



Beyond “You Are What You Eat”:Unlocking Gut Microbiota-Mediated Biotransformation of Dietary Phytochemicals

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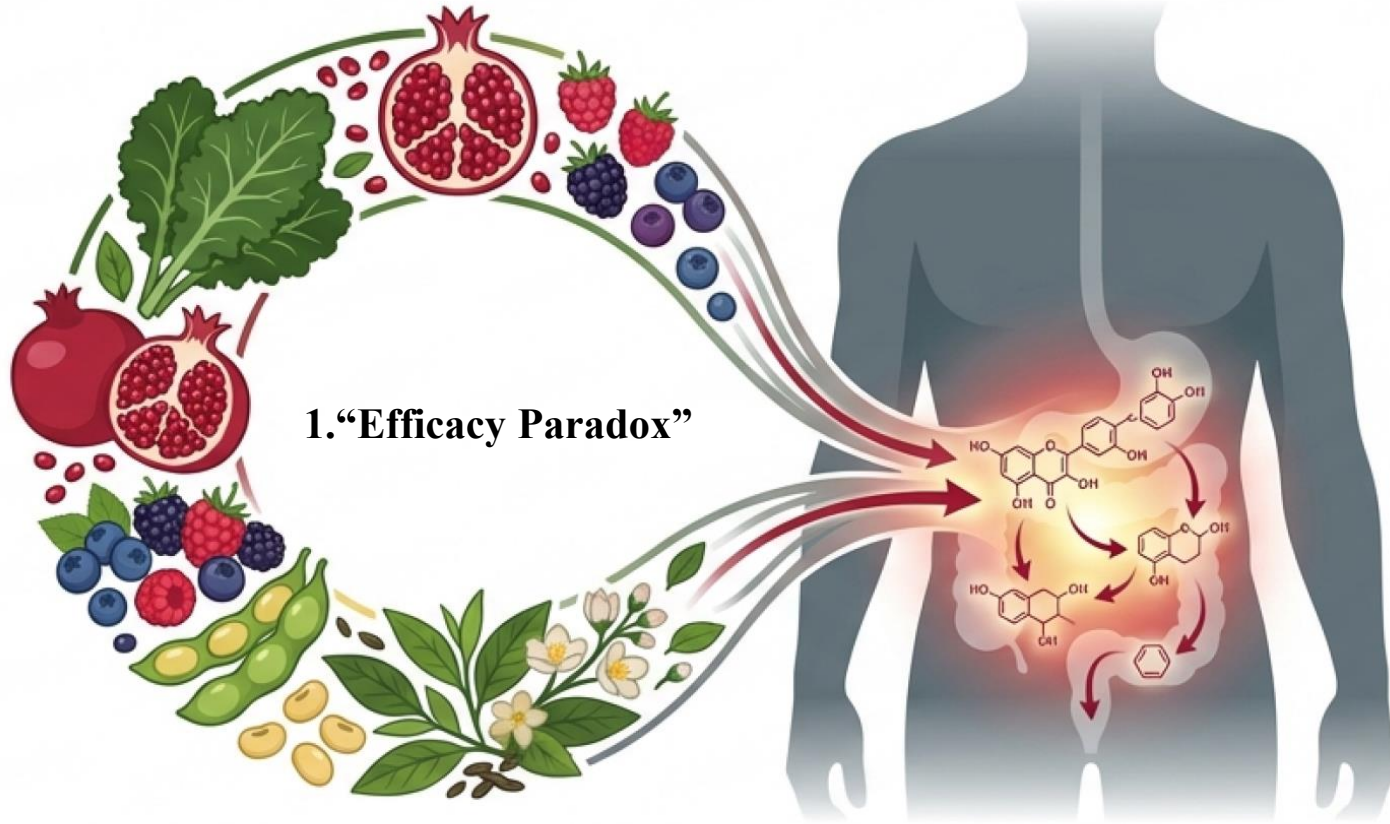
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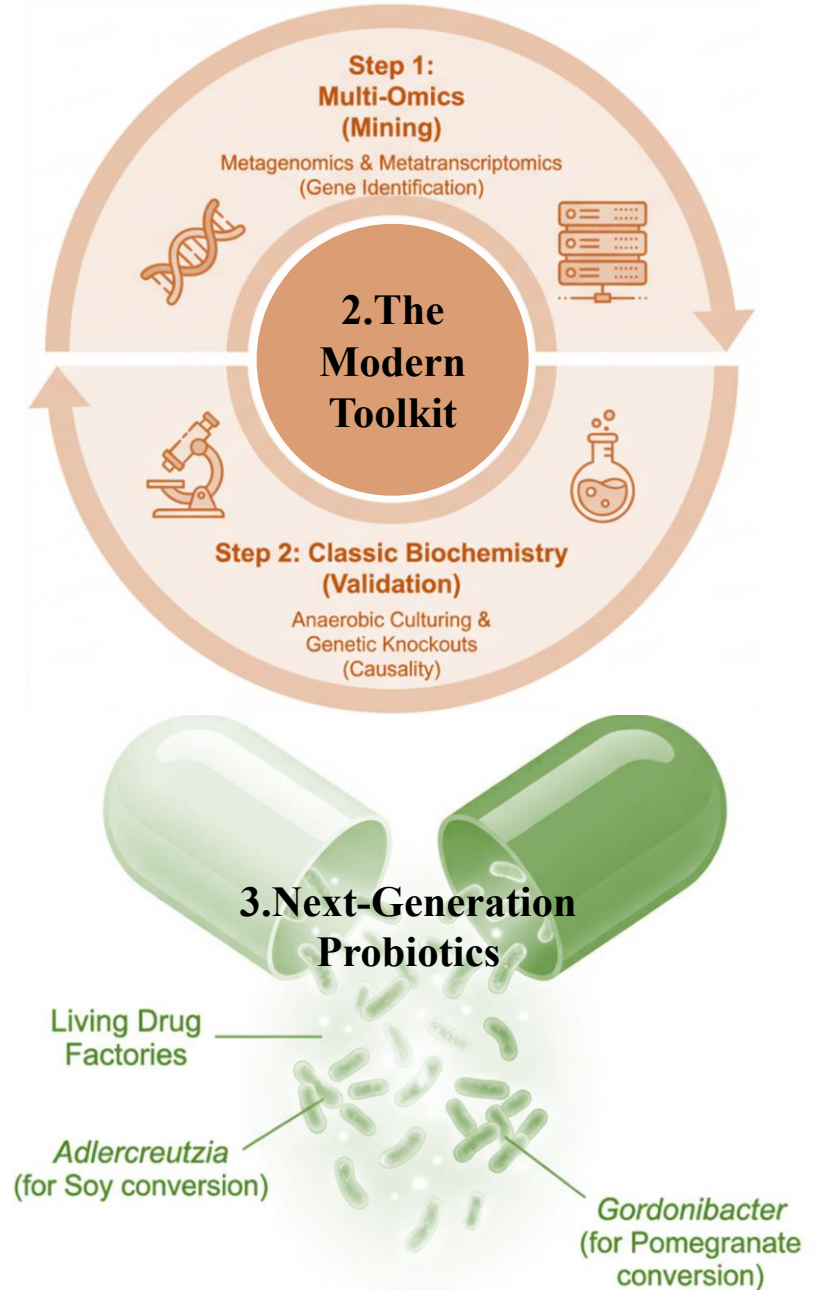
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Highlight



Beyond "You Are What You Eat"





Introduction

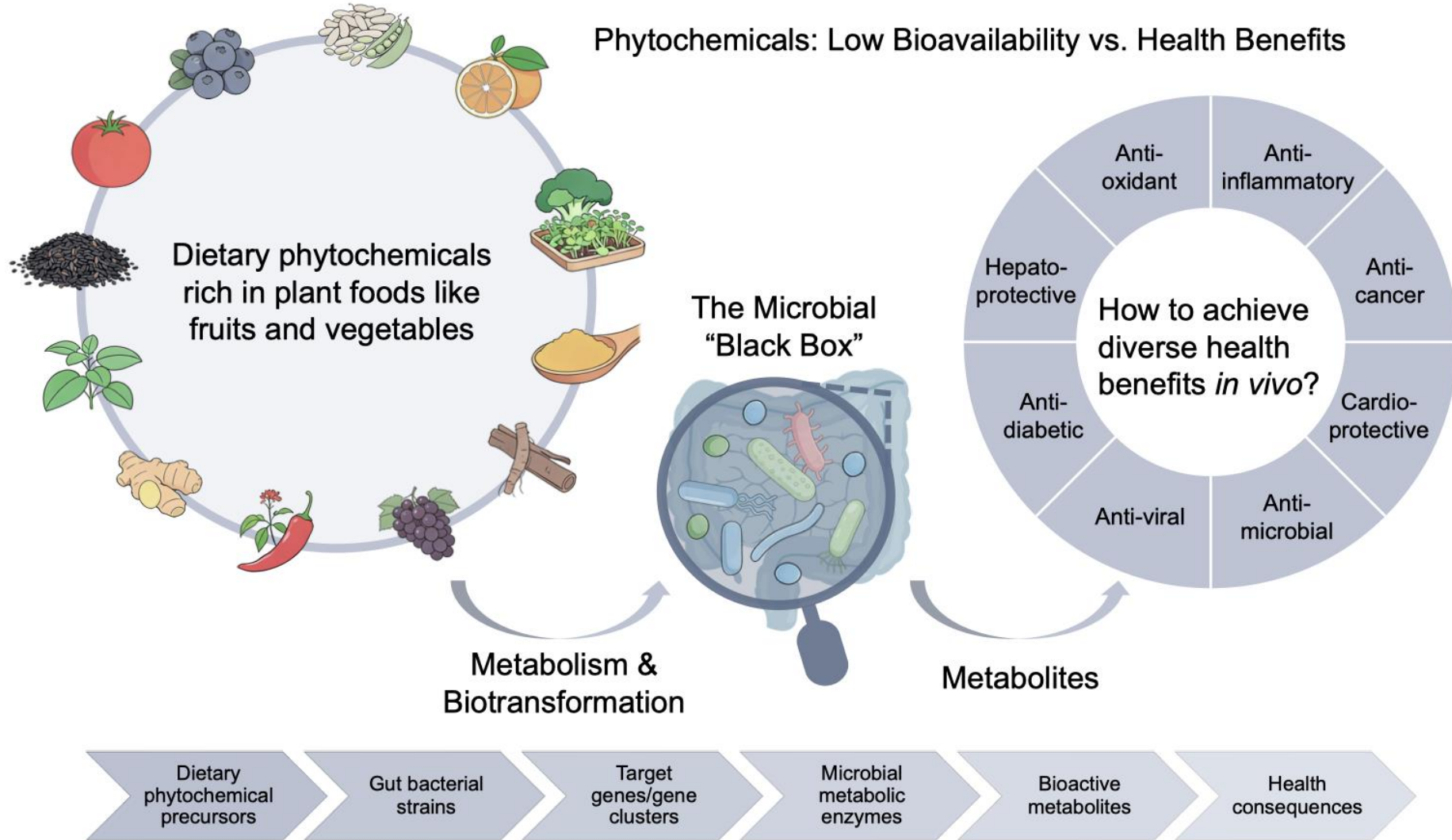
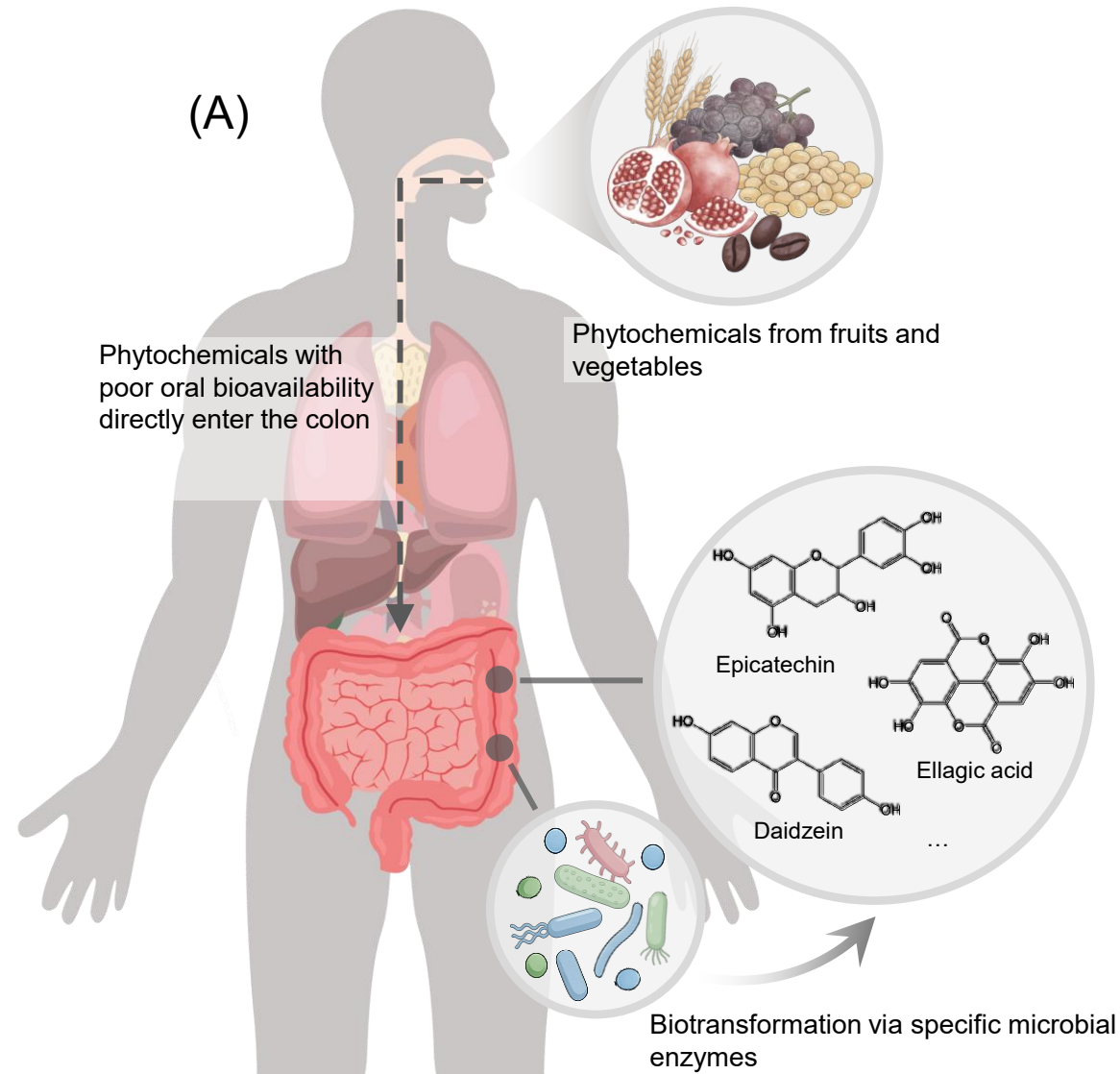


Figure 1. Unlocking the efficacy paradox of phytochemicals from “you are what you eat” to “you are what your microbiota metabolizes”

Unlocking the Black Box: Gut Microbiota-Mediated Metabolism Process



(B)

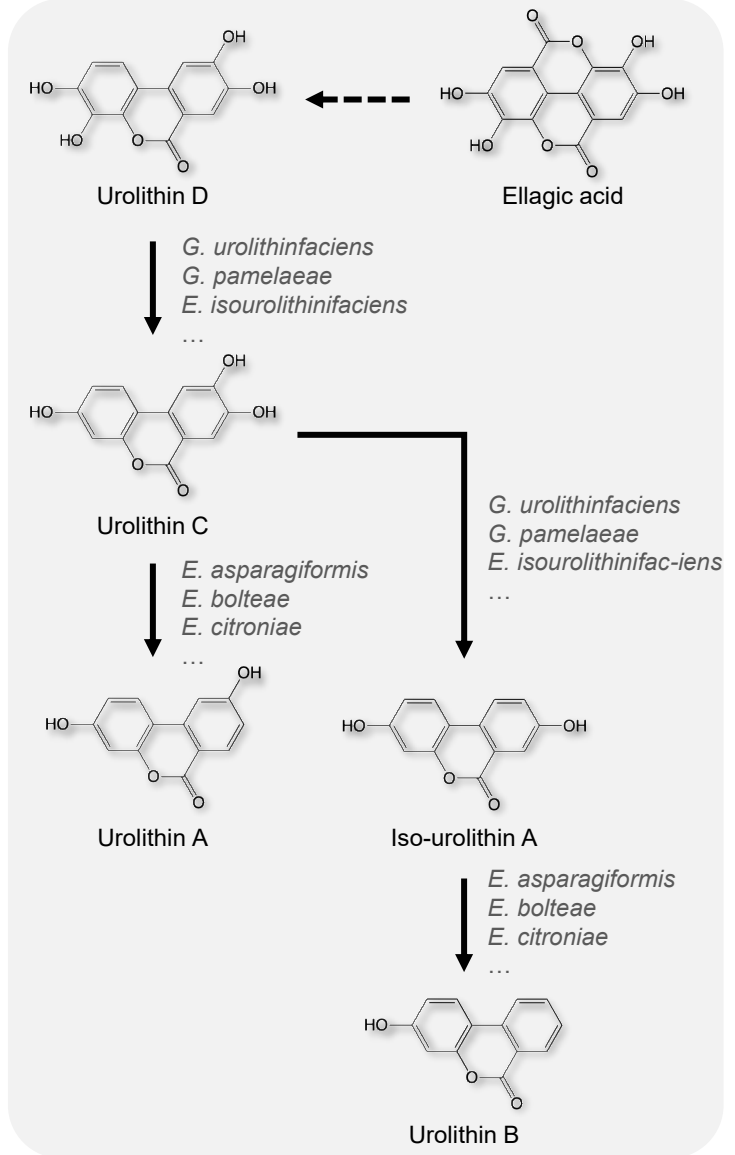
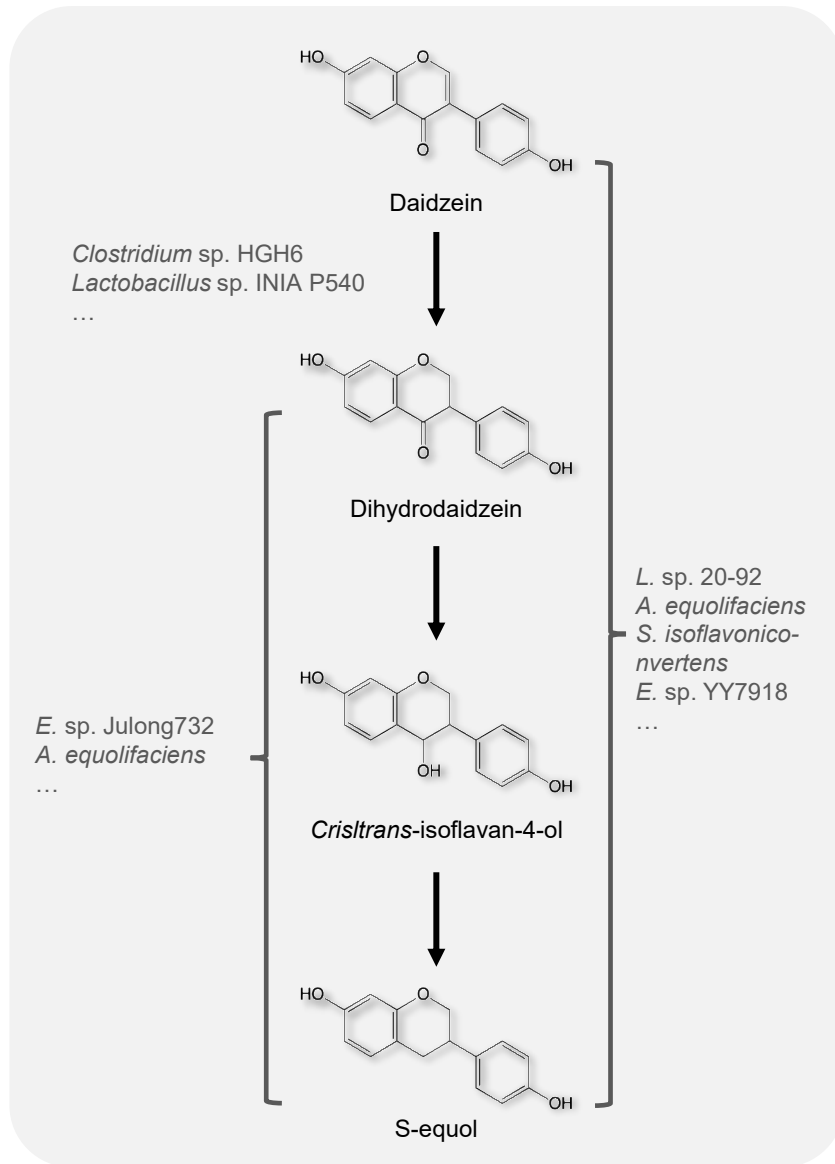


Figure 2. Biotransformation pathways of phytochemicals



Unlocking the Black Box: Gut Microbiota-Mediated Metabolism Process

(C)



(D)

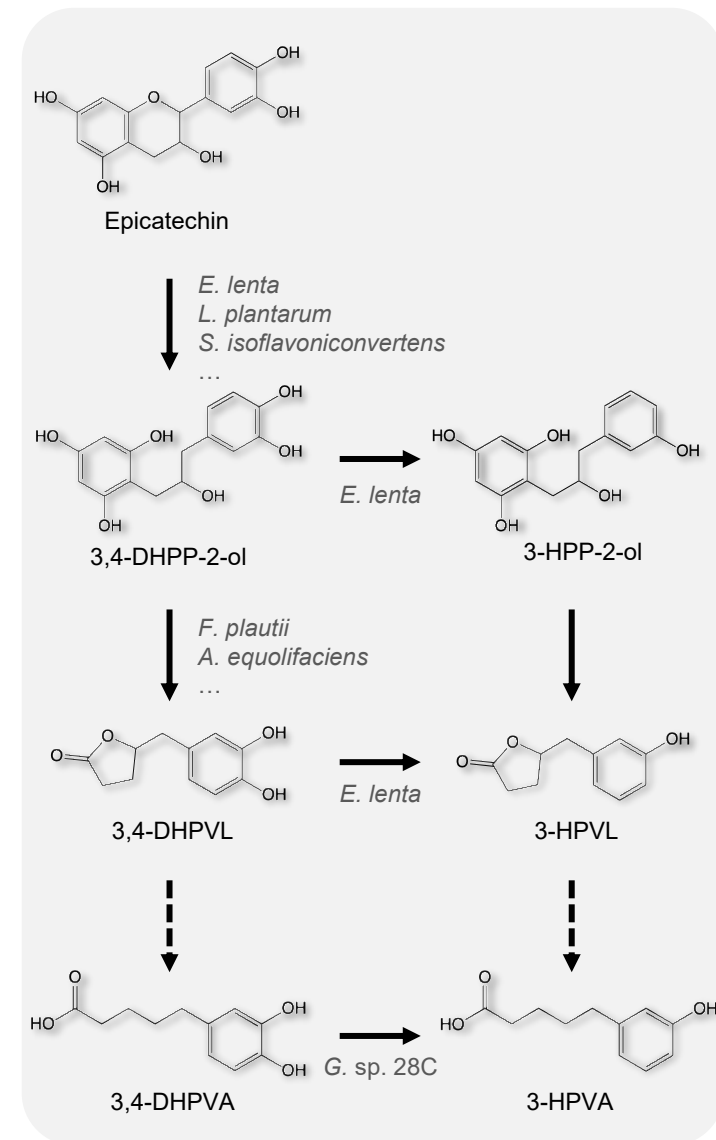


Figure 2. Biotransformation pathways of phytochemicals



The Modern Toolkit: Deciphering Host-Microbe-Diet Interactions

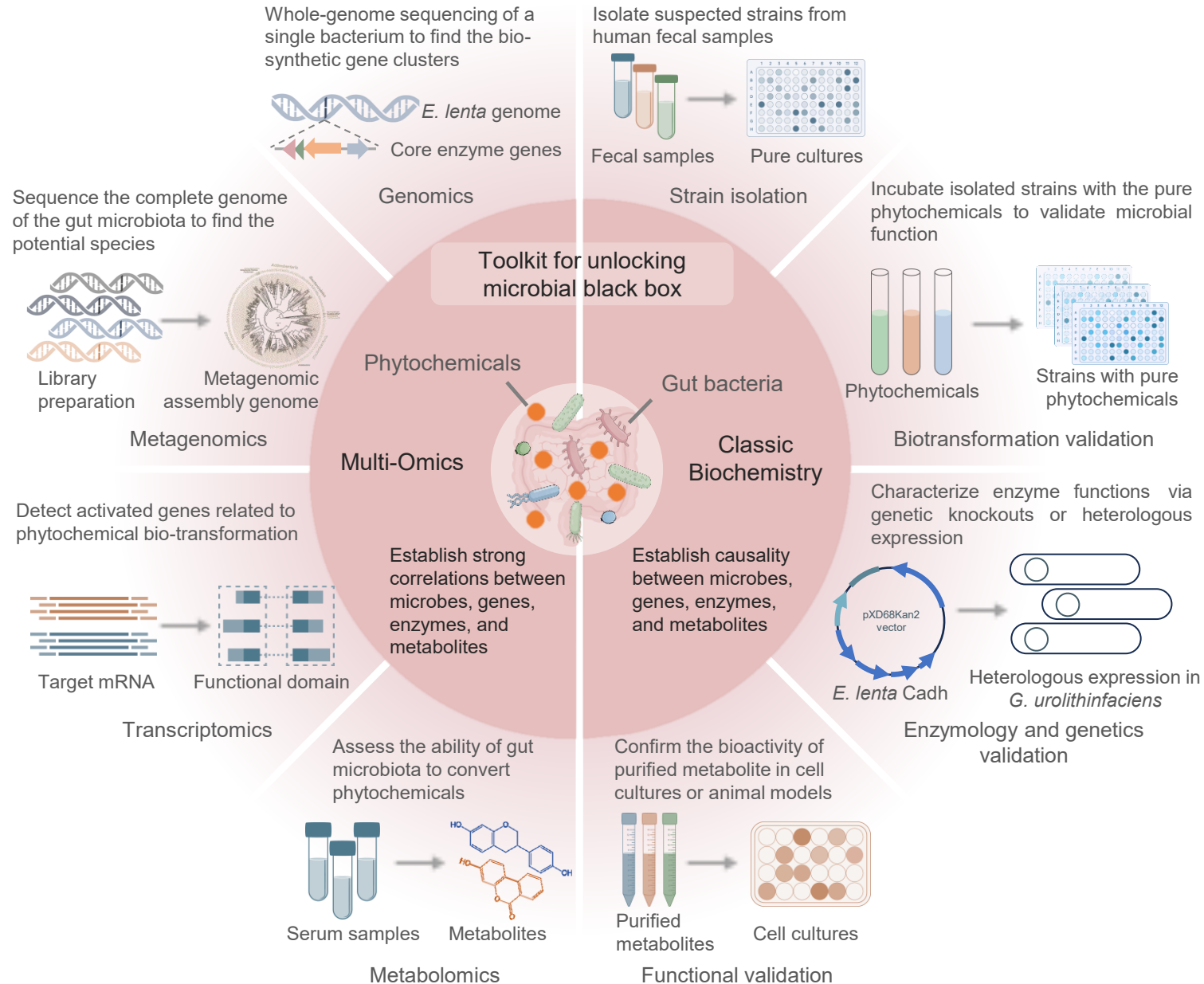
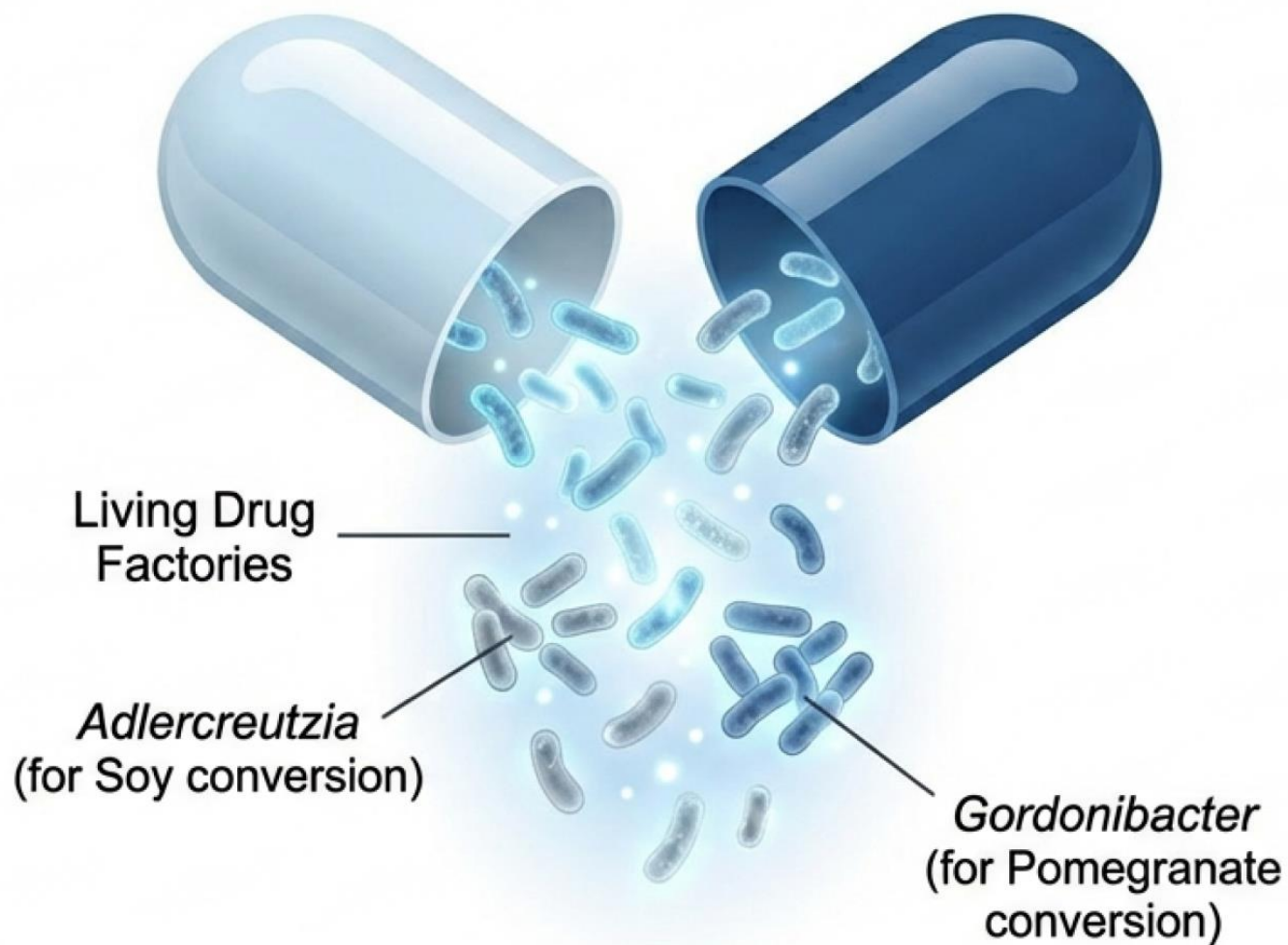


Figure 3. The modern toolkit for unlocking the gut's black box



The Future of Functional Foods: A Personalized and Fermented Horizon



Concept: Moving **beyond** generic “gut health” to Specialist Converters.

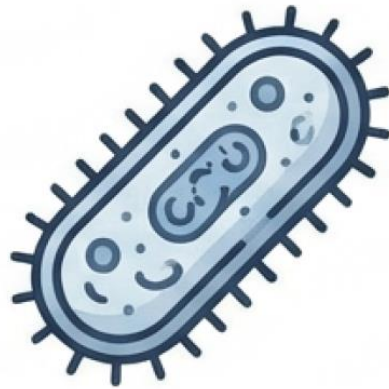
Definition: Live Biotherapeutics with validated metabolic functions.



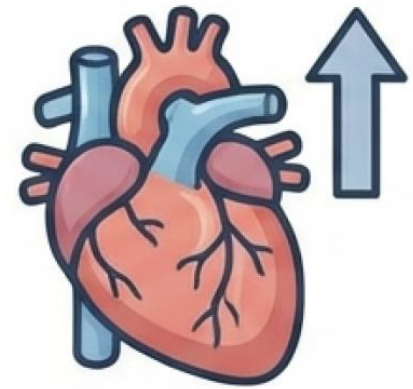
The Future of Functional Foods: A Personalized and Fermented Horizon



Precursor Food



Converter Microbe
(e.g., *Adlercreutzia*)



Health Outcome
(e.g., S-Equol)

Dietary Precursor + Converter Microbe = Health Outcome

Example: Supplementing Soy Isoflavones AND *Adlercreutzia* together to ensure S-Equol production.

The Future of Functional Foods: A Personalized and Fermented Horizon



Precision Fermentation
(Cell Factories)



Postbiotics
(Direct Metabolite Administration)

Bypassing gut variability entirely by creating the final metabolite before consumption.



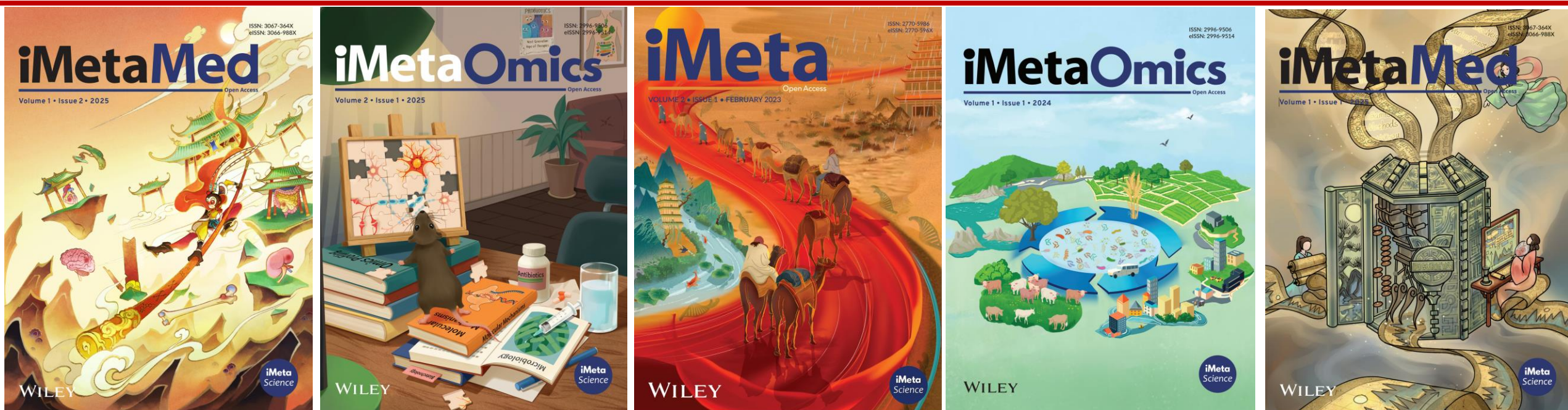
Conclusion

- ❑ The efficacy of phytochemicals varies among individuals, and this variation guides us to a deeper understanding of the profound symbiotic relationship between ourselves and our gut microbiota.
- ❑ Integrating multi-omics, bioinformatics, and classical biochemistry helps reveal the microbial metabolic landscape underlying the health benefits of our diet.
- ❑ Resolving the “efficacy paradox” will lay the foundation for personalized nutrition, enabling us to precisely tailor diets, supplements, and functional foods to each person’s unique microbial composition, ultimately unlocking the health-promoting bioactive molecules hidden in food.

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