

Gut Feeling An Actuary's Exploration of the Microbiome

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* MARIO BROS., BATTLE THE PESTS! TWO PLAYERS MAKE IT EASIER.

1983



South Africa insurer,
Crusader Life



Gen Re

First Critical Illness product

Gen Re Ownership



“ *Price is what you pay.
Value is what you get.* ”

“ *Our favorite holding period
is forever.* ”

“ *... we have no exit strategy.* ”

*– Warren E. Buffett, Chairman & CEO,
Berkshire Hathaway Inc.*

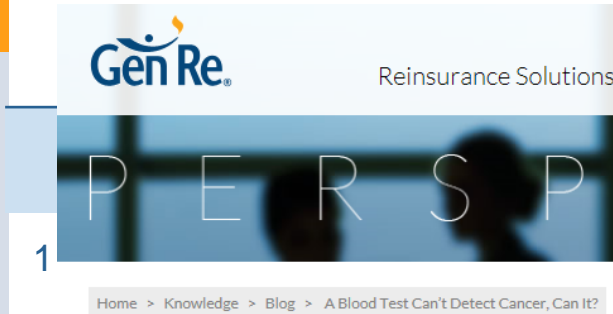


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Historical Development of Gen Re's DD Survey



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A Blood Test Can't Detect Cancer, Can It?

February 06, 2018 | By [Andres Webersinke](#) | [Critical Illness](#) |

We began 2018 with some promising news on cancer: A simple blood test can now detect disease in eight common sites. Called the CancerSEEK test, it was developed at the Johns Hopkins Kimmel Cancer Center, and may herald a new age in cancer medicine.



How should insurers react? Treating cancer earlier would mean many policyholders will live longer; this could be useful in risk selection, but insurers of Trauma & Critical Illness concerned their policy definitions could date more quickly. The best response for insurers is to review facts and definitions.

Early detection is key to successful treatment of cancer. Some tests detect proteins and DNA from a developing tumour, as CancerSEEK does, or through traditional mammography and colonoscopy screening or the detection of circulating tumour cells.

Liquid biopsies have been heralded as the next best solution with the technology has been limited to specific cancer types.



Home > Knowledge > Blog > Genetic Testing - A Blessing or a Curse?

Genetic Testing - A Blessing or a Curse?

July 09, 2019 | By [Annika Tiedemann](#) | [Life](#) | [English](#)

The rise of genetic testing in recent years is fueling a debate in insurance circles over the potential risks versus benefits posed by the readily available genetic information. Insurers, physicians and consumer protection organizations all have strong positions on the issue, albeit often with very diverse opinions.



Annika Tiedemann
Life/Health Underwriting
Manager, Cologne
[Read all articles](#)

It's fair to say that there are big concerns on all sides. Consumer protection agencies, for example, point to the particular nature of genetic information and the need for privacy. They fear that if genetic information falls into insurers' hands, it could result in individuals being denied access to insurance cover - which is of existential importance to an applicant whose genes indicate a predisposition to a critical disease.



Nature vs. Nurture



Topics Covered



1. What is a microbiome and who put one in my body?
2. How has the human microbiome determined who we are?
3. Relevance to insurance today and tomorrow.



1. What is the human microbiome?

And who put one in my body?

Biome [**bahy**-ohm]

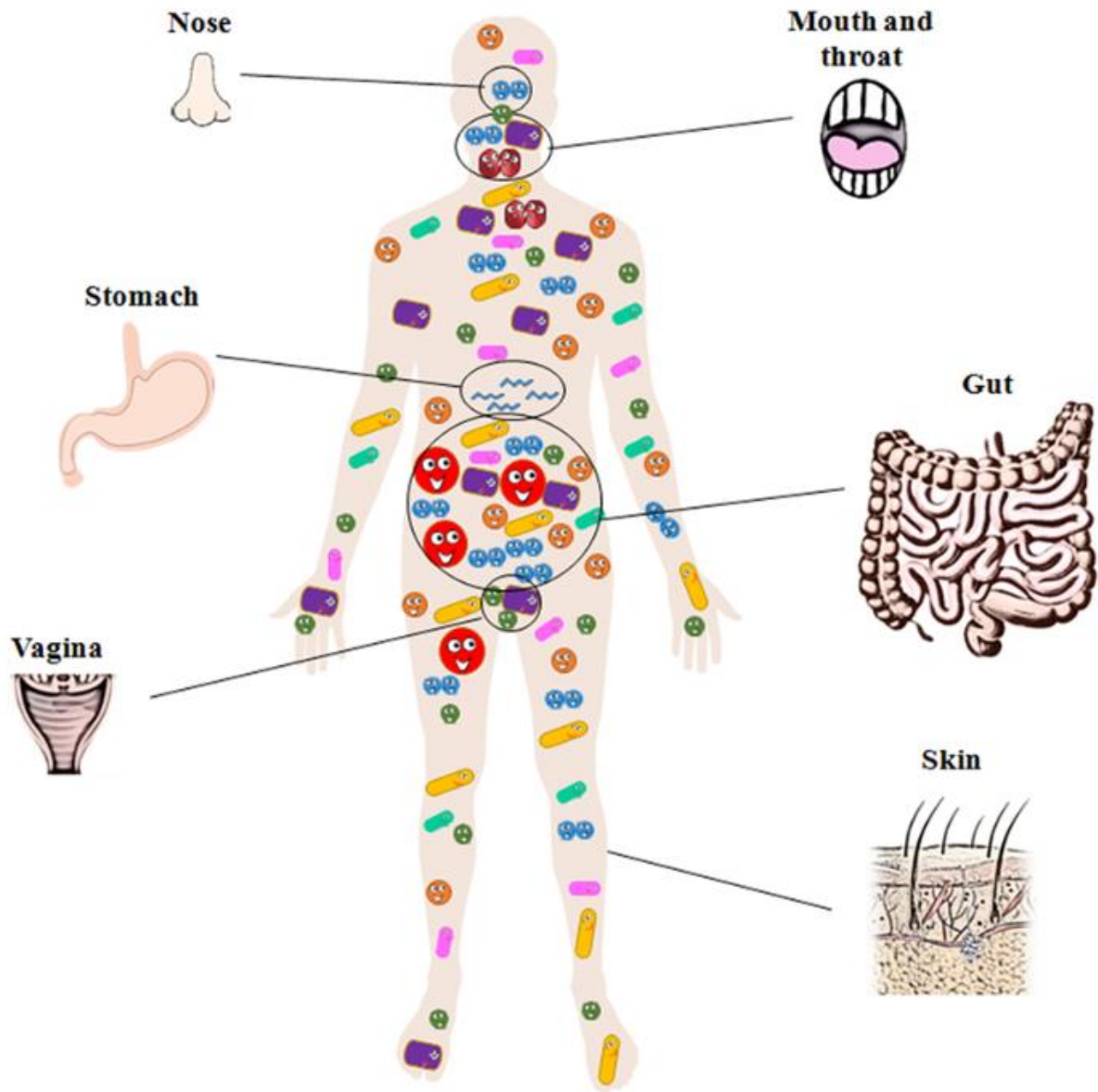
noun a major ecological community type (such as tropical rain forest, grassland, or desert).

Microbiome [mahy-kroh-**bahy**-ohm]

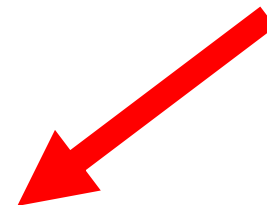
noun a community of microorganisms (such as bacteria, fungi, and viruses) that inhabit a particular environment and especially the collection of microorganisms living in or on the human body.

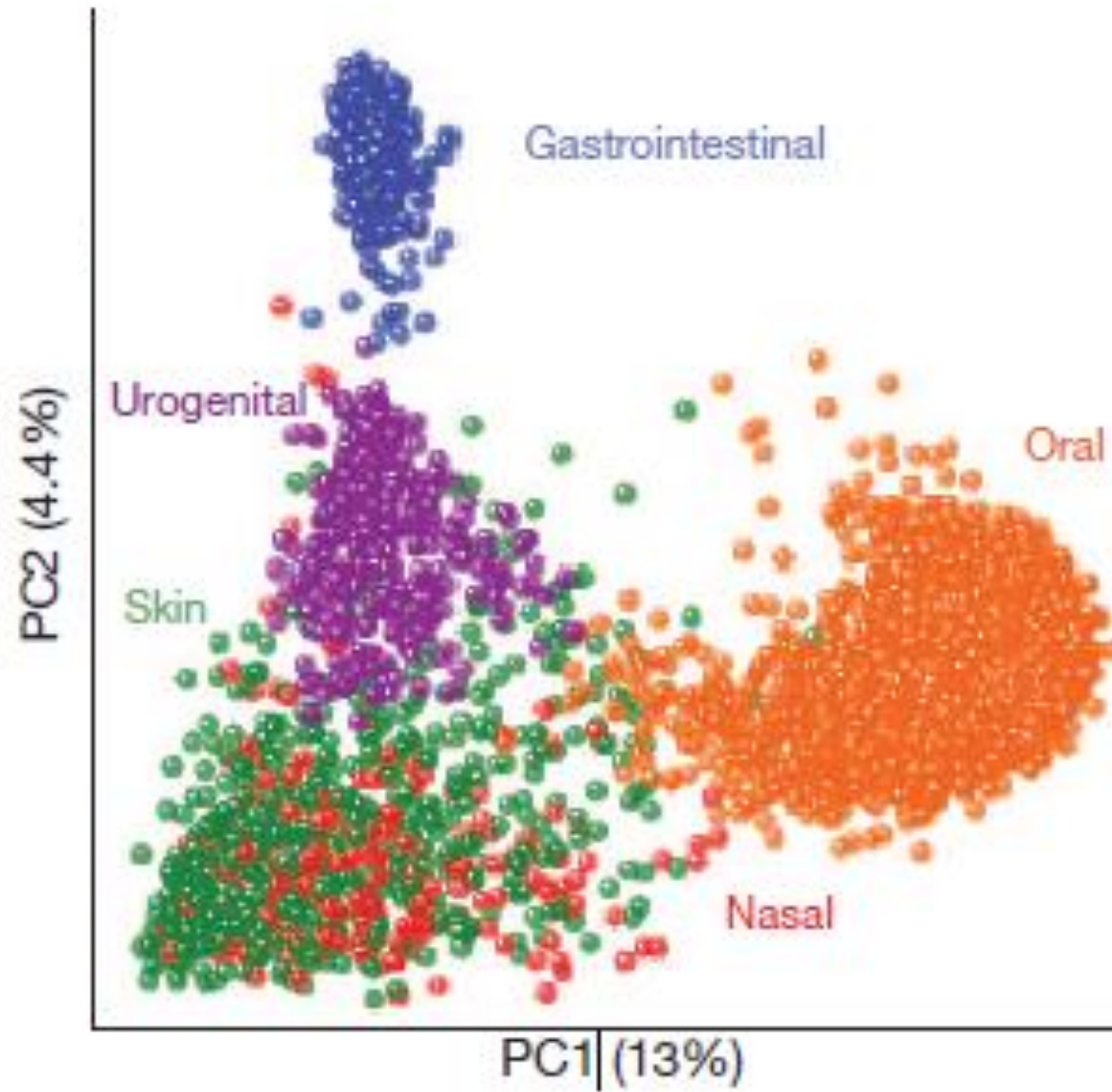
noun the collective genomes of microorganisms inhabiting a particular environment and especially the human body.

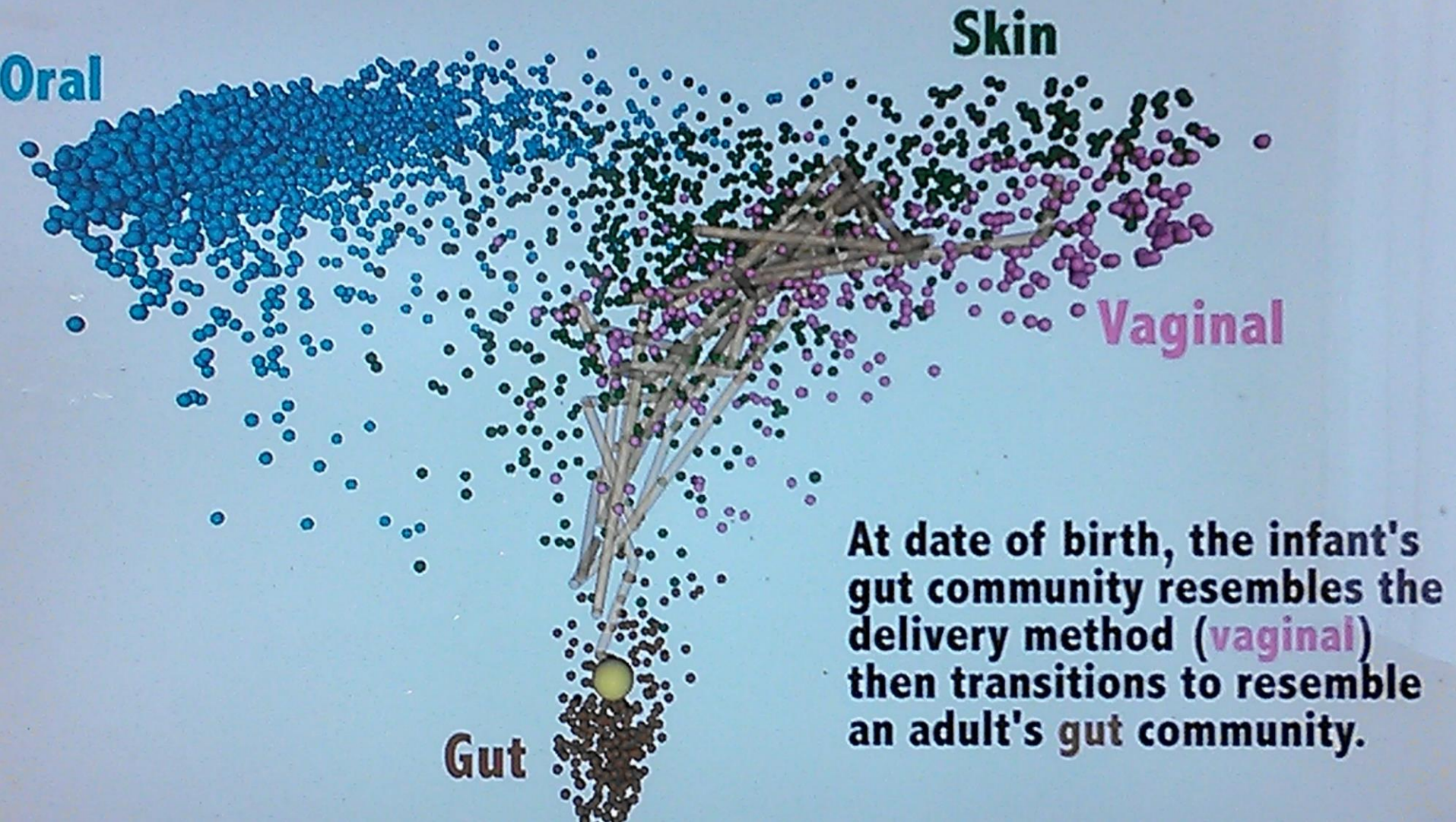




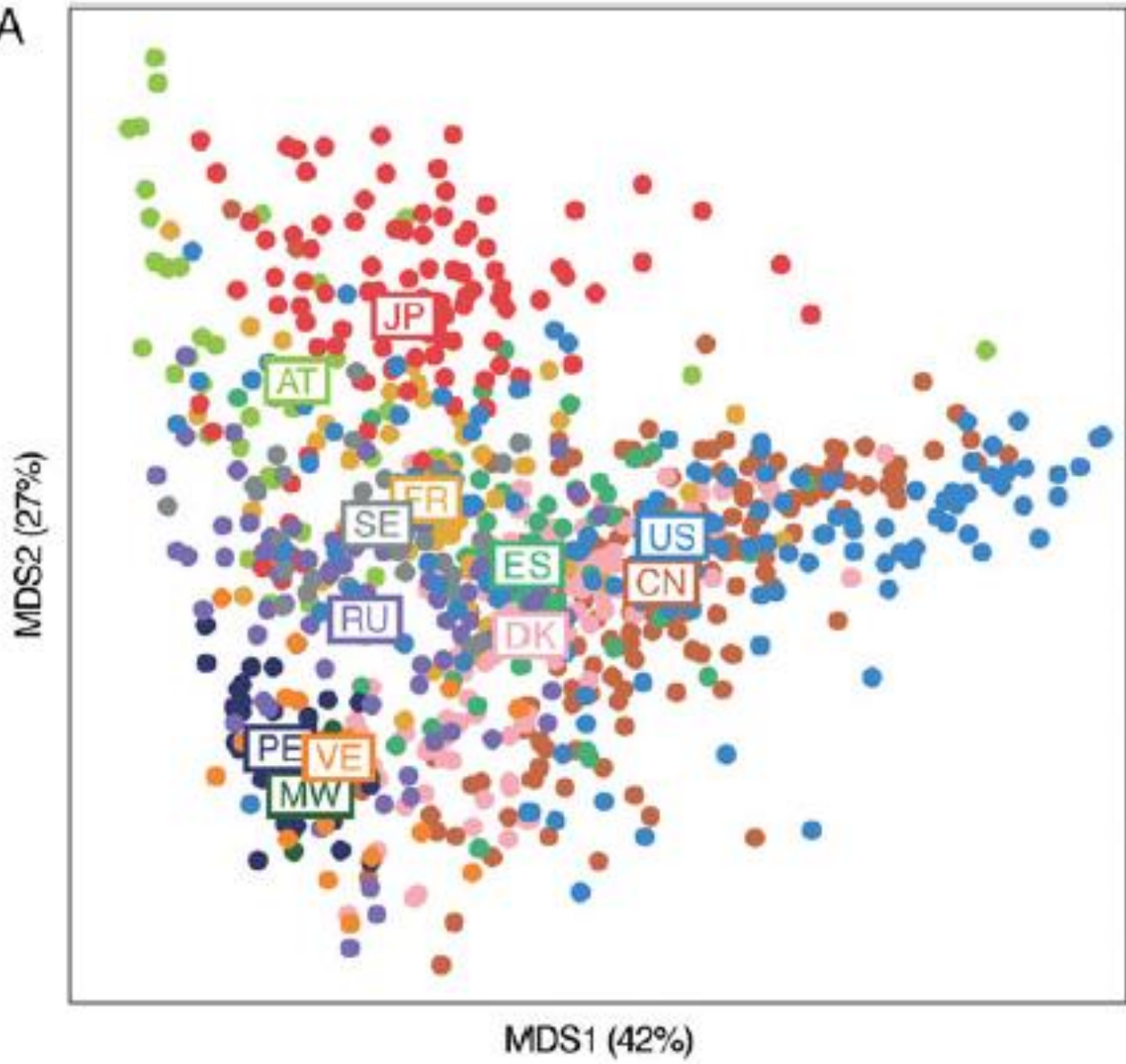
Thousands of species

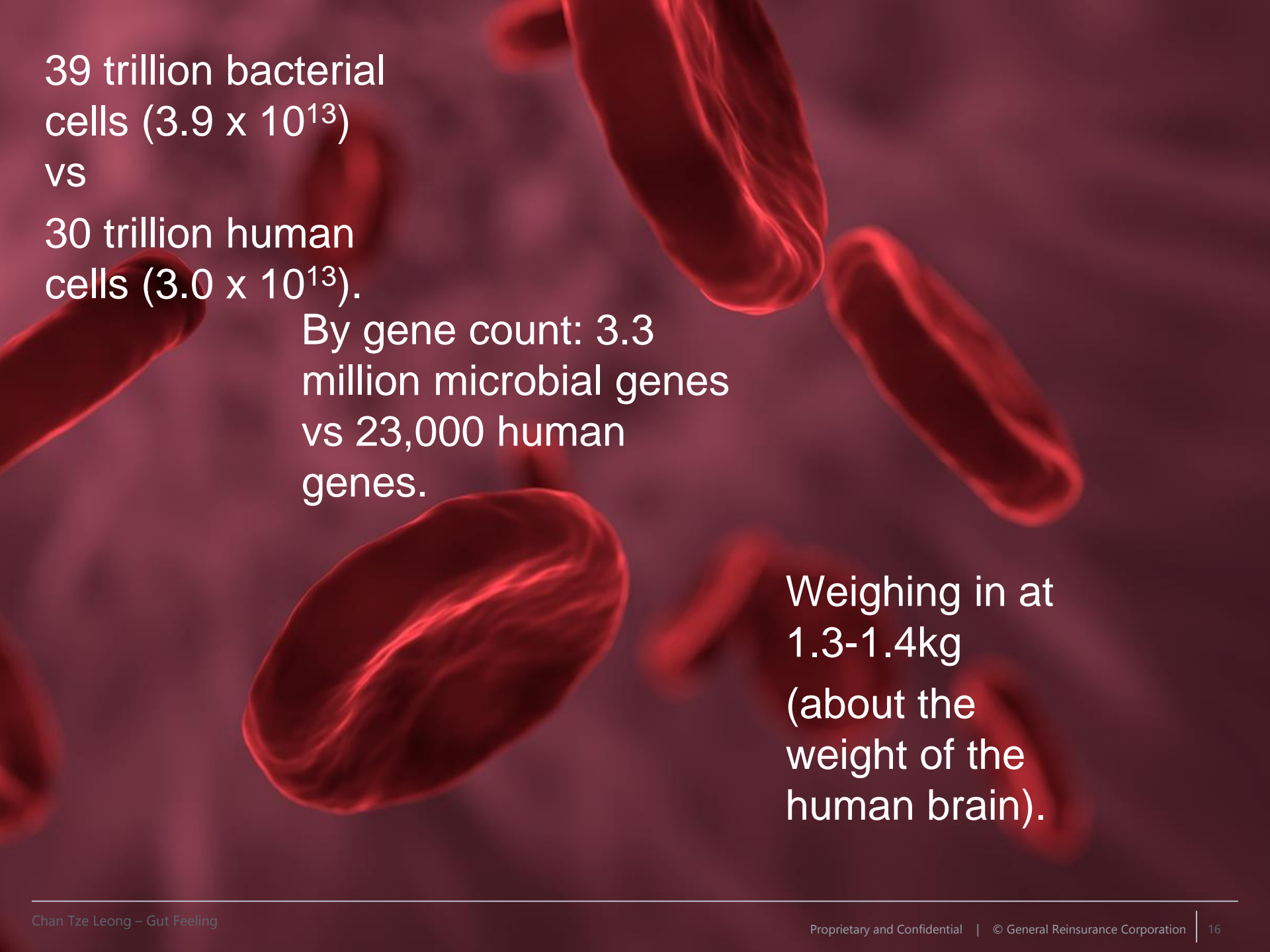






A



A microscopic view of several rod-shaped bacteria, likely E. coli, stained with a red dye. The bacteria are scattered across the frame, with some in sharp focus and others blurred in the background. The background is a dark, reddish-brown color.

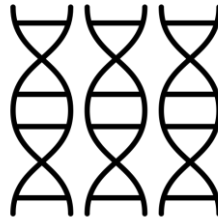
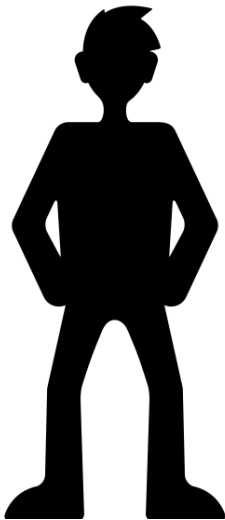
39 trillion bacterial
cells (3.9×10^{13})

vs

30 trillion human
cells (3.0×10^{13}).

By gene count: 3.3
million microbial genes
vs 23,000 human
genes.

Weighing in at
1.3-1.4kg
(about the
weight of the
human brain).

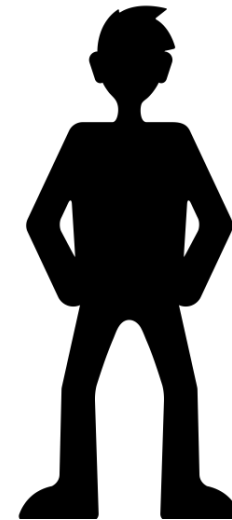


99%
similarity



Created by Maxim Kulikov

10%
similarity?

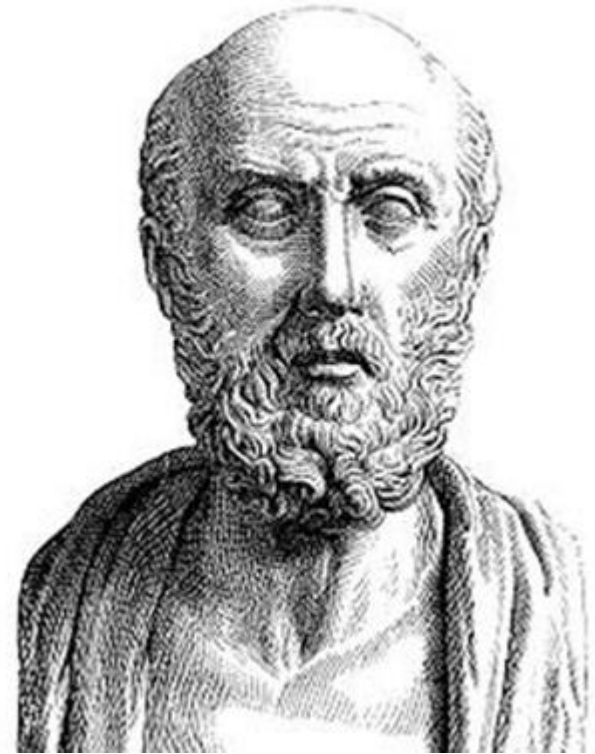




2. The influence of the human microbiome

“All diseases begin in the gut.”

- Hippocrates, 460-370 B.C.



Inflammatory Bowel Diseases

Crohn's Disease

Ulcerative Colitis

Influenced by mix and diversity of microbiota, including reduction in certain species.

Cancers

Cervical, Liver, Colorectal

Viruses such as HPV, Hepatitis B
Bacteria in the colon

Cardiovascular Diseases

Production of TMAO metabolite,
which depends on the mix/ratio of
certain bacteria.

Obesity and Diabetes

Biochemical signals triggering
responses like fat storage or
insulin regulation.

Mood, Anxiety, Memory

Endocrine and immune system

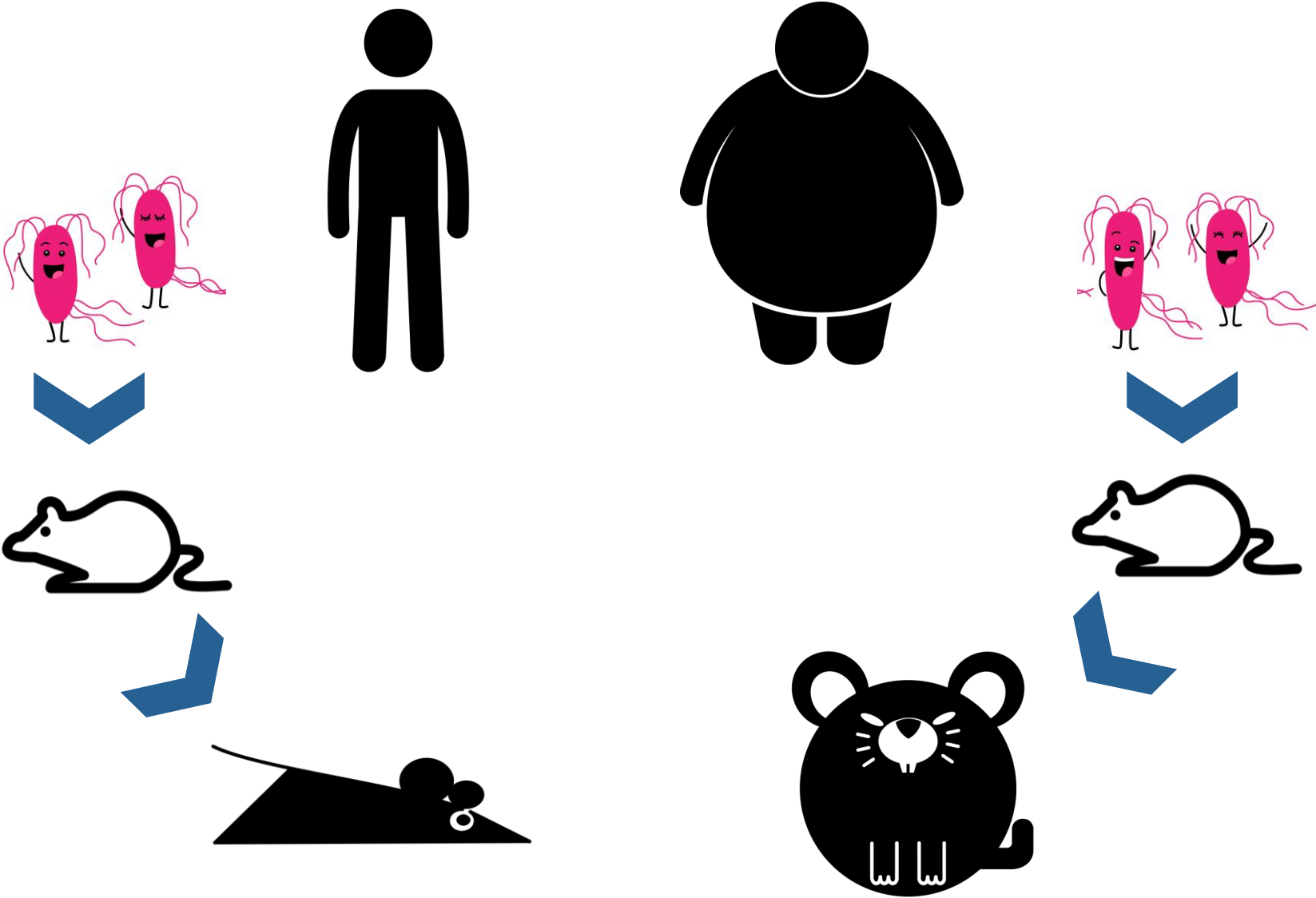


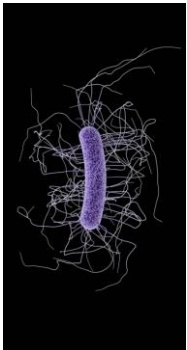
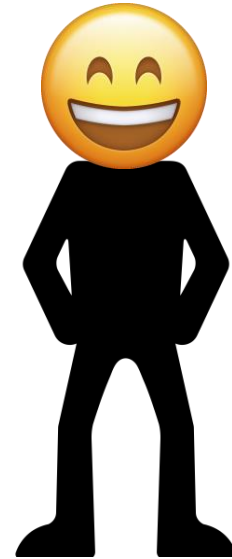
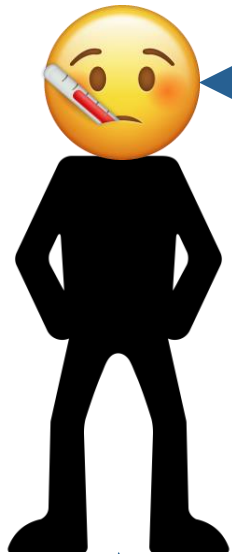
2. The influence of the human microbiome

And how we can influence it

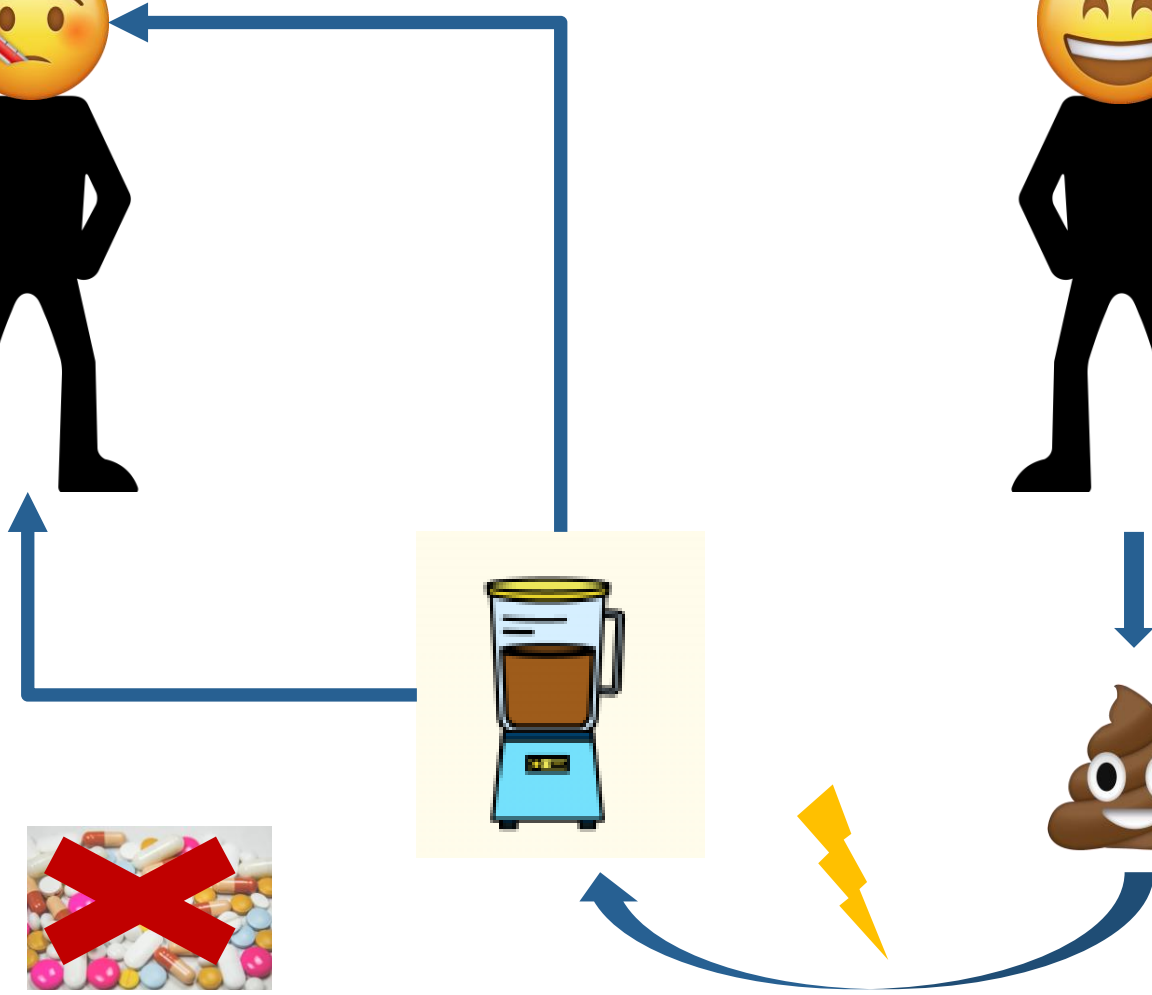


Twins Study





Clostridiodes difficile (C. diff.)



Healthy Human Microbiota for Asia

The Asia Microbiota Bank is a social enterprise providing an unmet need for the citizens of Hong Kong and greater Asia. We are opening access to the quickly emerging field of microbiome therapy to patients, researchers and institutions in Asia by supplying safe access to human microbiota transfer, also known as fecal microbiota transplant.

The Asia Microbiota Bank is Asia's first commercial stool bank collecting human gut microbiota from healthy human donors. We provide a processed microbiota solution, in the form of a Human Microbiota Transplant (HMT) implants, to clinicians and their patients. Scroll down for more information, or click on the links according to your interest.



'Yellow soup' to treat diarrhea

- Ge Hong, 4th century China

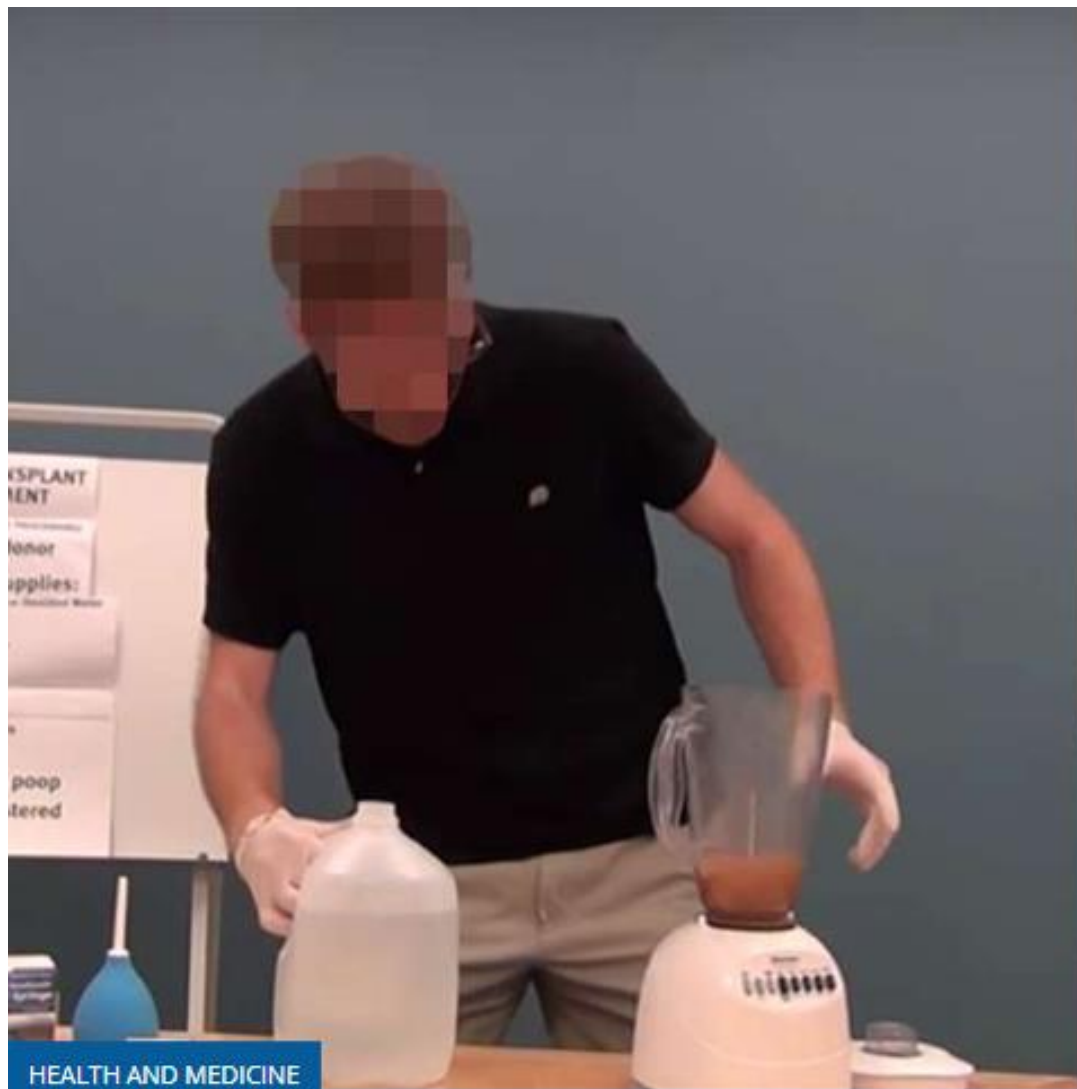


Doctors perform Singapore's first faecal transplants

By **TAN SHI WEI**

Published **07 MAY, 2014**


UPDATED 07 MAY, 2014



THERE IS APPARENTLY A GROWING TREND OF PERFORMING YOUR OWN AT-HOME FECAL TRANSPLANTS. [MICHAEL HURST / YOUTUBE](#) / [HOME FMT / YOUTUBE](#).

This Poop Transplant Resulted In A Death, FDA Warning



Bruce Y. Lee Contributor 
Healthcare

June 2019





3. Implications on insurance

A microscopic view of green, rod-shaped bacteria, likely Bacillus subtilis, against a dark background. The bacteria are scattered across the frame, with some appearing in clusters and others individually. The lighting highlights the texture of the bacterial cell walls.

Onboarding

Nature vs Nurture, Genes vs Gut
Underwriting: static vs dynamic
Asymmetric information and anti-selection

Insured Events

Predictive and diagnostic power
New conditions could be covered
Are CI still critical?

Treatments

Self-treatment
New treatments
Impermanence of pre-existing
conditions

A Summary



- Organisms which outnumber us and can be considered as an organ of its (their?) own!
- We're still at the early stages of understanding, but vast implications are on the horizon!
- Fecal transplants are a thing!
- Predictions & Underwriting
- Outcomes & Claims
- Malleability & Health



Thank You

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Visit genre.com for more info.

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Other Acknowledgments



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- Human by julian roman from the Noun Project
- Bacteria by Maxim Kulikov from the Noun Project
- DNA by Made by Made from the Noun Project
- The assembly of an infant gut microbiome framed against healthy human adults (Youtube – Antonio Gonzalez)
- <https://www.yakult.co.in/whyyakult.php>
- Kiran Krishnan “Metabolic Reconditioning”
- The Poop Emoji
- Very Happy Emoji
- Sick Emoji
- Yellow Soup from Unsplash
- Ge Hong portrait from <https://www.iep.utm.edu/gehong/>
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- <https://www.forbes.com/sites/brucelee/2019/06/15/this-poop-transplant-resulted-in-a-death-fda-warning/#cc800df1972c>
- South Africa flag (1928 – 1994) from Wikipedia

Other Acknowledgments



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- Super Fat by Gan Khoo Lay from the Noun Project
- Rat by N.K.Narasimhan from the Noun Project
- Rat by Chanut is Industries from the Noun Project

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