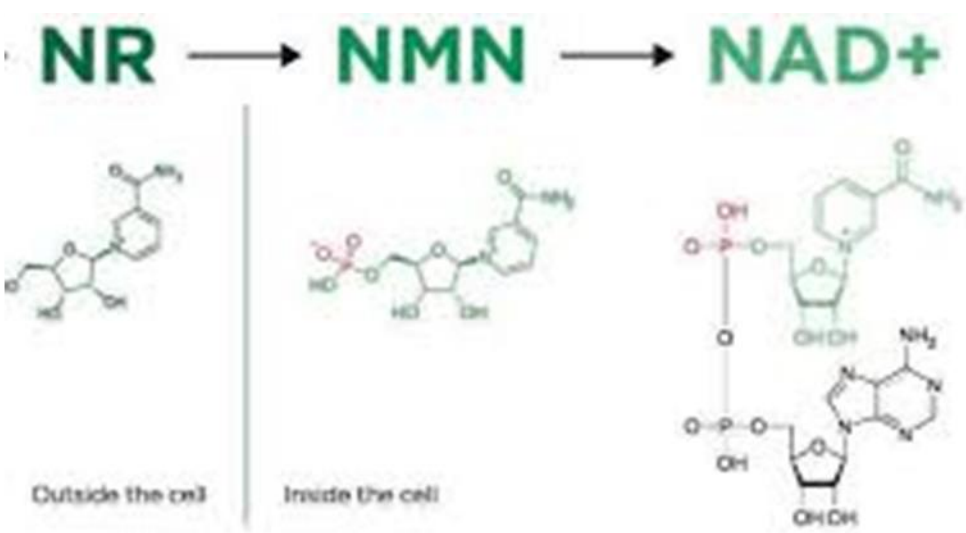
Nicotinic Acid, Nicotinamide, and Nicotinamide Riboside: A Molecular Evaluation of NAD^+ Precursor Vitamins in Human Nutrition

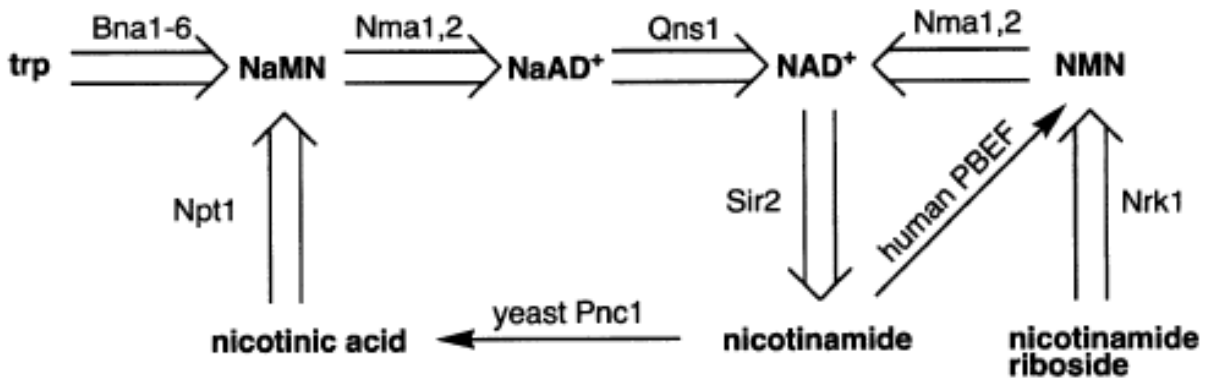
Katrina L. Bogan and Charles Brenner

Departments of Genetics and Biochemistry and the Norris Cotton Cancer Center, Dartmouth Medical School, Lebanon, New Hampshire 03756;
email: charles.brenner@dartmouth.edu

Numerous studies have demonstrated that NMN is capable of augmenting NAD+ biosynthesis and mitigating various pathological condition]. NMN was shown to prevents age-related gene expression changes in key metabolic organs. For example, in skeletal muscle, NMN enhances oxidative metabolism in mitochondria thereby effectively alleviating aging







hepato- and cardioprotective effects (Rajman et al., 2018);

alleviate vascular aging (Das et al., 2018);

improve learning, memory, and cognitive function

in Alzheimer disease models;

promote muscle function in models of muscular dystrophy (Rajman et al., 2018);

In fact, NR could extend the lifespan of mice even when administered late in life (Zhang et al., 2016c).

Einsteiger oder unter 35 Jahre:
👉 250 mg pro Tag

Erwachsene über 35 Jahre:
👉 500–1000 mg pro Tag

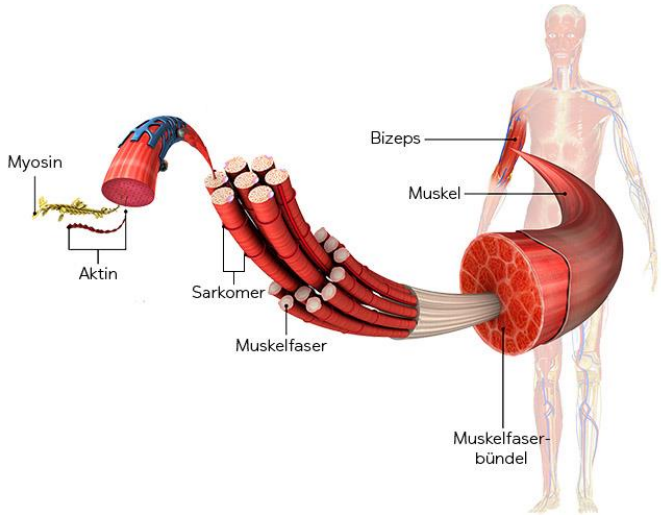
Aktive oder ältere Erwachsene:
👉 bis zu 1200 mg pro Tag,

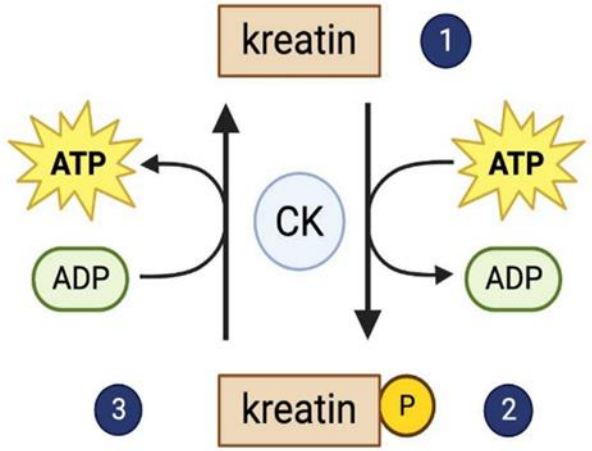
NR. 139 · SEITE N 1
MITTWOCH, 18. JUNI 2025
FRANKFURTER ALLGEMEINE ZEITUNG

Fitnesspulver für die Psyche

Im Internet wird Kreatin als Wundermittel gegen Depressionen und Alzheimer gepriesen. Wie gut ist das belegt?

Von Felix Kunz





European Neuropsychopharmacology 96 (2025) 3–4

Contents lists available at ScienceDirect

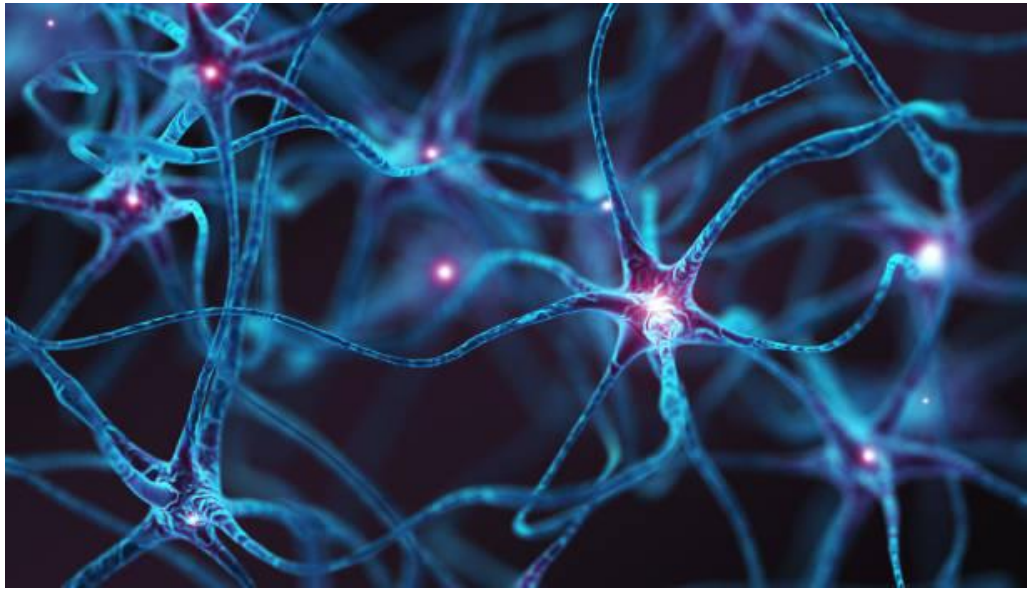
European Neuropsychopharmacology

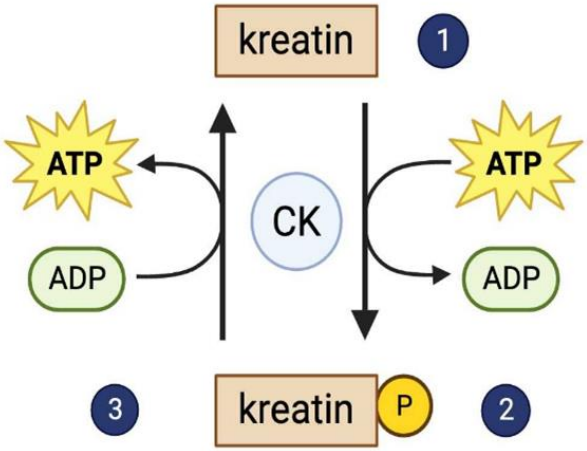
journal homepage: www.sciencedirect.com/journal/european-neuropsychopharmacology

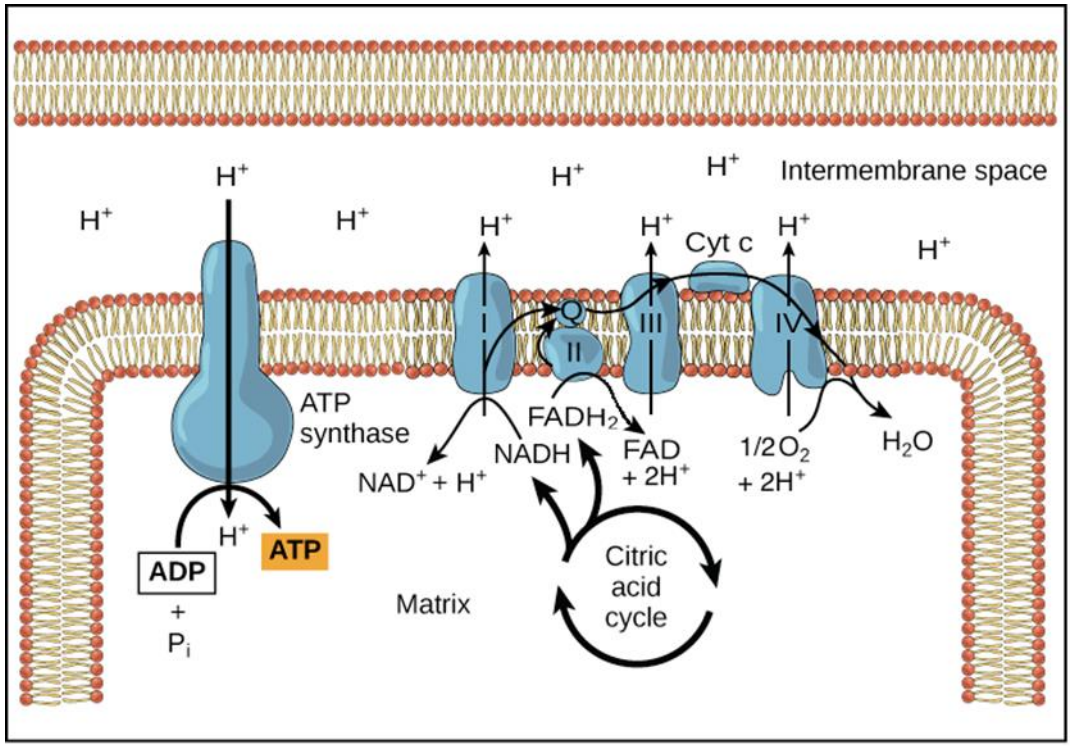
Creatine as a treatment for depression: A brain bioenergetics perspective

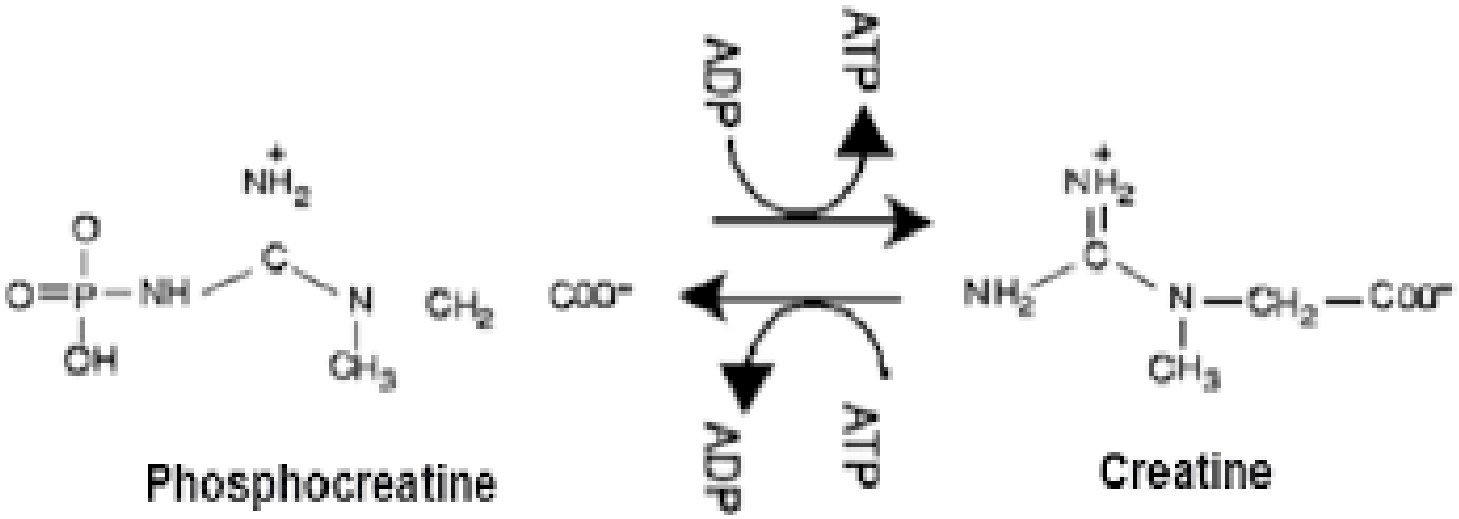
Nicholas Fabiano [a,*], Brendon Stubbs [b]

[a] University of Ottawa, Department of Psychiatry, Ottawa, ON, Canada
[b] Department of Psychological Medicine, Institute of Psychiatry, Psychology and Neuroscience, Kings College London, London, UK

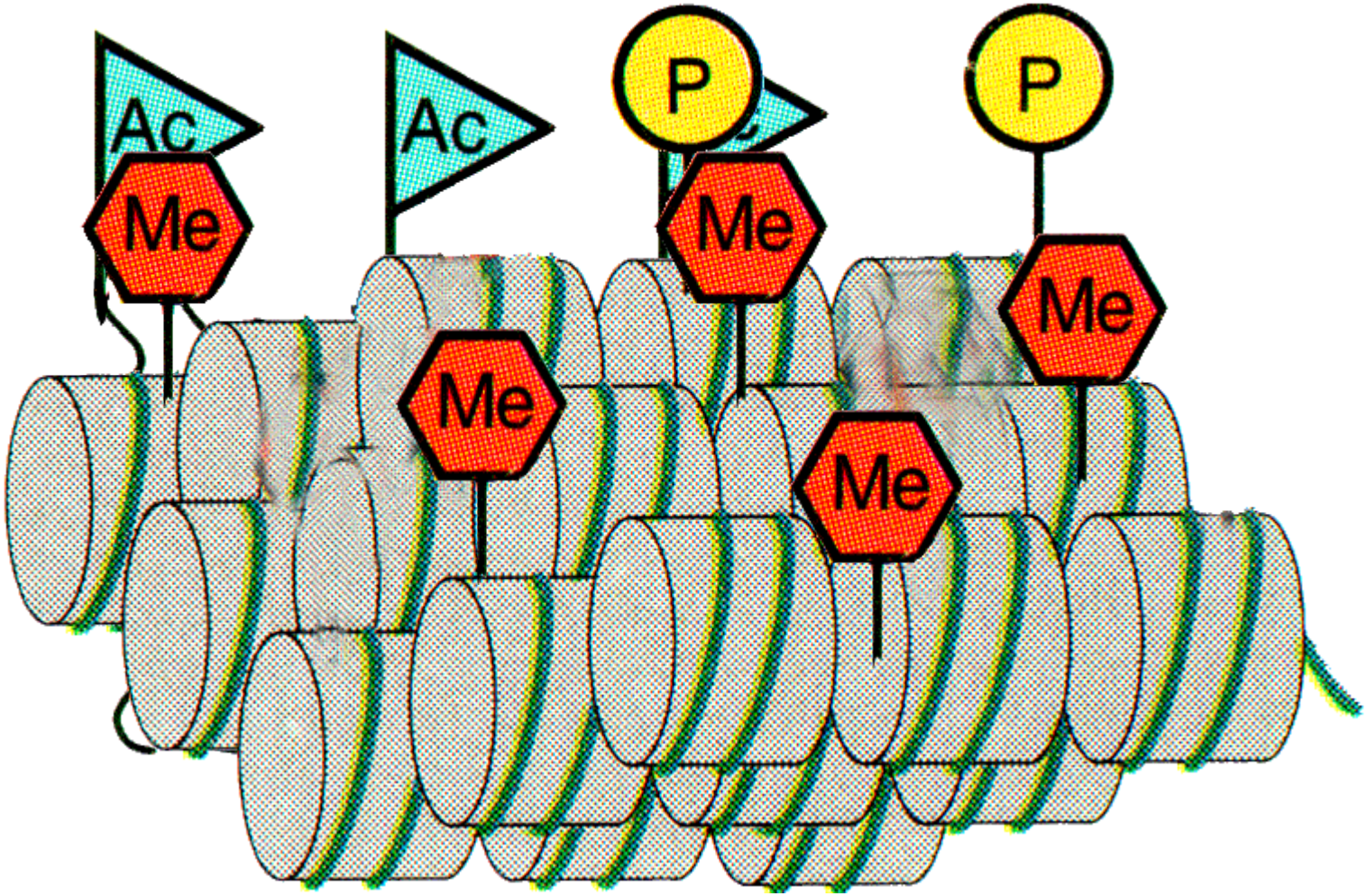




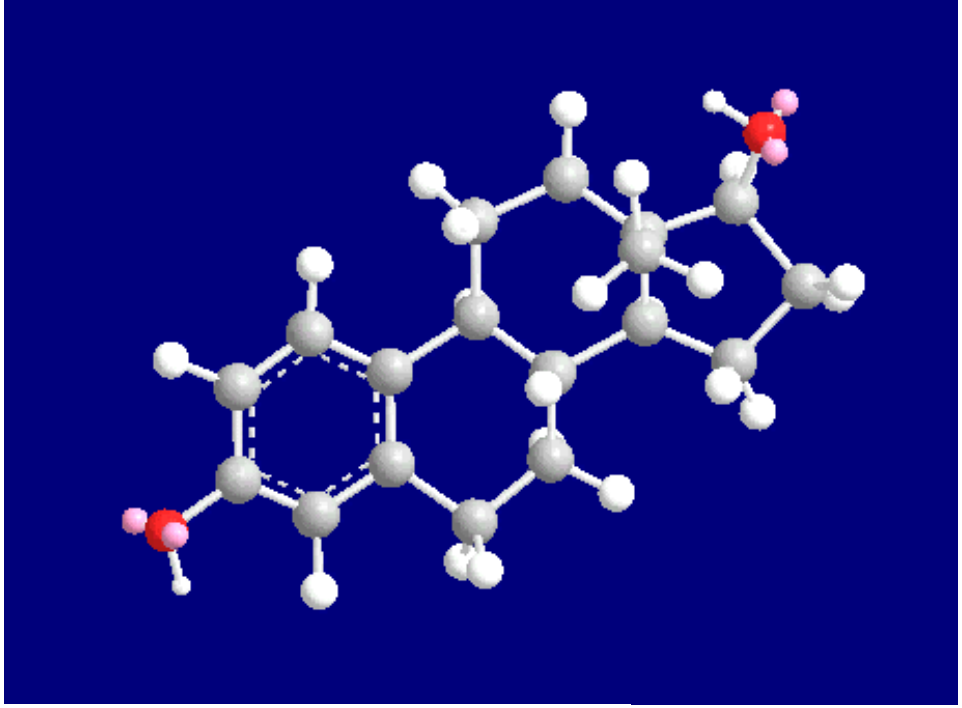

Intermembrane space
H+
Cyt c
ATP synthase
FADH2
NADH
FAD + 2H+
1/2 O2 + 2H+
H2O
NAD+ + H+
ADP + Pi
ATP
Matrix
Citric acid cycle
I
II
III
IV

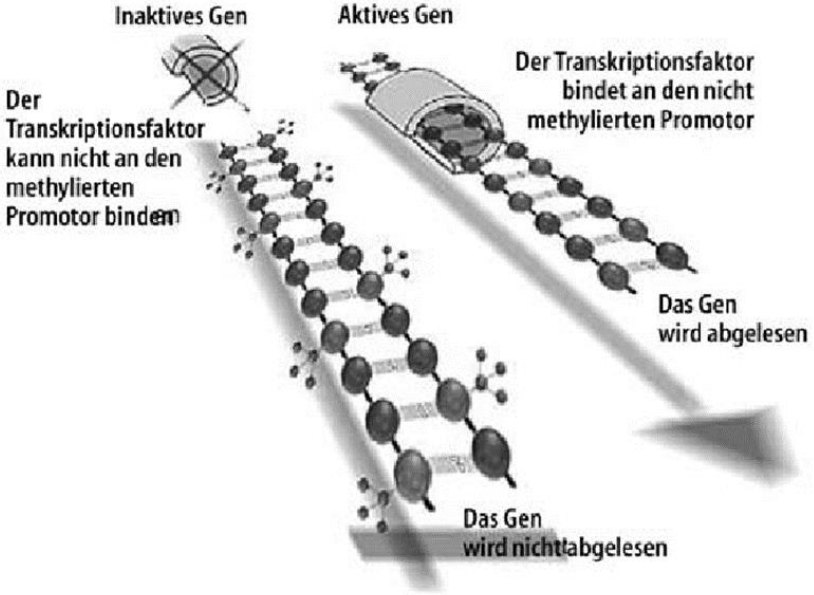

Phosphocreatine
Creatine
ATP
ADP
ATP
ADP

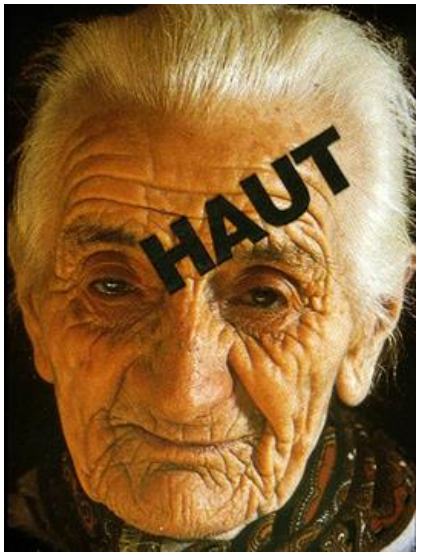
IV. EPIGENETIK LADUNGSÄNDERUNGEN VERÄNDERN DNA STRUKTUR



Jenuwein - SCIENCE VOL 293 10 AUG 2001 p1065




Inaktives Gen
Aktives Gen
Der Transkriptionsfaktor bindet an den nicht methylierten Promotor
Der Transkriptionsfaktor kann nicht an den methylierten Promotor binden
Das Gen wird abgelesen
Das Gen wird nicht abgelesen


HAUT

www.aging-us.com AGING 2016, Vol. 8, No. 9

Priority Research Paper

DNA methylation-based measures of biological age: meta-analysis predicting time to death

Brian H. Chen[1,2,3*], Riccardo E. Marioni[4,5,6*], Elena Colicino[7*], Marjolein J. Peters[8], Cavin K. Ward-Caviness[9], Pei-Chien Tsai[10], Nicholas S. Roetker[11], Allan C. Just[7], Ellen W. Demerath[11], Weihua Guan[12], Jan Bressler[13], Myriam Fornage[13,14], Stephanie Studenski[1], Amy R. Vandiver[15], Ann Zenobia Moore[1], Toshiko Tanaka[1], Douglas P. Kiel[16,17], Liming Liang[18,19], Pantel Vokonas[18], Joel Schwartz[18], Kathryn L. Lunetta[20,2], Joanne M. Murabito[2,21], Stefania Bandinelli[22], Dena G. Hernandez[23], David Melzer[24], Michael Nalls[25], Luke C. Pilling[24], Timothy R. Price[25], Andrew B. Singleton[25], Christian Gieger[9,25], Rolf Holle[26], Anja Kretschmer[9,25], Florian Kronenberg[27], Sonja Kunze[9,25], Jakob Linseisen[9], Christine Meisinger[9], Wolfgang Rathmann[28], Melanie Waldenberger[9,25], Peter M. Visscher[4,6,29], Sonia Shah[6,29], Naomi R. Wray[6], Allan F. McRae[6,29], Oscar H. Franco[30], Albert Hofman[18,30], André G. Uitterlinden[8,30], Devin Absher[31], Themistocles Assimes[32], Morgan E. Levine[33], Ake T. Lu[33], Philip S. Tsao[32,34], Lifang Hou[35,36], JoAnn E. Manson[37], Cara L. Carty[38], Andrea Z. LaCroix[39], Alexander P. Reiner[40,41], Tim D. Spector[10], Andrew P. Feinberg[15,42], Daniel Levy [2,43*], Andrea Baccarelli [7,44*], Joyce van Meurs[8*], Jordana T. Bell[10*], Annette Peters[9*], Ian J. Deary[4,45*], James S. Pankow[11*], Luigi Ferrucci[1*], Steve Horvath[33,46*]

epiAge™ ist ein epigenetischer Alterstest der neuesten Generation für Zuhause. Er erfasst Ihr biologisches Alter. Anhand neuester Forschungserkenntnisse der Biotechnologie ist es möglich zu erkennen, wie schnell Sie bisher gealtert sind.

Ihr biologisches Alter in Jahren

42,95

Ihr biologisches Alter ergibt sich aus Ihrem persönlichen epigenetischen **epiAge™ Score von 4955** in Relation zu einer repräsentativen Vergleichsgruppe aus allgemein verfügbaren, unabhängigen wissenschaftlichen Studien. Ihr chronologisches Alter haben wir im Testablauf bewusst nicht abgefragt.

nature aging

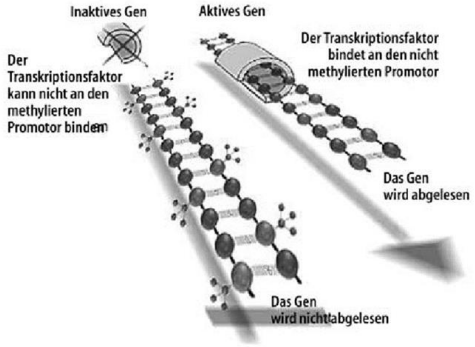
Letter

https://doi.org/10.1038/s43587-024-00793-y

Individual and additive effects of vitamin D, omega-3 and exercise on DNA methylation clocks of biological aging in older adults from the DO-HEALTH trial

Received: 7 August 2024

Heike A. Bischoff-Ferrari[1,2,3] ✉, Stephanie Gängler[1,2,3],



2,000 IU per day of vitamin D compared to placebo;

1 g per day of omega-3s (330 mg EPA plus 660 mg DHA from marine algae) compared to placebo;

and a strength-training exercise program performed for 30 min three times per week compared to an attention control exercise program focused on joint flexibility performed for 30 min three times a week.

Aging Cell
Open Access
ANATOMICAL SOCIETY

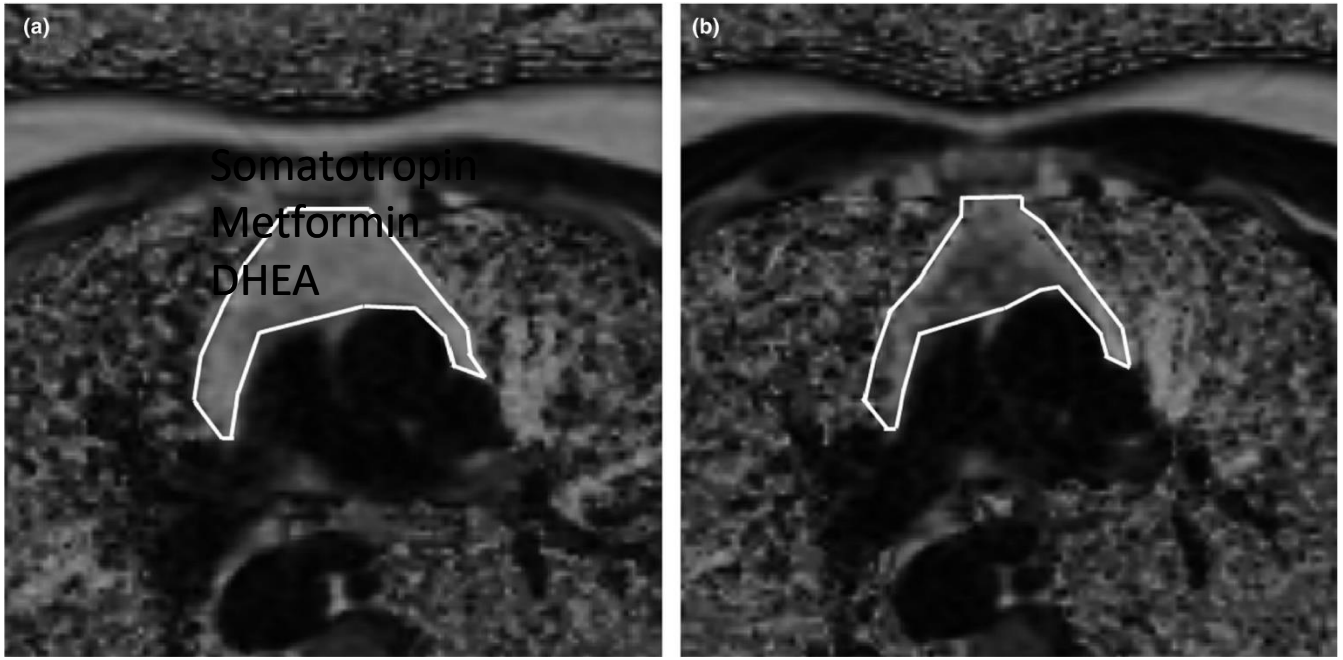
ORIGINAL ARTICLE | Open Access

Reversal of epigenetic aging and immunosenescent trends in humans

Gregory M. Fahy, Robert T. Brooke, James P. Watson, Zinaida Good, Shreyas S. Vasanawala, Holden Maecker, Michael D. Leipold, David T. S. Lin ... See all authors

First published: 08 September 2019 |

Somatotropin
Metformin
DHEA



Aging Cell, Volume: 18, Issue: 6, First published: 08 September 2019, DOI: (10.1111/acel.13028)

Immune aging

https://doi.org/10.1038/s43587-025-00814-4

FGF21 keeps the thymus young

Yousuke Takahama

Age-associated thymic involution causes a reduction in the de novo production of T cells, which results in limited self-protective immunity and an elevated risk of autoimmunity. Two studies have now identified that the peptide hormone FGF21 acts on thymic epithelial cells to delay age-associated thymic involution and T cell imbalance.

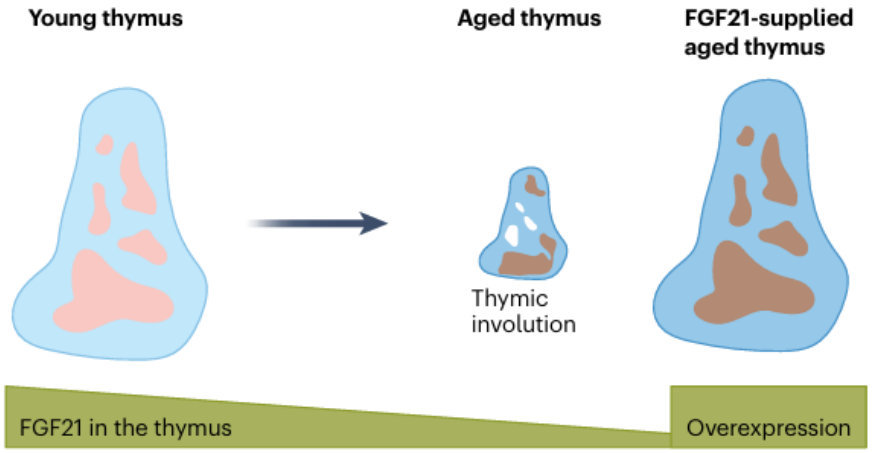


Fig. 1 | FGF21 in the thymus protects against age-associated thymus involution. FGF21 in the thymus declines with age (left and middle), whereas FGF21 maintained in the aged thymus morphologically and functionally restores the involuted thymus (right).


Nobelförsamlingen
The Nobel Assembly at Karolinska Institutet
The Nobel Prize in Physiology or Medicine 2024
Nobelpriset i Fysiologi eller Medicin 2024
Victor Ambros
Gary Ruvkun

Frankfurter Allgemeine
Wissen

REPROGRAMMIERTE ZELLEN

Der Code für junge Haut

VON JOACHIM MÜLLER-JUNG - AKTUALISIERT AM 19.09.2018 - 11:36

Wie neu – so lautet das Versprechen, das hinter vielen Schönheitsbehandlungen steckt. Oft bleibt es Flickwerk. Zellforscher testen ein Heftpflaster für echte Hautverjüngung.

LETTER

https://doi.org/10.1038/s41586-018-0477-4

In vivo reprogramming of wound-resident cells generates skin epithelial tissue

Masakazu Kurita[1,2], Toshikazu Araoka[1,3], Tomoaki Hishida[1], David D. O'Keefe[1], Yuta Takahashi[1], Akihisa Sakamoto[1,3], Masahiro Sakurai[1,3], Keiichiro Suzuki[1], Jun Wu[1], Mako Yamamoto[1], Reyna Hernandez-Benitez[1], Alejandro Ocampo[1], Pradeep Reddy[1], Maxim Nikolaievich Shokhirev[4], Pierre Magistretti[5], Estrella Núñez Delicado[3], Hitomi Eto[2], Kiyonori Harii[2] & Juan Carlos Izpisua Belmonte[1]*

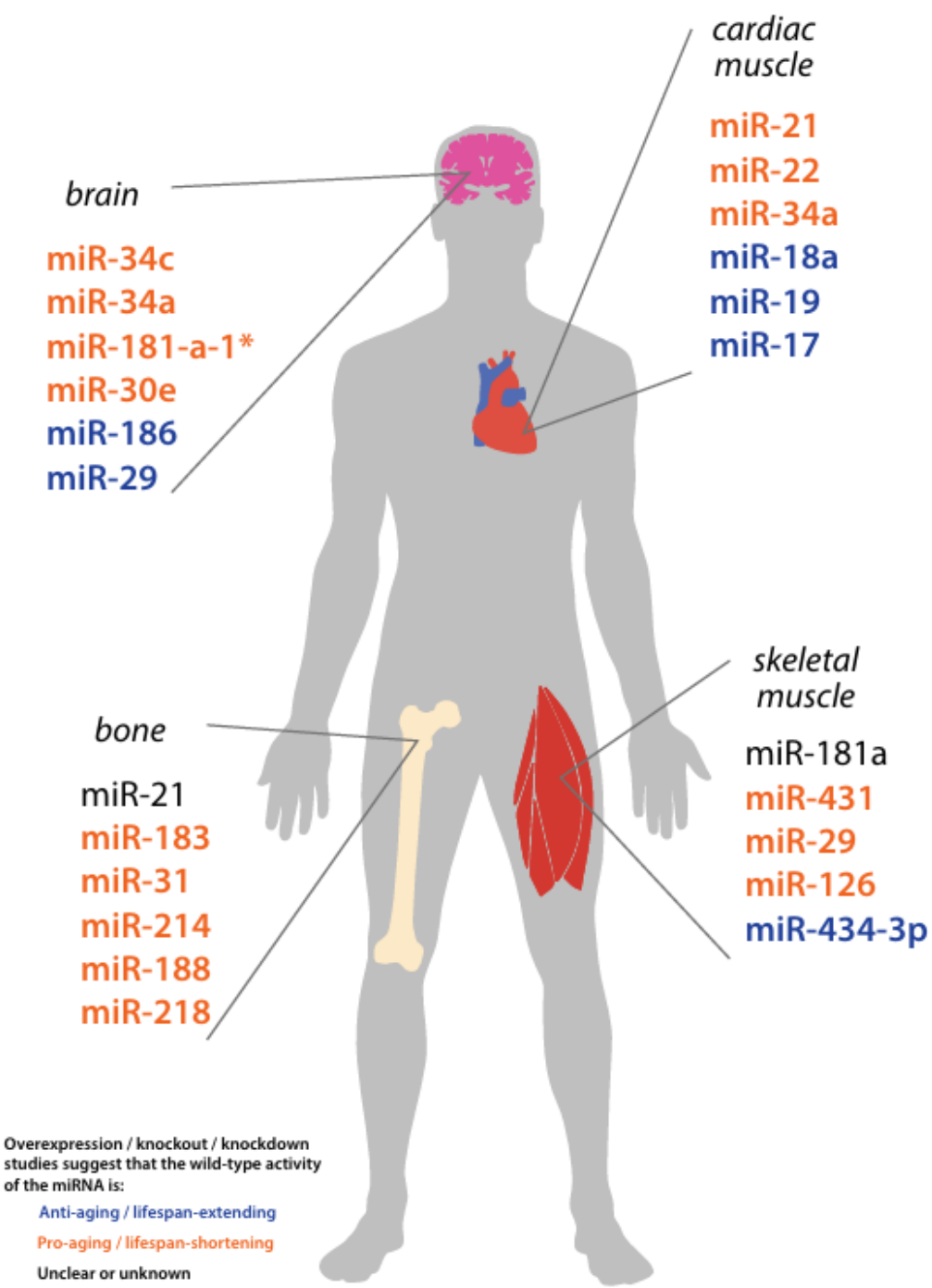
Large cutaneous ulcers are, in severe cases, life threatening[1,2]. As the global population ages, non-healing ulcers are becoming increasingly common[1,2]. Treatment currently requires the transplantation of pre-existing epithelial components, such as skin grafts, or therapy using cultured cells[2]. Here we develop alternative supplies of epidermal coverage for the treatment of these kinds of wounds. We generated expandable epithelial tissues using in vivo reprogramming of wound-resident mesenchymal cells.

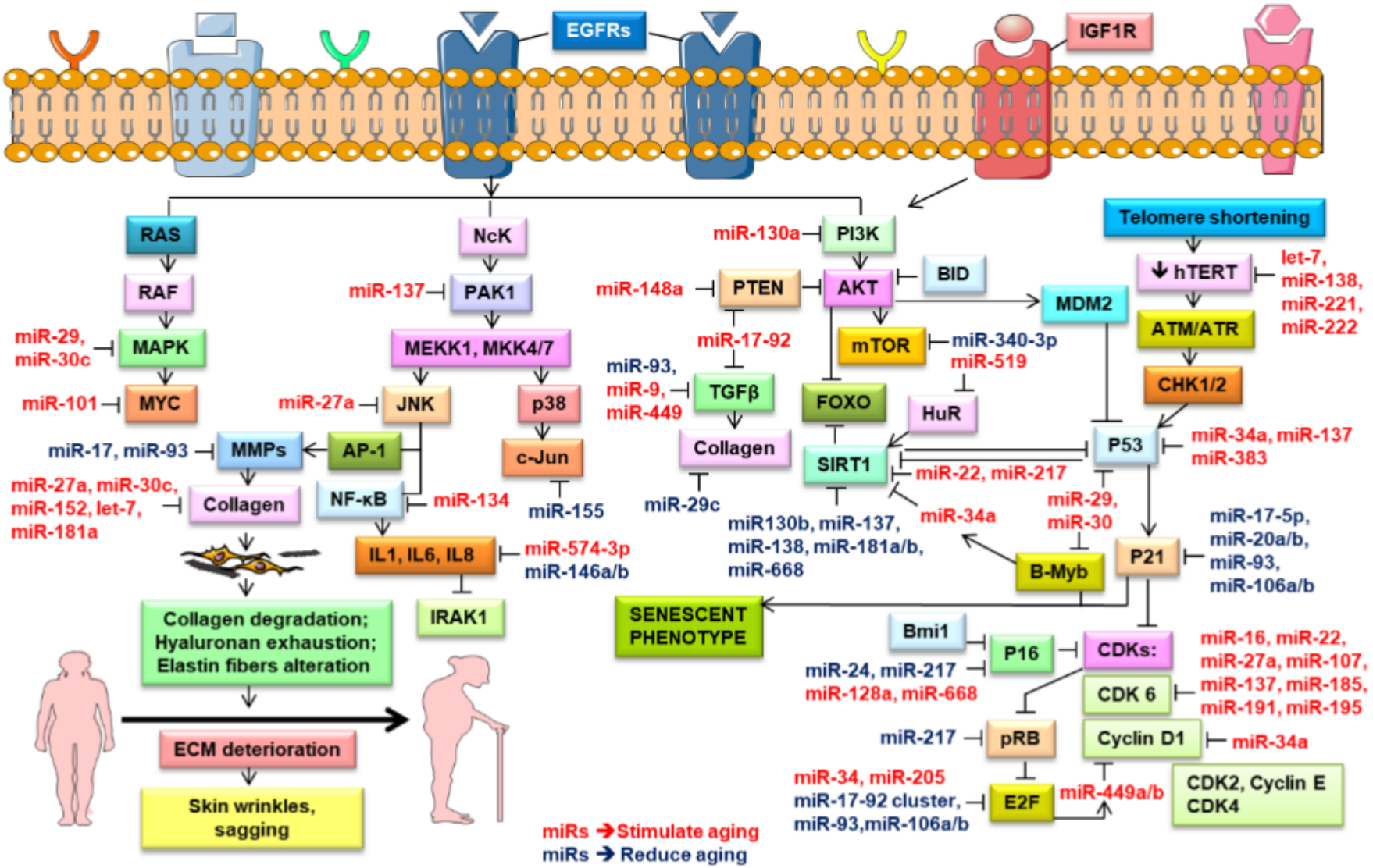
To exclude the possibility that keratinocytes were contaminating the cell-isolation process, we switched to working with hADSCs. To improve transduction efficiency and lower cytotoxicity, we switched to retroviruses (Extended Data Fig. 1n, o). Using this system, we systematically eliminated redundant factors by: (1) excluding factors not integrated into the genome of 28TF-iSEPs (Extended Data Fig. 1m); (2) removing one factor at a time[4]; and (3) measuring keratinocyte

Frankfurter Allgemeine
Wissen

Zellen in wenigen Tagen umgewandelt

Belmonte ist ein ausgebildeter plastischer Chirurg, er weiß genau, welche Rolle das Aussehen der Haut spielt. Aber selbstverständlich will er sein Experiment, über das er jüngst in der Zeitschrift „Nature“ berichtete, nicht als Einladung für die Schönheitschirurgie verstanden wissen. Sein Ziel ist ein Durchbruch, auf den die Medizin seit Jahrzehnten sehnlichst wartet: die Haut erneuern, und zwar möglichst schnell, in Tagen, vielleicht Stunden. Es geht darum, Wunden zu heilen, bevor sie zur Lebensgefahr für den Verletzten oder den alten Menschen werden.


brain
miR-34c
miR-34a
miR-181-a-1*
miR-30e
miR-186
miR-29
cardiac muscle
miR-21
miR-22
miR-34a
miR-18a
miR-19
miR-17
bone
miR-21
miR-183
miR-31
miR-214
miR-188
miR-218
skeletal muscle
miR-181a
miR-431
miR-29
miR-126
miR-434-3p
Overexpression / knockout / knockdown studies suggest that the wild-type activity of the miRNA is:
Anti-aging / lifespan-extending
Pro-aging / lifespan-shortening
Unclear or unknown


EGFRs
IGF1R
RAS
RAF
MAPK
MYC
miR-29, miR-30c
miR-101
NcK
PAK1
MEKK1, MKK4/7
JNK
p38
c-Jun
miR-137
miR-27a
miR-17, miR-93
MMPs
AP-1
NF-κB
miR-134
miR-155
miR-27a, miR-30c, miR-152, let-7, miR-181a
Collagen
IL1, IL6, IL8
miR-574-3p
miR-146a/b
IRAK1
Collagen degradation; Hyaluronan exhaustion; Elastin fibers alteration
ECM deterioration
Skin wrinkles, sagging
miR-130a
PI3K
miR-148a
PTEN
AKT
BID
MDM2
miR-17-92
mTOR
miR-340-3p
miR-519
miR-93, miR-9, miR-449
TGFβ
FOXO
HuR
Collagen
miR-29c
SIRT1
miR-22, miR-217
miR-34a
miR130b, miR-137, miR-138, miR-181a/b, miR-668
Telomere shortening
hTERT
let-7, miR-138, miR-221, miR-222
ATM/ATR
CHK1/2
P53
miR-34a, miR-137 miR-383
miR-29, miR-30
B-Myb
P21
miR-17-5p, miR-20a/b, miR-93, miR-106a/b
SENESCENT PHENOTYPE
Bmi1
P16
CDKs:
miR-16, miR-22, miR-27a, miR-107, miR-137, miR-185, miR-191, miR-195
miR-24, miR-217 miR-128a, miR-668
CDK 6
miR-217
pRB
Cyclin D1
miR-34a
miR-34, miR-205 miR-17-92 cluster, miR-93,miR-106a/b
E2F
miR-449a/b
CDK2, Cyclin E CDK4
miRs → Stimulate aging
miRs → Reduce aging

Cancer
↑ miR-21
↑ miR-205
↓ miR-130b
↓ miR-137
↓ miR-138
↓ miR-181a
↓ miR-181b
↓ miR-668
Aging
↑ miR-130b
↑ miR-137
↑ miR-138
↑ miR-181a
↑ miR-181b
↑ miR-191
↑ miR-668
Development
↑ miR-21
↑ miR-203
↑ miR-205
↑ miR-574-3p
↑ miR-720
↓ miR-34a
↓ miR-34c
Keratinocytes
Melanocyte
Cancer
↑ miR-205
↓ miR-29
Development
↓ miR-141-3p
↓ miR-200a-3p
Aging
↑ miR-21-5p
↑ miR-25
↑ miR-29
↑ miR-141-3p
↑ miR-200a-3p
↑ miR-434-5p
↓ miR-205
UVA
UVB
UVC
Fibroblasts
Aging
↑ miR-9
↑ miR-449
↑ miR-709
↓ miR-10a
↓ miR-200
↓ miR-200c
Development
↑ miR-10
↑ miR-17-92 cluster
↑ miR-21
↑ miR-22
↑ miR-142
↑ miR-146a
↑ miR-155
Langerhans' cell
Development
↑ miR-145
Aging
↑ let-7 family
↑ miR-152
↑ miR-181a
↓ miR-17-92 cluster
↓ miR-106
↓ miR-205
Cancer
↓ miR-29a
↓ miR-30
Photoaging
↑ miR-23a
↑ miR-30b
↑ miR-30c
↑ miR-34a
↑ miR-34c-5p
↑ miR-101
↑ miR-145
↑ miR-148
↑ miR-199a-5p
↑ miR-365
↑ miR-383
↓ miR-146a
↓ miR-146b-5p
↓ miR-155
↓ miR-181c
↓ miR-218
↓ miR-1246
↓ miR-3613-p
↓ miR-3648
↓ miR-4281
↓ miR-6636
↓ miR-6879
Senescence
↑l et-7d-5p
↑ let-7e-5p
↑miR-23a-3p
↑miR-34a-5p
↑miR-122-5p
↑miR-125a-3p
↑miR-125a-5p
↑miR-125b-5p
↑miR-181a-5p
↑miR-221-3p
↑miR-222-3p
↑miR-503-5p
↑miR-574-3p
↑miR-574-5p
↑miR-4454
Aging/alopecia
↑ let-7d-5p
↑ miR-18a-5p
↑ miR-19a-3p
↑ miR-20a-5p
Development
↑ miR-31
↑ miR-199a
↑ miR-199b
↑ miR-214
↑ miR-1256
Hair

Über Calico ist wenig bekannt, die Firma kommunizierte bisher kaum nach aussen. Man weiss allerdings, dass sie grosse Kolonien von **Nacktmullen** kauft. Die Tiere ähneln Mäusen, leben aber um die **dreissig** Jahre – also rund zehnmal so lange wie Mäuse. Der Grund: Nacktmulle scheinen nicht zu altern. Sie entwickeln keinen Krebs, und **weder ihre Fruchtbarkeit noch ihre mentalen Fähigkeiten lassen im Alter** nach. Im Labor sterben sie nach einem langen, gesunden Leben von einem Tag auf den anderen. Warum, blieb den Forschenden bisher ein Rätsel


DER SPIEGEL
DER SPIEGEL
Wissen
BESSERES LEBEN
Wird er 150?
Wie die Wissenschaft das Leben verlängern will
BOTOX TO GO
Anti-Aging in der Midlifepause
MEDIZIN
Kommt die Pille gegen das Altern?
PSYCHE
So denkt man sich jung


KLAUS BERGER
DIE APOKALYPSE DES JOHANNES
Band I/1
Kommentar (Apk 1–10)
HERDER