



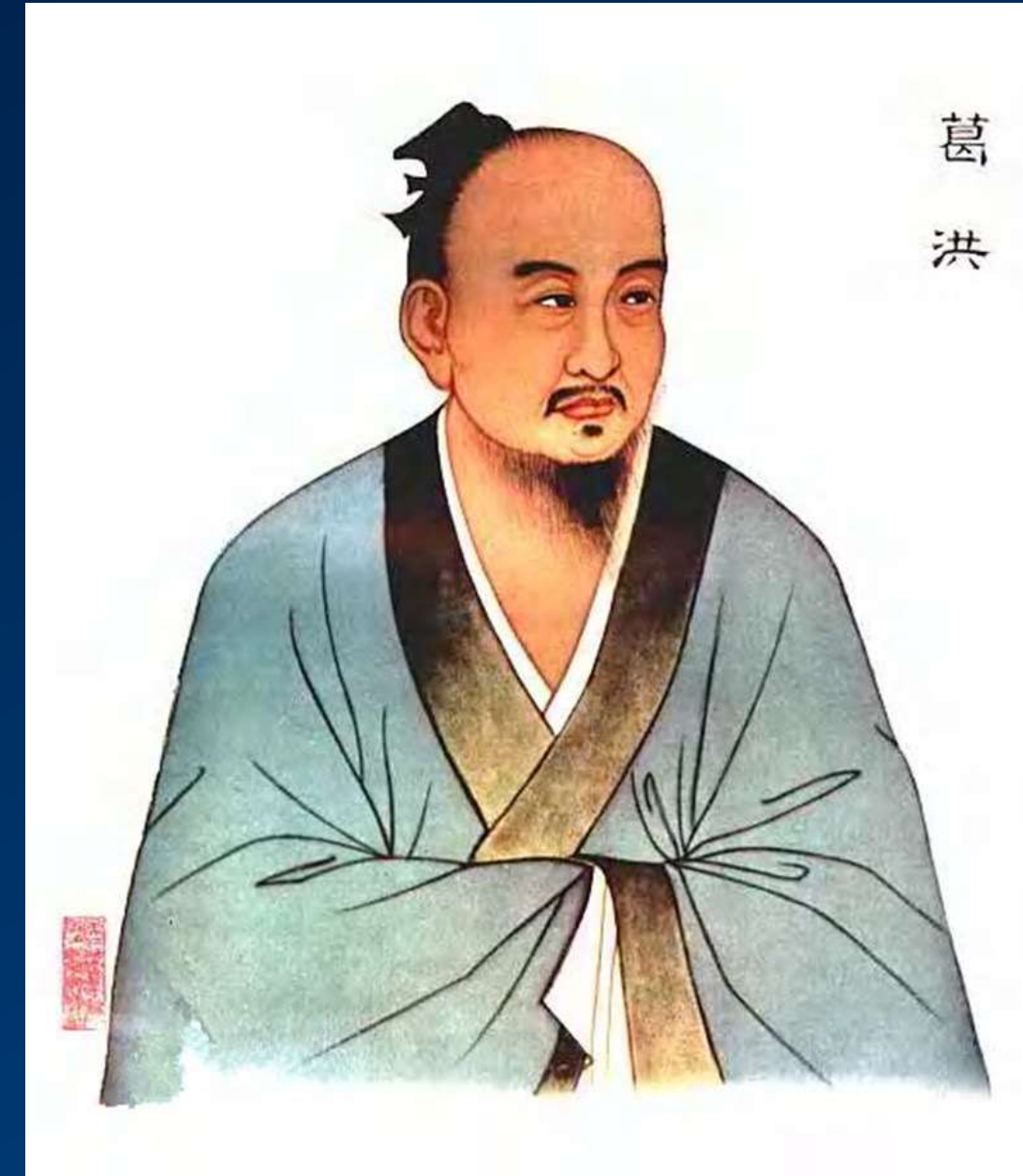
The Microbiome: Lessons From the Gut – Part 2

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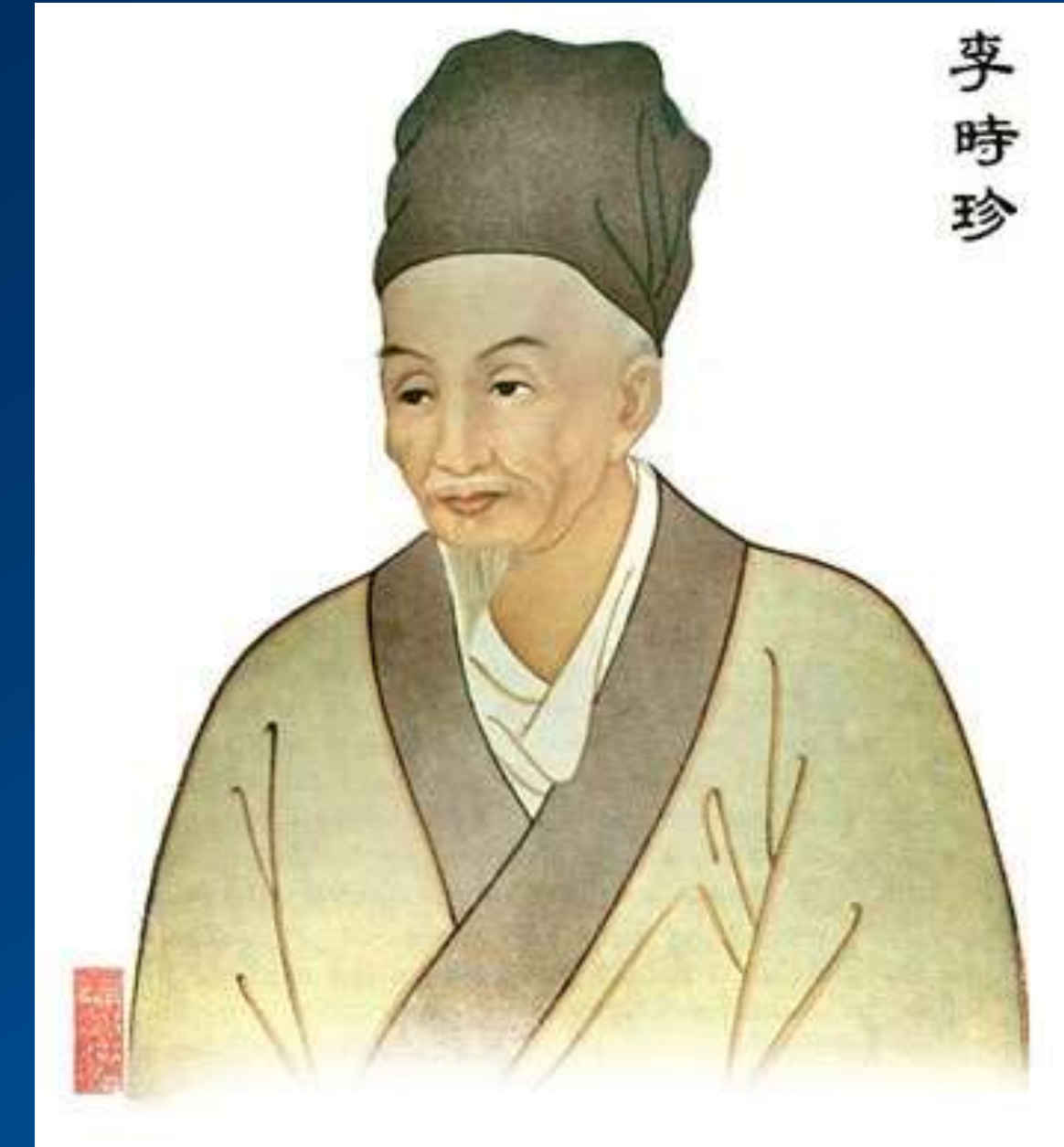


History of Fecal Transplantation

- Pliny the Elder is known for recommending fermented milk and apparently also fecal transplants
- Ge Hong reported on the use of fecal transplant in the 4th century
- Li Shizhen in the 16th century (the father of traditional Chinese medicine) used “yellow soup” to treat a variety of GI illnesses



Ge Hong



Li Shizhen

<http://www.iep.utm.edu>



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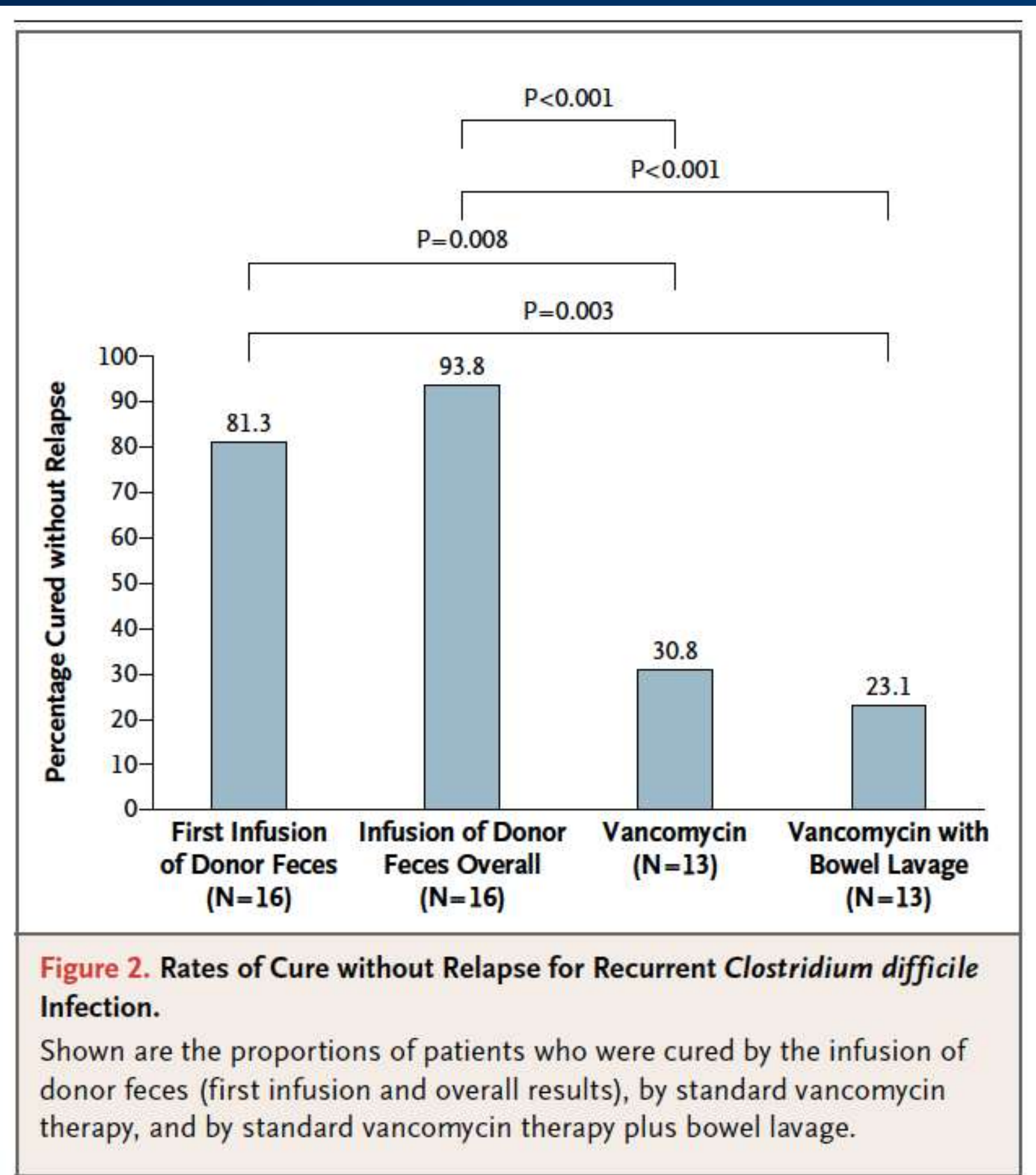
JANUARY 31, 2013

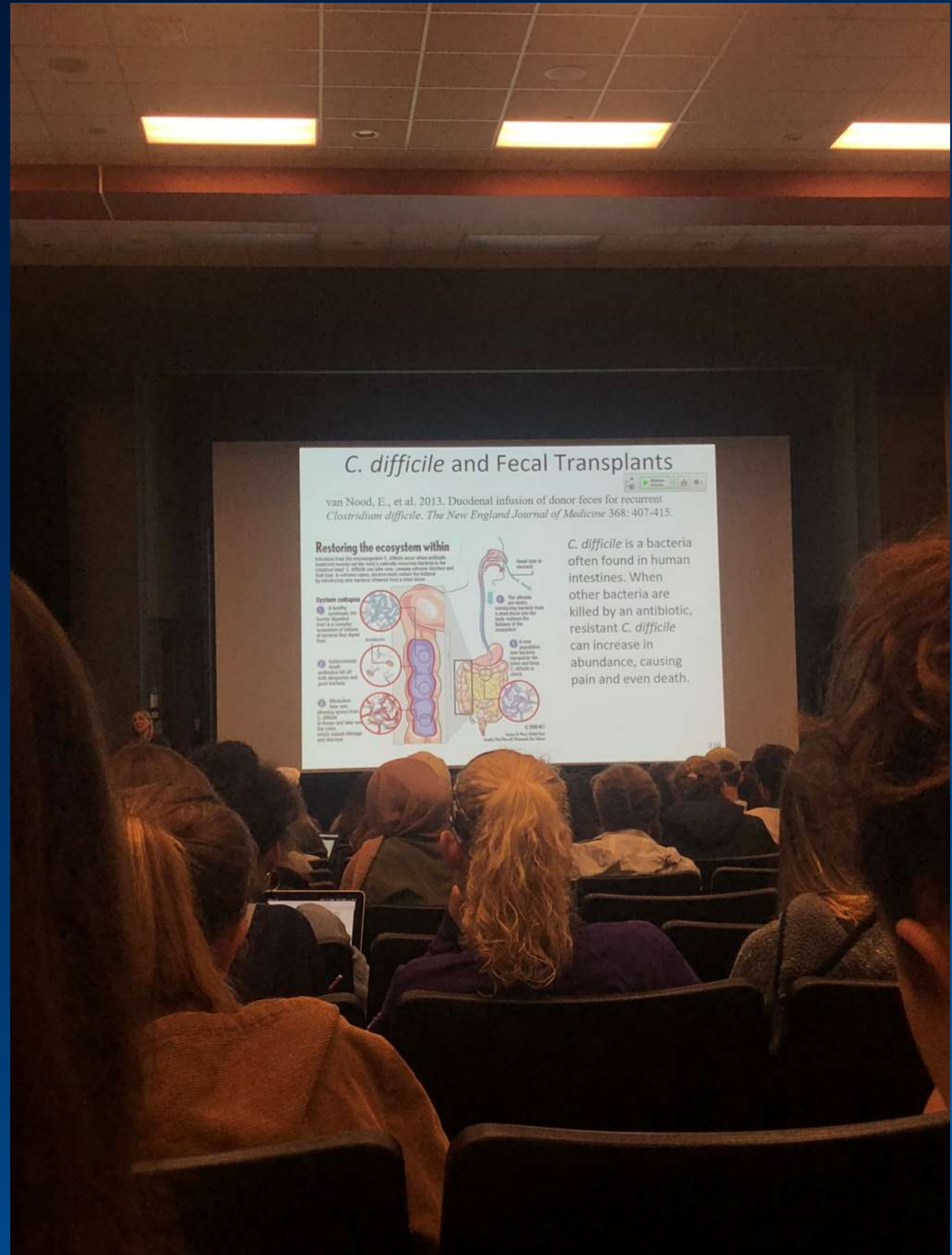
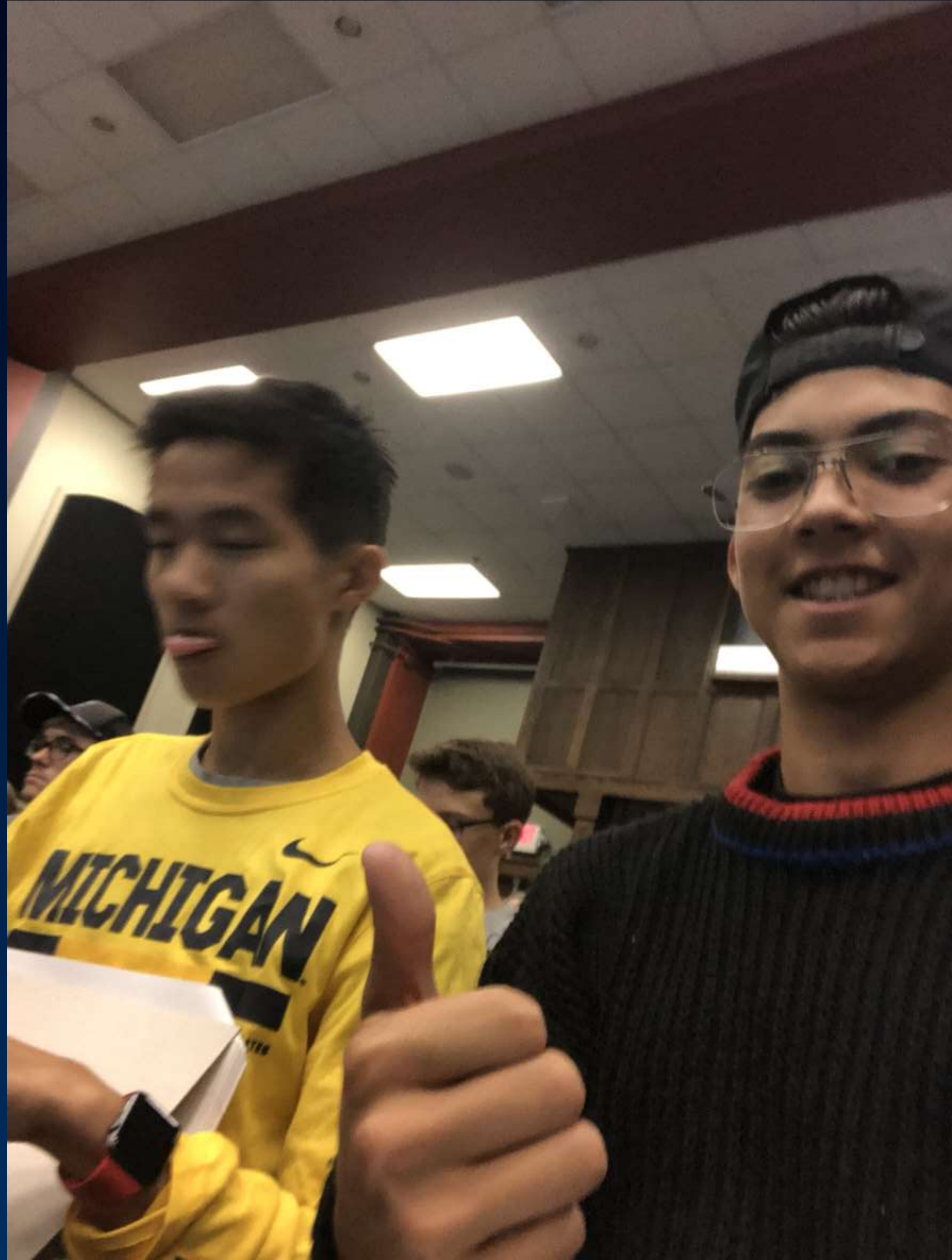
VOL. 368 NO. 5

Duodenal Infusion of Donor Feces for Recurrent *Clostridium difficile*

Els van Nood, M.D., Anne Vrieze, M.D., Max Nieuwdorp, M.D., Ph.D., Susana Fuentes, Ph.D.,
Erwin G. Zoetendal, Ph.D., Willem M. de Vos, Ph.D., Caroline E. Visser, M.D., Ph.D., Ed J. Kuijper, M.D., Ph.D.,
Joep F.W.M. Bartelsman, M.D., Jan G.P. Tijssen, Ph.D., Peter Speelman, M.D., Ph.D.,
Marcel G.W. Dijkgraaf, Ph.D., and Josbert J. Keller, M.D., Ph.D.

FMT: 94% success rate
vancomycin: 30% success rate





C. difficile and Fecal Transplants

van Nood, E., et al. 2013. Duodenal infusion of donor feces for recurrent *Clostridium difficile*. *The New England Journal of Medicine* 368: 407-415.

Restoring the ecosystem within

Antibiotics from the environment *C. difficile* enter when antibiotic treatment travels out the body to colonize normally healthy in the gut. In antibiotic treated patients, *C. difficile* can take over, causing diarrhea and colitis. The antibiotic and bacteria are cleared from a mild case.

System collapse

1. Antibiotic treatment kills off all the good bacteria in the gut. In a healthy state, a complex community of bacteria maintains the balance of the gut.

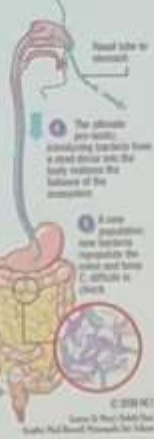
Antibiotic resistance

2. Antibiotic resistance genes are passed on to other bacteria, which allows them to survive and grow.

Restoration

3. Fecal transplantation restores the gut ecosystem. Donor feces are introduced into the gut, which restores the balance of the gut.

C. difficile is a bacteria often found in human intestines. When other bacteria are killed by an antibiotic, resistant *C. difficile* can increase in abundance, causing pain and even death.



HOST MICROBIOME INITIATIVE
MICHIGAN MEDICINE

Profile of microbiome in FMT



Recovery of the Gut Microbiome following Fecal Microbiota Transplantation

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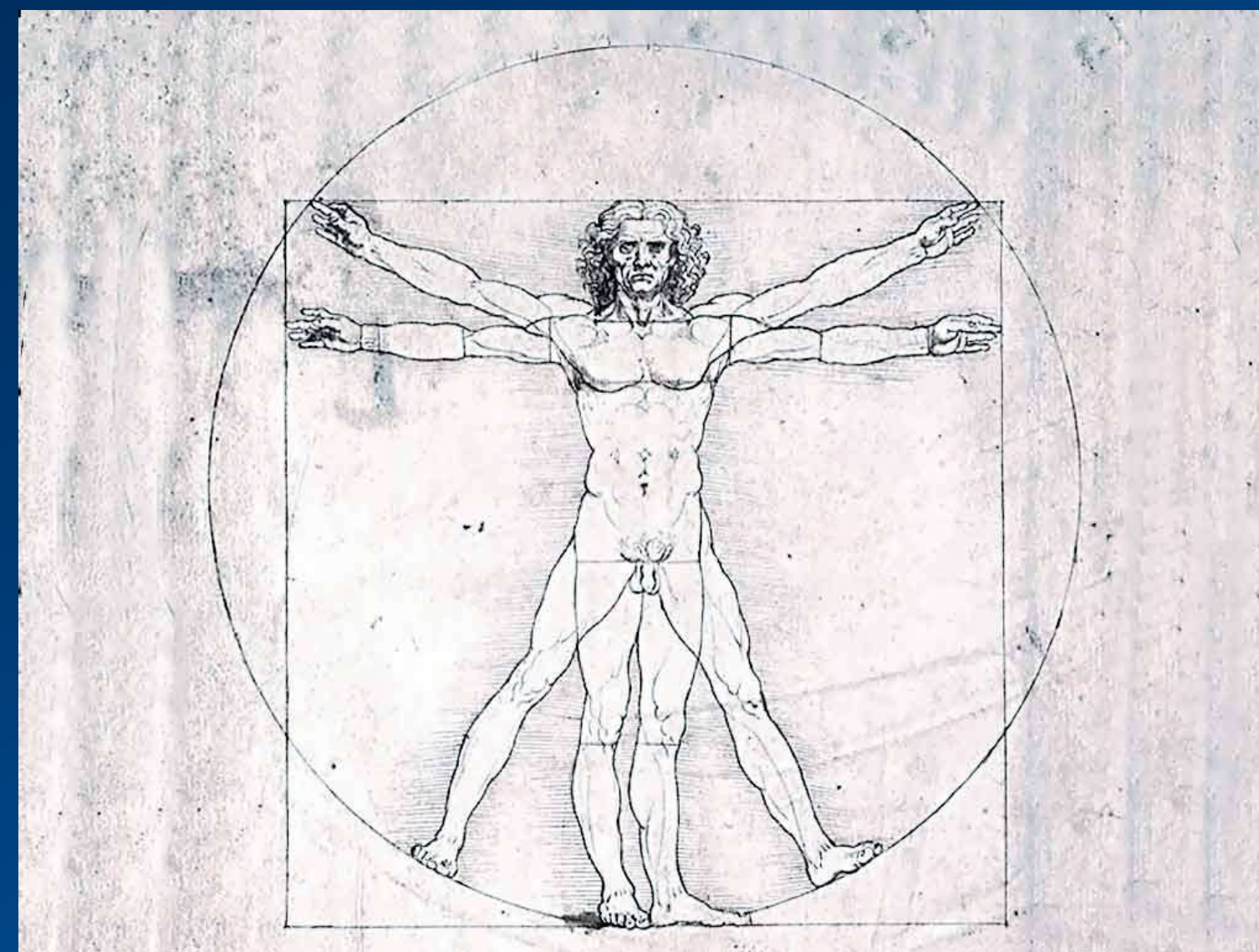
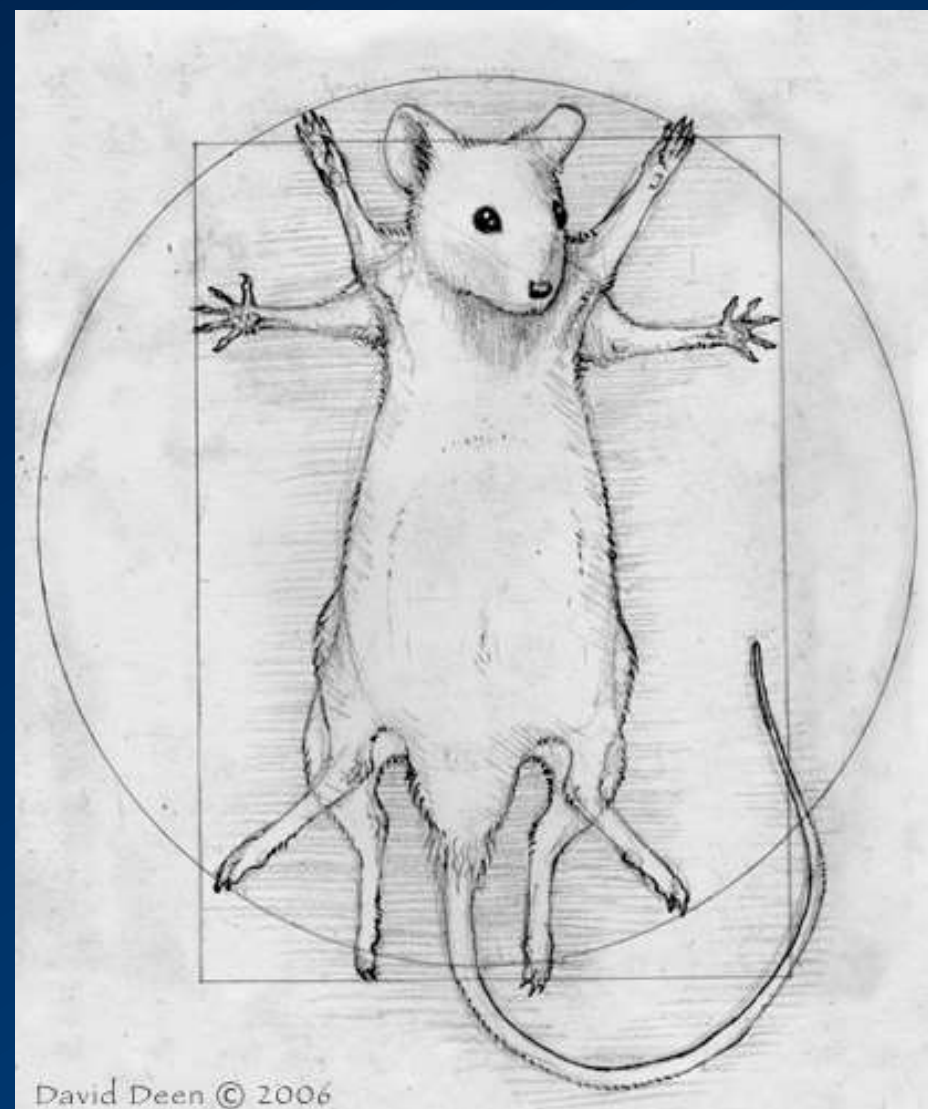
Seekatz, A. M., et al., mBio 5. PMID:PMID24939885



Fecal Microbiota Transplantation Eliminates *Clostridium difficile* in a Murine Model of Relapsing Disease

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Where do we go from here with regards to the microbiome?

- Multiple between the microbiome and many diseases.
- We are beginning to move from association to causation
- We have early success in intentionally manipulating the microbiota to “improve health”

The Microbiota in the Precision Health Paradigm

A Vision for the Future

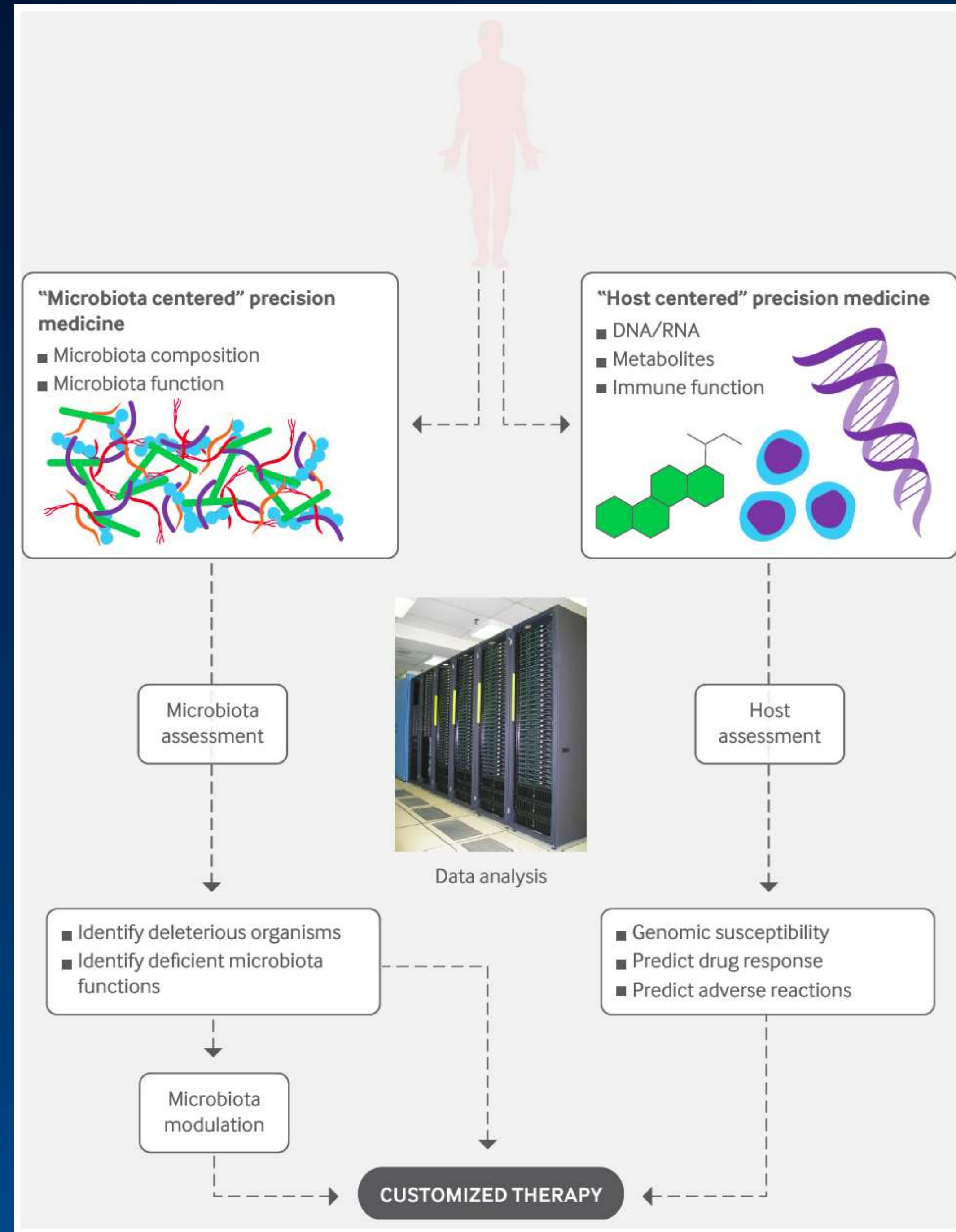


The future of health begins with you

The *All of Us* Research Program is a historic effort to gather data from one million or more people living in the United States to accelerate research and improve health. By taking into account individual differences in lifestyle, environment, and biology, researchers will uncover paths toward delivering precision medicine.

[WATCH VIDEO](#)

<https://allofus.nih.gov>



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The Young Lab: David Hill, Christine Bassis, Roberto Cieza, Lisa Close, Matthew Schnizlien, Michael Dieterle, Kimberly Vendrov, Rishu Dheer, Maddie Barron, Karrie Black, Mike Dority, Alexandra Standke, Veda Yadagiri, Clarrise Roman, Chris Blair, Ruth Synkowiec (current). Anna Seekatz, Jhansi Leslie, Judy Opp, Angela Reeves, Casey Theriot, Seth Walk, Mark Koenigsknecht, Josie Libertucci, Micah Keidan, Aline Penkevich, Stephanie Spohn (alumni).



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