

Harnessing the Microbiome for Personalized Health and Wellness in Aging

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Financial Disclosures

- Co-founder and Chief Scientific Officer of Postbiotics Inc, MusB LLC, and BiomAge Inc
- Co-Founder and Vice-President of MusB Research LLC
- Scientific Advisor of SwipeBiome

Learnings Objectives:

- ◆ **The concept of personalization, is it implementable?**
- ◆ **Implementable personalization strategies?**
- ◆ **New frontiers in microbiome and aging research**
- ◆ **Collaborative opportunities**

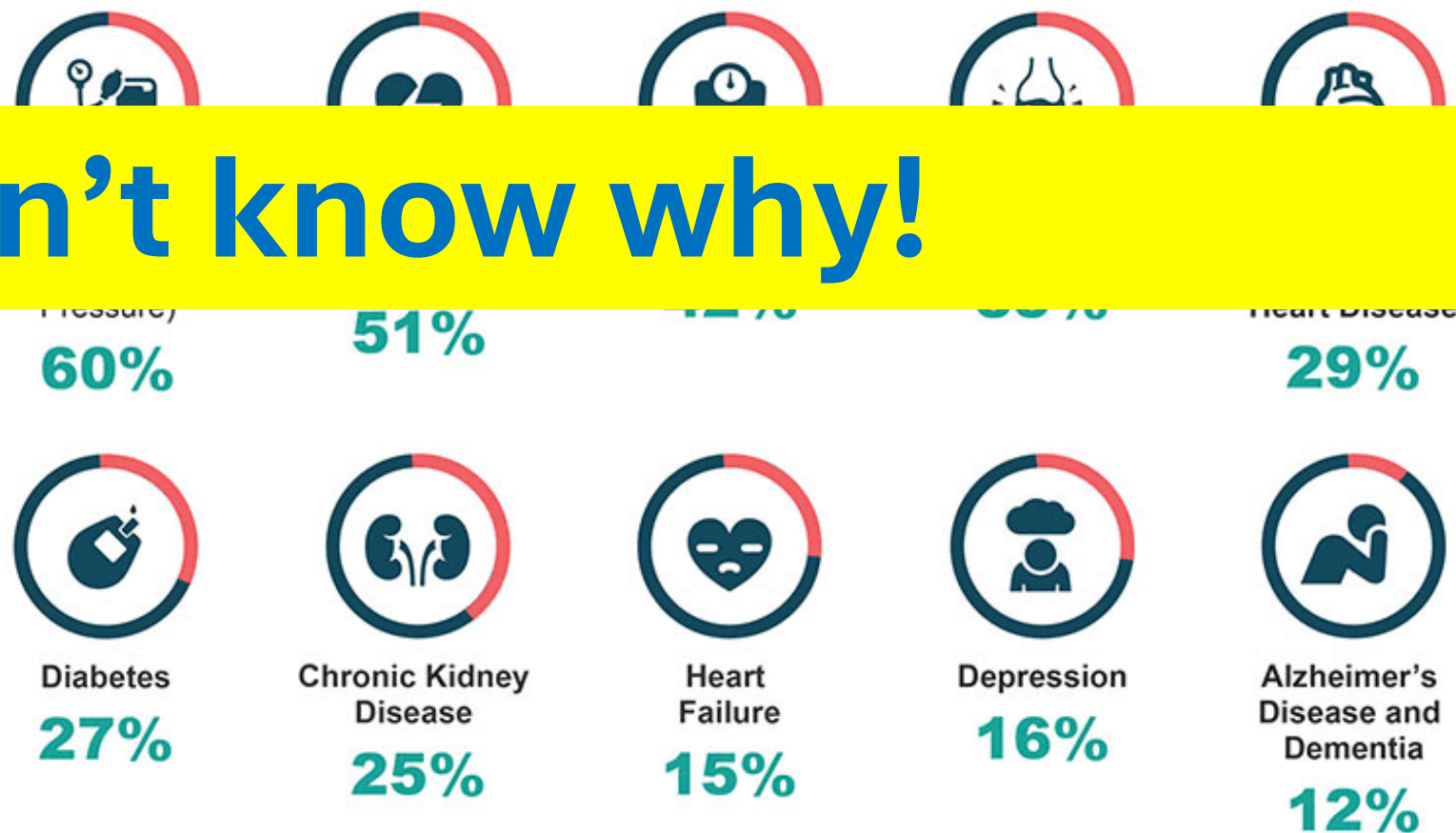
Personalized Health

- **Age-related diseases**

- When we grow older, why do some people develop conditions while others don't?
- For those who do, why do they develop them at different times?

We don't know why!

10 Common Chronic Conditions for Adults 65+



Personalized/Precision Medicine

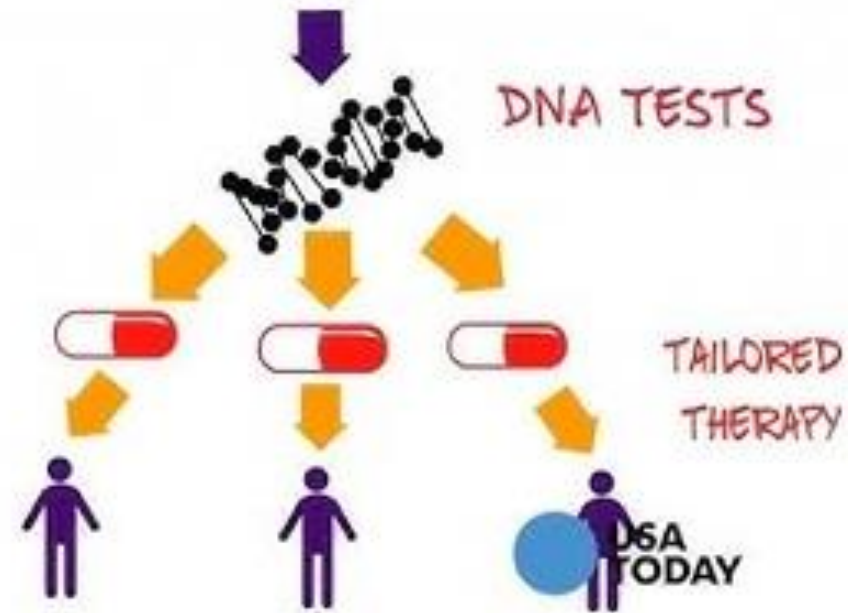
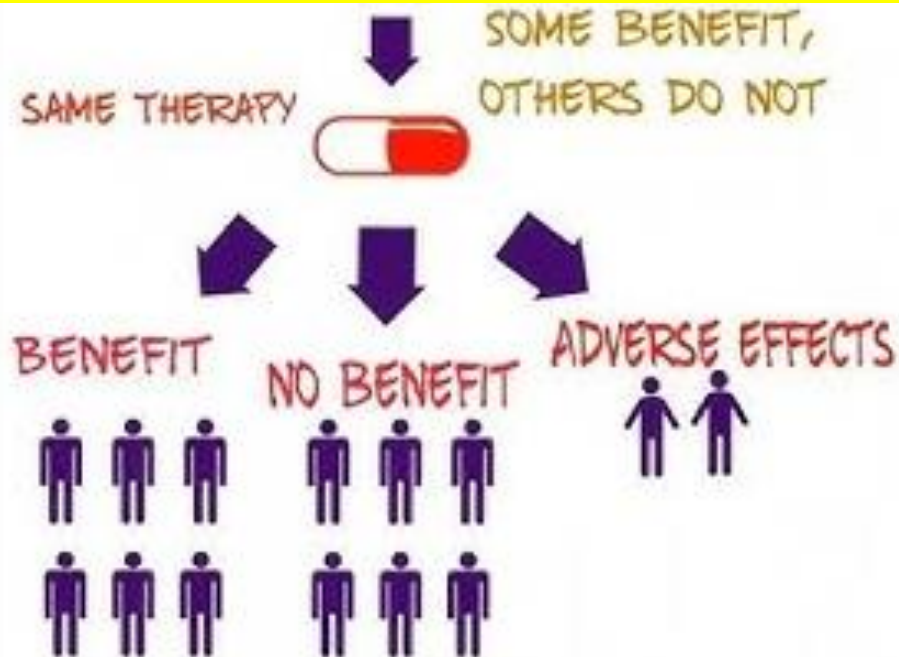
WITHOUT
PRECISION MEDICINE



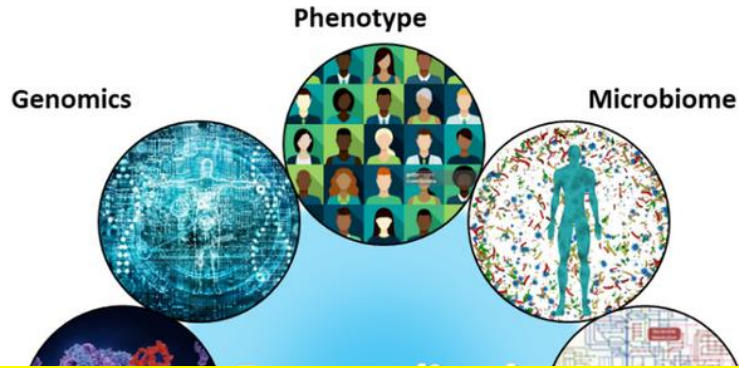
WITH
PRECISION MEDICINE



Genetics contributes <2% in chronic diseases!



Personalized/Precision Nutrition

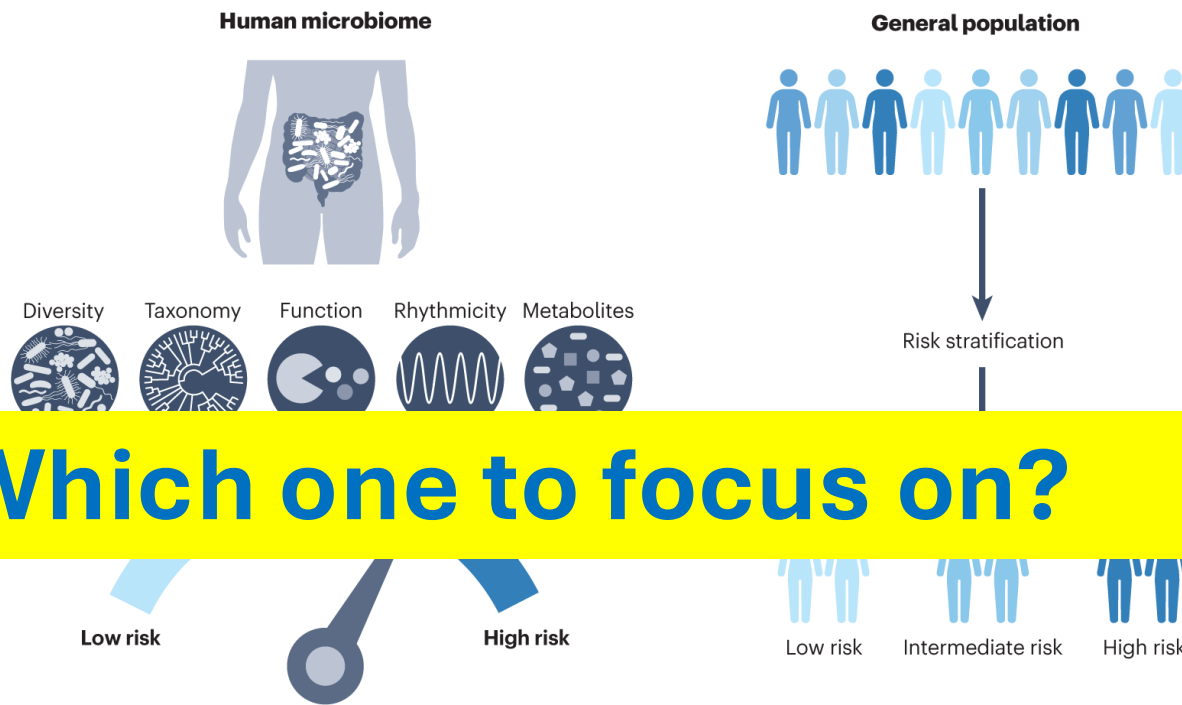


Too many to consider!



Personalized/Precision Microbiome

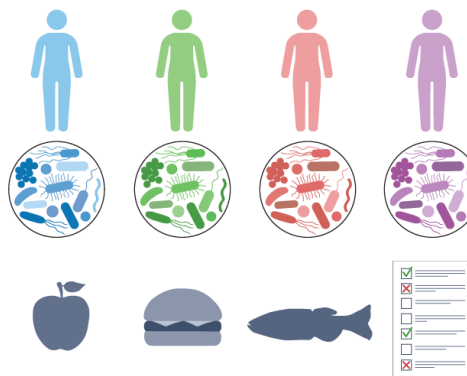
A Screening for populations at risk



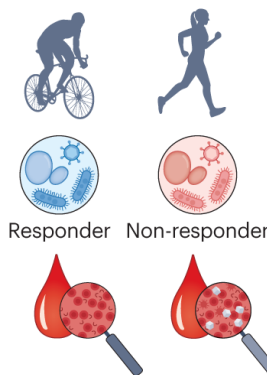
Which one to focus on?

B Personalized disease prevention

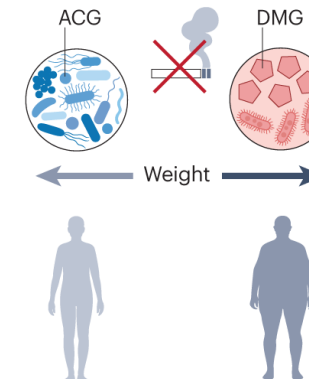
Ba Risk stratification



Bb Exercise



Bc Smoking cessation



Summary #1

- We don't know why our health differs from each other during aging
- Genetics contributes <2% in chronic diseases, then how personalization of medicines and diets can work?

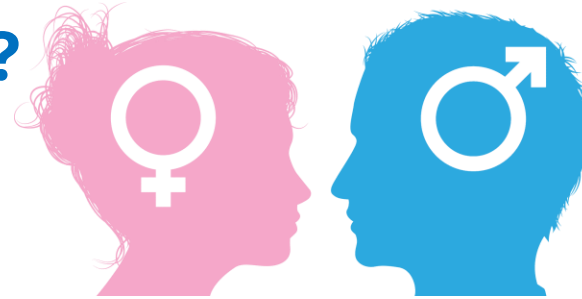
Should we lose hope from personalization? NO!

all, how can be stratify them?

- None of these approaches are economically implementable for large populations, as well as not easy in natural/dietary/nutraceutical world.
 - They can break companies, products
 - Large setbacks- already happened

Think Simple!

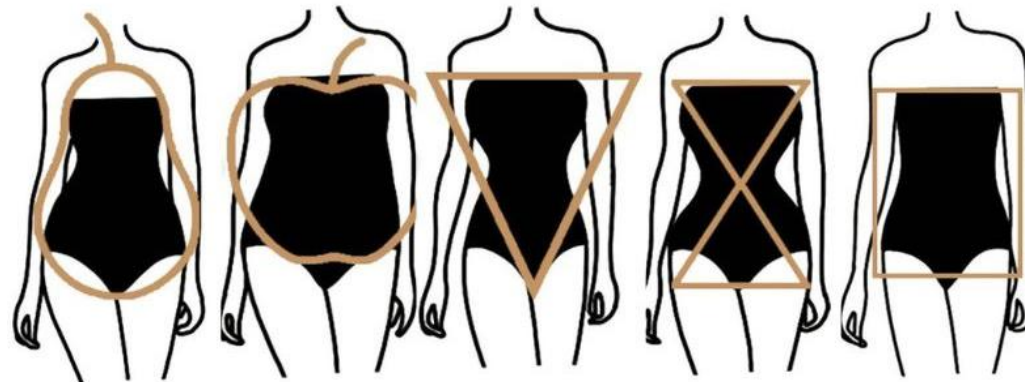
- Are males different from females?



- Are young individuals different from older individuals?

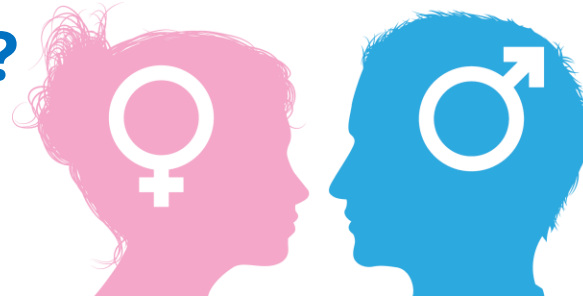


- Do we look alike?



Think Simple!

- Are males different from females?



- Are young individuals different from older individuals?

- Do we look alike?

Men and Women develop distinct health conditions, and their microbiome also differs significantly

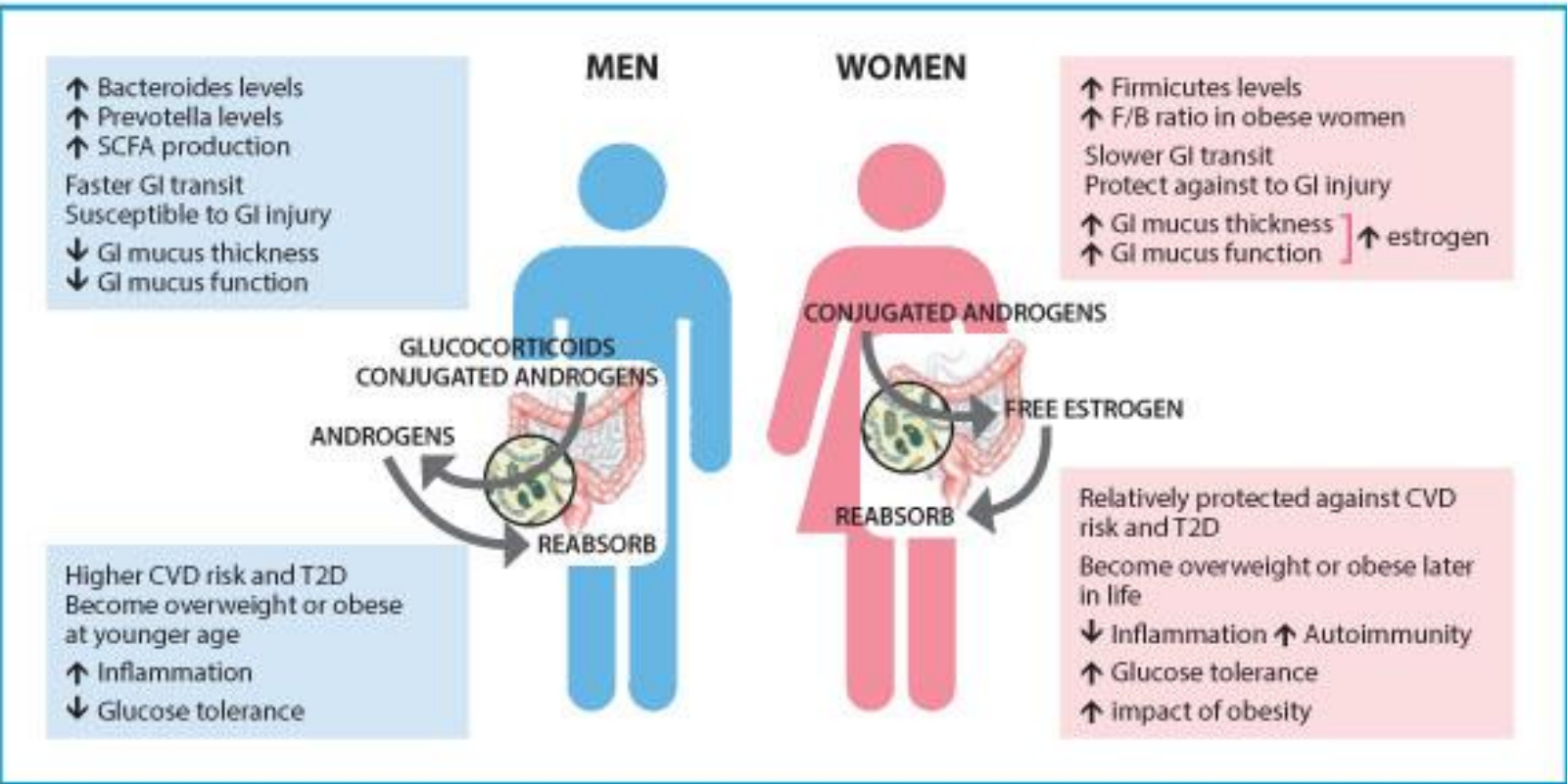
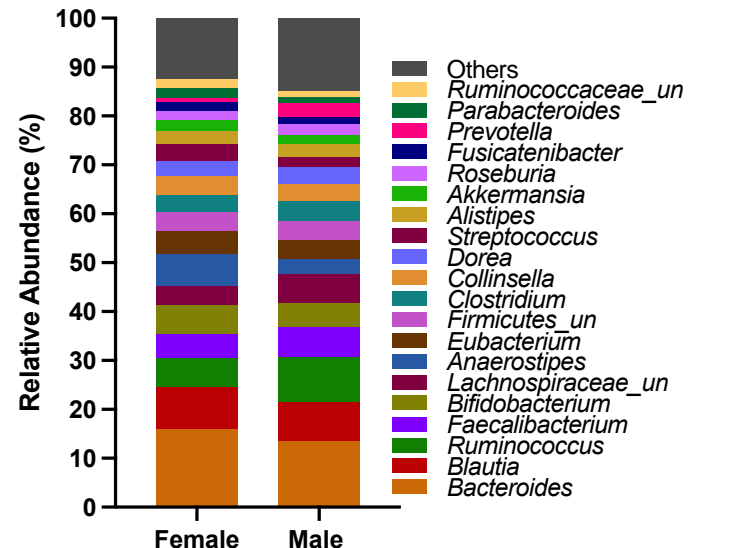
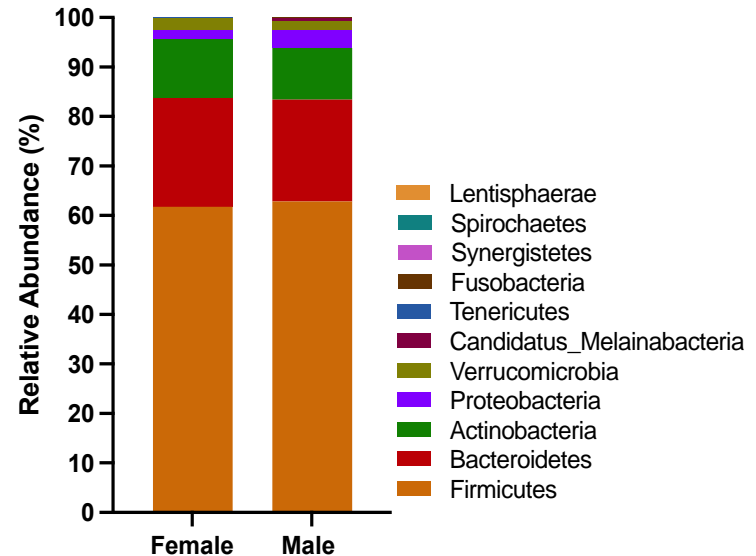
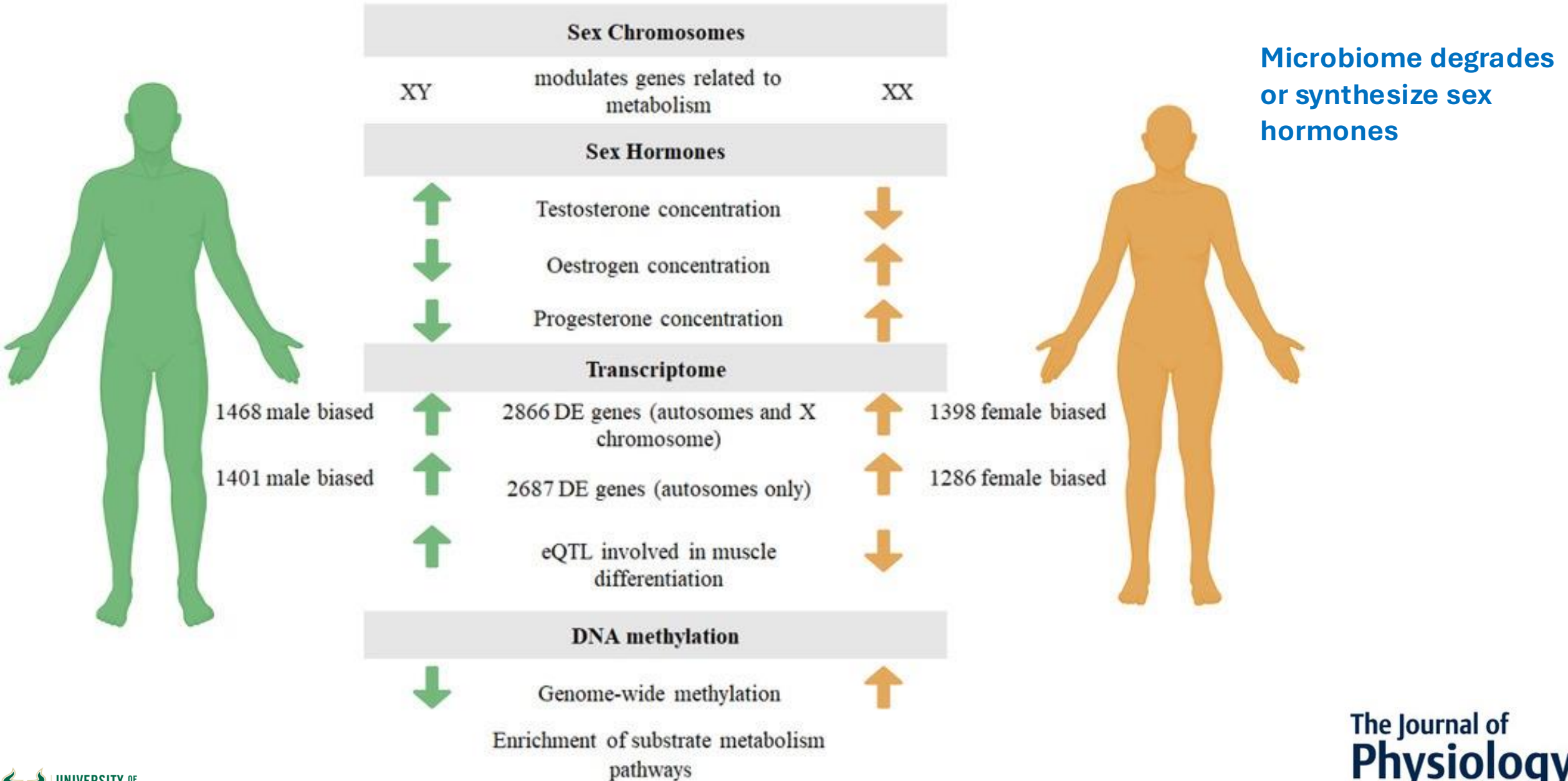


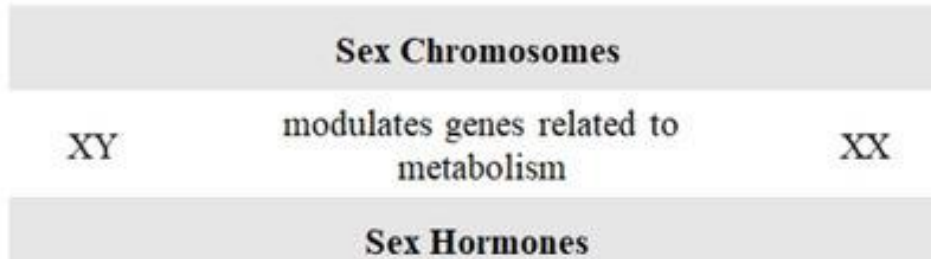
Figure 1. Sex differences in the cardio-metabolic disease and the gut microbiome (modified from Cross L et al. Mol Metab, 2018). SCFA: short-chain fatty acids, GI: gastrointestinal; F/B: Firmicutes/Bacteroidetes; CVD: cardiovascular disease.



Male and female significantly differ biologically



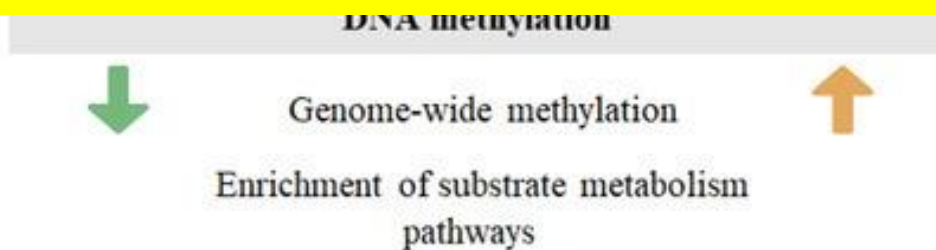
Male and female significantly differ biologically



Microbiome degrades or synthesizes sex hormones

Men and women health can be personalized for nutritional and natural ingredients/ products

**Want to learn more, how to screen and develop?
Contact Us: develop ingredients and technologies for men and women's health**

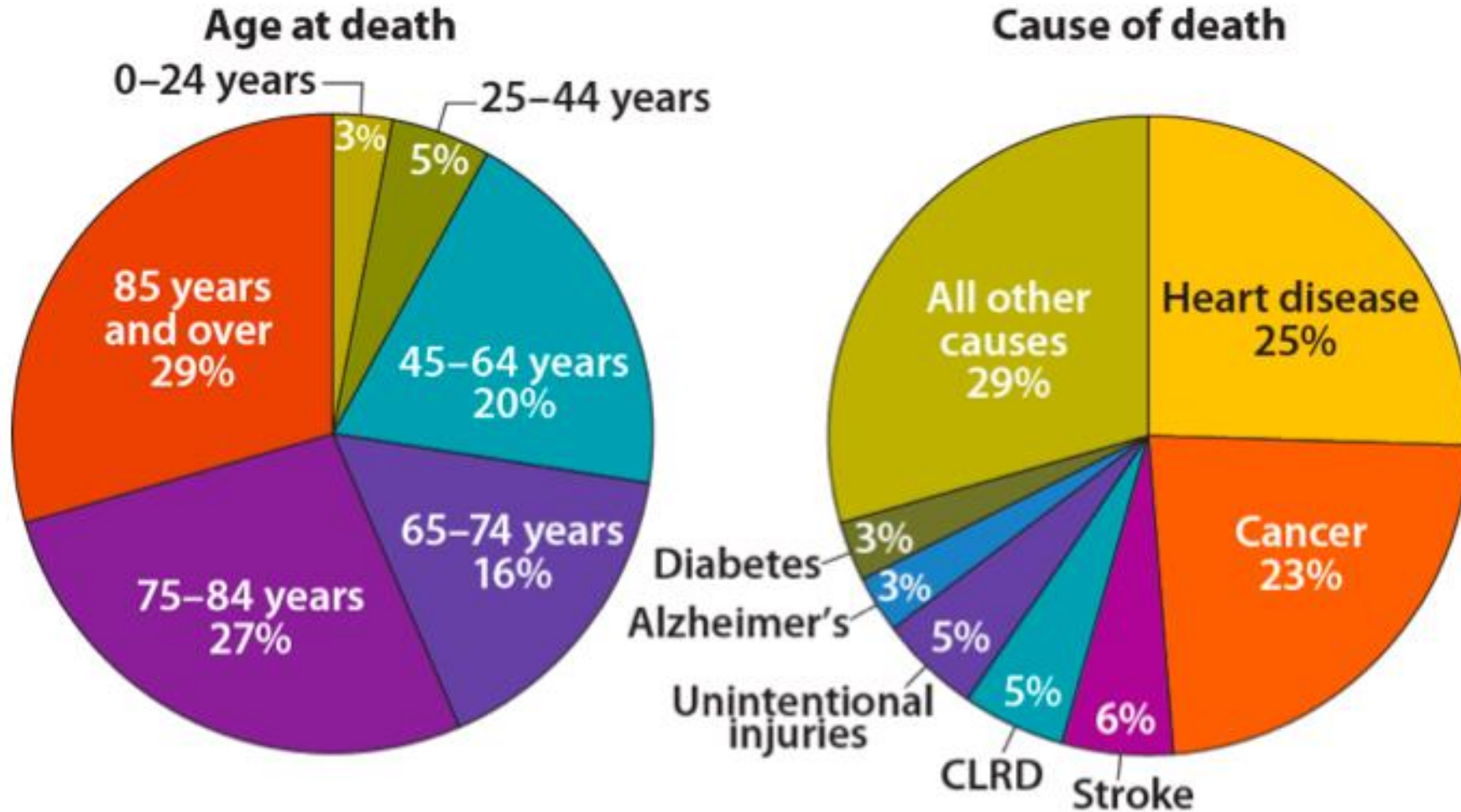


Think Simple!

- Are males different from females?
- **Are young individuals different from older individuals?**
- Do we look alike?



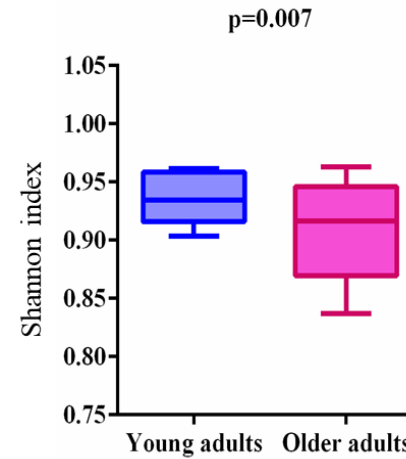
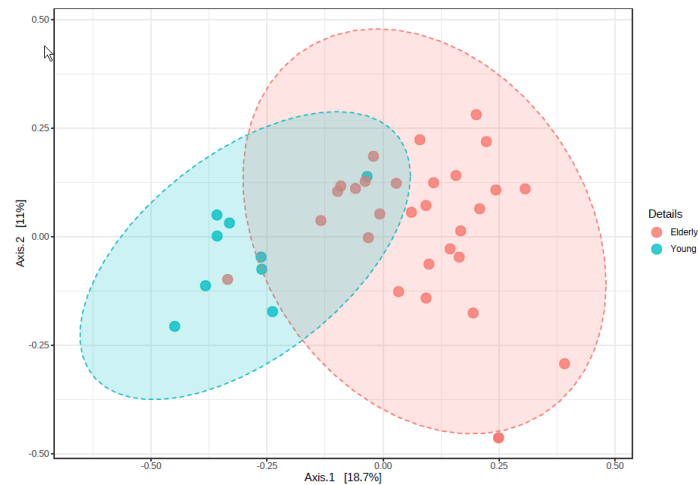
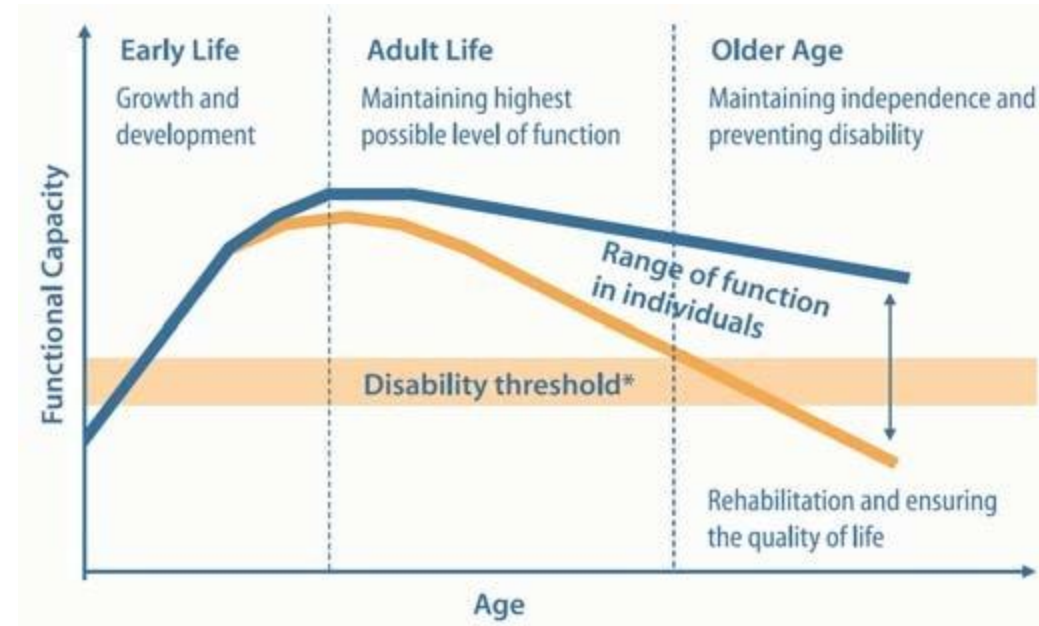
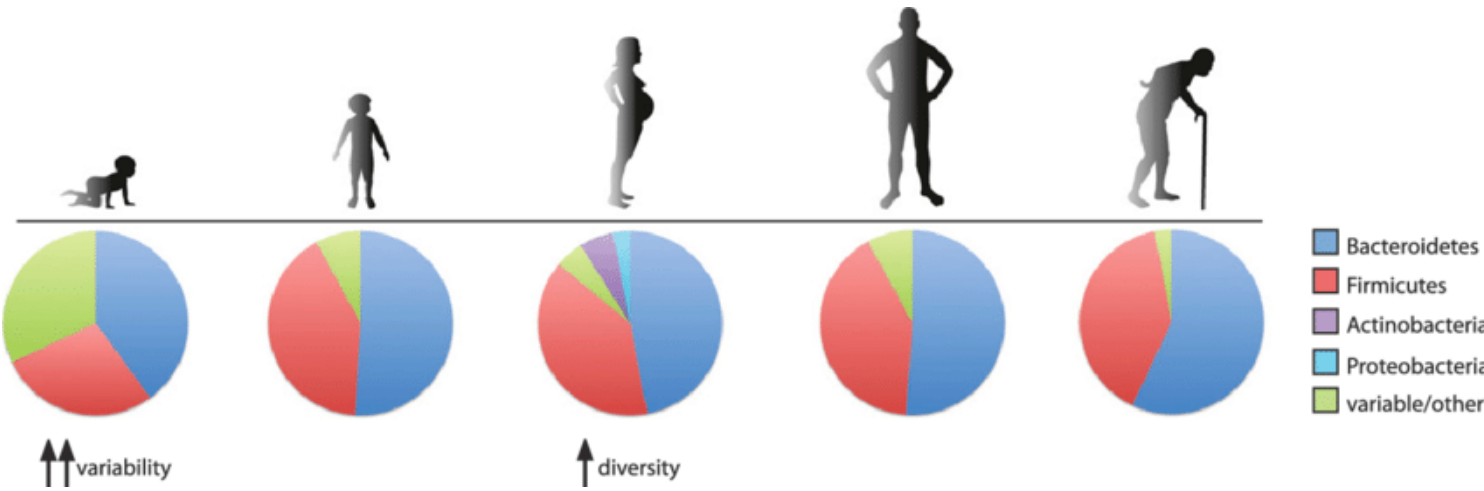
Different age groups have susceptibility for different disorders, should they be treated a similar way?



NOTE: CLRD is chronic lower respiratory diseases.

SOURCE: CDC/NCHS, *Health, United States, 2010*, Figure 24. Data from the National Vital Statistics System.

Microbiome is also significantly distinct young versus old



How can we measure biological age, relevant for clinical substantiation



We all AGE!!



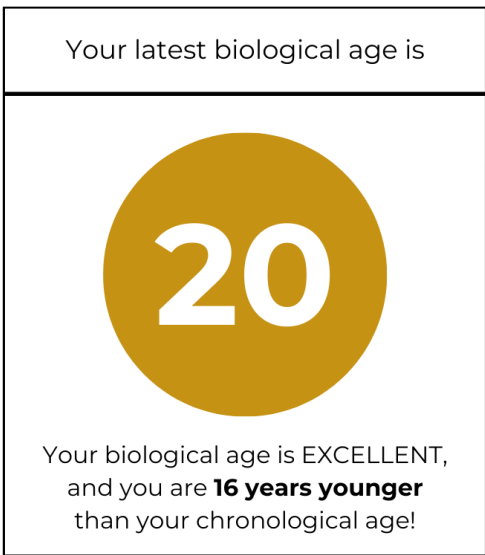
Some faster than others



Develop distinct conditions, not same



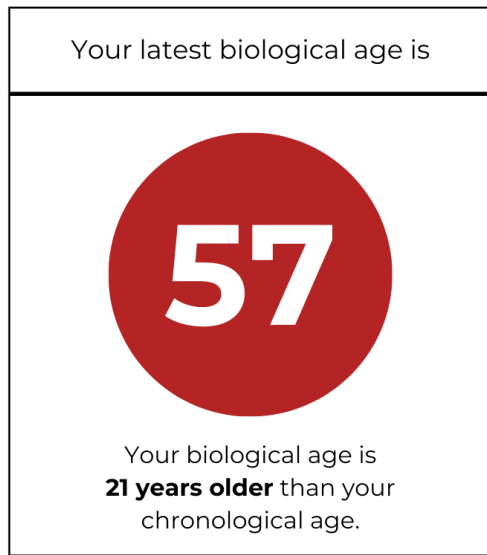
Organ specific conditions



BIOLOGICAL AGE < CHRONOLOGICAL AGE

=

- Low levels of chronic inflammation
- Slower rate of aging

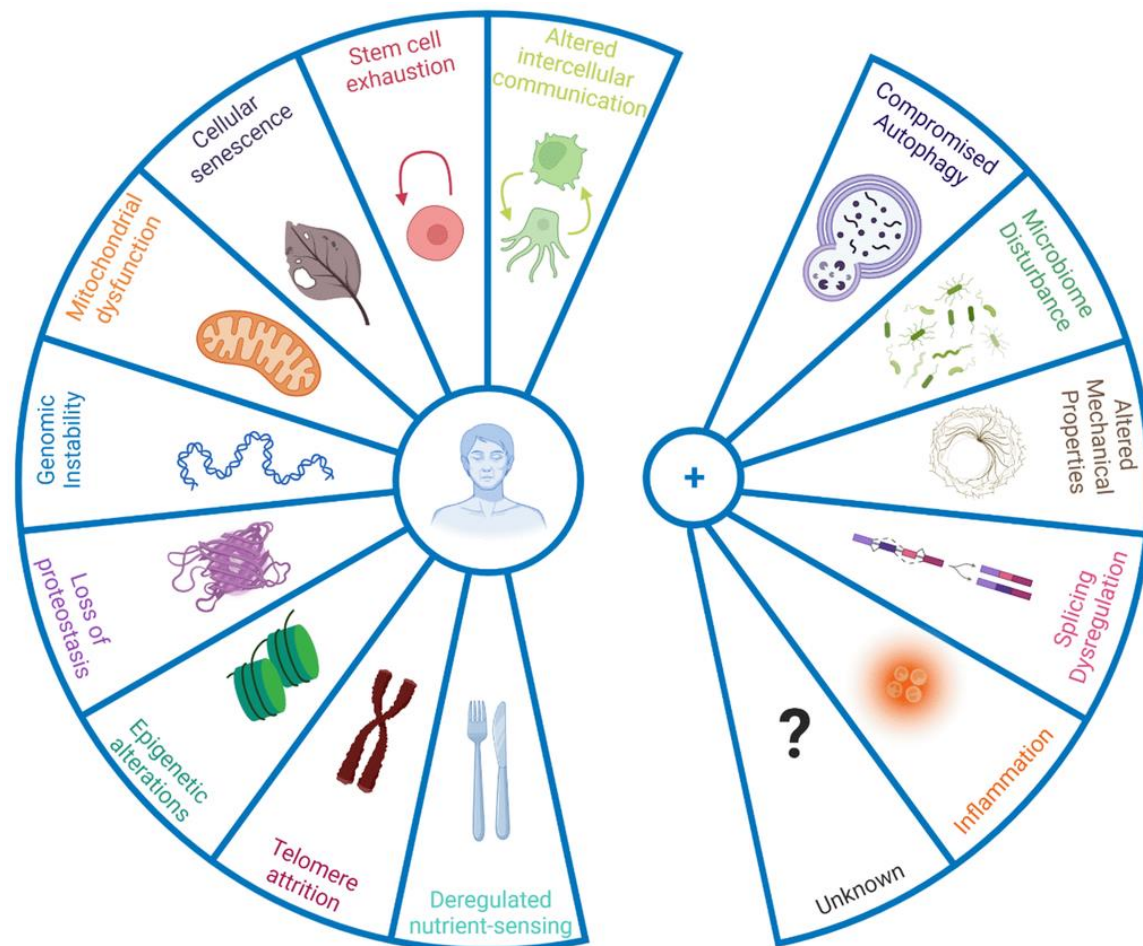


BIOLOGICAL AGE > CHRONOLOGICAL AGE

=

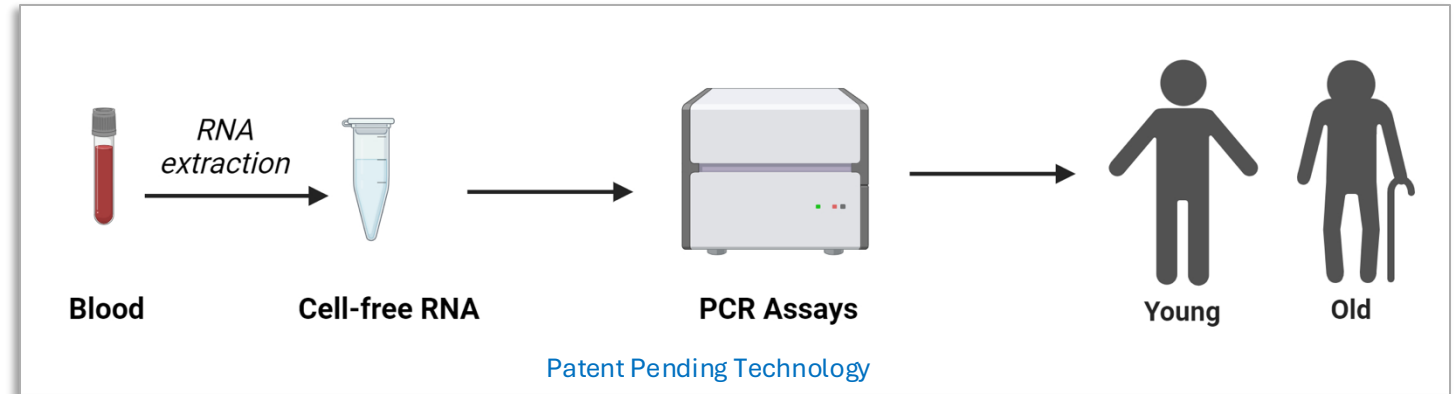
- High levels of chronic inflammation
- Accelerated rate of aging

Hallmarks of aging- Geroscience



Using blood-based markers, we can measure the effects of ingredients on biological aging

Panel of aging biomarkers for clinical effects



Clinical trials can show substantiation:

- 📌 12-20 weeks intervention period
- 📌 Cost effectively done
- 📌 Faster clinical substantiation
- 📌 Established clinical network

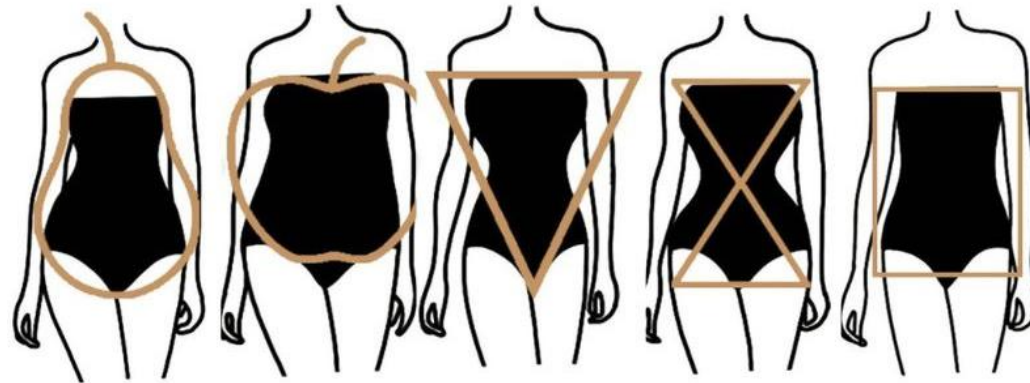
Bring your ingredients

Think Simple!

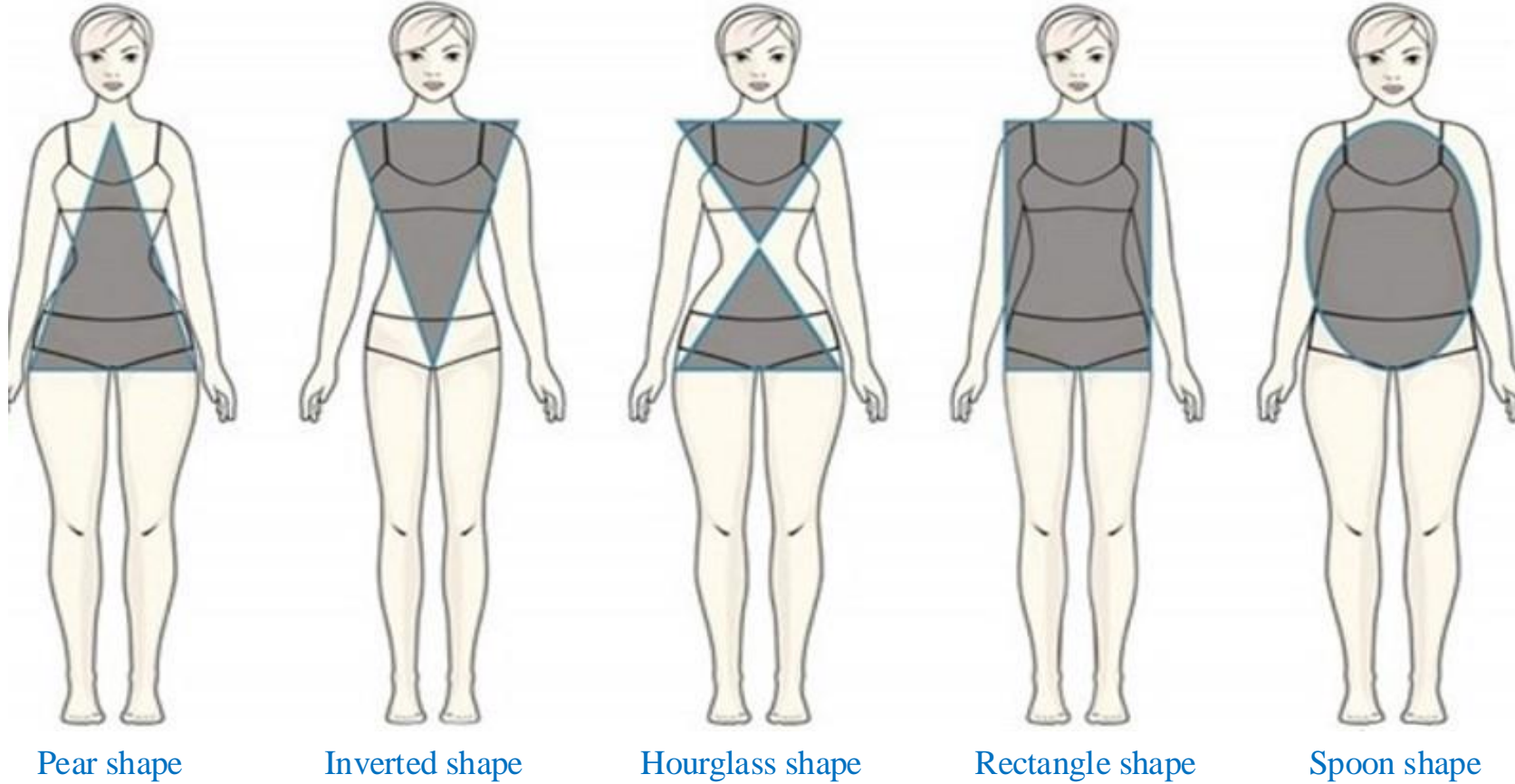
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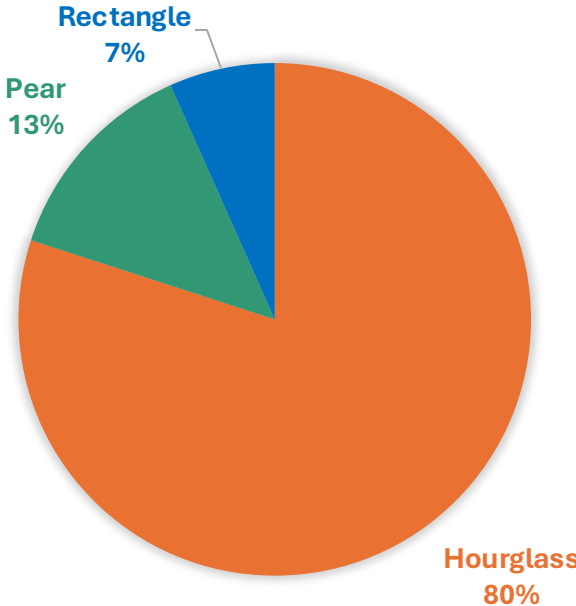
Microbiome significantly differs in different body shapes



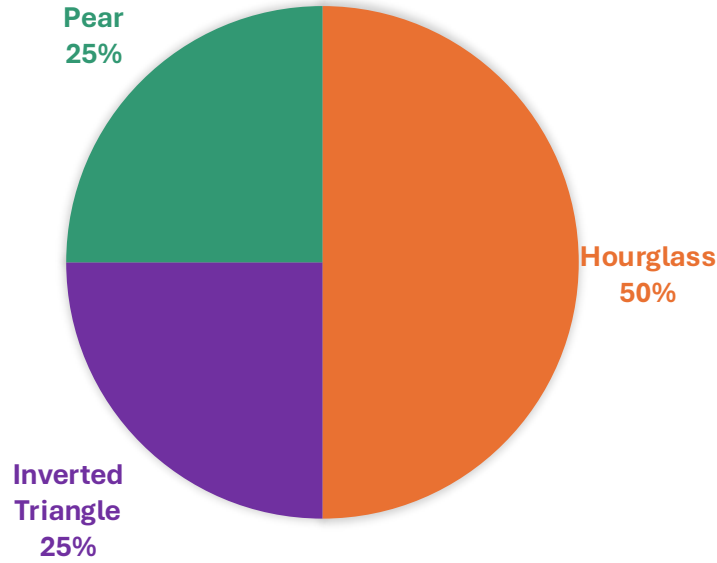
Hourglass

For years, experts have considered this "healthiest" body shape since the waist-to-hip ratio is low.

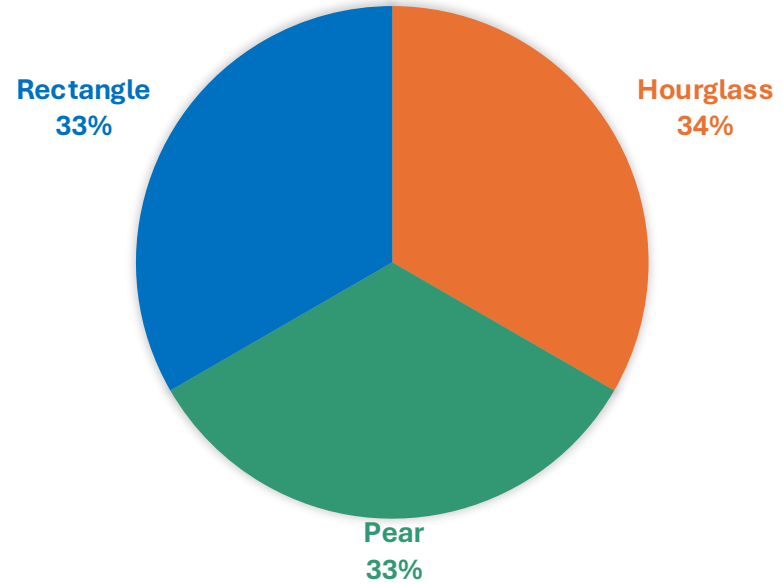
Cognitive health significantly differs according to body shapes



Healthy controls

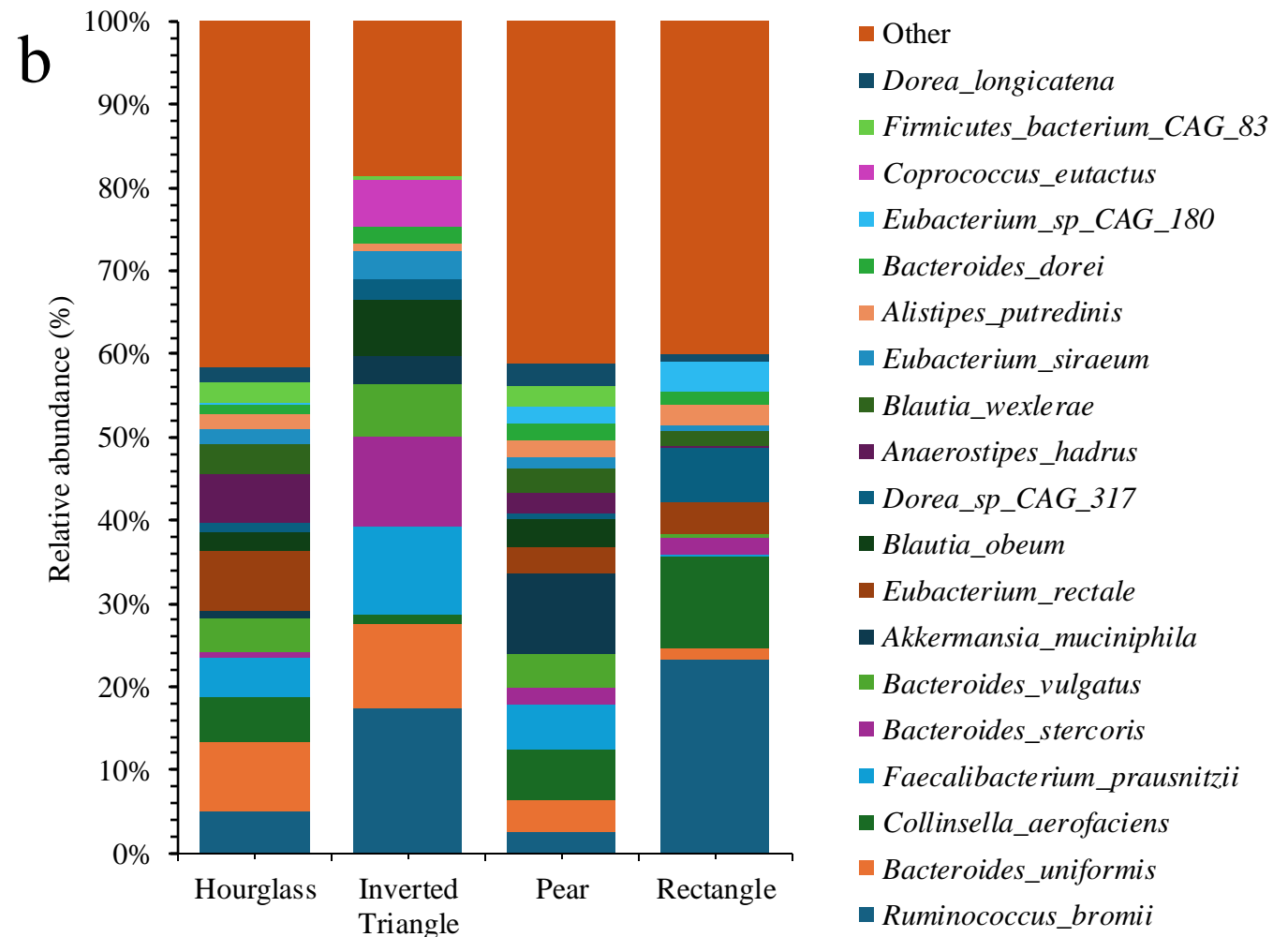
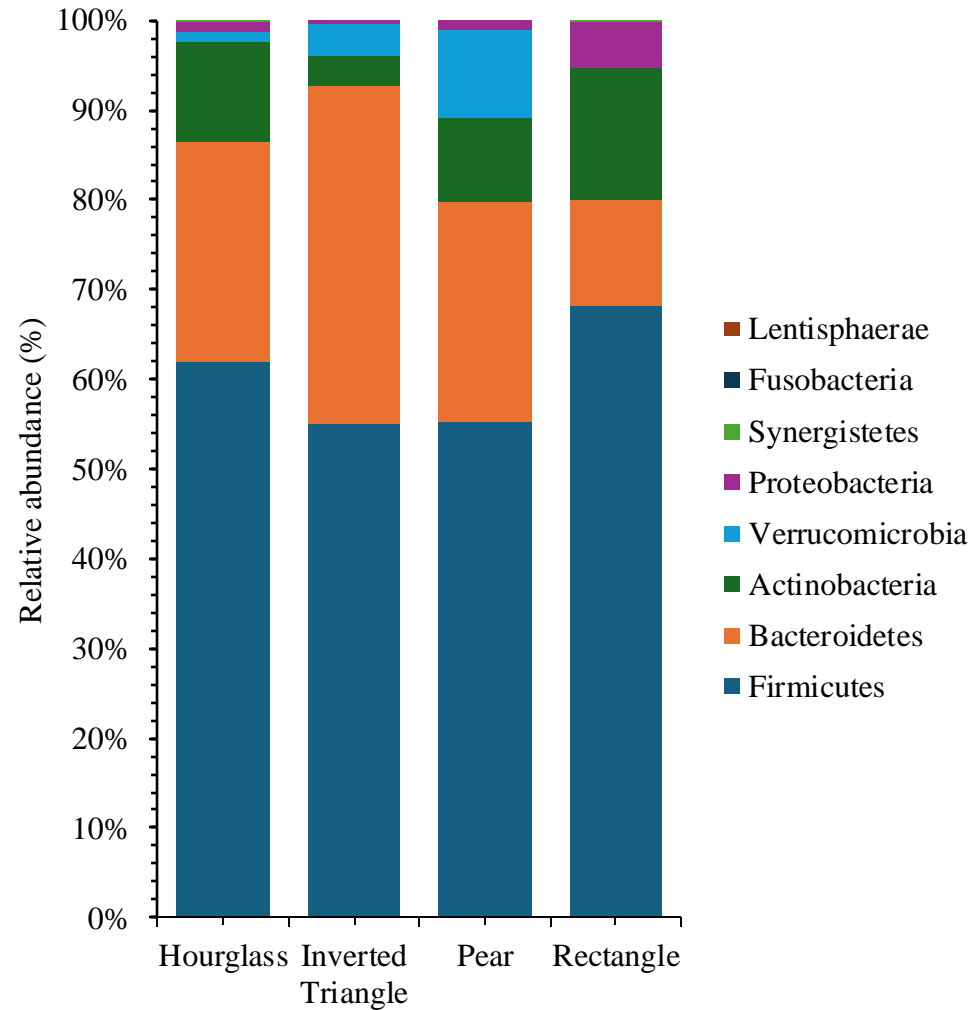


MCI

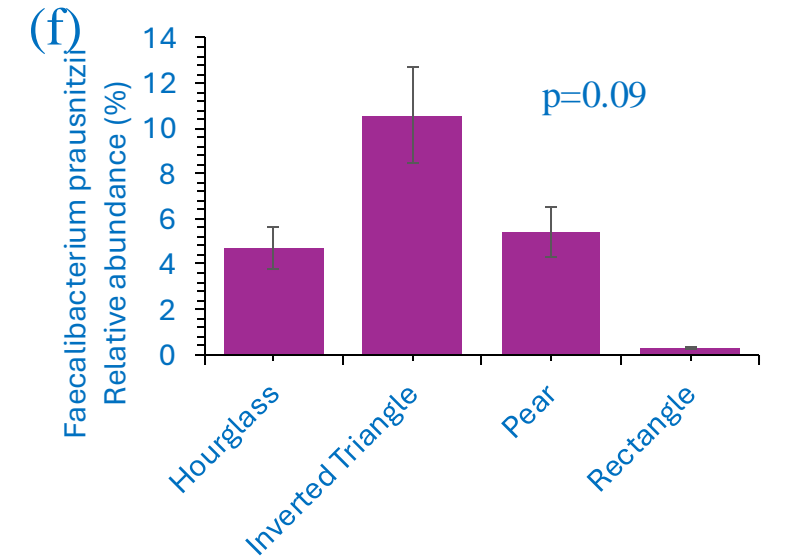
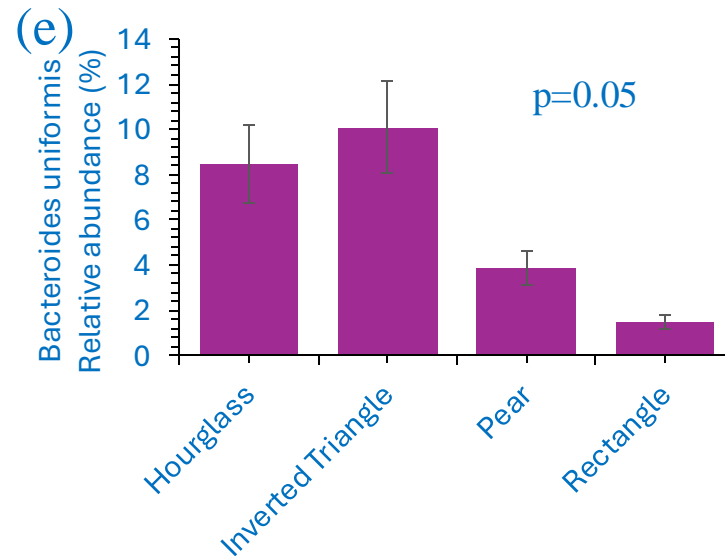
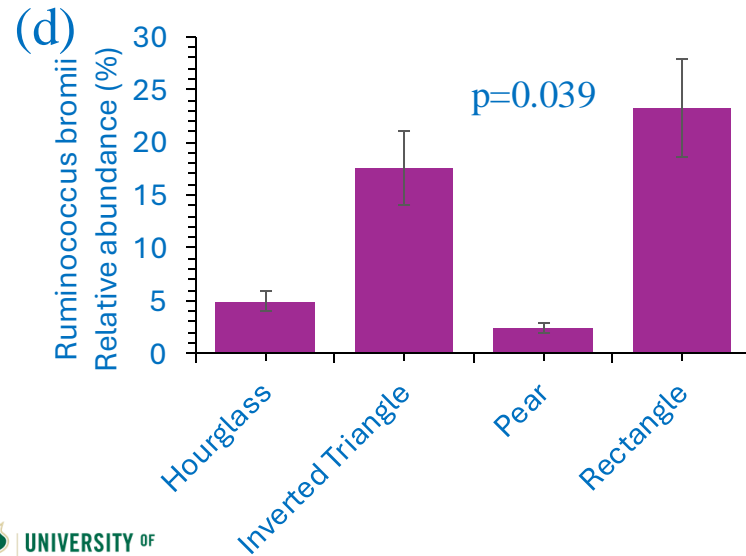
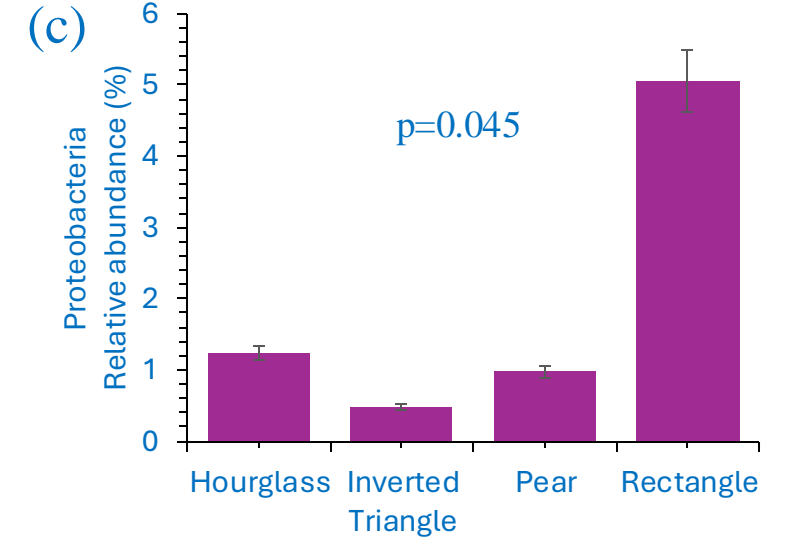
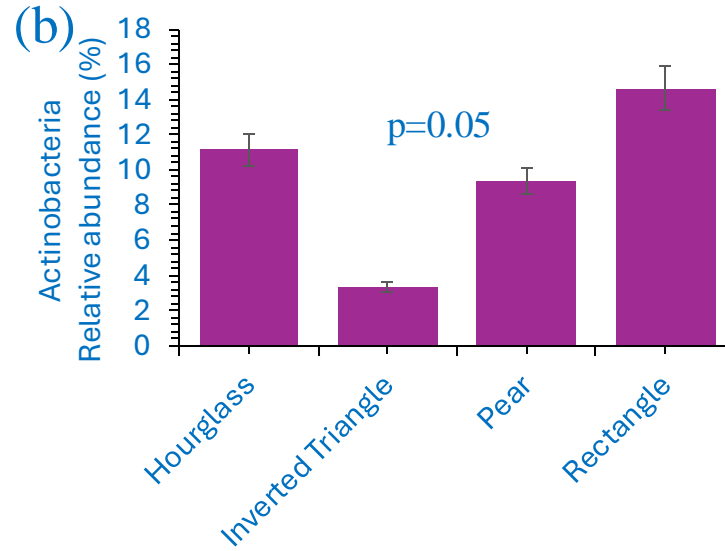
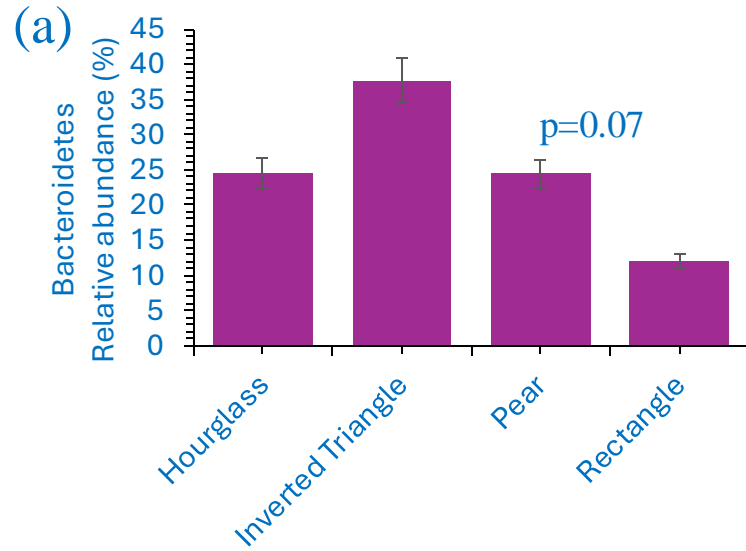


Dementia

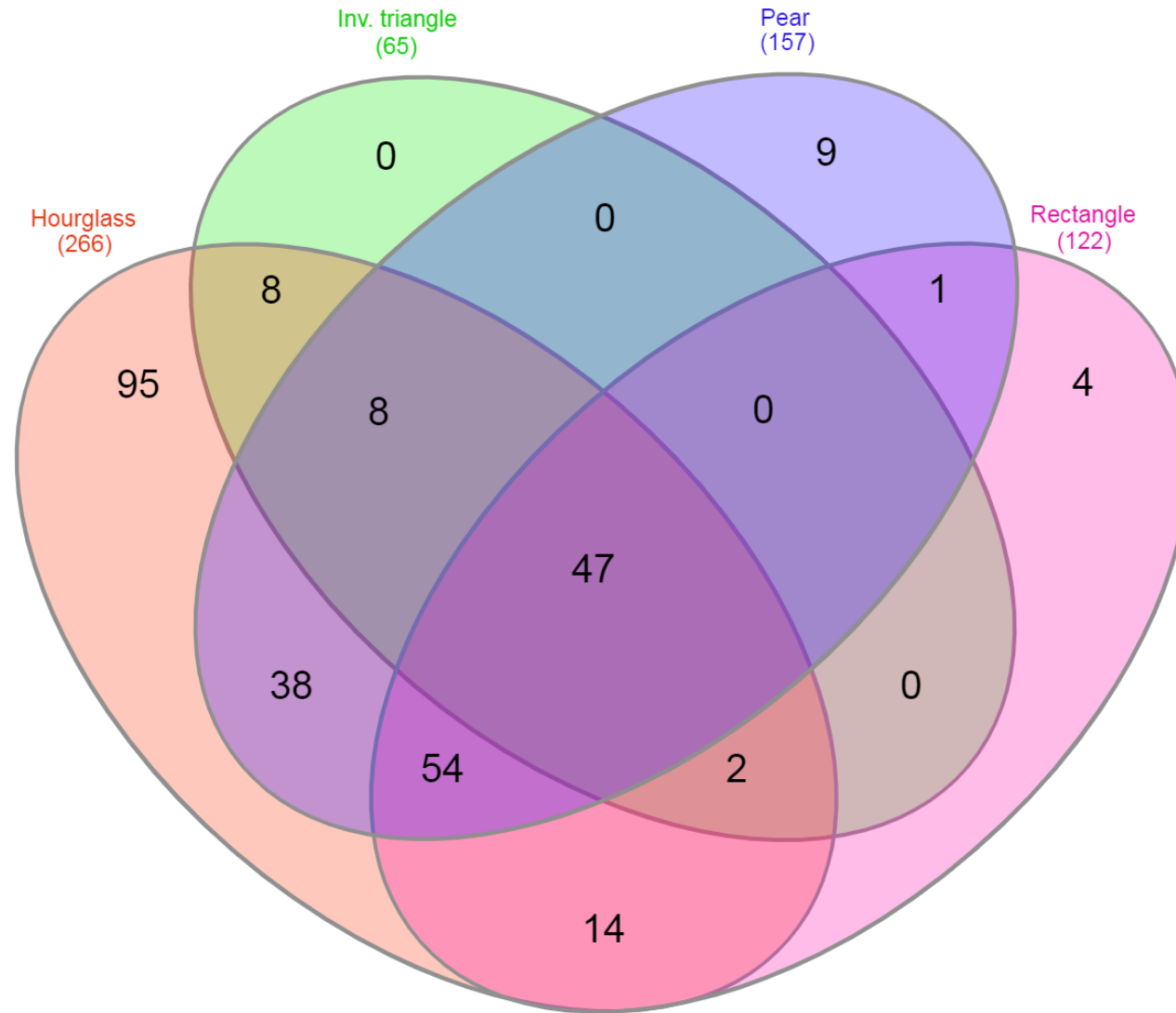
For different body shapes the gut harbors a distinct microbiome



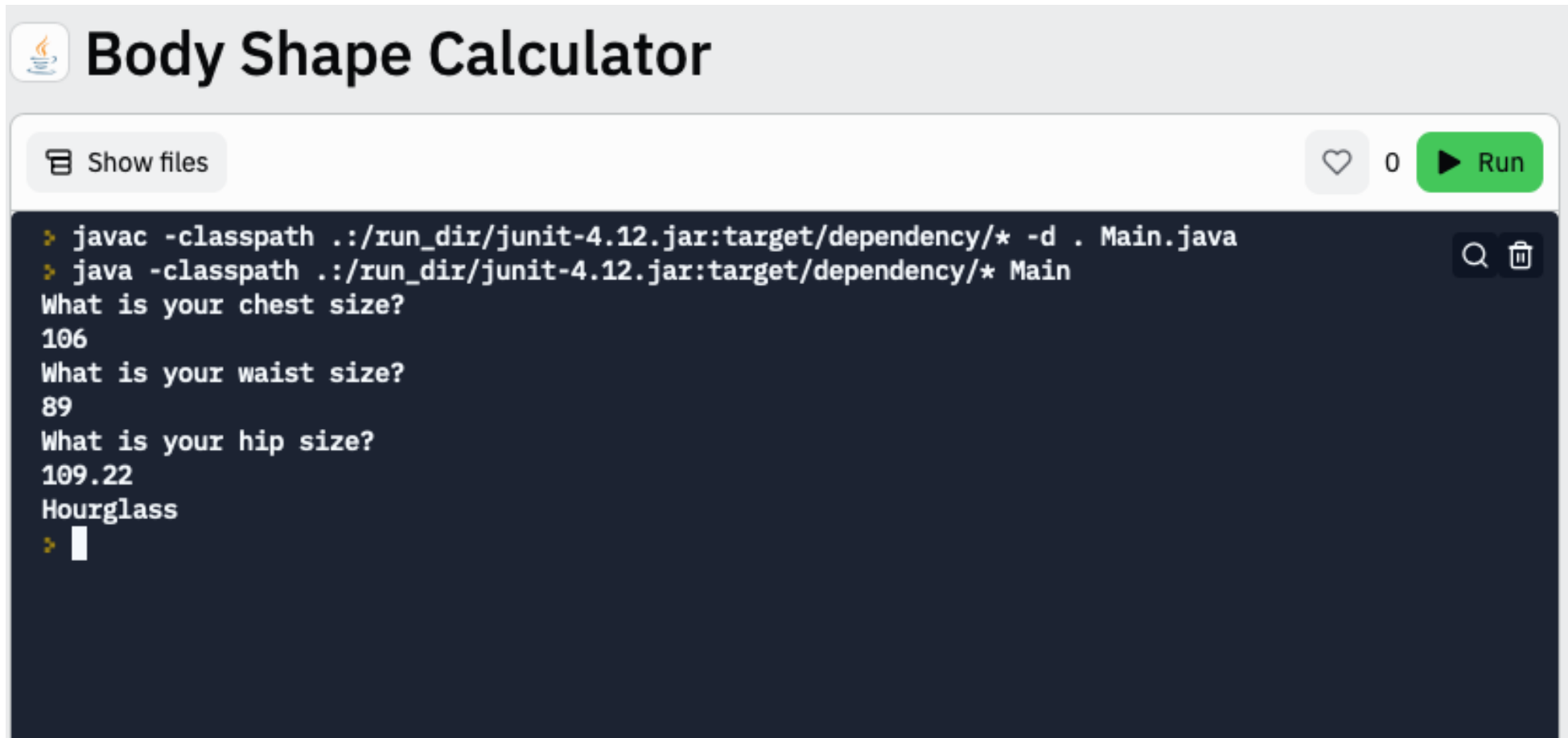
Differential bacteria propagate in distinct body types



Unique bacteria species harbored in distinct body types

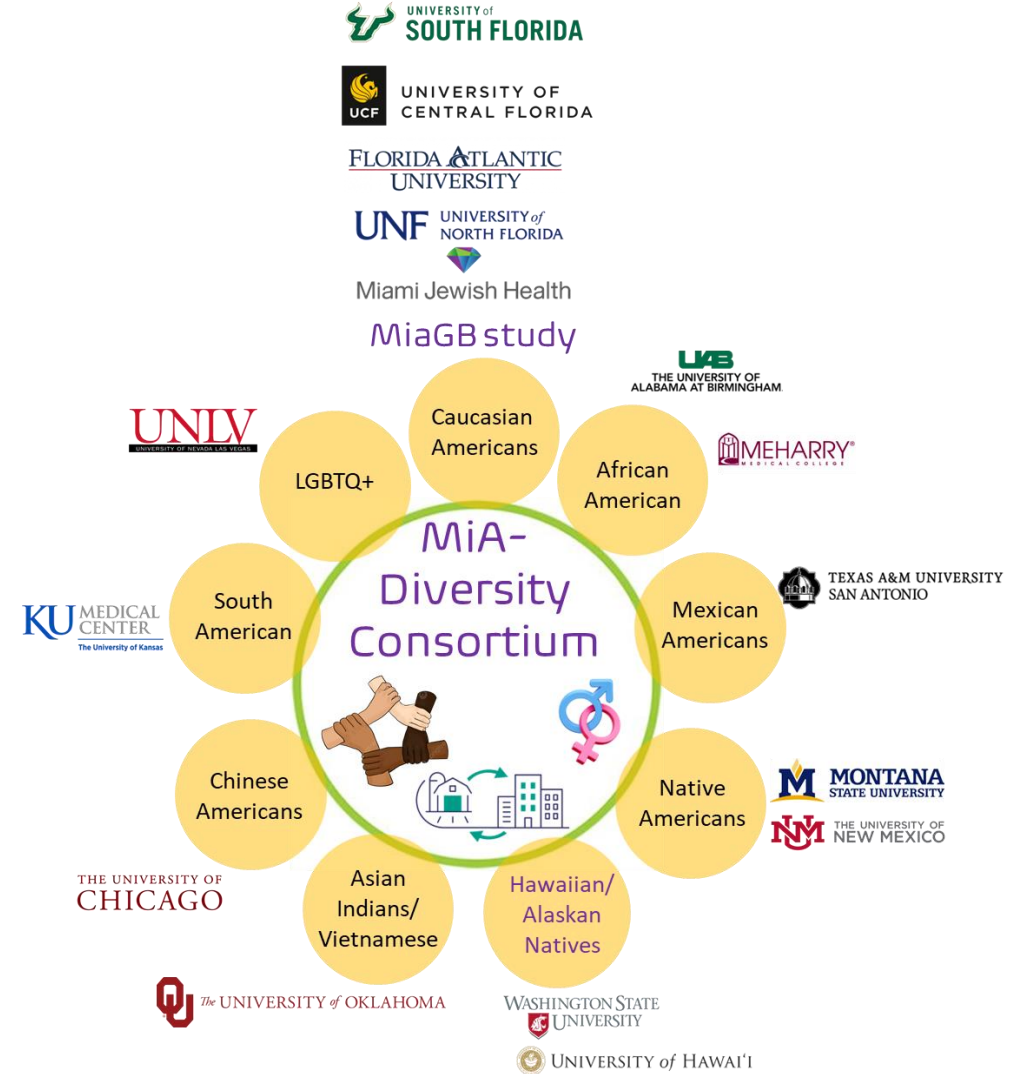
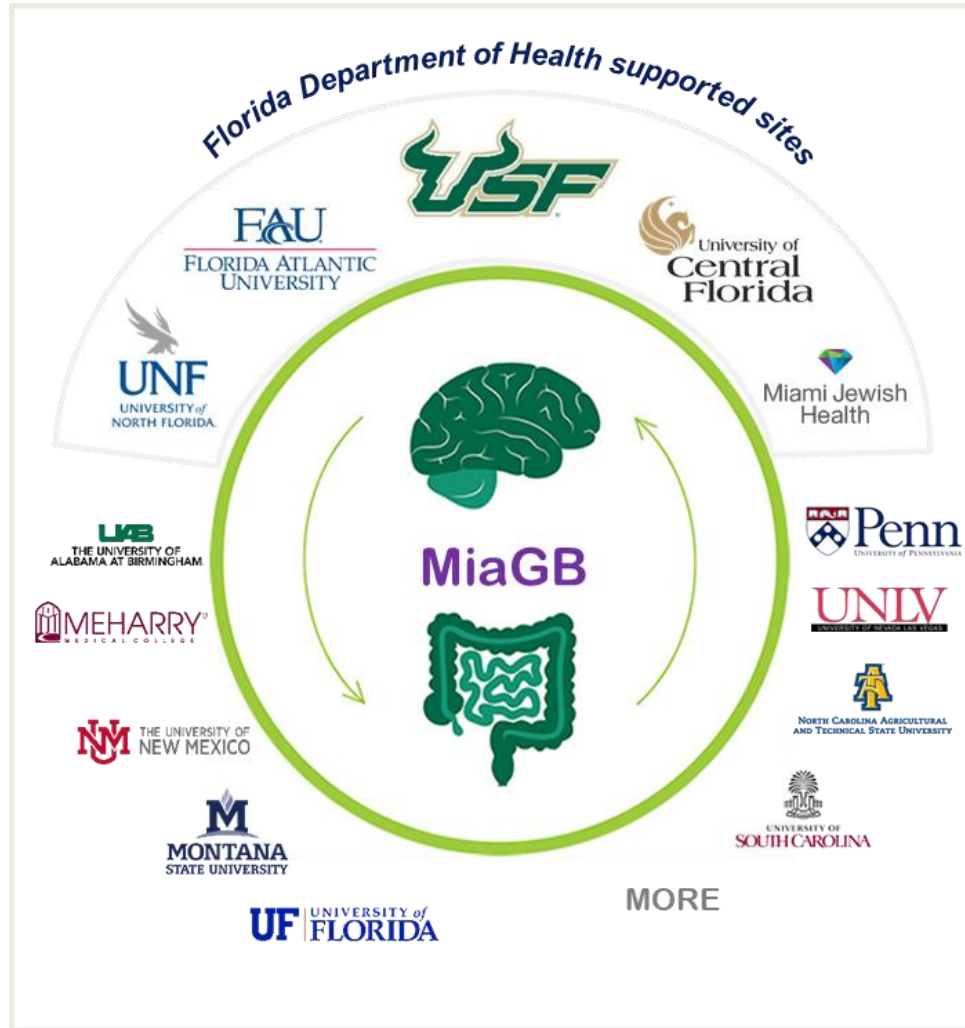


Java Script was used for the estimation of body-shapes of the participants



```
Body Shape Calculator  
Show files 0 Run  
> javac -classpath ./run_dir/junit-4.12.jar:target/dependency/* -d . Main.java  
> java -classpath ./run_dir/junit-4.12.jar:target/dependency/* Main  
What is your chest size?  
106  
What is your waist size?  
89  
What is your hip size?  
109.22  
Hourglass  
> |
```

MiaGB- National Outreach



Most diverse cohort of microbiome-aging research

Our expertise is available through USF and/or Contract Research Organization-MusB Research!!



Gut Health

- Leaky Gut
- Inflammation
- Microbiome
- Probiotics (screening to production)



Cardiovascular Health

- Leaky blood vessels
- Lipid metabolism



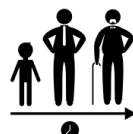
Obesity and Diabetes

- GLP-1 secretion
- Fat accumulation
- Insulin secretion & sensitivity



Brain Health

- Cognition, dementia
- Leaky BBB
- Neurodegeneration
- Neurotransmitter production



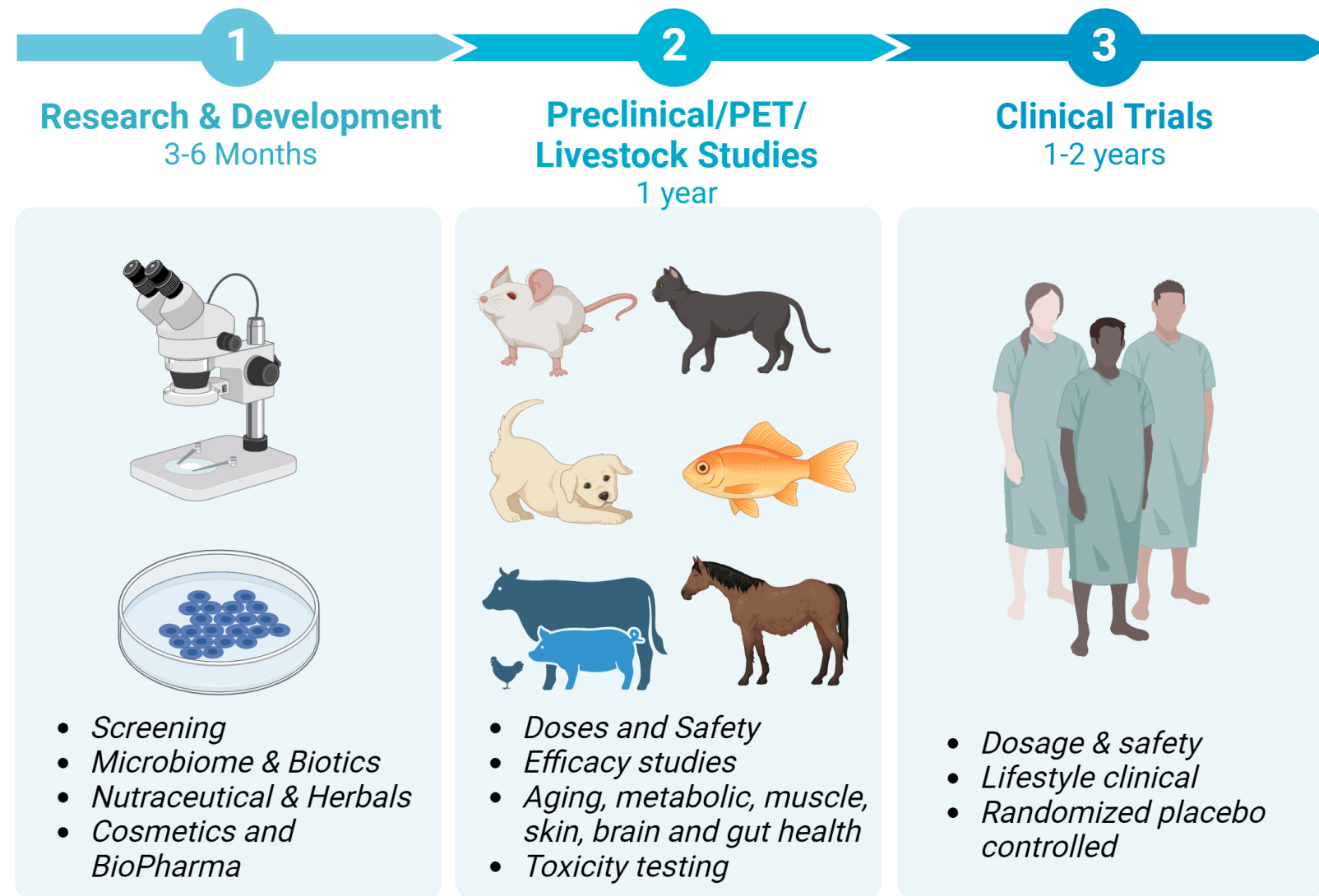
Aging Health/ Longevity

- Senescence
- Muscles, QOL, Nutrition



Dose Responses

Toxicities and Accumulations



Acknowledgements

Our Team

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Vivek Kumar, PhD, Postdoc Fellow
Sherri Huang, MD, PhD, Physician Resident
Brandi Miller, PhD student
Adewale James, PhD student
Surabhi Gangani, Masters student
Lalitha Lekkala, Masters Student
Manan Mahani, BS/MD student
Mihir Kulkarni, BS/MD student
Sima Maleki, International fellow
Dayna Goltz, MD student
Divyani Tangudu, Undergraduate student

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PARTICIPANTS

Collaborators

- MiaGB Team
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- MABB TEAM
- ViRAD TEAM
- HeartShare team
- MetPEF Team
- MiCASE Team
- MiTB Team

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Thank you!

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Thank you



<https://health.usf.edu/medicine/microbiome>

