“Quantifying your Superorganism: Your Gut Microbiome and its Interactions with Your Immune System

Lecture

Science & Entertainment Exchange

National Academy of Sciences

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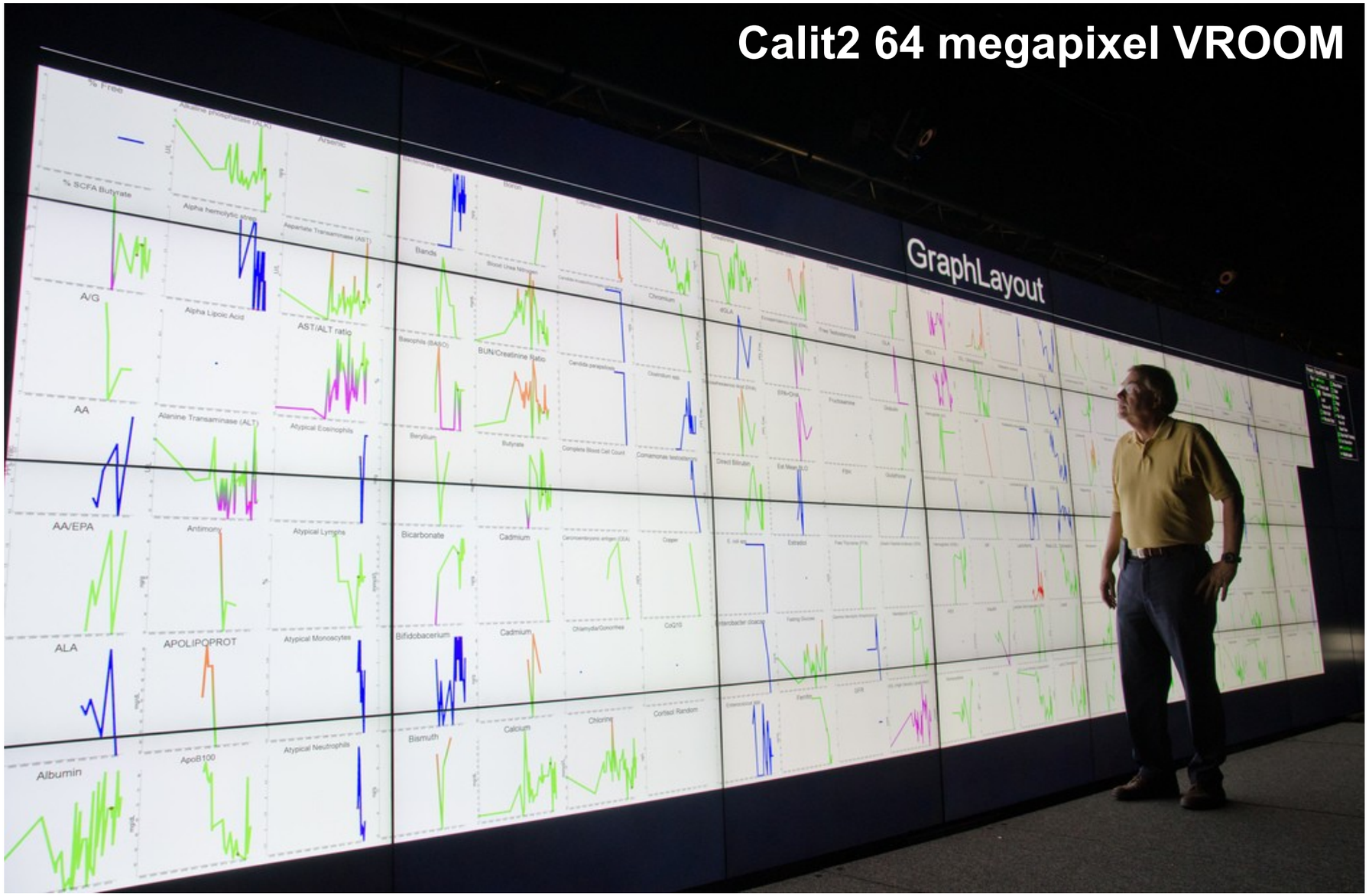
Jacobs School of Engineering, UCSD

http://lsmarr.calit2.net

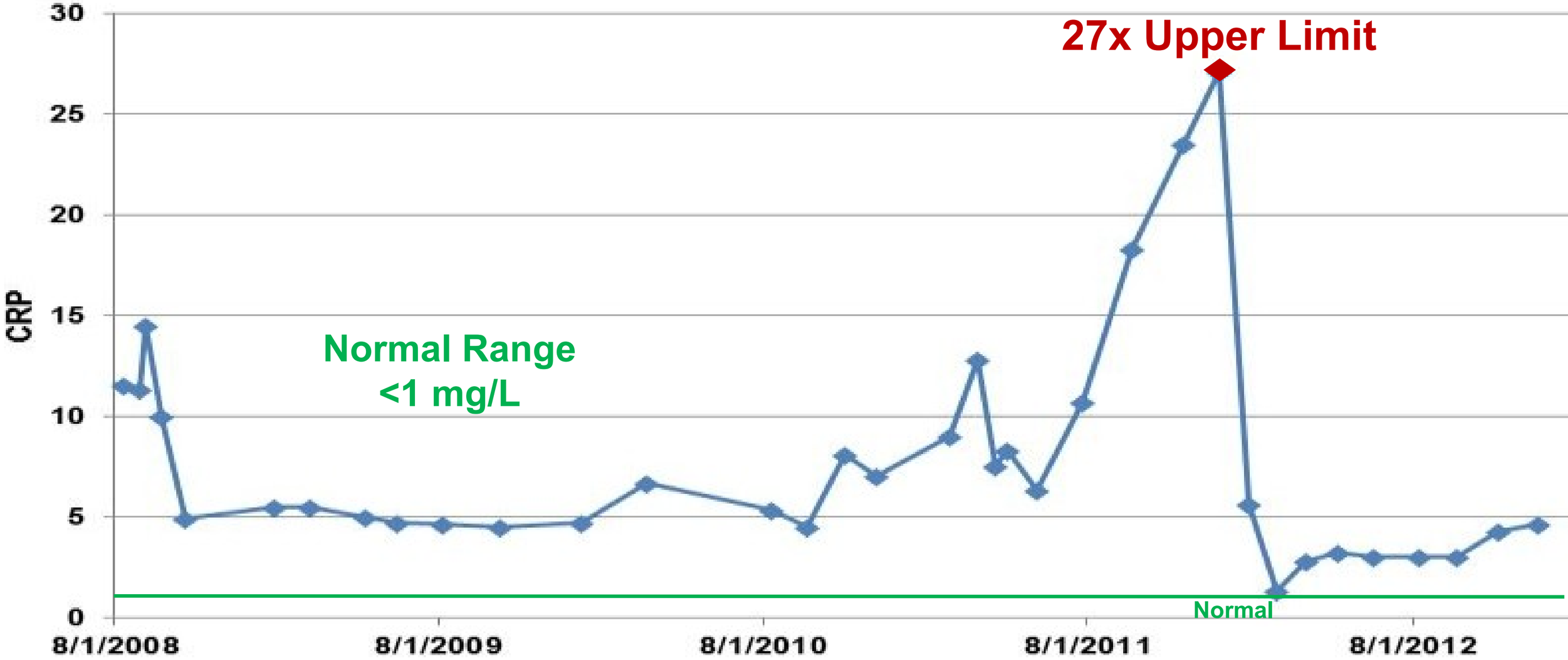
An MRI Showed My Sigmoid Colon Wall Was Thickened and Inflamed



I Searched for Clues Among
My 150 Blood and Stool Variables, Each Graphed Over 5-10 Years

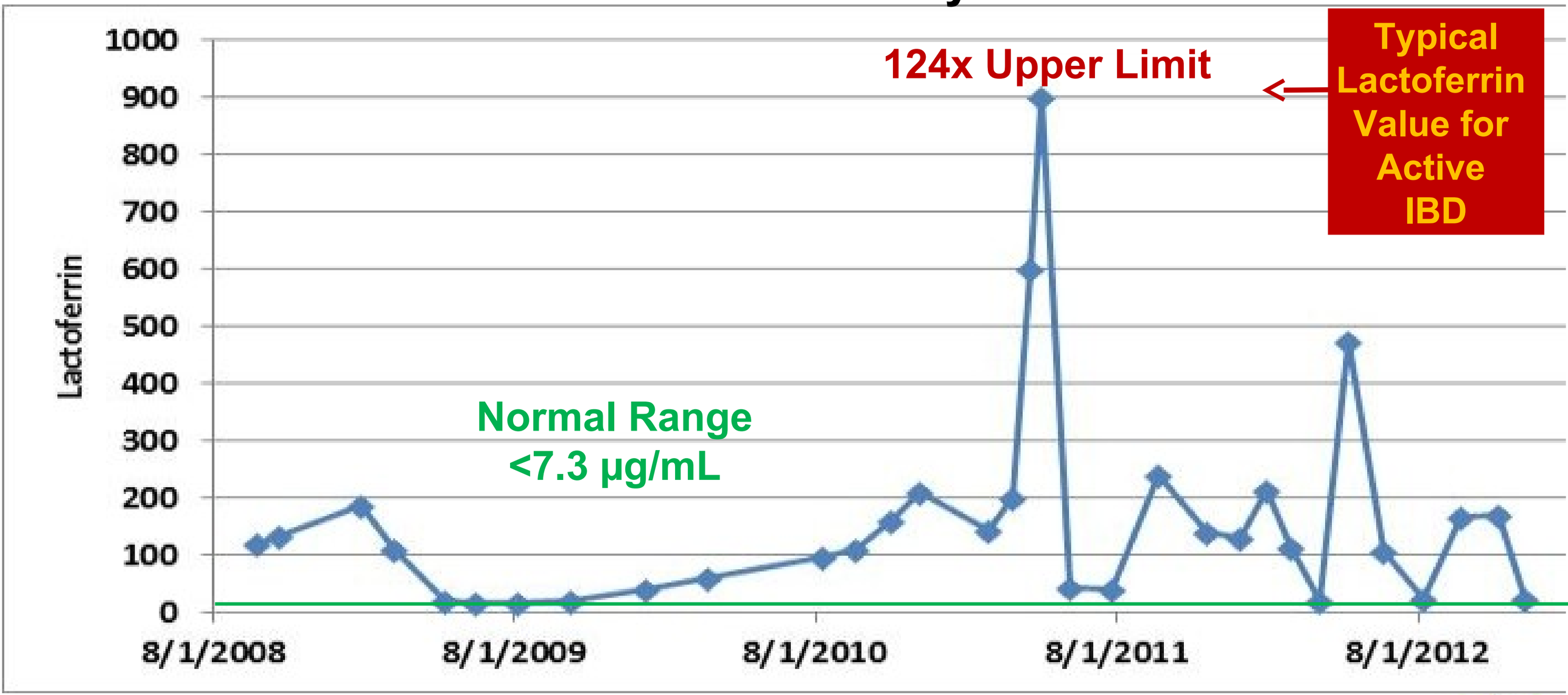


Only One Variable Was Far Out of Norm-
Complex Reactive Protein From Blood Sample



CRP Indicates Chronic Episodic Inflammation

By Looking at Stool Samples Over Time I Discovered An Immune Variable That Was Very Far Above Normal



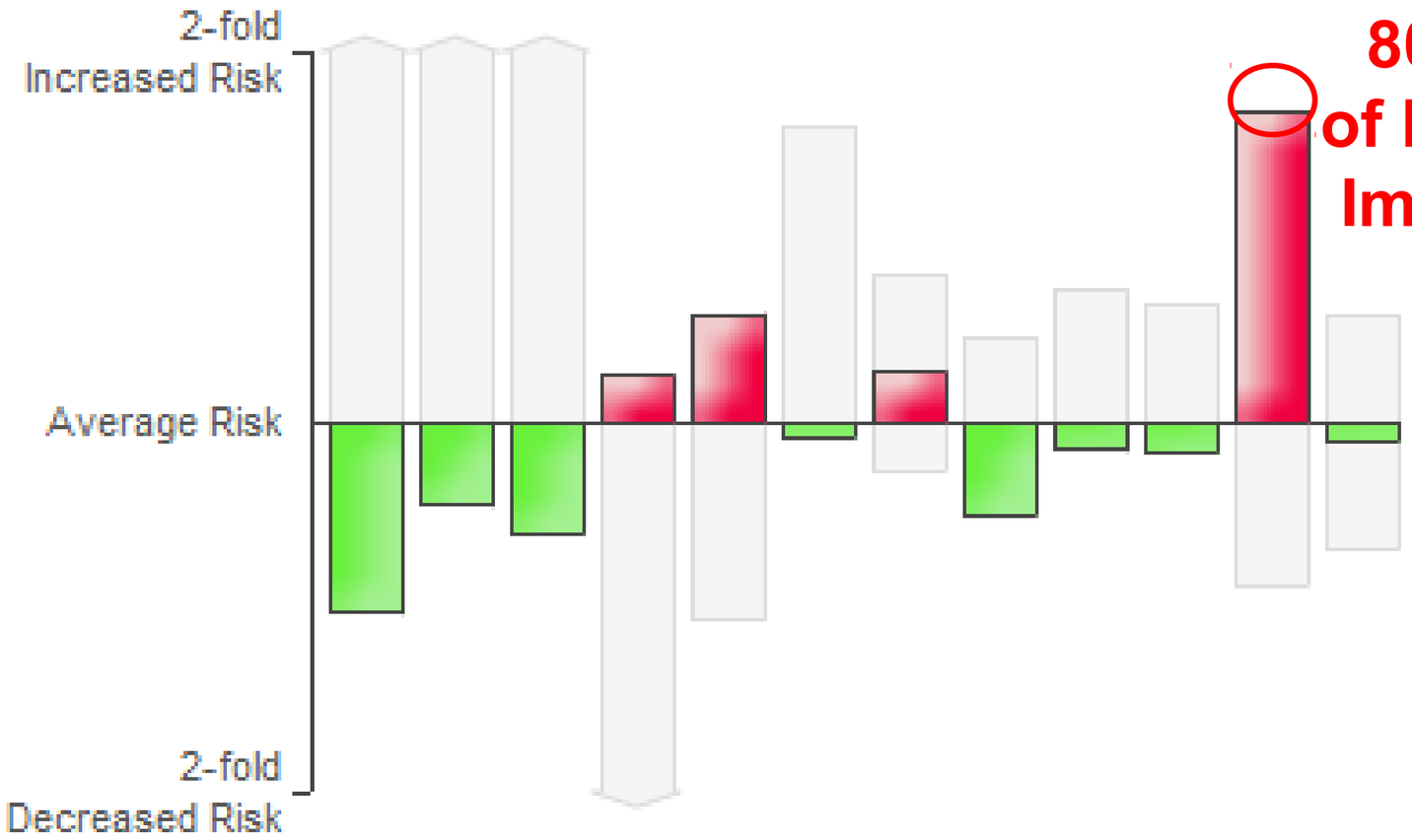
Lactoferrin Is an Indicator of White Blood Cells Attacking Your Colon

Why Did I Have an Autoimmune Disease like IBD?

"Despite decades of research,
the etiology of Crohn's disease
remains unknown.
Its pathogenesis may involve
a complex interplay between
host genetics, immune dysfunction,
and microbial or environmental factors.

--*The Role of Microbes in Crohn's Disease (2007)*

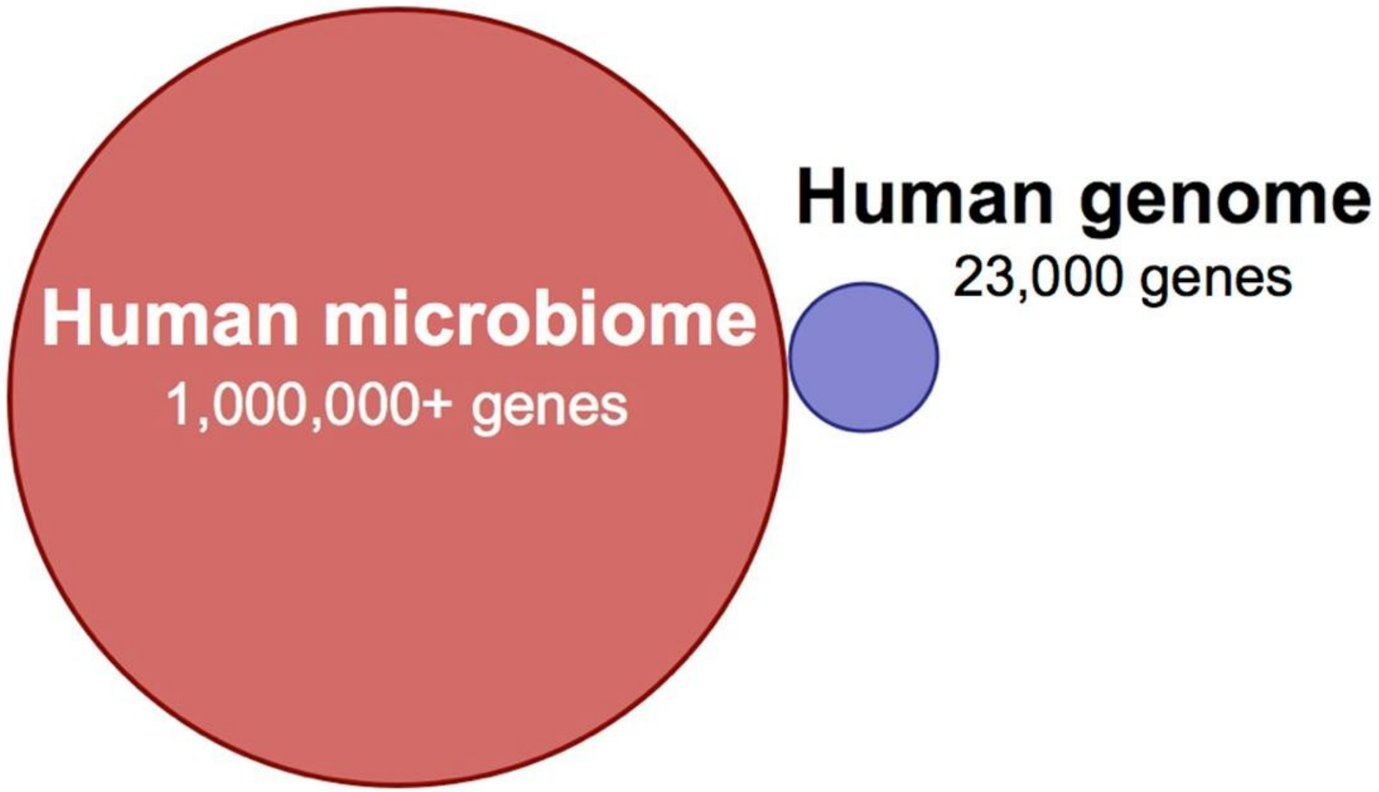
I Used a Simple Consumer Saliva Test to Test for Human Genetic Pre-Disposition



80% Higher Risk of Pro-Inflammatory Immune Response

From www.23andme.com

Exploring the Dance Inside Your Superorganism
Between Your Microbiome and Human Immune System



Your Body
Has
10 Times
As Many
Microbe Cells
As
Human Cells

Inclusion of Microbiome
Will Radically Change Medicine

Startups Are Enabling Genomic Sequencing of Your Microbiome

uBiome -- Sequencing Your Microbiome

Be a citizen scientist and help us sequence the human microbiome. Learn about your health, advance science, and CHANGE THE WORLD!

Health – San Francisco, United States

http://ubiome.com/

$351,193

Raised of $100,000 Goal

0 *time left*

indiegogo

SECOND GENOME
THE MICROBIOME COMPANY

Second Genome Gets J&J Deal, $6.5M, to Explore Bugs of the Gut

I Collaborated with the J. Craig Venter Institute To do Deep Genetic Sequencing

When We Think About Biological Diversity
We Typically Think of the Wide Range of Animals






But All These Animals Are in One SubPhylum Vertebrata of the Chordata Phylum

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Think of These Phyla of Animals
When You Consider the Biodiversity of Microbes Inside You



Phylum
Chordata



Phylum
Cnidaria



Phylum
Echinodermata



Phylum
Annelida



Phylum
Mollusca

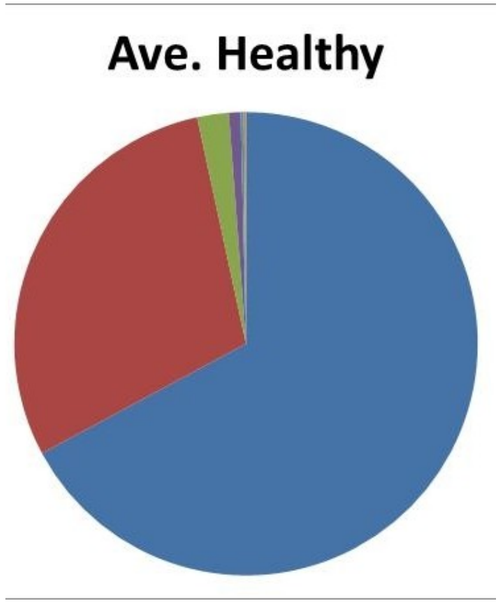


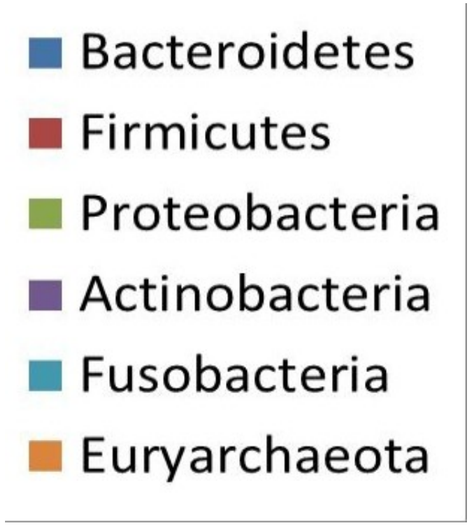
Phylum
Arthropoda

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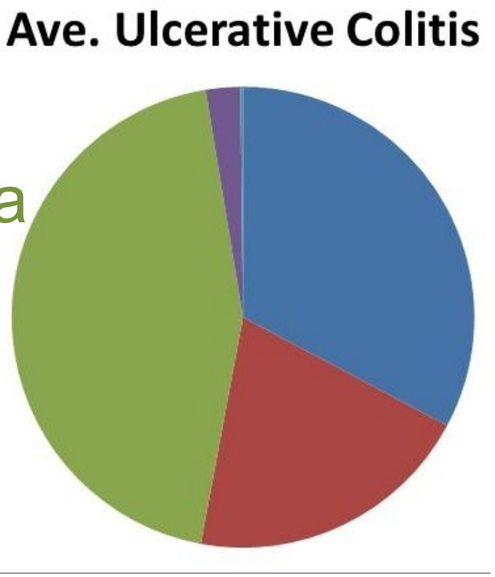
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I Found Major Shifts in Microbial Ecology Phyla Between Healthy and Two Forms of IBD

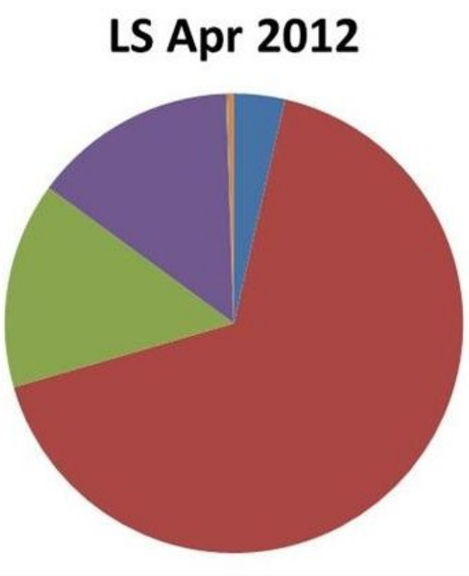


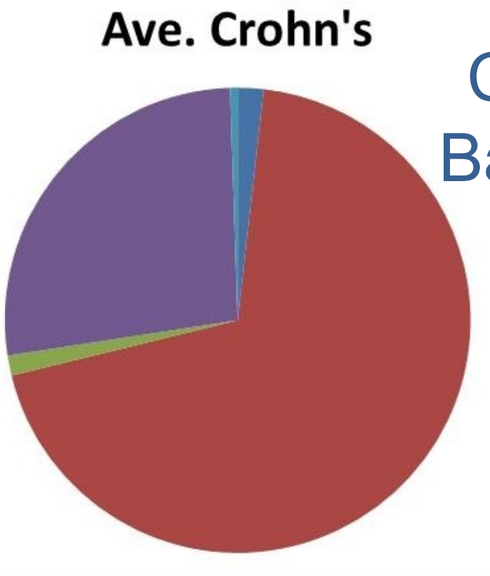


Most Common Microbial Phyla



Explosion of Proteobacteria



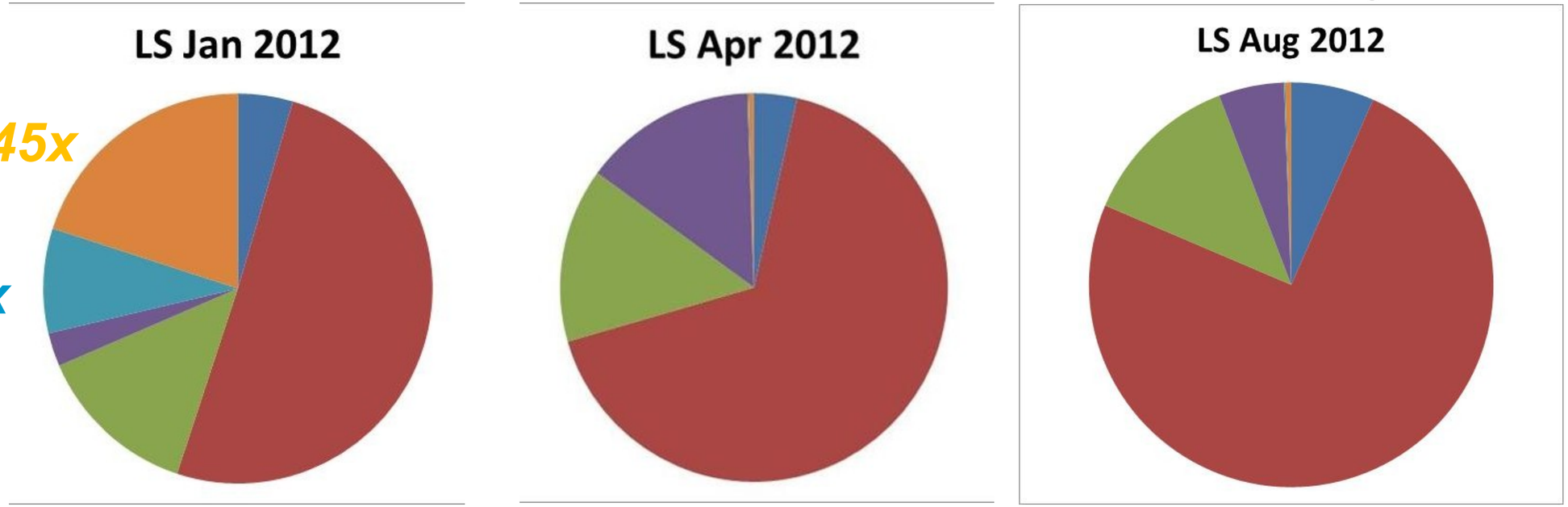


Collapse of Bacteroidetes

I Can Track Changes in My Microbiome Before and After 1 Month Antibiotic & 2 Month Prednisone Therapy

Reduced 45x

Reduced 90x



- Bacteroidetes
- Firmicutes
- Proteobacteria
- Actinobacteria
- Fusobacteria
- Euryarchaeota

Therapy Greatly Reduced Two Phyla,
But Massive Reduction in Bacteroidetes
And Large % Proteobacteria Remain

Small Changes
With No Therapy

I am Trapped in a Local Microbial Ecology
"Far from Home"

My Future

- I Now Know Where I Am
- And Where I Need to Get to
- Startups Enable Tracking
- Novel Interventions Become Possible

Where There is Data
There is Hope