“Frontiers of Self-Tracking”

Plenary Talk

Quantified Self Conference 2012

Stanford University

September 15, 2012

Dr. Larry Smarr

Director, California Institute for Telecommunications and Information Technology

Harry E. Gruber Professor,

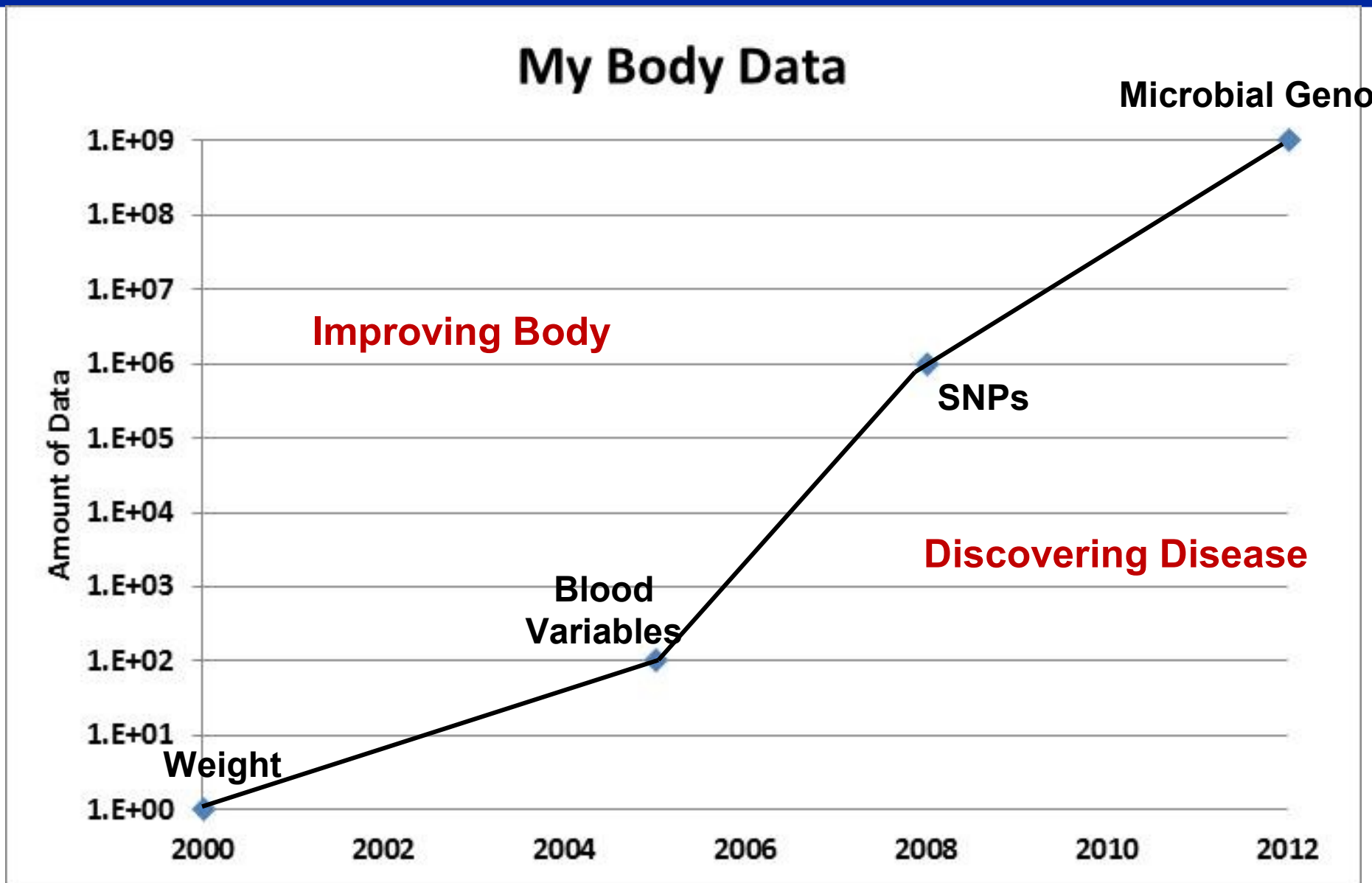
Dept. of Computer Science and Engineering

Jacobs School of Engineering, UCSD

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From One to a Billion Data Points Defining Me: The Exponential Rise in Body Data in Just One Decade!



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By Measuring the State of My Body and "Tuning" It Using Nutrition and Exercise, I Became Healthier

Age 51



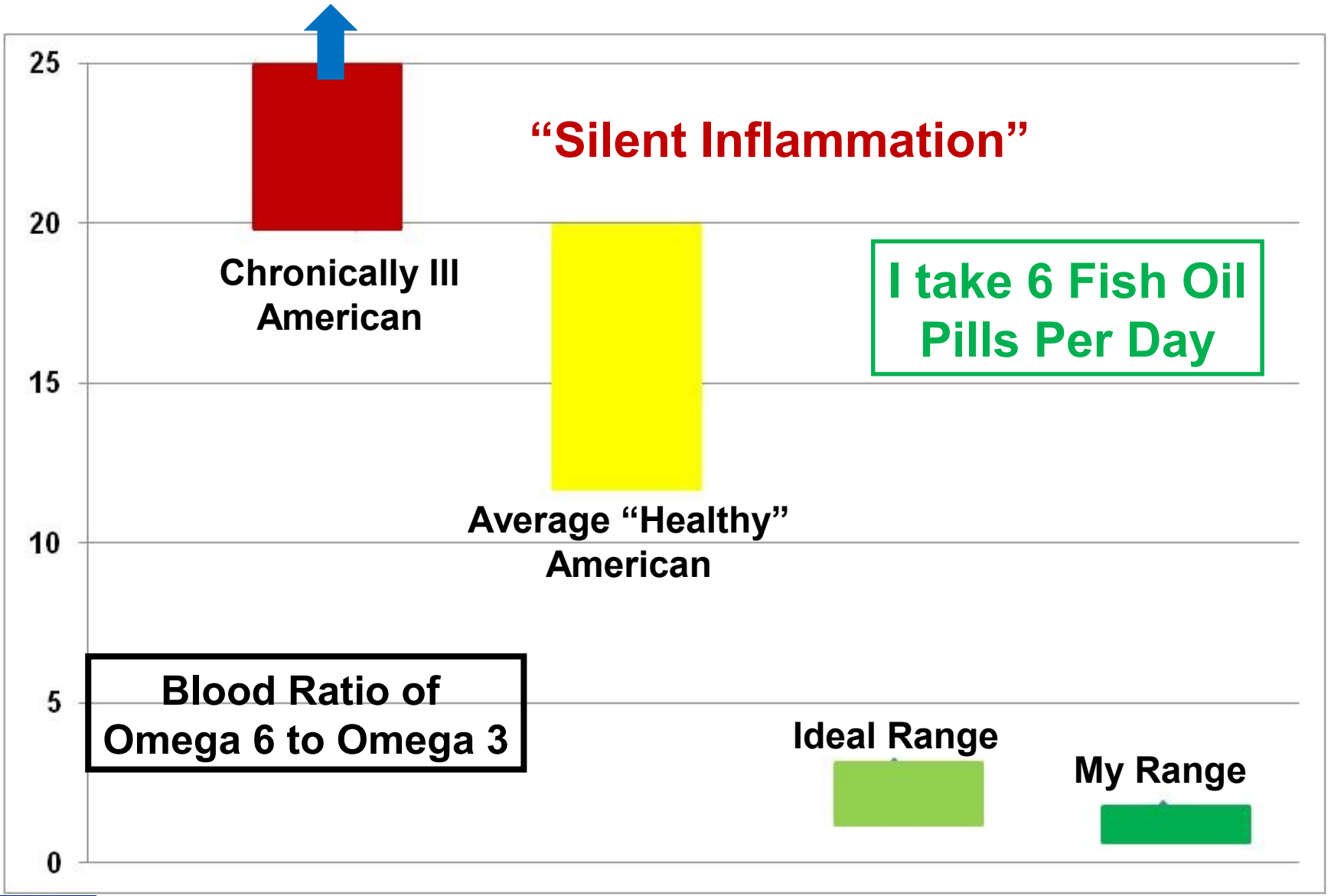


Age 61

I Arrived in La Jolla in 2000 After 20 Years in the Midwest and Discovered I was Pre-Diabetic

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I Have Greatly Lowered My Body's Inflammation From Food By Increasing Omega-3s



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Range Source: Barry Sears
My Tests by www.yourfuturehealth.com

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I Track 100 Variables in Blood Tests Done Quarterly to Annually

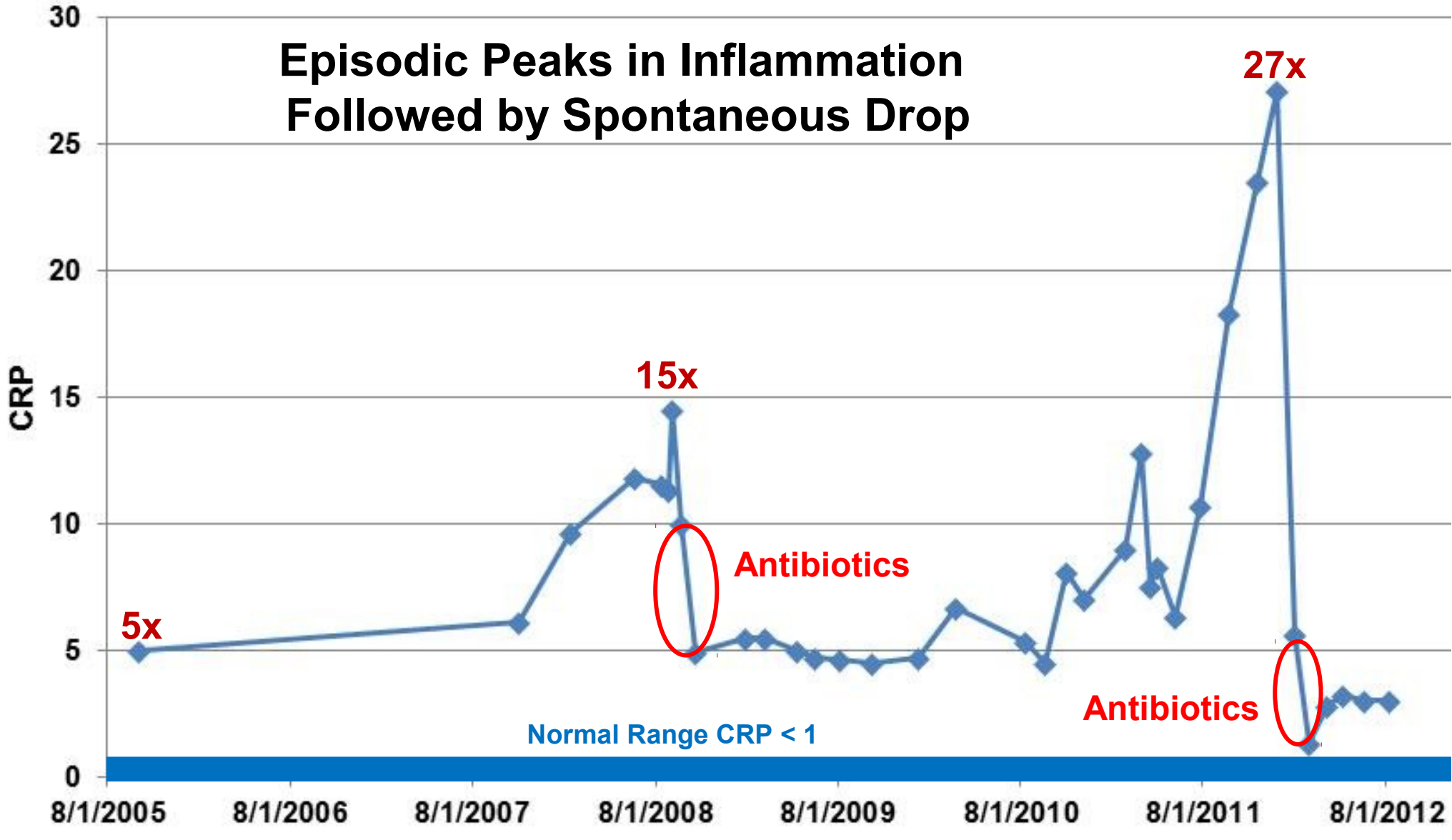
- **Electrolytes**
  - Sodium, Potassium, Calcium, Magnesium, Phosphorus, Boron, Chlorine, CO_2
- **Micronutrients**
  - Arsenic, Chromium, Cobalt, Copper, Iron, Manganese, Molybdenum, Selenium, Zinc
- **Blood Sugar Cycle**
  - Glucose, Insulin, A1C Hemoglobin
- **Cardio Risk**
  - Complex Reactive Protein
  - Homocysteine
- **Kidneys**
  - Bun, Creatinine, Uric Acid
- **Protein**
  - Total Protein, Albumin, Globulin
- **Liver**
  - GGTP, SGOT, SGPT, LDH, Total Direct Bilirubin, Alkaline Phosphatase
- **Thyroid**
  - T3 Uptake, T4, Free Thyroxine Index, FT4, 2nd Gen TSH
- **Blood Cells**
  - Complete Blood Cell Count
  - Red Blood Cell Subtypes
  - White Blood Cell Subtypes
- **Cancer Screen**
  - CEA, Total PSA, % Free PSA
  - CA-19-9
- **Vitamins & Antioxidant Screen**
  - Vit D, E; Selenium, ALA, coQ10, Glutathione, Total Antioxidant Fn.

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Only One of These Was Far Out of Normal Range

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But, In Spite of My High Levels of Omega-3s, My Blood Measurements Revealed Chronic Inflammation

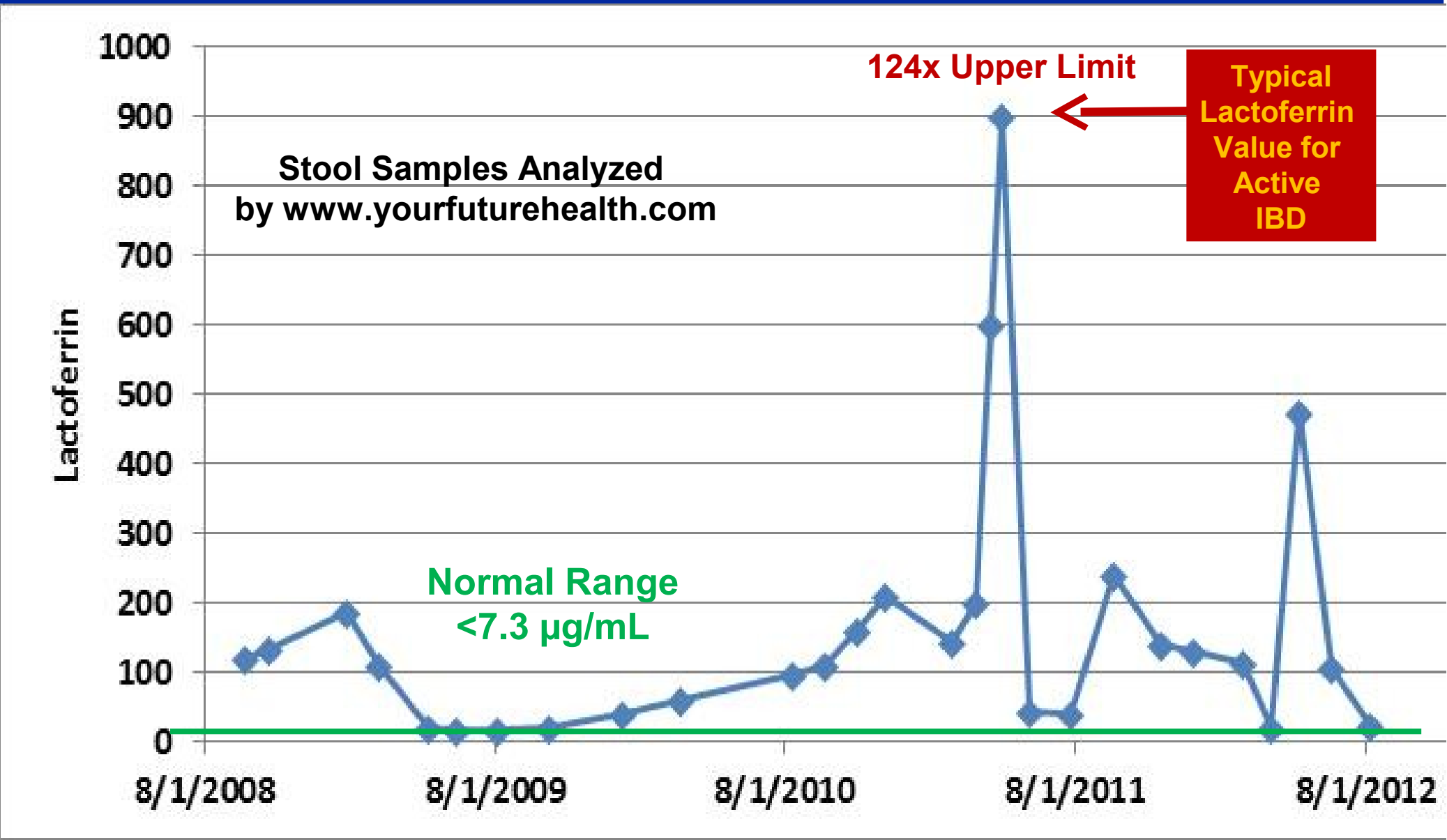


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Complex Reactive Protein (CRP) is a Blood Biomarker for Detecting Presence of Inflammation

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By Quantifying Stool Measurements Over Time I Discovered Source of Inflammation Was Likely in Colon



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Lactoferrin is a Sensitive and Specific Biomarker for Detecting Presence of Inflammatory Bowel Disease (IBD)

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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

So I Set Out to Quantify All Three!

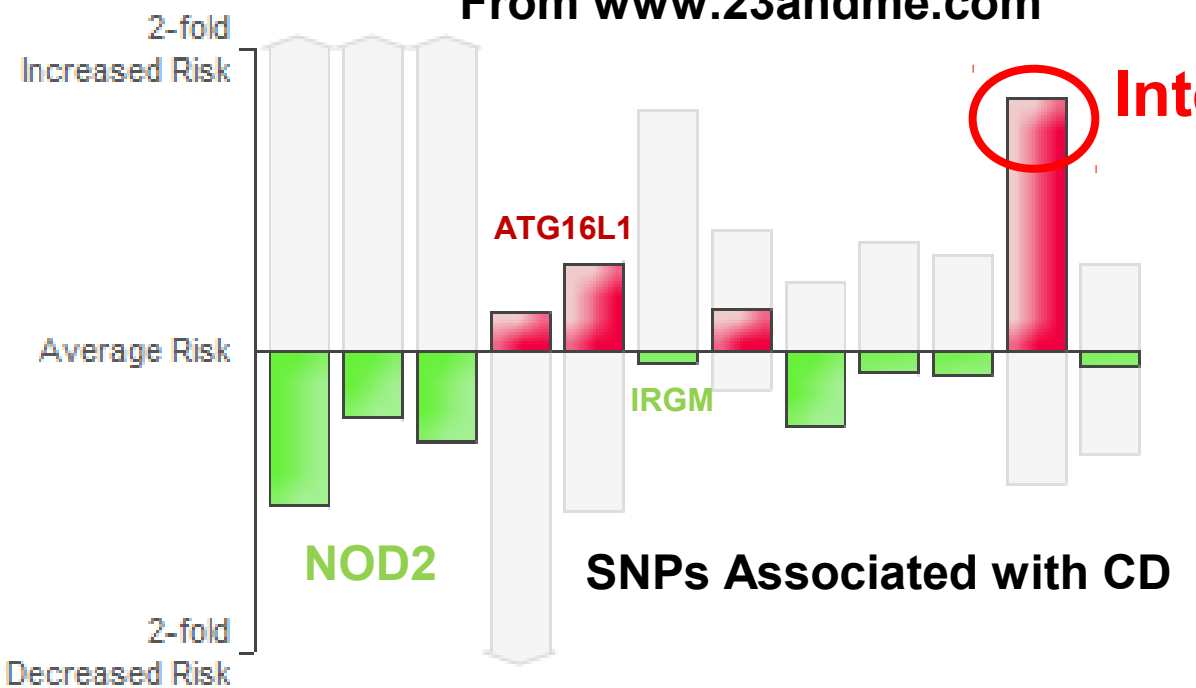
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Paul B. Eckburg & David A. Relman
Clin Infect Dis. 44:256-262 (2007)

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I Wondered if Crohn's is an Autoimmune Disease, Did I Have a Personal Genomic Polymorphism?

From www.23andme.com



Polymorphism in Interleukin-23 Receptor Gene — 80% Higher Risk of Pro-inflammatory Immune Response

News and Views

Nature Medicine **13**, 26 - 28 (2007)
doi:10.1038/nm0107-26

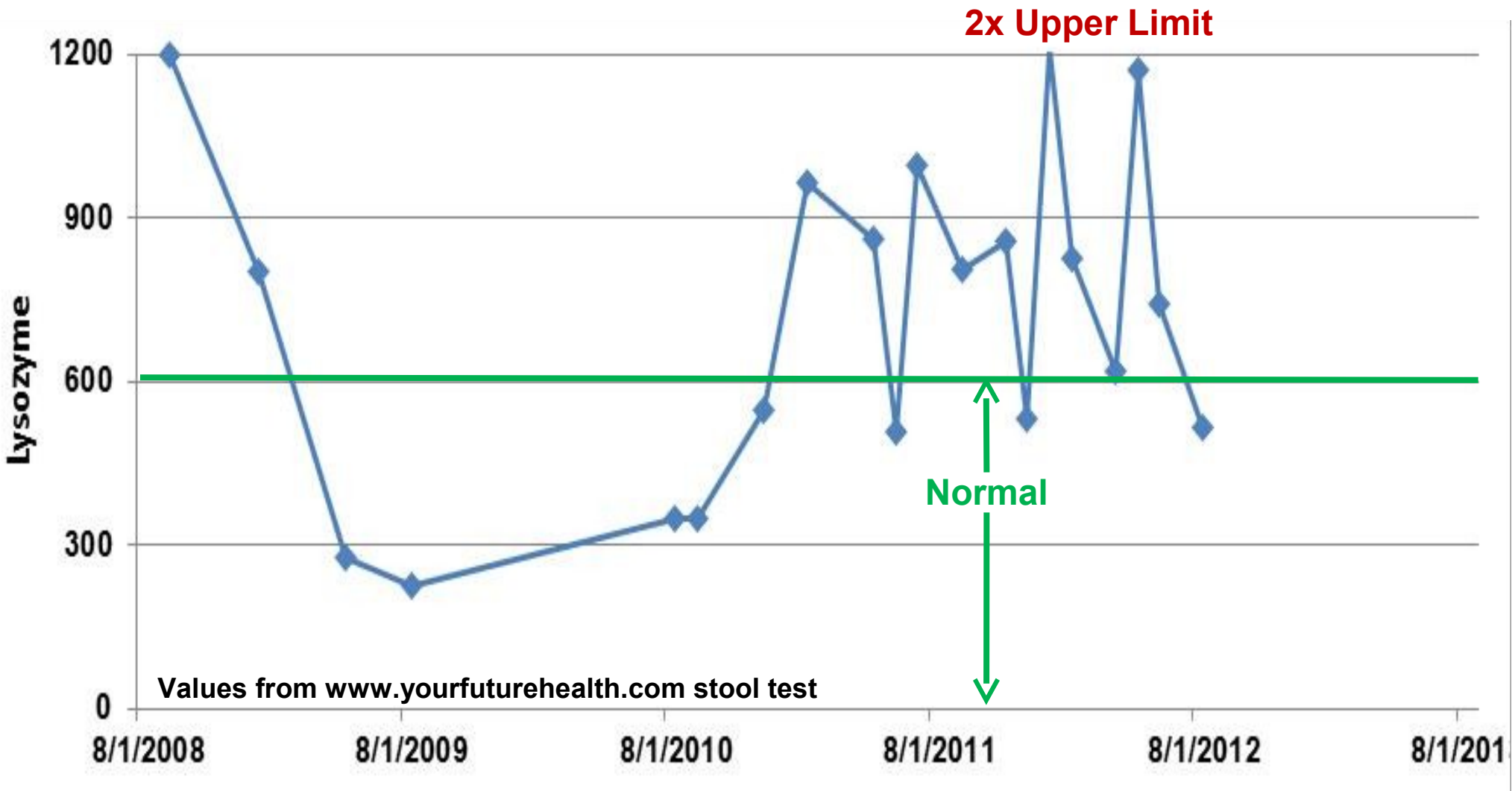
IL-23: a master regulator in Crohn disease

Markus F Neurath[1]

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I Tracked My Innate Immune System By Measuring Lysozyme From Stool Samples Over Time

My Immune System Seems to Be Fighting Bacteria Episodically

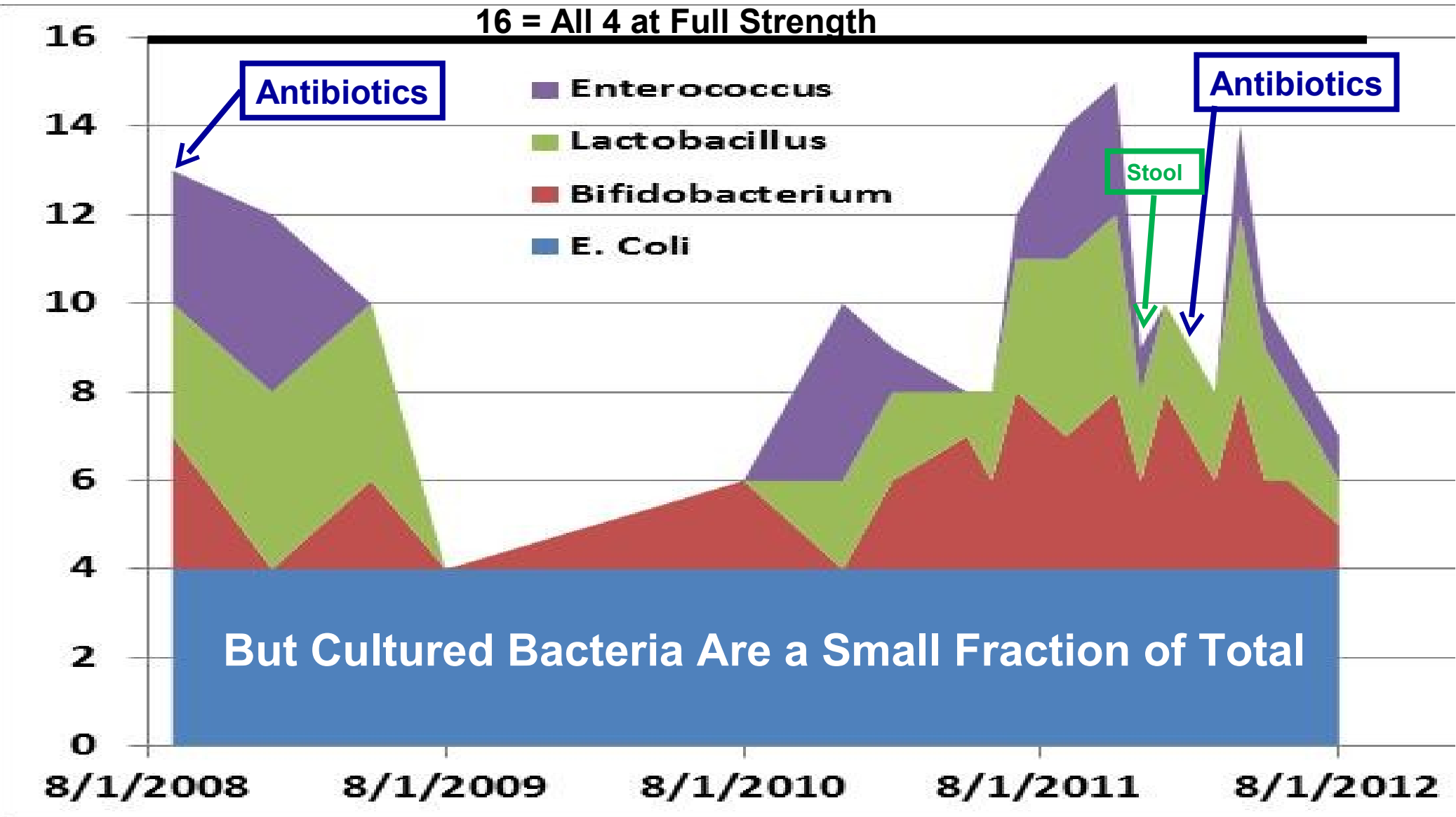


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Lysozyme is an Enzyme of the Innate Immune System that Attacks Bacterial Cell Walls

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Your Human Cells are Only 10% of Your Superorganism: How Can We Track the 90% which are Microbes?



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Values From www.yourfuturehealth.com stool test

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Emerging Technology Will Enable You to Quantify Your SuperSelf !

- **Whole Genome Sequencing Used on Jan 2012 Stool Sample**
  - Computationally Intensive
- **Results:**
  - Healthy Microbes Depleted
  - Unhealthy Microbes Took Over
- **Next Step:**
  - Repeat on April/August Samples
  - Continue Measuring
  - Evaluate Novel Therapies



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UC San Diego Health Sciences

J. Craig Venter Institute

August 2012

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From “How Do You Feel?”, to “What Are Your Numbers?”

Where’s There’s Data There’s Hope

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