



University
of Glasgow

The exposome of ageing

Food Forum 2024

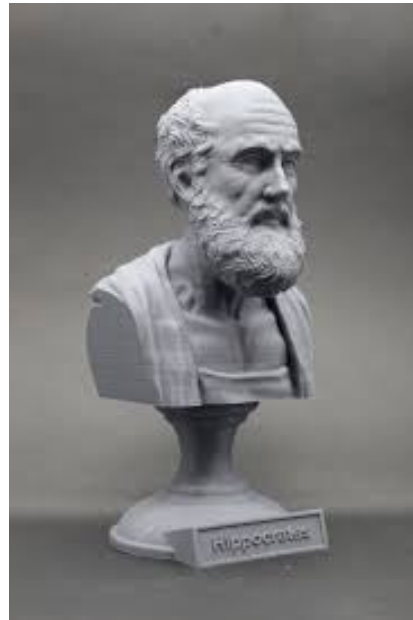
Paul G Shiels
Professor of Geroscience
SMB
University of Glasgow



G3: Glasgow Geroscience Group

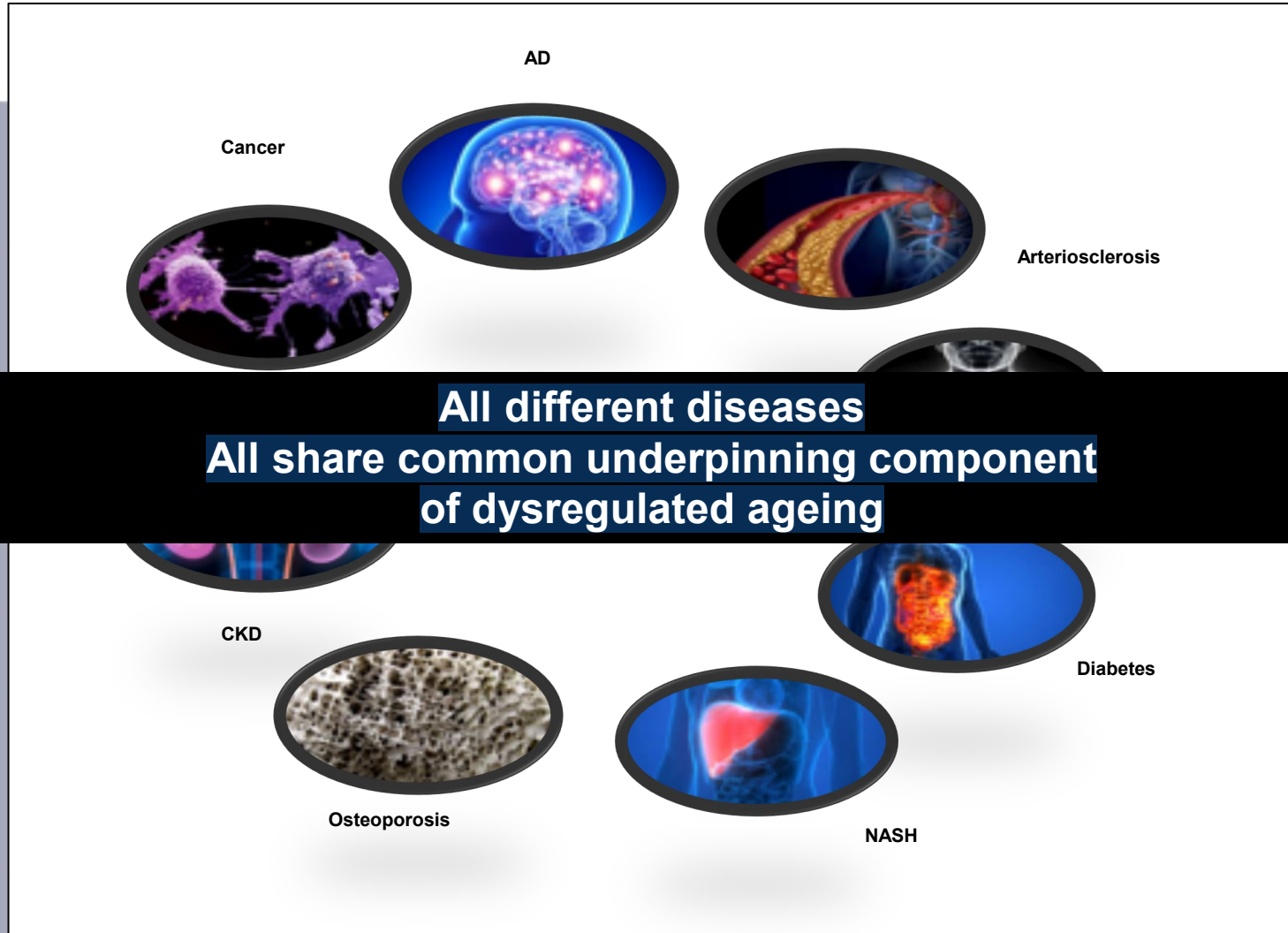


- Consultancy on Geroscience for Revalesio (US), Eolas (UK).
- Scientific Reviewer Mars (UK),



- More people in the world are over 60 than at any time in history
- This demographic is growing
- Years of healthy living have not kept apace with increase in lifespan

Global Ageing



- Common features
- All affected by a changing environment
- Diminished stress defenses (Nrf2)
- Loss of diversity in gut microbes
- Inflammatory burden
- Loss of physiological resilience

Peter Stenvinkel¹,
Paul G. Shiels²,
Johanna Painer³,
J. Jaime Miranda⁴,
Barbara Natterson-
Horowitz^{5,6,7} and
Richard J. Johnson⁸

www.kidney-international.org

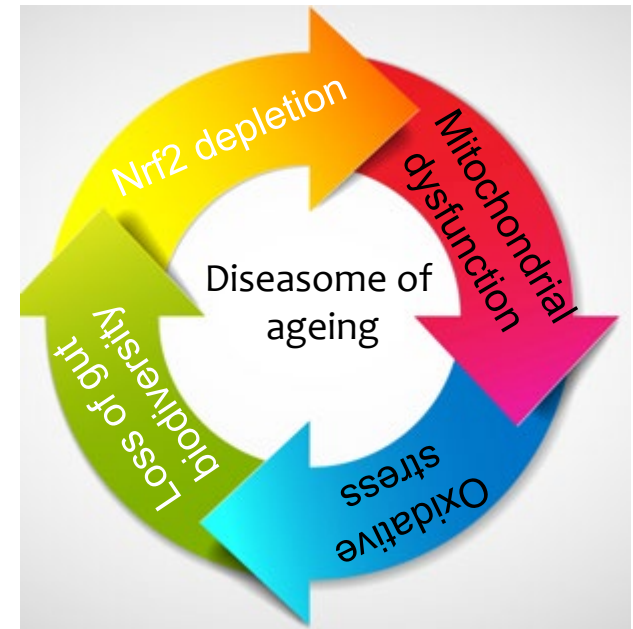
editorial

A planetary health perspective for kidney disease

Check for updates

Kidney International (2020) **98**, 261–265; <https://doi.org/10.1016/j.kint.2020.03.024>

KEYWORDS: biomimetics; burden of lifestyle disease; chronic kidney disease; heat stress; planet health; pollution
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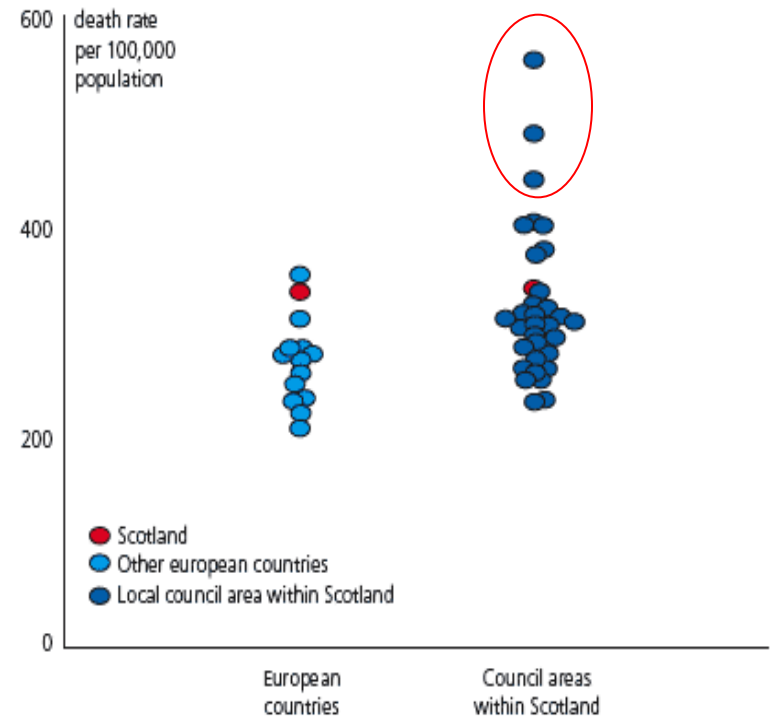


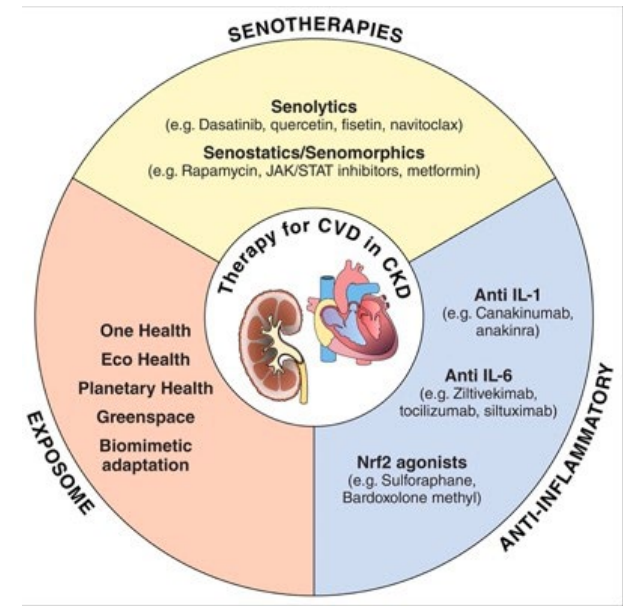
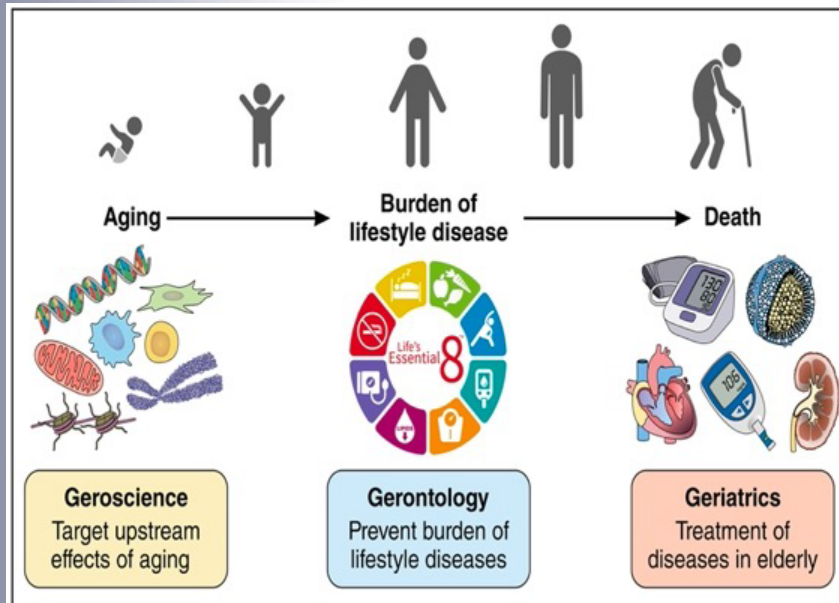
Scotland is 'sick man' of Europe

Glasgow is 'sick man' of Scotland

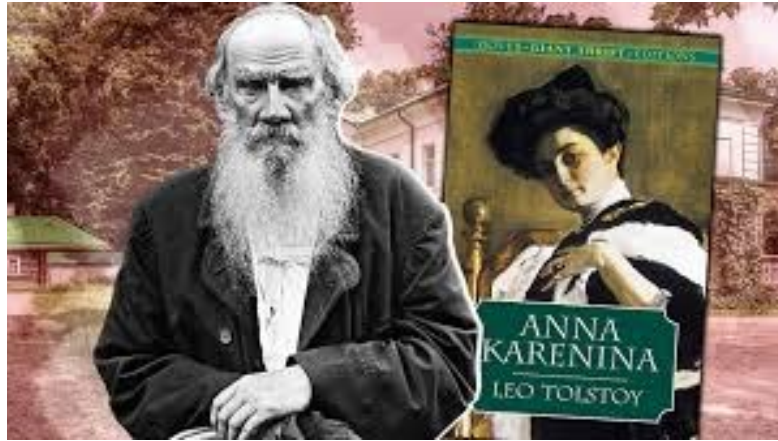
Why?

- Ill health tied to steep SE gradient
- May impact upon age related health





Ageing is highly individual



"All happy families are alike; each unhappy family is unhappy in its own way."
Tolstoy- Ana Karenina

Tomar, A. *et al. Nature* <https://doi.org/10.1038/s41586-024-07472-3>
(2024).

[nature](#) > [news](#) > article

NEWS | 05 June 2024

A dad's diet affects his sperm – and his sons' health

Mouse fathers who ate high-fat foods and human fathers with high body-mass index have male offspring with metabolic disorders.

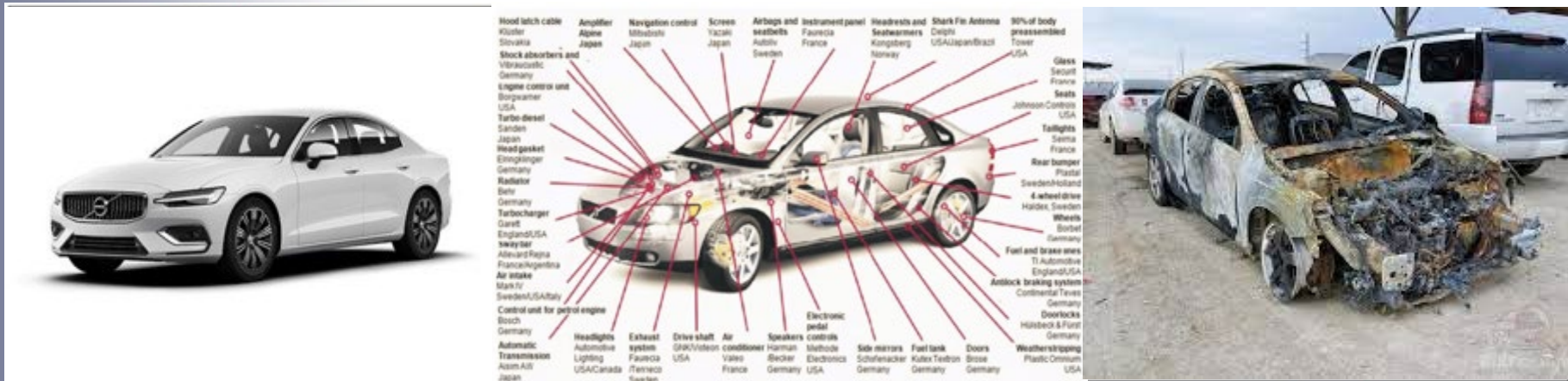
Hallmarks of ageing common across taxa

- It has been calculated that the impact on health span of curing both cancer and heart disease would add no more than 2-3 years to healthy life expectancy to a hypothetical 50-year-old woman, whereas slowing the ageing process would add an extra 25 years of healthy life

Burch et al *J Gerontol A Biol Sci Med Sci*. 2014 Jun; 69(Suppl 1): S1–S3.

- The economic value of delayed aging is estimated to be \$7.1 trillion over 50 years.

Goldman Cold Spring Harb Perspect Med. 2016 Feb; 6(2): a025072.



Biochemical Journal (2021) 478 2889–2898
<https://doi.org/10.1042/BJC.20200958>



Review Article

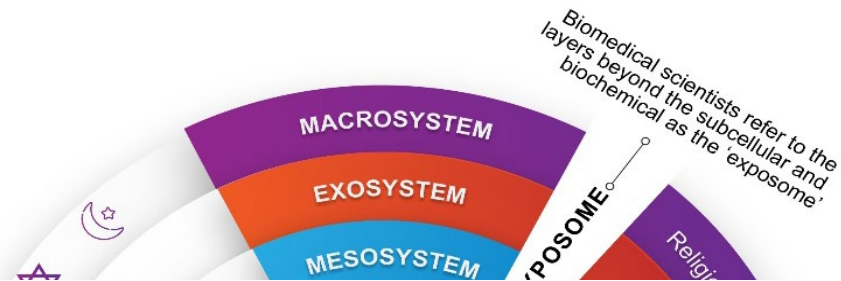
Manipulating the exposome to enable better ageing

● Paul G. Shiels¹, Johanna Painer², Barbara Natterson-Horowitz³, Richard J. Johnson⁴, Jaime J. Miranda⁵
and ● Peter Stenvinkel⁶

**The exposome comprises the totality of
human environmental exposures
(both biotic and abiotic) pre-conception to
death.**

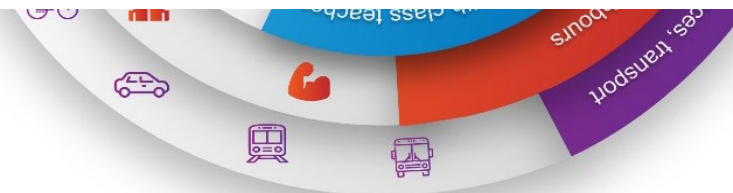
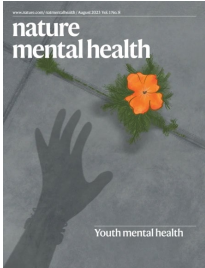
Wild CP. Cancer Epidemiol Biomarkers Prev 2005;14:1847–50.

The exposome



- Three simple exposome factors, namely air pollution, tobacco smoke and diet, account for ~50% of mortality globally

Lim SS, Vos T, Flaxman AD, et al Lancet 2012;380:2224–60.



Minnis; et al and Paul G Shiels Nature mental health : 132–140 (2024).

Specific exposome factors influencing ageing and health in general population

www.impactaging.com

AGING, May 2016, Vol 8 No 5

Research Paper

Accelerated ageing and renal dysfunction links lower socioeconomic status and dietary phosphate intake

Ruth McClelland¹, Kelly Christensen¹, Suhaib Mohammed¹, Dagmara McGuinness¹, Josephine Cooney², Andisheh Bakshi³, Evangelia Demou³, Ewan MacDonald³, Muriel Caslake², Peter Stenvinkel⁴, and Paul G. Shiels¹

- Microbial dysbiosis
 - Bacterial DNA signatures in the circulation

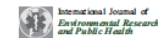
OPEN ACCESS freely available online

plus one

Accelerated Telomere Attrition Is Associated with Relative Household Income, Diet and Inflammation in the pSoBid Cohort

Paul G. Shiels¹, Liane M. McGlynn¹, Alan MacIntyre¹, Paul C. D. Johnson², G. David Batty^{1,3}, Harry Burns⁴, Jonathan Cavanagh⁵, Kevin A. Deane^{2,6}, Ian Ford⁷, Alex McConnachie⁸, Agnes McGinty⁹, Jennifer S. McLean¹⁰, Keith Millar⁹, Naveed Sattar¹¹, Carol Tannahill¹², Yoga N. Velupillai¹³, Chris J. Packard¹⁴

scientific reports



Article

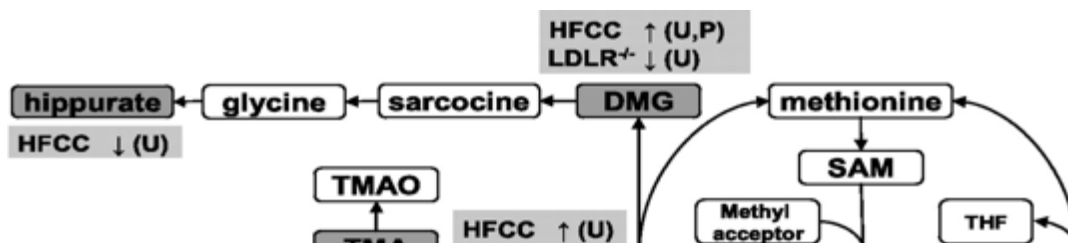
Perceived Neighbourhood Problems over Time and Associations with Adiposity

Anne Ellaway^{1,*}, Ruth Dundas¹, Jonathan R. Olsen¹ and Paul G. Shiels²



Glasgow population

- Telomere attrition
- Increased PO4
- Inflammation
- Imbalanced diet
- Poor renal function among deprived



Published by Oxford University Press on behalf of the International Epidemiological Association
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International Journal of Epidemiology 2012;1-10
doi:10.1093/ije/dyr215

Socio-economic status is associated with epigenetic differences in the pSoBid cohort

Dagmara McGuinness,¹ Liane M McGlynn,¹ Paul CD Johnson,² Alan MacIntyre,¹ G David Batty,³ Harry Burns,⁴ Jonathan Cavanagh,⁵ Kevin A Deans,⁶ Ian Ford,² Alex McConnachie,² Agnes McGinty,⁷ Jennifer S McLean,⁸ Keith Millar,⁵ Chris J Packard,⁷ Naveed A Sattar,⁹ Carol Tannahill,^{8,10} Yoga N Velupillai^{8,11} and Paul G Shiels^{1*}

THE TIMES

Unfriendly gut bacteria linked to early ageing



Eating unhealthily is associated with a higher risk of disease
GETTY IMAGES

Bacteria that live in the [human gut](#) and thrive on an unhealthy diet have been linked to premature ageing among Scotland's poor.

- Oral pathobionts and loss of salutobionts linked to faster ageing and poorer health

Nrf2 Activation

nature food



Brief Communication

<https://doi.org/10.1038/s43016-023-00868-w>

Life expectancy can increase by up to 10 years following sustained shifts towards healthier diets in the United Kingdom

Received: 22 March 2023

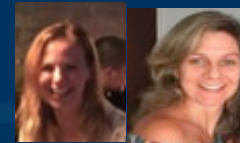
Accepted: 29 September 2023

Published online: 20 November 2023

Lars T. Fadnes ^{1,2}✉, Carlos Celis-Morales ^{3,4}, Jan-Magnus Økland ^{1,5},
Solange Parra-Soto^{3,6}, Katherine M. Livingstone ⁷, Frederick K. Ho ⁸,
Jill P. Pell ⁸, Rajiv Balakrishna¹, Elaheh Javadi Arjmand ^{1,2},
Kjell Arne Johansson^{1,2,5}, Øystein A. Haaland ^{1,5} & John C. Mathers⁹

The Spring of Hope

- Resistant starch type-2 (RS2), a prebiotic, can mitigate inflammation and oxidative stress in patients with chronic kidney disease (CKD) on hemodialysis (HD).
- Generates Short Chain Fatty Acids via activity of saccharolytic bacteria in the gut
- Four weeks intervention for HD patients
- Analysis of changes in renal function and microbiota



Phytomedicine 114 (2023) 154731



ELSEVIER

Contents lists available at ScienceDirect

Phytomedicine

journal homepage: www.elsevier.com/locate/phymed

Original Article

The effect of Brazilian Green Propolis extract on inflammation in patients with chronic kidney disease on peritoneal dialysis: A randomised double-blind controlled clinical trial

Beatriz Germer Baptista^a, Susane Fanton^b, Márcia Ribeiro^c, Ludmila FMF Cardozo^b,
Bruna Regis^b, Livia Alvarenga^{a,c}, Marcelo Ribeiro-Alves^d, Andresa A. Berretta^e, Paul G. Shiels^f,
Denise Mafra^{a,c,*}

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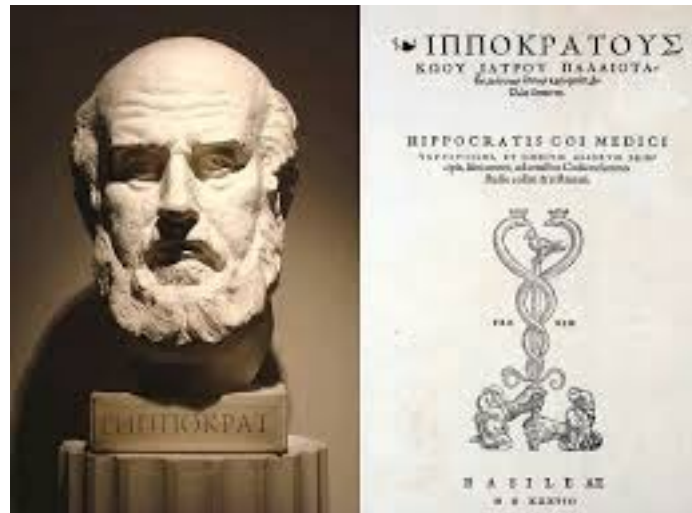


Baptista et al 2023- Phytomedicine. 2023 Mar 1;114:154731. doi: 10.1016/j.phymed.2023.154731
Esgalhado et al Food Funct. 2020 11(3):2617-2625
Kemp et al Mol Nutr Food Res. 2021:e2100374. doi: 10.1002/mnfr.202100374

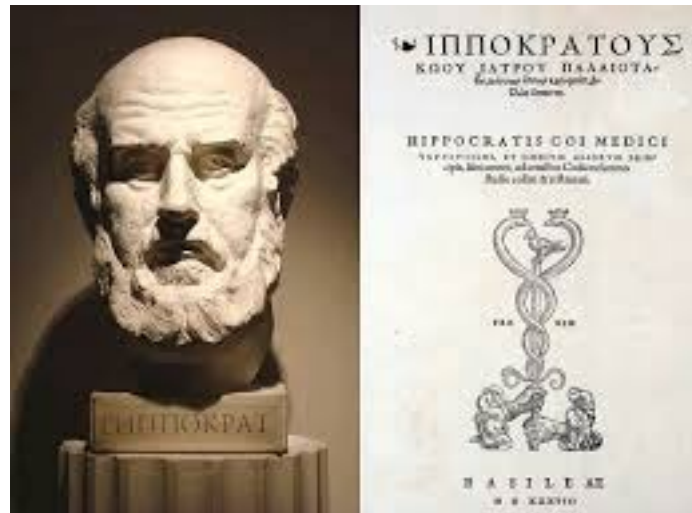
Conclusions

- The exposome is a powerful mediator of ageing and health
- Amenable to simple interventions
- Tools now available to assess these in real time

- “If we could give every individual the right amount of nourishment and exercise, not too little and not too much, we would have found the safest way to health.” —
Hippocrates.



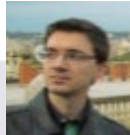
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Hippocrates.



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U Lima
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Jichi MU
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Denver
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