Connect to previous writing: Use of DNA to assess microbial communities

In the past, isolation prevented epidemics.

Hygiene Hypothesis

Now, modernization improved contagion.

Disappearance of microbes due to sanitation.

Importance of Microbiome in general for health

Ie Microbes improve nutrition by increasing digestable volume of food.

Bacteria metabolisms are essential.

Bacteria are predators, not evil!

Colonization is harmless.

Correlation != Causation

H. pylori condundrum and dual nature.

Your microbiome as an essential organ

**Microbial genome is more important than DNA genome?**

Bacterial Genes > Human Genes.

Importance of Microbiome in Development

Ie max height is determined at a young age

Importance of microbes in pregnancy/infant health

Microbes in milk

Modern disinfection is harmful?

C Section babies lack microbes that have been *selected* for

Microbial poplns change over time.

Ie dramatic changes in height over a short period.

Combination of microbes and environment contribute to height

**However, “microbial signature” is consistent.**

Microbes must balance b/w cooperation and cheating to get ahead. Balance b/w own benefits and human body/community benefits.

Change in microbiome can be good for responding to a disease, but this loss/change in diversity makes future responses more difficult

Antibiotics as the “atomic bomb”

Short vs long, known vs unknown side effects

Antibiotics can cause permanent microbial popn change.

especially during crucial development stage.

Disappearing Microbiome

If disappearing is pathogenic 🡪 good. Beneficial/neutral 🡪 bad.

Microbes that assist/protect against allergies are being removed by antibiotics/disinfecting procedures.

Freq antibiotics/treatments increase harmful effects on natural microbiome.

Vicious cycle of relapses and more antibiotics

For example, one nosocomial strain (C. dificile) has evolved parallel strains bc of selection due to antibiotics. This is a problem bc it becomes resistant to many things.

A large volume of a single microbe does not mean it is essential. A small volume of a single microbe does not mean it is not essential.

Diversity essential to avoid extinction by allowing for a “margin of error”

Loss of “contingency” microbes 🡪 increased risk

Problem 1: increase in allergies

Problem 2: obesity

Use in farms to increase yield and decrease price

Increase in resistance w/o saving lives

Accumulation of antibiotics in food?

Antibiotics make kids “heavier” too?

Microbes that improve nutrition + antibiotics that make kids heavier have synergistic effects on weight/obesity.

Challenges to Solutions: Social

Social Pressures 🡪 overuse

Economic Pressures 🡪 delay in research

Social Impacts

Personal vs Institutional challenges

Cost vs effort by doctors

Influence of norms/dogma

Challeges: “technical”

It will be problem bc rate of resistance > discovery of new drugs

Solution 1:

Manipulating Microbes as treatment?

Can it be harmful?

**What is the “normal” microbiome?**

What beneficial microbes have already been lost?

Venezuela case

Probiotics. Can a pre-determined set of microbes help a personal case?

Example: mantually inoculating c section babies

Solution 2:

**French program to reduce dependency.**

Antibiotics are not Automatic.

Antibiotics only when necessary.

Solution: **narrow focus meds + faster diagnoses**