Functional Medicine - Osteopathy at its Best!

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Cleveland Clinic Center for Functional Medicine
Objectives

• Introduce Functional Medicine
• Introduce Center for Functional Med – Cleveland Clinic
• How OMT can and should play a role in our approach to chronic disease
• Case study
America’s Health Care Crisis
People with Chronic Conditions

<table>
<thead>
<tr>
<th>Year</th>
<th># of People with Chronic Conditions (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>118</td>
</tr>
<tr>
<td>2000</td>
<td>125</td>
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<tr>
<td>2005</td>
<td>133</td>
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<td>2010</td>
<td>141</td>
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<tr>
<td>2015</td>
<td>149</td>
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<tr>
<td>2020</td>
<td>157</td>
</tr>
<tr>
<td>2025</td>
<td>164</td>
</tr>
<tr>
<td>2030</td>
<td>171</td>
</tr>
</tbody>
</table>

Data: World Economic Forum 2011

$47\text{ trillion}

GDP of United States
$15\text{ trillion}

Germany
Brazil
France
Japan
China
• Increase in incidence of obesity and diabetes and cardiovascular disease

• Childhood obesity = 1000% increase in type 2 diabetes in children

• Increase in neurodegenerative, mood disorders, allergic, autoimmune/ inflammatory disorders, digestive disorders (GERD) and cancer

• Decrease in life expectancy of 2-5 years
The Problem???

Trying to use 20\textsuperscript{th} century ACUTE care diagnosis and treatment model in a 21\textsuperscript{st} century CHRONIC multi-systems disease epidemic
Curriculum Renewal

In August 2009, the Johns Hopkins University School of Medicine implemented a new curriculum, “Genes to Society” (GTS), aimed at reframing the context of health and illness more broadly, to encourage students to explore the biologic properties of a patient's health within a larger, integrated system including social, cultural, psychological, and environmental variables. This approach presents the patient's phenotype as the sum of internal (genes, molecules, cells, and organs) and external (environment, family, and society) factors within a defined system. Unique genotypic and societal factors bring individuality and variability to the student's attention. GTS rejects the phenotypic dichotomy of health and illness, preferring to view patients along a phenotypic continuum from "asymptomatic and latent" to "critically ill." GTS grew out of a perceived need to reformulate the student experience to meet the oncoming revolution in medicine that recognizes individuality from the genome to the environment. This article describes the five-year planning process that included the definition of objectives, development of the new curriculum, commission of a new education building, addition of enhancements in student life and faculty development, and creation of a vertical and horizontal structure, all of which culminated in the GTS curriculum. Critical ingredients in meeting the challenges of implementing GTS were leadership support, dialogue with faculty, broad engagement of the institutional community, avoidance of tunnel vision, and the use of pilot courses to test concepts and methods. GTS can be viewed as the foundation for the scientific and clinical career development of future physicians.

Future physicians will integrate individual evidence into a biologic system that extends from genes and the genome to the environment and society.
Functional medicine is a systems-based personalized healthcare approach that assesses and treats underlying causes of illness through individually tailored therapies to restore health and improve function.
Center for Functional Medicine
Cleveland Clinic

• Patient care – systems based model
• Research
• Medical Education
• Community and Population Health
50 million deaths EVERY year from Non-Communicable Diseases

$47 TRILLION spent over 20 years

$2 TRILLION lost productivity every year
Each individual diagnosis becomes a distinct entity unto itself. The patient's whole story never has a chance to be heard and understood in context.
Organ System Diagnosis

Signs and Symptoms

The Fundamental Organizing Systems and Core Clinical Imbalances
- Assimilation: Digestion, Absorption, Microbiota/GI, Respiration
- Defense and Repair: immune system, Inflammatory processes, Infection and microbiota
- Energy: Energy regulation, Mitochondrial function
- Biotransformation and Elimination: Toxicity, Detoxification
- Communication: Endocrine, Neurotransmitters, immune messengers, Cognition
- Transport: Cardiovascular, Lymphatic systems, Structural Integrity
- From subcellular membranes to the musculoskeletal system

Antecedents, Triggers, and Mediators
- Mental, Emotional, Spiritual Influences
- Genetic Predisposition
- Experiences, Attitudes, Beliefs
- Sleep & Relaxation
- Exercise/Movement
- Nutrition/Hydration
- Stress/Resilience
- Relationships/Networks
- Trauma
- Microorganisms
- Environmental Pollutants

Fx Med Focus
MATRIX

- Communication
- Assimilation
- Structural Integrity

- Defense Repair
- Biotransformation
- Energy
Structural Integrity

- Musculoskeletal Dysfunction
  - Myofascial
  - Bones
  - Cartilage
  - Tendons/Ligaments
- Subcellular Membrane
“We conclude that when the fluids of the body are stopped in the fascia, organs, and other parts of the system, stagnation, fermentation, heat and general confusion will follow....”

- AT Still 1828-1917
MYOFASCIAL PAIN

- Pathophysiology
- Nutrients play what role??
- Referred triggers (other illness/disease)
Sensitizing agents $\rightarrow$ ROS $\rightarrow$ cell damage $\rightarrow$ chronic symptom presentation $\rightarrow$ change in gene expression
Classical signs of infection:
- Calor – heat
- Dolor – pain
- Rubor – redness
- Tumor - swelling
Significant rise in proinflammatory cytokines IL-8 and TNF α but no significant changes in IL-4, IL-6, and IL-10 have been reported.


Medicine (Baltimore) 2016 Sep; 95(37): e4650. Published online 2016 Sep 16. doi: PMCID: PMC5402557

Circulating biomarkers in acute myofascial pain
A case–control study
Liza Grosman-Rimon, PhD, et al.
Chronic inflammation induces telomere dysfunction and accelerates aging in mice

Nature 2014

Our results show that chronic inflammation aggravates telomere dysfunction and cell senescence, decreases regenerative potential in multiple tissues and accelerates ageing of mice. Anti-inflammatory or antioxidant treatment, specifically COX-2 inhibition, rescued telomere dysfunction, cell senescence and tissue regenerative potential, indicating that chronic inflammation may accelerate ageing at least partially in a cell-autonomous manner via COX-2-dependent hyper-production of ROS.
I see ... So, your medicine fell down the sink by accident. And it was just your pain pills, not your blood pressure tablets.
Caloric restriction

Mitochondrial efficiency

High caloric intake

Mitochondrial dysfunction

Apoptosis

Adipocyte

Stem cells

Metabolic syndrome

Disease

Aging

Inner membrane
Electron transport chain
Malate-aspartate shuttle

Matrix
TCA cycle
\(\beta\)-oxidation
Heme synthesis
Vitamins play key roles of the Citric Acid Cycle

Four of the B vitamins are essential in the citric acid cycle:
1. Riboflavin → FAD
2. Niacin → NAD
3. Thiamin → TPP
4. Pantothenic acid → CoA

The B vitamins are essential in energy yielding metabolism by dehydrogenase enzyme:
- FAD → 2 mol ATP
- NAD → 3 mol ATP
Figure 9. Lipid peroxidation markers pre- and post-intervention with oral NADH and CoQ10.
VIT A, C, E and B-carotene LOW ➔
higher ROS
DIET
OMEGA 3/6

• Consensus from nutritional experts is that the omega-6 to omega-3 ratio should be no greater than 4:1, and ideally 1:1 for optimal health.

• If following the Standard American Diet (SAD), the ratio may be 25:1 or higher in favor of omega-6. This imbalance promotes inflammation, pain, and will compromise your ability to quickly recover from pain or injury.
Vitamin D also inhibits synthesis of IL-6 by monocytes, which is the primary stimulant of CRP production in the liver.
Irritable Bowel Syndrome/Abdominal Pain

- 25 y/o female
- IBS c/d, Abd pain LUQ, Fibromyalgia
- Labs from outside: CBC, CMP, TSH – neg
- GI: Linzess tried, colonoscopy/EGD negative
- Neuro consult: fibromyalgia Dxd, tender pt 16/18, tried Lyrica and Gabapentin
Initial Visit

**PE:** ttp18/18 pts, white spots in nails, tongue scalloped, beefy red, ttp LUQ, patellar hyperreflexia b/l, no organomegaly, no rash, skin color changes/trauma--nml exam otherwise

- **Labs Ordered:** GI microscopic culture and Eval, Nutritional status evaluated

- Treated one MTp on LUQ and rib 9-11 with myofascial release ➔ IMPROVED IN OFFICE
“To prevent a heart attack, take one aspirin every day. Take it out for a run, then take it to the gym, then take it for a bike ride...”
Nutrition/Health Coach

- Started on basic “clean eating plan” – eliminated added sugar, processed foods/drinks
- Deep breathing 10 mins daily
- Meditative walking as tolerated and 10 mins stretching as tolerated
- Sleep to continue with reg routine bedtime 10p-6a
- Journal for stress outlet
Follow up visit

- MfTp per pt request
- **Comprehensive Stool Cx:**
  - pancreatic elastase 177, Commensal bacteria overgrowth 18/22, **low**
  - SCFA, fecal sIgA elevated, low growth bifidobacter sp. by PCR cx
- **Nutritional eval (serum and urine):**
  - low B1, B12, folate, Zinc and several amino acids including glutamine, methionine and araginine (high need)
  
  MSQ 94  PROMIS 28% PH
Zinc Def

Selenium and Zinc Status in Chronic Myofascial Pain: Serum and Erythrocyte Concentrations and Food Intake

João Araújo Barros-Neto,1,* Adelmir Souza-Machado,2 Durval Campos Kraychete,3 Rosangela Passos de Jesus,4 Matheus Lopes Cortes,5 Michele dos Santos Lima
The relationship between serum trace elements, vitamin B12, folic acid and clinical parameters in patients with myofascial pain syndrome.


doi: 10.4103/0975-5950.154810
PMCID: PMC4405950
Trends in management of myofacial pain
Uma Shanker Pal, Lakshya Kumar,¹

Published online 2016 May 27. doi: 10.1186/s12903-016-0215-y
PMCID: PMC4884371
Oral manifestations in vitamin B_{12} deficiency patients with or without history of gastrectomy
Jihoon Kim
Amino Acid Deficiencies

Arginine
Methionine
Glycine
L-tryptophan

www.balancingbrainchemistry.co.uk
It is now recognized that a significant portion of the metabolites circulating in mammalian blood derives from the intestinal microbial community\cite{21-25} and the presence or absence of the gut microbiota influences the metabolic profile in regions distant from the gut such as the brain\cite{26}. Moreover, it releases factors that target specific neuronal systems involved in the gut-brain axis, generating neurotransmitters and neuromodulators as dopamine, noradrenaline, acetylcholine and gamma-aminobutyric acid (GABA)\cite{27-31}. Direct contact of certain probiotics (i.e., *Lactobacillus acidophilus*) with epithelial cells induce the expression of opioid and cannabinoid receptors in the gut and contribute to the modulation and restoration of the normal perception of visceral pain.


LOW SCFA

• Glutamine – promotes intestinal cell proliferation, → NFkB

• Probiotics
  • modulate the activity of many cells NKs, DCs, macrophages, epithelial cells and granulocytes, and Th1, Th2, Th17, Treg, Tc and B cells
  • Biotransformation, vitamin synthesis, peristalsis

• Prebiotics
“I’ve always been a high achiever, always striving for bigger, faster, greater...and now suddenly I’m expected to settle for lower blood pressure and less cholesterol?!"
<table>
<thead>
<tr>
<th>Vegetables</th>
<th>Fruits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artichokes</td>
<td>Tomatoes</td>
</tr>
<tr>
<td>Radishes</td>
<td>Apples</td>
</tr>
<tr>
<td>Carrots</td>
<td>Berries</td>
</tr>
<tr>
<td>Cucumbers</td>
<td>Bananas</td>
</tr>
<tr>
<td>Asparagus</td>
<td>Mango</td>
</tr>
<tr>
<td>Bell Peppers</td>
<td></td>
</tr>
<tr>
<td>Onions</td>
<td></td>
</tr>
<tr>
<td>Leeks</td>
<td></td>
</tr>
<tr>
<td>Jicama</td>
<td>Dark Chocolate</td>
</tr>
<tr>
<td>Beets</td>
<td>Coconut Flour</td>
</tr>
<tr>
<td>Yams</td>
<td>Flax Seeds</td>
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<tr>
<td>Garlic</td>
<td>Hemp Seeds</td>
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<tr>
<td>Daikon Radishes</td>
<td>Pumpkin Seeds</td>
</tr>
<tr>
<td>Dandelion Greens</td>
<td>Chia Seeds</td>
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<tr>
<td>Chicory Root</td>
<td>Legumes</td>
</tr>
<tr>
<td>Sweet Potatoes</td>
<td>Quinoa</td>
</tr>
<tr>
<td>Cabbage</td>
<td>Wild Rice</td>
</tr>
<tr>
<td></td>
<td>Ginger Root</td>
</tr>
</tbody>
</table>

Other Sources:
- Honey
- Dark Chocolate
- Coconut Flour
- Flax Seeds
- Hemp Seeds
- Pumpkin Seeds
- Chia Seeds
- Legumes
- Quinoa
- Wild Rice
- Ginger Root
Probiotics, Prebiotics and Immunomodulation of Gut Mucosal Defences: Homeostasis and Immunopathology

Holly Hardy, Jennifer Harris, Eleanor Lyon, Jane Beal, and Andrew D. Foey
Visit #3 (6 mths)

**MSQ 22** (119) **PROMIS: PH 87% (7.2%)**

Gi effects retest ordered, Nutra Eval reordered

BM- daily (dairy constipates me)

Belching and reflux improved “a lot with Creon”

Muscle pain overall better – off the daily aleve

No more LUQ pain

And BTW…Psych is weaning me off the mood stablizer
Viscerosomatic Reflex