Ayurveda & Microbiome Typing, Re-setting & Diet

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RESEARCH ARTICLE

Genetic Factors Are Not the Major Causes of Chronic Diseases

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Fig 3. Numbers of Western-European deaths in 2000 estimated for ischemic heart disease and nine cancer types (1.53 million total deaths from these causes). The contributions attributed to genetics plus shared exposures are based on the population attributable fractions (PAFs) estimated from Western European monozygotic twins (Table 2).
Commensal Host-Bacterial Relationships in the Gut

Lora V. Hooper and Jeffrey I. Gordon

One potential outcome of the adaptive coevolution of humans and bacteria is the development of commensal relationships, where neither partner is harmed, or symbiotic relationships, where unique metabolic traits or other benefits are provided. Our gastrointestinal tract is colonized by a vast community of symbionts and commensals that have important effects on immune function, nutrient processing, and a broad range of other host activities. The current genomic revolution offers an unprecedented opportunity to identify the molecular foundations of these relationships so that we can understand how they contribute to our normal physiology and how they can be exploited to develop new therapeutic strategies.

Interactions between bacteria and their hosts can be viewed in terms of a continuum between symbiosis, commensalism, and pathogenicity, with symbiosis and commensalism grouped under the general heading of mutualism (Fig. 1). “Symbiosis” refers to a relationship between two different species where at least one partner benefits without harming the other and is typically centered on metabolic capabilities that allow either or both partners to exploit an otherwise unavailable or poorly utilisable nutrient foundation (7, 8). The term “commensal” comes from the medieval Latin “commensalis,” meaning “at table together,” and generally refers to partners that coexist without detriment but without obvious benefit. A pathogenic relationship results in damage to the host. Symbiosis and commensalism have been viewed as potential outcomes of a dynamic “arms race” (9) initiated when a pathogen encounters a vulnerable host. In this race, a change in one combatant is matched by an adaptive response in the other. In some settings, the arms race evolves toward attenuation of virulence and peaceful coexistence, with or without frank codependence (symbiosis). In other circumstances, the pathogenic relationship is sustained by the development of effective countermeasures that bypass the host’s innate or adaptive defenses (Fig. 1).

Bacteria have inhabited Earth for at least 2.5 billion years (5). As a result, our predecessors have had to adapt to a biosphere dominated by microbes. However, we have minimal knowledge of how coevolution with indigenous microbes has shaped our genome and microbiome, as well as our physiology and postnatal development. For example, the human genome encodes 223 proteins with significant homology to bacterial but not eukaryotic proteins, suggesting that they were acquired through horizontal transfer of bacterial genes (1). Unfortunately, the components of our microbiome remain poorly defined. Like most complex ecosystems, enumerating membership in the various microbial societies that reside on our body surfaces has been hindered by the fact that most societal members cannot be cultured ex vivo. Moreover, most microbial genome-sequencing projects have focused on pathogens. Those that have embraced non-pathogens have turned to Archaea to understand the evolutionary diversification of protocytes and eukaryotes or to extremophiles to examine their adaptations to harsh environments and their potential for performing commercially applicable chemistry (6).

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Microbiome Research
What has it revealed?

- the previously unappreciated bacterial diversity
- the ‘unanticipated’ variability between individuals
- numerous correlations between gut community composition and various host states
Microbiome Research
3 Questions it Raises

• How can one categorize in a consistent way, the immense variation in the microbiome of a population?

• How can one restore and reset a disturbed microflora?

• What food sources are available to contribute to healthy microbiome?
An Alternate Viewpoint

Prakriti

Doshas
Transport, Metabolism, Storage

Health

Harmony

Diet & Lifestyle

Discord

Stress

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Table 1: Characteristic features of the three extreme prakriti types: Vata, pitta, and kapha and their susceptibility to diseases

<table>
<thead>
<tr>
<th>Features</th>
<th>Vata</th>
<th>Pitta</th>
<th>Kapha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body frame</td>
<td>Thin</td>
<td>Medium</td>
<td>Broad</td>
</tr>
<tr>
<td>Body build and musculature</td>
<td>Weakly developed</td>
<td>Moderate</td>
<td>Well-developed</td>
</tr>
<tr>
<td>Skin</td>
<td>Dry and cracked</td>
<td>Soft, thin, with tendency for</td>
<td>Smooth and firm, n</td>
</tr>
<tr>
<td></td>
<td></td>
<td>moles, acne and freckles</td>
<td>complexion</td>
</tr>
<tr>
<td>Hair</td>
<td>Dry, thin, prone to breaks</td>
<td>Fluctuating</td>
<td>Thick, smooth, and brown</td>
</tr>
<tr>
<td>Weight gain</td>
<td>Recalcitrant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food and bowel habits</td>
<td>Frequent, variable, and irregular</td>
<td>Higher capacity for food and water consumption</td>
<td>Less mobile and cold</td>
</tr>
<tr>
<td>Movements and physical activities</td>
<td>Excessive and brisk</td>
<td>Moderate</td>
<td>Tolerant to both hot and cold</td>
</tr>
<tr>
<td>Tolerance for seasonal weather</td>
<td>Cold intolerant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disease resistance and healing capacity</td>
<td>Poor</td>
<td>Good</td>
<td>Excellent</td>
</tr>
<tr>
<td>Metabolism of toxic substances</td>
<td>Moderate</td>
<td>Quick</td>
<td>Sharp, incisive communication with analytical abilities</td>
</tr>
<tr>
<td>Communication</td>
<td>Talkative</td>
<td></td>
<td>Less vocal with communication skills</td>
</tr>
<tr>
<td>Initiation capabilities</td>
<td>Quick, responsive, and enthusiastic</td>
<td>Moderate, upon conviction and understanding</td>
<td>Slow to initiate new things</td>
</tr>
<tr>
<td>Memory</td>
<td>Quick at grasping but poor retention</td>
<td>Moderate grasping and retention</td>
<td>Slow grasping but retention</td>
</tr>
<tr>
<td>Ageing</td>
<td>Fast</td>
<td>Slow</td>
<td>Slow</td>
</tr>
<tr>
<td>Disease predisposition/poor prognosis</td>
<td>Developmental, neurological, dementia, movement and speech disorders, arthrit</td>
<td>Uler, bleeding disorders, skin diseases</td>
<td>Obesity, diabetes, atherosclerotic diseases</td>
</tr>
</tbody>
</table>

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## Prakriti & Microbiome

**Exploratory Study (Prasher, Mukerji, Dash et al., IGIB)**

<table>
<thead>
<tr>
<th>Prakriti</th>
<th>Microbiome Features</th>
<th>Phenotype Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vata</td>
<td>B. Vulgaris Oscillibacter valeriegenes Eubacterium rectale R. hominis</td>
<td>Irregular, unpredictable digestion, lower immune response</td>
</tr>
<tr>
<td>Pitta</td>
<td>Enrichment of butyrate producing microbes</td>
<td>In general good digestion &amp; strong metabolism. But prone to inflammation (Juyal et al. 2012), IBS</td>
</tr>
<tr>
<td>Kapha</td>
<td>Prevotella and P. copri</td>
<td>Obesity, susceptibility to type 2 diabetes, atherosclerosis (Prasher et al. 2008, Govindraj et al. 2015, Doddoli et al. 2016)</td>
</tr>
</tbody>
</table>
Resetting the Microbiome

The Holistic Approach

Diet

Agni

Aahaar, Rasa,
Bhuta, Dhatu

Ama

Panchakarma

Digestion in Gut

Health

Fecal Transplant

Prebiotics

Probiotics

Health

Disease

Agni vardhak
Fermented milk products
Takra arishta
Jeerakady asava
## Dairy-based Products

### Role in Treating Diarrhoeal Diseases

<table>
<thead>
<tr>
<th>INDICATION</th>
<th>PREPARATION</th>
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</table>
| Diarrhea and Dysentery | • Light food consisting of buttermilk is given when there is hunger after diarrhea  
• In diarrhea with *kapha* dominance (passing stools with mucous and with continuous pain), drugs like *Woodfordia fruticosa, Symplocos racemosa, Zingiber officinalis* added with buttermilk is given.  
• Buttermilk with *Plumbago zeylanica* is given during abdominal discomfort.  
• Pomegranate juice with *Holarrhena antidysenterica* along with buttermilk cures diarrhea. |
| Chronic diarrhea: Lactose or gluten intolerances/ Crohn’s disease | • Buttermilk is taken as post meal drink  
• Buttermilk is wholesome in chronic diarrhoea and other abdominal disorders  
• Buttermilk is appetizing  
• After taking meal prepared from horse gram, buttermilk is given  
• Buttermilk with *Plumbago zeylanica* in chronic indigestion |
| Others | • Astringency of butter milk for blood mixed stools  
• For electrolyte loss  
• Ensures improved metabolism for those suffering from overall debility |
But What is Buttermilk
An Innovators Dream!

8-sources of milk
5 degrees of fermentation
5 process variations
200 product combinations

Milk and fermented milk products mentioned in Ayurveda (Kukkupuni et al., 2015)
Enhancing Agni

<table>
<thead>
<tr>
<th>Dipaniya, Agni Vardhaka (Enhancers of digestion and metabolism)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haritaki (<em>Terminalia chebula</em>)- fruits</td>
</tr>
<tr>
<td>Pippali (<em>Piper longum</em>) - fruits</td>
</tr>
<tr>
<td>Vibhitaki (<em>Terminalia bellerica</em>)- fruits</td>
</tr>
<tr>
<td>Kakamachi (<em>Solanum nigrum</em>)- fruits and leaves</td>
</tr>
<tr>
<td>Jiraka (<em>Cuminum cyminum</em>)- fruits</td>
</tr>
<tr>
<td>Dadima (<em>Punica granatum</em>)- fruits</td>
</tr>
<tr>
<td>Agnimantha (<em>Clerodendrum phlomides</em> L.F. or <em>Premna integrifolia</em> L.)- root/stem bark</td>
</tr>
</tbody>
</table>
Resetting the Microbiome

The 6 Rasa Diet

Figure 1. The *thali* diet promotes gut bacterial diversity by delivering probiotics, prebiotics, and different classes of phytochemicals from fermented foods, *dai* and vegetables and spices, respectively. Indeed, *sambar*, a component of the *thali* diet suppressed chemically-induced colon carcinogenesis *in vivo* [67]. *Black and white peppercorns, cloves, cinnamon, mace (part of nutmeg), black and green cardamom pods, bay leaf, cumin, and coriander.*
We Are What We Eat & Drink

दीपो भक्षयते ध्वंतं कग्जलं च प्रसूयते ||
यदन्नं भक्षयेन्नित्यं जायते ताद्रशी प्रजा ||

dIpo bhakShayate dhvAntam kajjalam cha prasUyate |
yadannam bhakShayennityam jAyate tAdRishI prajA ||

Lamp eats darkness and produces [black] soot!
What food (quality) [one] eats daily, so will [one] produce.

All Diseases Begin in the Gut
Thank You