Sequential Stool Testing to Monitor Progress in People with Rheumatoid Arthritis

Susan Blum, MD, MPH
Founder and Director, Blum Center for Health
Author, The Immune System Recover Plan
November 16, 2016
Susan Blum, MD

Board Certified in Preventive Medicine, Certified in Functional Medicine, is Senior Faculty with the Center for Mind-Body Medicine, and author of *The Immune System Recovery Program*
Technical Issues & Clinical Questions

Please type any technical issue or clinical question into either the “Chat” or “Questions” boxes, making sure to send them to “Organizer” at any time during the webinar.

We will be compiling your clinical questions and answering as many as we can the final 15 minutes of the webinar.

DISCLAIMER: Please note that any and all emails provided may be used for follow up correspondence and/or for further communication.
Need More Resources?

Ensure you have an account!
Sequential Stool Testing to Monitor Progress in People with Rheumatoid Arthritis

Susan Blum, MD, MPH
Founder and Director, Blum Center for Health
Author, The Immune System Recover Plan
November 16, 2016
What We Will Talk About...

• The role of gut microbial dysbiosis and leaky gut in triggering inflammatory arthritis
• The role of stool testing to determine different patterns in the gut microbiome and direct your treatment
• Case studies:
  – Sequential stool tests
  – Treatment protocols
  – How to treat the gut to treat the joints
Dysbiosis and Inflammation

Dysbiosis is a common feature of those with inflammatory arthritis and appears to trigger a whole cascade of inflammation that ends up in the joints.
Dysbiosis and Arthritis

• Healthy gut microbiome:
  – Ferments food (fiber) and makes SCFA: butyrate, propionate, acetate
  – Helps protect and maintains barrier
  – Immune system development: T regulator cells
  – Anti-inflammatory cytokines

• Dysbiosis: altered state of gut bacteria.
  – Promotes increased intestinal permeability

• Leaky gut:
  – Cell walls of gut bacteria have been found in the joints
  – Increased systemic inflammation and oxidative stress

Oxidative Stress

- High levels of oxidative stress in the joints
- Causes synovial hyperplasia, then tissue and joint damage
- Dysbiosis and leaky gut: system wide immune activation, generates free radicals
- Immune complexes in the joints generate reactive oxygen species
- Poor absorption of nutrients causes deficiency of much needed antioxidants
Bacterial Triggers for RA

Studies showing possible bacterial triggers

• *Proteus mirabilis* in the gut or urine
  – Treating the gut with herbs can lower anti-proteus antibody levels

• Many studies linking dysbiosis to RA
  – *Prevotella copri* specifically
  – Studies consistently find different bacterial patterns in people with inflammatory arthritis vs controls. Some high in *bacteroides*, some high in *prevotella*
  – Pro-inflammatory bacteria: *Enterobacter aerogenes*, *Klebsiella pneumonia*, *Strep viridans*, *Bacteroides fragilis*, *Bacteriodes uniformis*, *Clostridium ramosum*
Treating Dysbiosis

• Researchers have not conclusively connected different patterns of dysbiosis with different diseases

• For now, best not to focus on the exact strains of bacteria that are out of balance

• Broad spectrum herbs to reduce bacterial populations

• Many herbs, like berberine, spare lactobacillus and bifidus while selectively killing inflammatory bacteria strains

• Rotate different blends

• Targeted treatment for candida
Information to Guide Gut Treatment

- Test for presence of these inflammatory microbes
  - Yeast (candida)
  - Parasites: Inflammatory bacteria
    - Aerobic: *Klebsiella, Pseudomonas, Citrobacter, Bacillus*
    - Anaerobes: very high amounts of bacteroidetes including *Preventella*
  - SIBO

- Test for absence of beneficial flora
Information to Guide Gut Treatment

- **Metabolic markers of dysbiosis and inflammation**
  - Fecal fat: when high may indicate SIBO. Follow this with treatment
  - SCFA: very low need more fiber, or reflects low amounts of beneficial flora. Directs treatment towards diet and probiotics
  - Beta glucuronidase: enzyme produced by bad bugs. When high, let’s you know that you need to continue treatment

- **Immune**:
  - Calprotectin: inflammatory marker, directs treatment to include anti-inflammatory support like curcumin and fish oil. Requires you to follow until it is normal
  - EPX: allergy marker, look harder for parasite and yeast. Food allergy testing
Conventional Assessment
Conventional Assessment

- Stool for calprotectin and fecal fat
- SIBO breath testing
- Stool for ova and parasites
- Endoscopy
- Colonoscopy
- ENT for reflux evaluation
Integrative Assessment

Stool Tests
Stool Test: GIFX or CDSA 2.0

- Use for initial assessment to determine what to treat and for how long
  - SIBO
  - Bacterial dysbiosis without SIBO
  - Candida
  - Parasites
  - Low good bacterial
  - Problems with digestion: need enzymes?
- Sequential testing to direct treatment as-you-go
- Finish what you started!
- People with inflammatory arthritis need multiple courses of gut treatment over months to years
Outcomes: Case Study

- Sequential stool tests
- Treatment protocols
- How to treat the gut to treat the joints
Case Study: “June”

- 63 y.o. woman with RA x 2 years
- Very aggressive quickly
- Pain and deformity in both hands: couldn’t open water bottles, put rollers in her hair, hold a toothbrush, clasp her bra
  - Despite being on Plaquinil, methotrexate, and prednisone
- Long history of living abroad, including Asia and Africa, and treated for parasites multiple times, including worms, giardia and amebic dysentery
- History of ulcerative colitis while living in Japan
- Most recently moved back to Connecticut and RA started when she went back to work as a teacher
RA Case “June”: Initial labs

- CCP antibodies 47 (<20 is normal). Best specificity for RA
- RF was normal
- CRP 1.0 (c-reactive protein, marker for inflammation)
- ESR 18 (sed rate, marker for inflammation)
- ANA negative
- Vit D 50
- DHEA-S 21 (very low, sign of chronic stress)
RA Case “June”: Initial labs

• Elimination diet
• Ultrainflammax plus 360 shakes with ProEFA liquid fish oil and vitamin D
• Within 1 month: dropped her prednisone in half (to 2.5), relieved digestive issues, and pain was much improved in hands though not in knees
• At second visit we reviewed her stool test. It was done in May, end of school year
  – Candida 1+ and high beta glucuronidase, NG LACTO with low butyrate
  – The stool test was not as bad as her symptoms suggested
Test Results

**Digestion/Absorption**

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Result</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pancreatic Elastase 1</td>
<td>401</td>
<td>&gt;= 201 mcg/g</td>
</tr>
<tr>
<td>2. Putrefactive SCFAs</td>
<td>4.7</td>
<td>1.3-8.6 micromol/g</td>
</tr>
</tbody>
</table>

*Total values equal the sum of all measurable parts.

**Gut Immunology**

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Result</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Eosinophil Protein X</td>
<td>1.2</td>
<td>&lt;= 7.0 mcg/g</td>
</tr>
<tr>
<td>4. Calprotectin</td>
<td>&lt;17</td>
<td>&lt;=50 mcg/g</td>
</tr>
</tbody>
</table>

**Metabolic**

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Result</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Beneficial SCFAs</td>
<td>31.9</td>
<td>&gt;= 13.6 micromol/g</td>
</tr>
<tr>
<td>(Total*)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. n-Butyrate</td>
<td>4.6</td>
<td>&gt;= 2.5 micromol/g</td>
</tr>
<tr>
<td>7. pH</td>
<td>8.5</td>
<td>6.1-7.9</td>
</tr>
<tr>
<td>8. Beta-glucuronidase</td>
<td>4.933</td>
<td>337-4,433 U/g</td>
</tr>
</tbody>
</table>

**Secondary Bile Acids**

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Result</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Lithocholic acid</td>
<td>1.55</td>
<td>0.85-5.21 mg/l</td>
</tr>
<tr>
<td>(LCA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Deoxycholic acid</td>
<td>2.20</td>
<td>0.87-6.76 mg/l</td>
</tr>
<tr>
<td>(DCA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. LCA / DCA Ratio</td>
<td>0.70</td>
<td>0.39-2.07</td>
</tr>
</tbody>
</table>

*Total values equal the sum of all measurable parts.

**Additional Tests**

<table>
<thead>
<tr>
<th>Test</th>
<th>In Range</th>
<th>Out of Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. HpSA- H.pylori</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>
Test Results

**Parasitology**

Microscopic Exam Results:
No Ova or Parasites seen

Macroscopic Exam for Larvae
No larvae seen macroscopically.

PARASITOLOGY EIA TESTS:

<table>
<thead>
<tr>
<th>Test</th>
<th>In Range</th>
<th>Out of Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cryptosporidium</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Giardia lamblia</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Entamoeba histolytica/dispar</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

**Microbiology**

**12. Beneficial Bacteria**
- Lactobacillus species
- Escherichia coli
- Bifidobacterium

**13. Additional Bacteria**
- alpha haemolytic Streptococcus
- gamma haemolytic Streptococcus
- Citrobacter youngae

**14. Mycology**
- Candida albicans/dubliniensis

Human microflora is influenced by environmental factors and the competitive ecosystem of the organisms in the GI tract. Pathological significance should be based upon clinical symptoms and reproducibility of bacterial recovery.

- **NG**: No Growth
- **NP**: Non-Pathogen
- **PP**: Potential Pathogen
- **P**: Pathogen
RA Case “June”: Treatment

- **Herbal gut cleanse:**
  - 1 month of oregano 2 BID
  - 1 month of Tricycline by ADP: 2 BID
  - Followed by 1 month of Nystatin: 500k TID

- **Gut support**
  - Ultrainflammx 360 plus
  - L-glutamine BID
  - Therbiotic complete (Klaire) 50 billion at bedtime

- **Gluten, dairy, eggs and night shade free diet**
  (she had reintroduced and found these were the problems)

- **EPA/DHA/GLA oils**
RA Case “June”: Visit 2 Summer

- Follow-up 4 months later
- Symptoms much improved, happy
- Still following food plan
- Most of the time, with minimal pain she can now:
  - open water bottles
  - fix her hair and brush it
  - get clothes and bra
- Knee has finally improved. Was 6/10, now 8/10
- Energy is better, now 8/10. was 5/10
- Taking Alleve less often. Was daily, now 3-4 days/week
- Stool test was improved but not completely resolved
2nd Stool Test

**Prescriptive Agents**

**BACILLUS SPECIES**

In general, Bacillus species, not B. cereus, demonstrate variable susceptibility to the penicillins and the cephalosporin antibiotics. Clindamycin and Vancomycin have shown effective activity when used to treat serious infections.

**Natural Agents**

**BACILLUS SPECIES**

- Serberine
- Plant Tannins
- Uva-Ursi

**Digestion**

<table>
<thead>
<tr>
<th>Enzyme</th>
<th>Reference Range</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chymotrypsin</td>
<td>0.9-20.8 U/l</td>
<td></td>
</tr>
<tr>
<td>Trypsin</td>
<td>0.11-1.1 U/l</td>
<td></td>
</tr>
<tr>
<td>Lipase</td>
<td>0.01-0.2 U/l</td>
<td></td>
</tr>
</tbody>
</table>

**Absorption**

<table>
<thead>
<tr>
<th>Component</th>
<th>Reference Range</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triglycerides</td>
<td>0.3-3.3 mg/l</td>
<td></td>
</tr>
<tr>
<td>Long Chain Fatty Acids</td>
<td>1.3-20.7 mg/l</td>
<td></td>
</tr>
<tr>
<td>Cholesterol</td>
<td>0.3-3.5 mg/l</td>
<td></td>
</tr>
<tr>
<td>Phospholipids</td>
<td>0.2-4.8 mg/l</td>
<td></td>
</tr>
<tr>
<td>Fecal Fat (Total*)</td>
<td>2.5-32.4 mg/l</td>
<td></td>
</tr>
</tbody>
</table>

**Metabolic Markers**

<table>
<thead>
<tr>
<th>SCFA Distribution</th>
<th>Reference Range</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetate %</td>
<td>44.5-72.4 %</td>
<td></td>
</tr>
<tr>
<td>Propionate %</td>
<td>&lt;=32.1%</td>
<td></td>
</tr>
<tr>
<td>n-Butyrate %</td>
<td>&lt;=10.8-33.5%</td>
<td></td>
</tr>
</tbody>
</table>

**Bacteriology**

**Beneficial Bacteria**

- Lactobacillus species
- Escherichia coli
- Bifidobacterium

**Additional Bacteria**

- alpha haemolytic Streptococcus
- gamma haemolytic Streptococcus
- Pseudomonas aeruginosa
- Bacillus species

**Mycology**

- *NG

**Immunology**

- Fecal Lactoferrin • Negative
- Lactoferrin • Negative

**Macroscopic**

- Color: Brown
- Mucus: Negative
- Occult blood •: Positive

**Microbiology**

- *NG
- NP
- PP
- P

- No Growth
- Non-Pathogen
- Possible Pathogen
- Pathogen
RA Case “June”: Interpretation and Treatment

• Beta glucuronidase dropped slightly, but still high suggesting presence of harmful anaerobes
• 3+ pseudomonas and 4+ bacillus need treatment
• Lactobacillus still not growing and butyrate still low
• Fecal fat is ok, lessening likelihood of SIBO
• Blood in stool: She reported seeing blood on tissue and having some hard stool
  – Referred to GI
• Treatment:
  – Candibactin BR: 2 BID for 1 month
  – Continue the rest of the GI support program
RA Case “June”: Visit 3

• She came back 4 months later, in December
• STRESS from work. Very physically demanding, too
• Gave up on diet completely
• FLARE of symptoms
• Blood work:
  – CCP was higher 82
  – CCRP: 13.1 (marker for inflammation)
• No stool test this visit
• Decided to treat gut again with
  – GI MicrobX by DFH: 2 BID for 1 month
  – Oregano by DFH: 2 BID x 1 month
RA Case “June”: Visit 4

• End of school year in May
• Had the flu and strep during the winter, took antibiotics
• Following the food plan only some of the time but overall eating less processed food and sugar
• Was still on the lowered dose of prednisone 2.5, but afraid to change it during the school year
• Symptoms were stable from initial improvement, but not changed from last visit
• We reviewed the CDSA:
  – Beta glucuronidase finally resolved, normal
  – No more blood in stool
  – 1+ proteus, still low butyrate
RA Case “June”: CDSA
RA Case “June”: Assessment and Treatment

- Given her high amounts of stress, winter flare, and the flu, stool test and symptoms pretty stable
- Plan: Over the summer focus on food, mind-body practice, and another short round of gut cleanse herbs
- Tricycline (ARG) 2 BID for 2 weeks
- Return end of summer with repeat blood testing, SIBO and NutrEval to check dysbiosis markers
RA Case “June”: Visit 5

- Joint pain, energy and gut all improved again over the summer
- Blood work: CCP 7.6!!!
- RA testing now normal
- SIBO was normal
- NutrEval: showed high dybiosis markers including yeast
- Based on NutrEval
  - Treat the yeast with Diflucan: 100 mg daily for 2 weeks.
  - Add digestive enzymes: low amino acids
  - She also needed lots of support for OXIDATIVE STRESS: NAC. Lipoic acid
RA Case “June”: NutrEval Dysbiosis Markers

<table>
<thead>
<tr>
<th>Malabsorption Markers</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoleacetic Acid (IAA)</td>
<td>&lt;= 4.2</td>
</tr>
<tr>
<td>Phenylacetic Acid (PAA)</td>
<td>&lt;= 0.12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bacterial Dysbiosis Markers</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dihydroxyphenylpropionic Acid (DHPPA)</td>
<td>&lt;= 5.3</td>
</tr>
<tr>
<td>3-Hydroxyphenylacetic Acid</td>
<td>&lt;= 8.1</td>
</tr>
<tr>
<td>4-Hydroxyphenylacetic Acid</td>
<td>&lt;= 29</td>
</tr>
<tr>
<td>Benzoic Acid</td>
<td>&lt;= 0.05</td>
</tr>
<tr>
<td>Hippuric Acid</td>
<td>&lt;= 603</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yeast / Fungal Dysbiosis Markers</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arabinose</td>
<td>&lt;= 96</td>
</tr>
<tr>
<td>Citramalic Acid</td>
<td>&lt;= 5.8</td>
</tr>
<tr>
<td>Tartaric Acid</td>
<td>&lt;= 15</td>
</tr>
</tbody>
</table>
RA Case “June”: Visit 6

- She returned mid-school year
- She still felt great! This is the first year she can remember that she didn’t have a flare in the winter
- Only has pain when she overworks her hands
- Blood tests: CCP and RF still normal
- Retiring in 6 months
- CDSA 2.0:
  - SCFA are lower; need to focus here now
  - Enzymes a little low: stay on enzymes
  - Only 3+ bacillus
Assessment and Treatment

• We decided to focus on gut healing for the next 6 months, no more herbs
• Increase probiotics to 100 billion/day
• Focus on prebiotics, digestion and leaky gut with glutamine
• She returned at the end of the school year, very excited for her retirement
• NO FLARE FOR ONE YEAR
• Can open jars, carry books, fix her hair, all without pain and consistently
• Moved boxes herself during the move out of her office
• Maintaining 95% night shade free, gluten and dairy free diet
• Has brandy a few nights each week with her husband
• We made a plan to start tapering prednisone
Case Study: “Robert”

- 60 year old man with high cholesterol and high PSA
  Working together for 2 years
- No digestive symptoms, but hx of celiac as a child he “out grew” and hx of ulcer and gastritis @ 16 y.o.
  - We had never done a stool test
- Sudden onset of pain and swelling in two fingers
  Couldn’t bend them
  - No obvious trigger other than STRESS
- Orthopedist: not OA, joints looked normal
  - Alleve didn’t help
- Sent him home with
  - Inflammatone (DFH, 4 x 3), Ultrainflamx increased his dose of EPA/DHA/ GLA
  - Arthritis diet: elim diet: gluten, dairy, soy, corn, eggs, night shades
  - Resources to begin a meditation practice
Inflammatory Arthritis Case “Robert”: Visit 2

Returned 6 weeks later:

• 25% reduction in pain and swelling
• My testing: RF, ACPA, CRP, ANA, Sjogrens, Lyme, all neg
• Undifferentiated inflammatory arthritis
• GIFX: Candida, Prevotella
• NutrEval: high dysbiosis markers
Test Results

GI Effects™ Comprehensive Profile - Stool

**Digestion and Absorption**

- Pancreatic Eiosta 1
- Products of Protein Breakdown (Total*)
- Fecal Fat (Total*)
- Triglycerides
- Long-Chain Fatty Acids
- Cholesterol
- Phospholipids

**Inflammation and Immunology**

- C-reactive Protein
- Eosinophil Protein X (EPX)
- Fecal secretory IgA

**Metabolic**

- Short-Chain Fatty Acids (SCFA) (Total*)
- n-Butyrate Concentration
- n-Butyrate %
- Acetate %
- Propionate %
- Beta-glucuronidase

Reference Range:

- >200 mcg/g
- 1.8-9.9 micromoles/g
- 3.3-38.6 mmole/g
- 0.3-2.8 mmole/g
- 1.2-29.1 mmole/g
- 0.4-4.8 mmole/g
- 0.2-6.9 mmole/g
- <=50 mcg/g
- <=4.6 mcg/g
- <=885 mcg/g
- >=23.3 micromoles/g
- >=3.6 micromoles/g
- 11.8-33.3 %
- 48.1-60.2 %
- <=29.3 %
- 368-2,260 U/g
### Test Results

The diagram shows the test results for the Gastrointestinal Microbiome with a focus on Commensal Bacteria (PCR). The results are presented in a table format with columns for the bacterial group, species, results, and a reference range for each species.

**Commensal Bacteria (PCR)**

<table>
<thead>
<tr>
<th>Bacterial Group</th>
<th>Result</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteroides Prevotella group</td>
<td>1.0E9</td>
<td>3.4E8-1.5E8</td>
</tr>
<tr>
<td>Bacteroides vulgatus</td>
<td>5.0E9 H</td>
<td>&lt;2.2E9</td>
</tr>
<tr>
<td>Bacteroides cuniculi</td>
<td>8.6E7 H</td>
<td>&lt;1.6E8</td>
</tr>
<tr>
<td>Clostridium spp.</td>
<td>1.8E8 H</td>
<td>&lt;8.5E7</td>
</tr>
<tr>
<td>Ruminobacter spp.</td>
<td>2.0E7 H</td>
<td>1.4E5-1.6E7</td>
</tr>
<tr>
<td>Ruminococcus gnavus</td>
<td>2.0E7</td>
<td>&lt;3.2E7</td>
</tr>
<tr>
<td>Butyricicoccus coeliclus</td>
<td>1.7E5</td>
<td>5.5E3-5.9E5</td>
</tr>
<tr>
<td>Clostridium spp.</td>
<td>2.6E10 H</td>
<td>1.7E8-1.5E10</td>
</tr>
<tr>
<td>Clostridium species</td>
<td>2.8E6</td>
<td>&lt;1.2E6</td>
</tr>
<tr>
<td>Faecalibacterium prausnitzii</td>
<td>1.3E10 H</td>
<td>5.6E7-4.7E8</td>
</tr>
<tr>
<td>Lactobacillus spp.</td>
<td>2.5E8</td>
<td>8.3E6-5.2E9</td>
</tr>
<tr>
<td>Peptostreptococcus spp.</td>
<td>6.1E8 H</td>
<td>4.2E5-1.3E8</td>
</tr>
<tr>
<td>Roseburia spp.</td>
<td>1.2E10 H</td>
<td>1.3E8-1.9E10</td>
</tr>
<tr>
<td>Ruminococcus spp.</td>
<td>1.6E8</td>
<td>9.5E7-1.6E7</td>
</tr>
<tr>
<td>Verrucomicrobium</td>
<td>1.7E7</td>
<td>1.2E5-5.5E7</td>
</tr>
</tbody>
</table>

**Bacteroides Prevotella group**

- **Bacteroides incarceratus**
- **Bacteroides vulgatus**

**Firmicutes Phylum**

- **Anaerotruncus caccoliniae**
- **Eubacterium rectale**
- **Clostridium spp.**
- **Clostridium species**

**Clostridium prausnitzii**

- **Faecalibacterium prausnitzii**

**Bacteroides Prevotella group**

- **Bacteroides vulgatus**

**Firmicutes/Gastricobacter Ratio**

- **Firmicutes/Gastricobacter Ratio**

The results are indicated with different colors representing various levels of presence, with a reference range provided for each bacterial species.
**Test Results**

**Gastrointestinal Microbiome**

<table>
<thead>
<tr>
<th>Bacteriology (Culture)</th>
<th>1+</th>
<th>2+</th>
<th>3+</th>
<th>4+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lactobacillus spp.</td>
<td>NG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Escherichia coli</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bifidobacterium</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2+</td>
<td>2+</td>
<td>2+</td>
<td>2+</td>
</tr>
</tbody>
</table>

**Additional Bacteria**

<table>
<thead>
<tr>
<th>Bacterium</th>
<th>1+</th>
<th>2+</th>
<th>3+</th>
<th>4+</th>
</tr>
</thead>
<tbody>
<tr>
<td>alpha haemolytic Streptococcus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mucoa Eismorica coli</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gamma haemolytic Streptococcus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Mycoology (Culture)**

<table>
<thead>
<tr>
<th>Mycoology (Culture)</th>
<th>1+</th>
<th>2+</th>
<th>3+</th>
<th>4+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Candida albicans</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhodotorula species</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Malabsorption and Dysbiosis Markers**

<table>
<thead>
<tr>
<th>Malabsorption Markers</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoleacetic Acid (IAA)</td>
<td>&lt;= 4.2</td>
</tr>
<tr>
<td>Phenylacetic Acid (PAA)</td>
<td>&lt;= 0.12</td>
</tr>
<tr>
<td>Dihydroxyphenylacetic Acid (DHPA)</td>
<td>&gt;11.1 &lt;= 5.3</td>
</tr>
<tr>
<td>3-Hydroxyphenylacetic Acid</td>
<td>&gt;25.6 &lt;= 8.1</td>
</tr>
<tr>
<td>4-Hydroxyphenylacetic Acid</td>
<td>18 &lt;= 29</td>
</tr>
<tr>
<td>Benzoic Acid</td>
<td>0.30 &lt;= 0.06</td>
</tr>
<tr>
<td>Hippuric Acid</td>
<td>&lt;= 803</td>
</tr>
</tbody>
</table>

**Yeast / Fungal Dysbiosis Markers**

<table>
<thead>
<tr>
<th>Marker</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arabinose</td>
<td>&lt;= 96</td>
</tr>
<tr>
<td>Citramalic Acid</td>
<td>&lt;= 5.8</td>
</tr>
<tr>
<td>Tartaric Acid</td>
<td>&lt;= 15</td>
</tr>
</tbody>
</table>
Inflammatory Arthritis Case ”Robert”: Treatment

- Treated him for bacterial and yeast dysbiosis
- GI MICROBx DFH: 2 BID x 1 month
- Oregano 2 BID x 1 month
- Followed by Diflucan 100 mg daily x 1 month
- He hasn’t returned yet with his follow up stool test, but he reported by phone that his arthritis was completely resolved
Take Home

• Marathon not a sprint: Finish what you started
• Multiple rounds of herbal treatment guided by stool test
• Need to know when to stop: When to add extra treatment for yeast
• Use dysbiosis markers in urine if the clinical picture doesn’t fit with the stool test
Moderator: Michael Chapman, ND

Presenter: Susan Blum, MD

Explore WWW.GDX.NET for more information and educational resources, including...

LEARN GDX – Brief video modules
LIVE GDX – Previous webinar recordings
GI University – Focused learning modules
Conferences – Schedule of events we attend
Test Menu – Detailed test profile information

MY GDX – Order materials and get results

Questions?
Additional Education Materials:

WWW.GDX.NET

Sample Reports, Support Guides, Kit Instructions, FAQs, Payment Options, and much more!
Additional Questions?

US Client Services: 800-522-4762
UK Client Services: 020.8336.7750

Please schedule a complimentary appointment with one of our Medical Education Specialists for questions related to:

- Diagnostic profiles featured in this webinar
- How Genova’s profiles might support patients in your clinical practice
- Review a profile that has already been completed on one of your patients

We look forward to hearing from you!
Upcoming **LIVE** GDX Webinar Topics

December 21, 2016

**The Lifestyle Factor:**  
*Utilizing Testing to Encourage Behavior Change*  
– Michael Chapman, ND

Register for upcoming **LIVE** GDX Webinars online at [WWW.GDX.NET](http://WWW.GDX.NET)

The views and opinions expressed herein are solely those of the presenter and do not necessarily represent those of Genova Diagnostics. Thus, Genova Diagnostics does not accept liability for consequences of any actions taken on the basis of the information provided.
Sequential Stool Testing to Monitor Progress in People with Rheumatoid Arthritis
Susan Blum, MD, MPH

The views and opinions expressed herein are solely those of the presenter and do not necessarily represent those of Genova Diagnostics. Thus, Genova Diagnostics does not accept liability for consequences of any actions taken on the basis of the information provided.