

Functional Medicine Approach To Osteoporosis Prevention & Treatment

Elizabeth M. Board, MD



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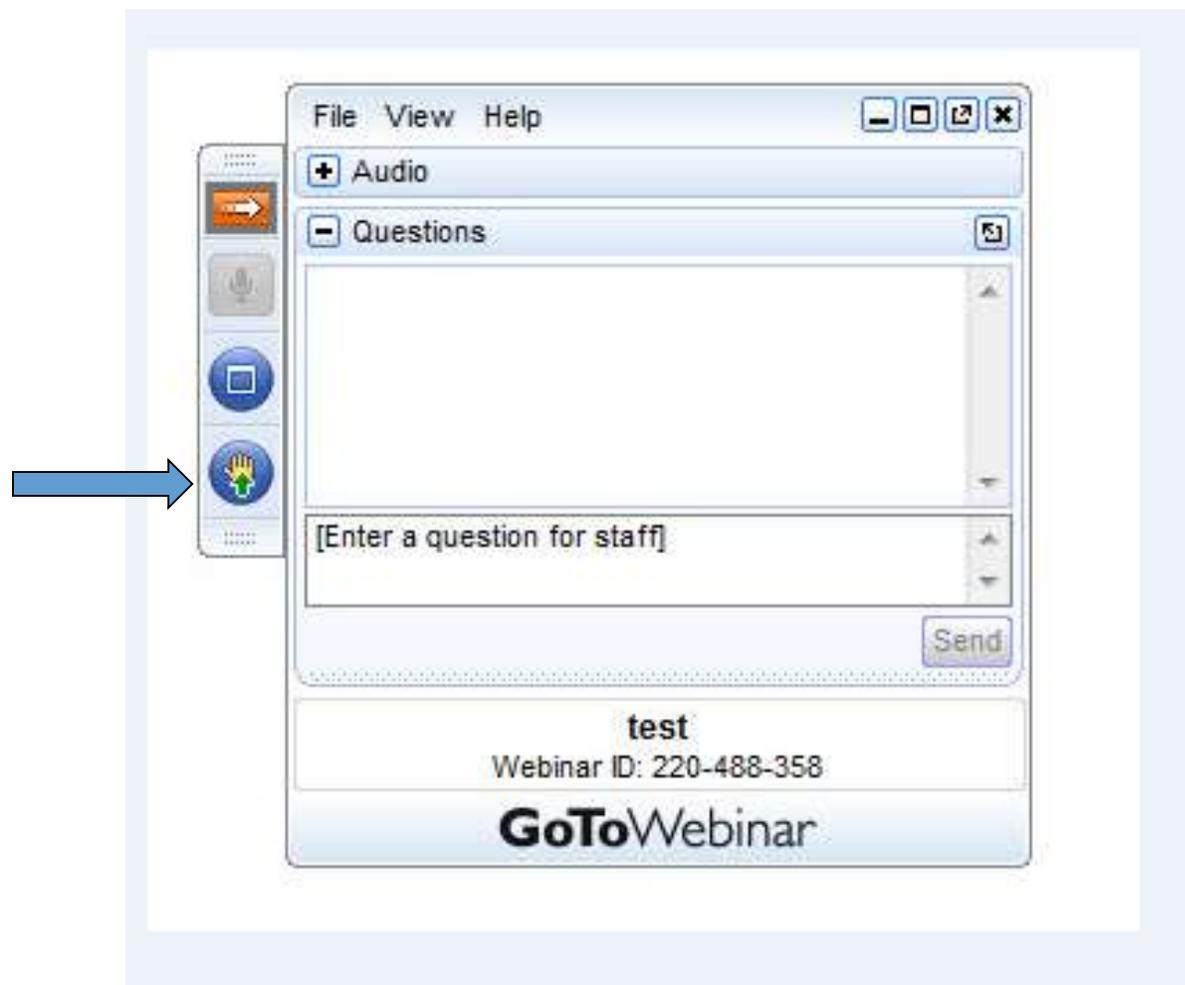
Elizabeth Board, MD, DABA, IFMCP

Founder of Atlanta Functional Medicine, Pain Physician, IFMCP



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.



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The screenshot shows the GENOVA DIAGNOSTICS website. At the top, there is a navigation bar with social media icons (Twitter, LinkedIn, YouTube, Facebook) and links for International, About Us, Contact Us, Search, myGDX, and US. Below the navigation bar is the GENOVA DIAGNOSTICS logo and a menu with HOME, CLINICIANS, and PATIENTS. A banner for a webinar is displayed, featuring a 3D model of a knee joint. The webinar is titled "Functional Medicine Approach to Osteoporosis Prevention and Treatment" and is scheduled for September 26, 2018, at 12 PM EDT. A button for "WEBINAR INFO & REGISTRATION" is present. Below the banner are three white boxes with blue borders, each containing an icon, a title, a description, and a button. The first box is "Getting Started" with a "NEW USERS" button. The second box is "Test Menu" with a "SEARCH TESTS" button. The third box is "myGDX Login" with a "LOGIN" button. At the bottom, there is a section for "Online Education" with a "LEARN NOW" button. Red circles highlight the "Getting Started", "myGDX Login", and "Online Education" sections.

Webinar – Featuring Elizabeth Board, MD LIVE GDX

Functional Medicine Approach to Osteoporosis Prevention and Treatment

September 26, 2018 — 12 PM EDT

[WEBINAR INFO & REGISTRATION >](#)

*Rebroadcast Available Thursday September 27, 2018 at 7 PM EDT

Getting Started

Simple account setup. Licensed healthcare practitioners may begin the process of opening a free account here.

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Test Menu

A comprehensive menu of our diagnostic tests, including test descriptions, specimen requirements and kit instructions.

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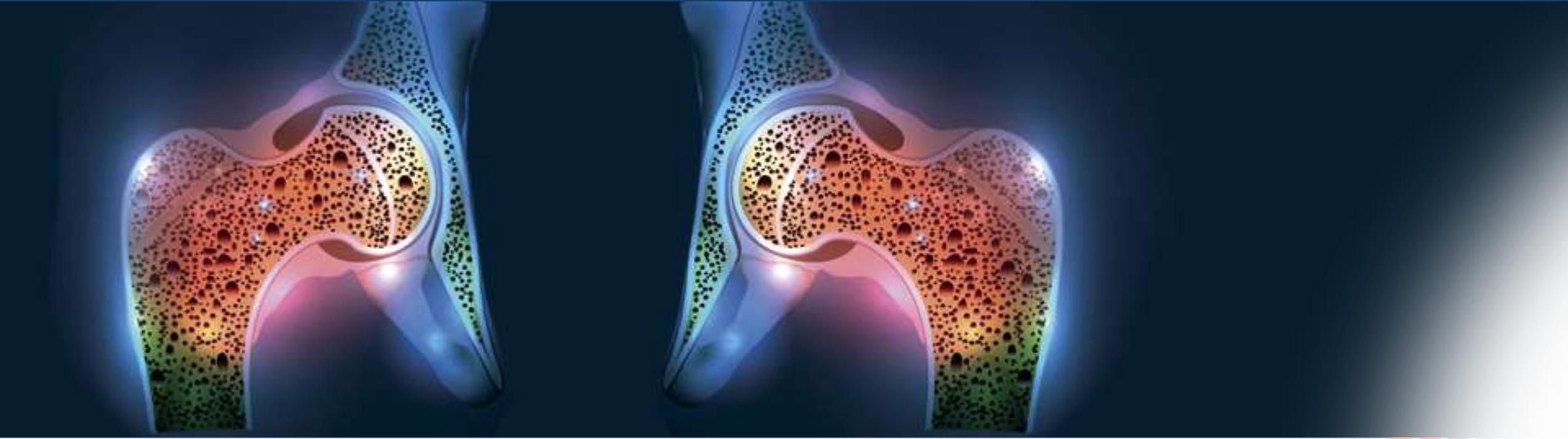
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Functional Medicine Approach To Osteoporosis Prevention & Treatment

Elizabeth M. Board, MD



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Objectives for This Presentation

- Review a rational approach to the prevention and treatment of osteoporosis
- Introduce functional lab testing that can identify causes and contributors to osteoporosis
- Explain how functional lab testing can provide a powerful educational platform that enhances patient comprehension and improves patient compliance

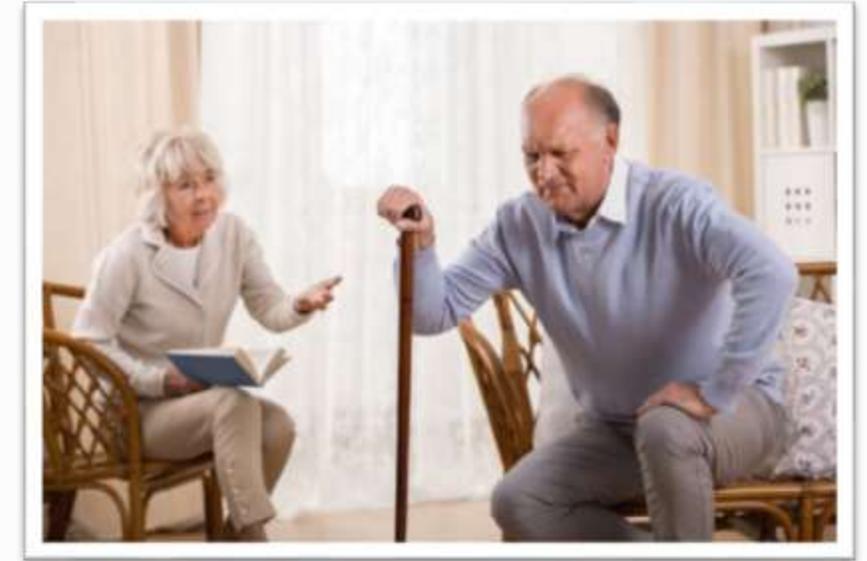
OBJECTIVE





Prevalence of the Problem

- By 2020, 12.3 million individuals in the United States aged >50 years are expected to have osteoporosis
- Osteoporotic fractures, particularly hip fractures, are associated with limitations in ambulation, chronic pain and disability, loss of independence, and decreased quality of life
- 21% to 30% of patients who experience a hip fracture ***die within 1 year***
- The prevalence of primary osteoporosis increases with age and differs by race/ethnicity
- With the aging of the US population, the potential preventable burden is likely to increase in future years

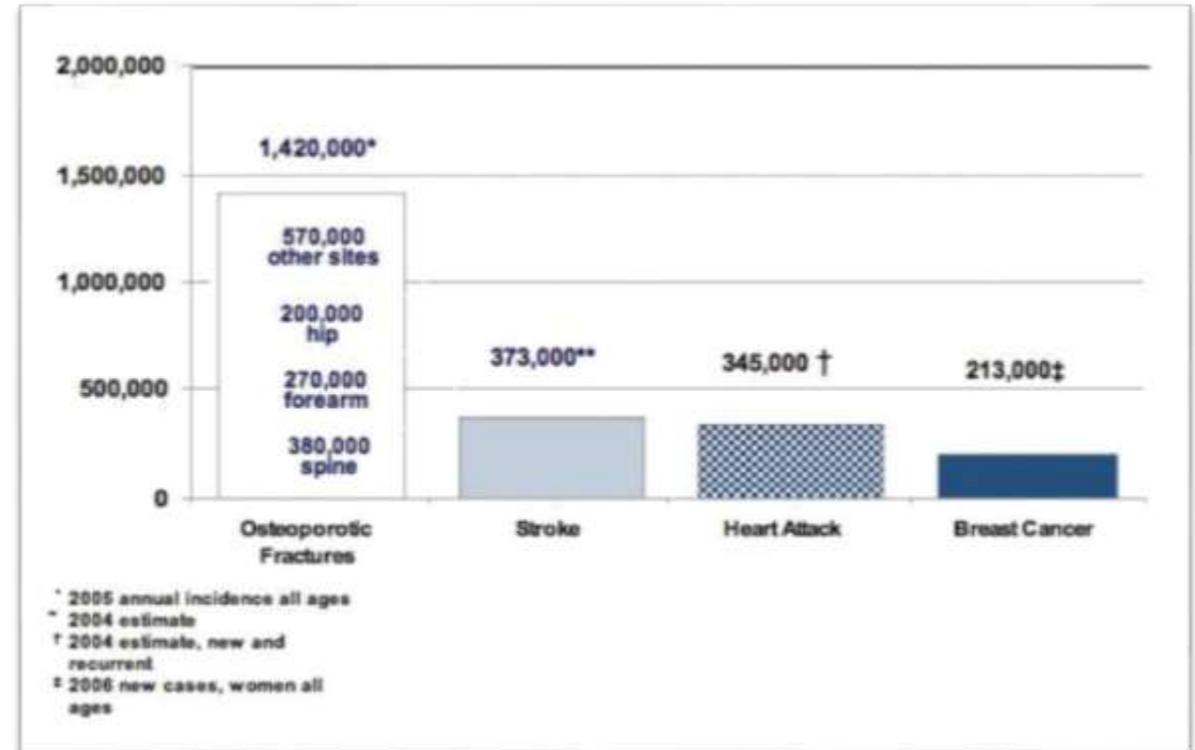




Impact of Osteoporosis

American Association Of Clinical Endocrinologists Medical Guidelines For Clinical Practice For The Diagnosis And Treatment Of Postmenopausal Osteoporosis: Executive Summary Of Recommendations

- Incidences of new diagnoses in U.S. women based on recent statistics (2004 to 2006)





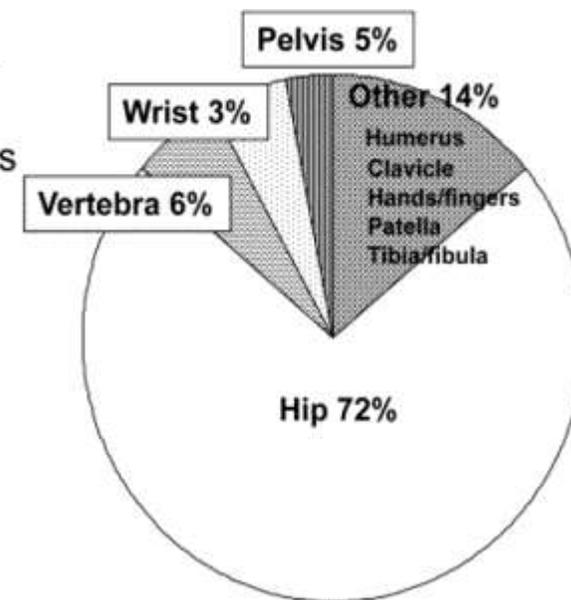
Osteoporosis Financial Impact

- Osteoporosis is defined as a “progressive systemic skeletal disease characterized by low bone mass and microarchitectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture.”
- In 2005 the estimated cost of osteoporosis was 17 billion
 - We expect this to increase as the population of those over 60 increases

Direct cost was \$16.9 billion in 2005

94% of cost was for nonvertebral sites

57% was spent on inpatient care
30% was spent on long-term care
13% was spent on outpatient care





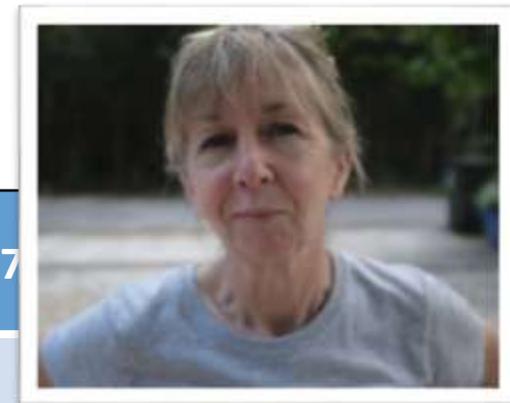
Case Study #1 M.P.

- 64 yo nulliparous, postmenopausal female presents with osteoporosis by DEXA
- White, 118 lbs, BMI <20 on diclofenac and migraine medications
- Began anti-inflammatory diet, multivitamin designed to build bone
- Anti-inflammatory medical food with turmeric
- Vitamin D3 and K2, increased omega-3 fatty acids
- Walk every day
- Stress reduction, breathing exercises
- Decrease diclofenac
- Began on estradiol and progesterone
- Sleep improved with progesterone and magnesium





Case Study #1 M.P.



T- score	12-2009	12-9-2010	1-5-2012	1-17-2013	* 2014	1- 2015	1- 2017
L1	-2.1	-2.7	-2.4	-2.2			
L2	-1.8	-2.2	-2.2	-2.1			
L3	-2.2	-1.8	-1.7	-1.6			
L4	-1.9	-2.3	-1.8	NA			
Neck L hip	-1.8	-1.4	-1.5	-1.8			
Neck R hip	?	-1.6	-1.9	-1.8			
AGE	64	65	67	68			

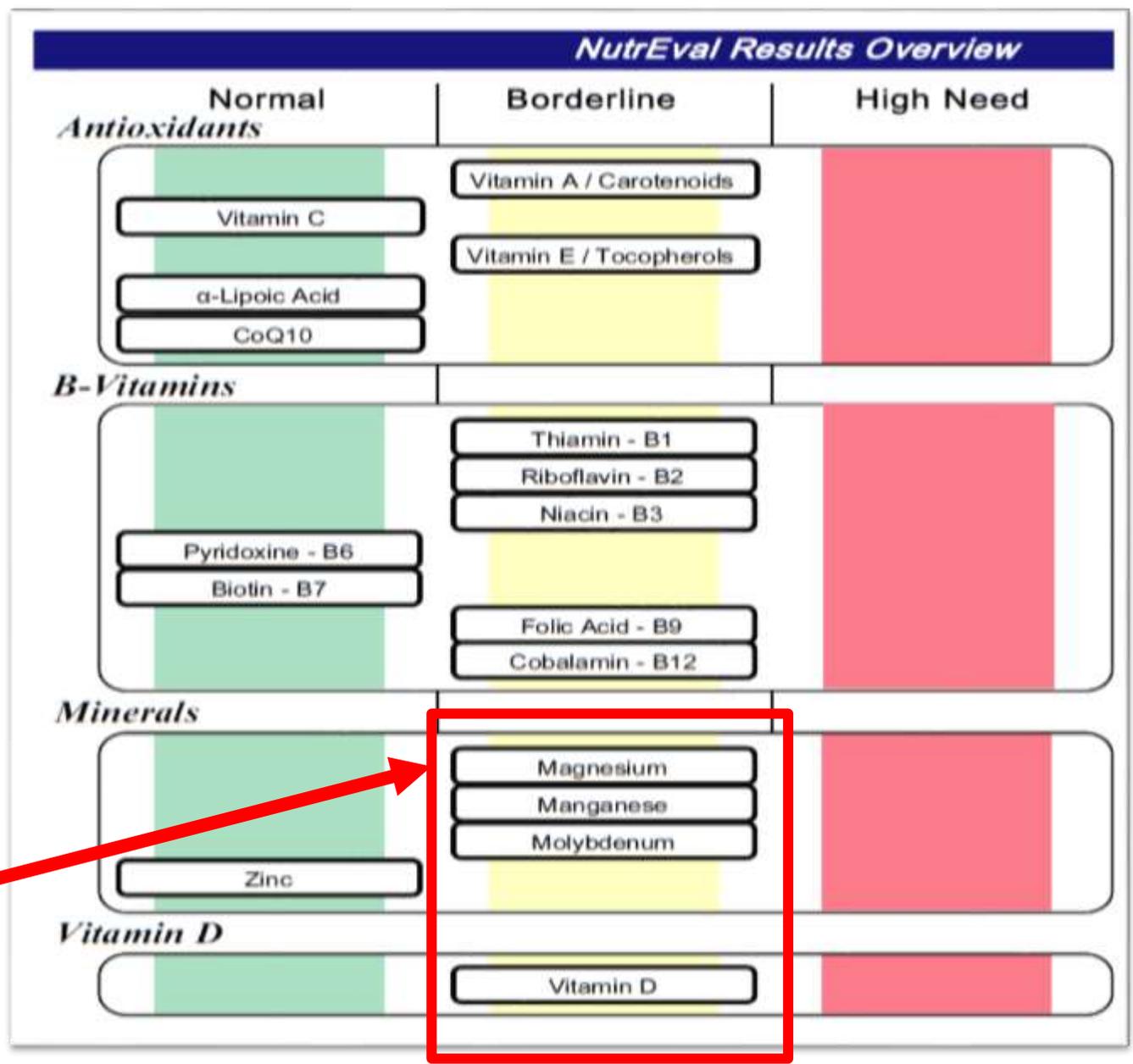
- 2014 had a cholecystectomy and was started on a PPI, stopped the bone building multivitamin supplements



Case Study #1 M.P.

2014

- She is taking Prilosec for nondysplastic Barrett's
 - She has recently undergone a Cholecystectomy
- Has lost 10 lbs, BMI 18.5

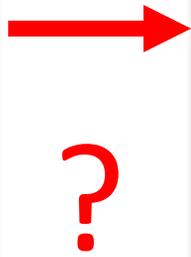




Case Study #1 M.P.

Malabsorption and Dysbiosis Markers			
Malabsorption Markers		Reference Range	
Indoleacetic Acid (IAA)	3.1	<= 4.2	
Phenylacetic Acid (PAA)	0.24	<= 0.12	
Bacterial Dysbiosis Markers			
Dihydroxyphenylpropionic Acid (DHPPA)	1.2	<= 5.3	
3-Hydroxyphenylacetic Acid	5.7	<= 8.1	
4-Hydroxyphenylacetic Acid	21	<= 29	
Benzolic Acid	0.10	<= 0.05	
Hippuric Acid	133	<= 603	
Yeast / Fungal Dysbiosis Markers			
Arabinose	79	<= 96	
Citramalic Acid	2.9	<= 5.8	
Tartaric Acid	26	<= 15	

Vitamin Markers			
		Reference Range	
α -Ketoadipic Acid	0.4	<= 1.7	
α -Ketoisovaleric Acid	0.41	<= 0.97	
α -Ketoisocaproic Acid	0.58	<= 0.89	
α -Keto- β -Methylvaleric Acid	1.6	<= 2.1	
Formiminoglutamic Acid (FIGlu)	0.4	<= 1.5	
Glutaric Acid	0.37	<= 0.51	
Isovalerylglycine	2.6	<= 3.7	
Methylmalonic Acid	1.6	<= 1.9	
Xanthurenic Acid	0.37	<= 0.96	
3-Hydroxypropionic Acid	6	5-22	
3-Hydroxyisovaleric Acid	12	<= 29	





Case Study #1 M.P.

Oxidative Stress Markers

Oxidative Stress Markers

Reference Range

Glutathione (whole blood)	1,172	>=669 micromol/L
Lipid Peroxides (urine)	4.1	<=10.0 micromol/g Creat.
8-OHdG (urine)	8	<=16 mcg/g Creat.
Coenzyme Q10, Ubiquinone (plasma)	0.73	0.43-1.49 mcg/mL

The Oxidative Stress reference ranges are based on an adult population

Vitamin D

Inside Range Outside Range Reference Range

25 - OH Vitamin D	49	50-100 ng/mL
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Elemental Markers (RBCs)

Nutrient Elements

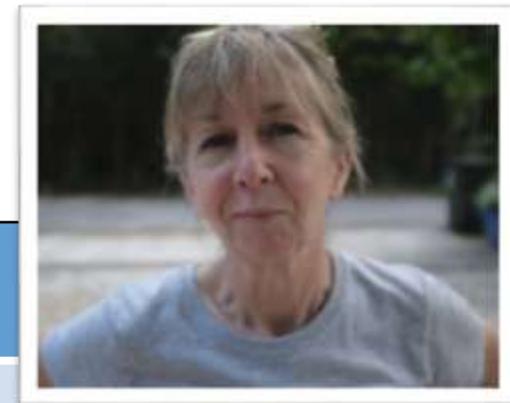
Element	Reference Range	Reference Range
Copper	0.705	0.466-0.721 mcg/g
Magnesium	49.0	30.1-56.5 mcg/g
Manganese	0.020	0.007-0.038 mcg/g
Potassium	3.171	2,220-3,626 mcg/g
Selenium	0.34	0.25-0.76 mcg/g
Zinc	11.1	7.8-13.1 mcg/g

Toxic Elements

Element	Reference Range	Reference Range
Lead	0.014	<= 0.048 mcg/g
Mercury	<dl	<= 0.0039 mcg/g
Antimony	0.000	<= 0.002 mcg/g
Arsenic	0.015	<= 0.071 mcg/g
Cadmium	0.001	<= 0.001 mcg/g
Tin	<dl	<= 0.0009 mcg/g



Case Study #1 M.P.



T- Score	12-2009	12-9-2010	1-5-2012	1-17-2013	* 2014	1- 2015	1- 2017
L1	-2.1	-2.7	-2.4	-2.2		-2.3	
L2	-1.8	-2.2	-2.2	-2.1		-2.2	
L3	-2.2	-1.8	-1.7	-1.6		-1.8	
L4	-1.9	-2.3	-1.8	NA		NA	
Neck L hip	-1.8	-1.4	-1.5	-1.8		-1.8	
Neck R hip	?	-1.6	-1.9	-1.8		-1.8	
AGE	64	65	67	68		70	

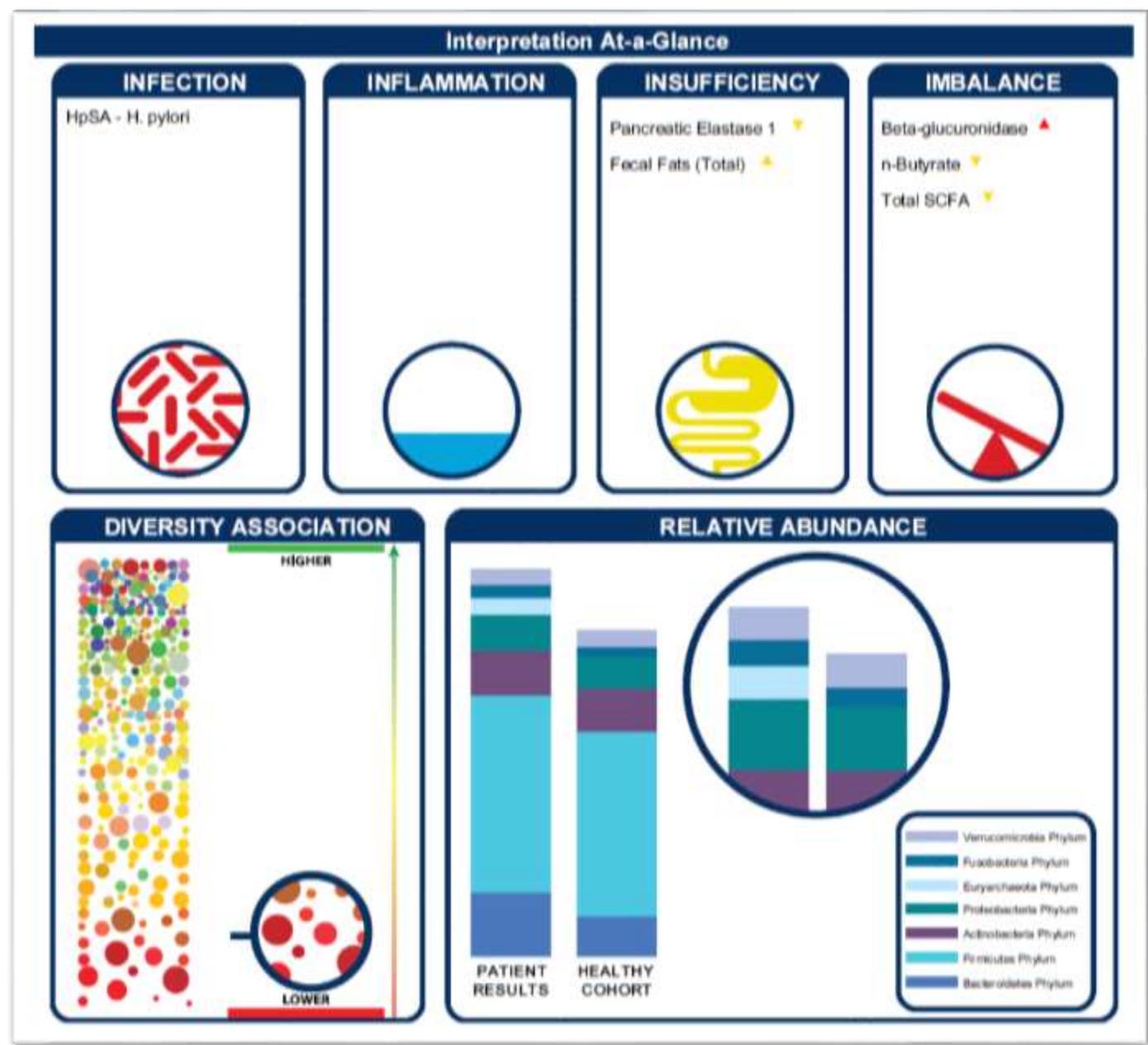
- 2014 had a cholecystectomy and was started on a PPI, late 2014 quickly reverted to an H2 blocker, back on same supplements



Case Study #1 M.P.

2015

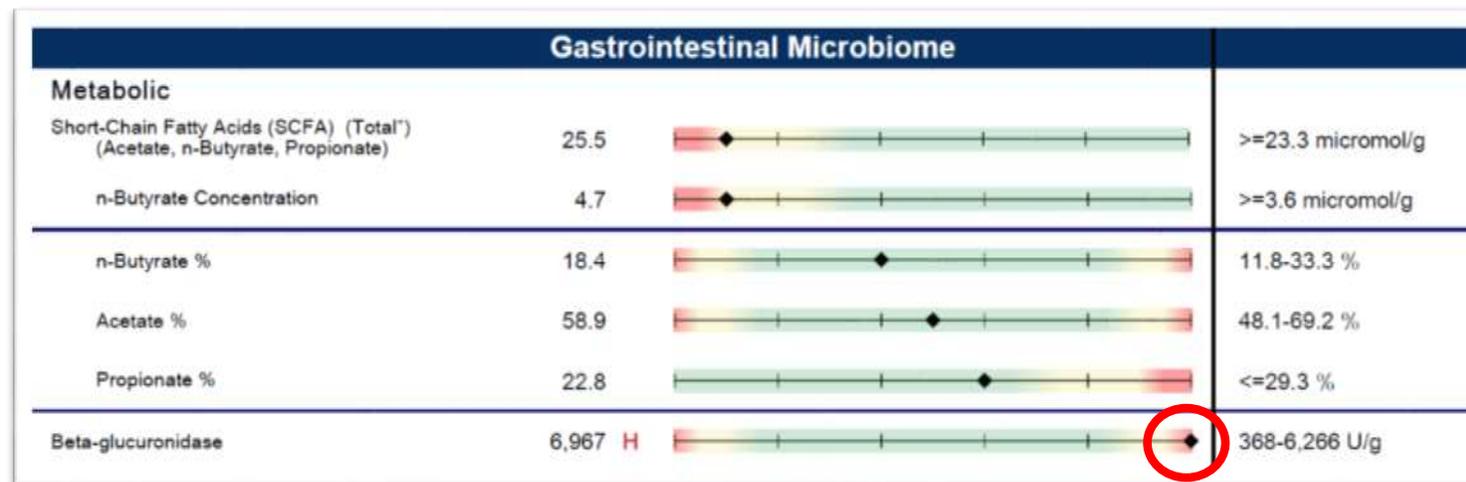
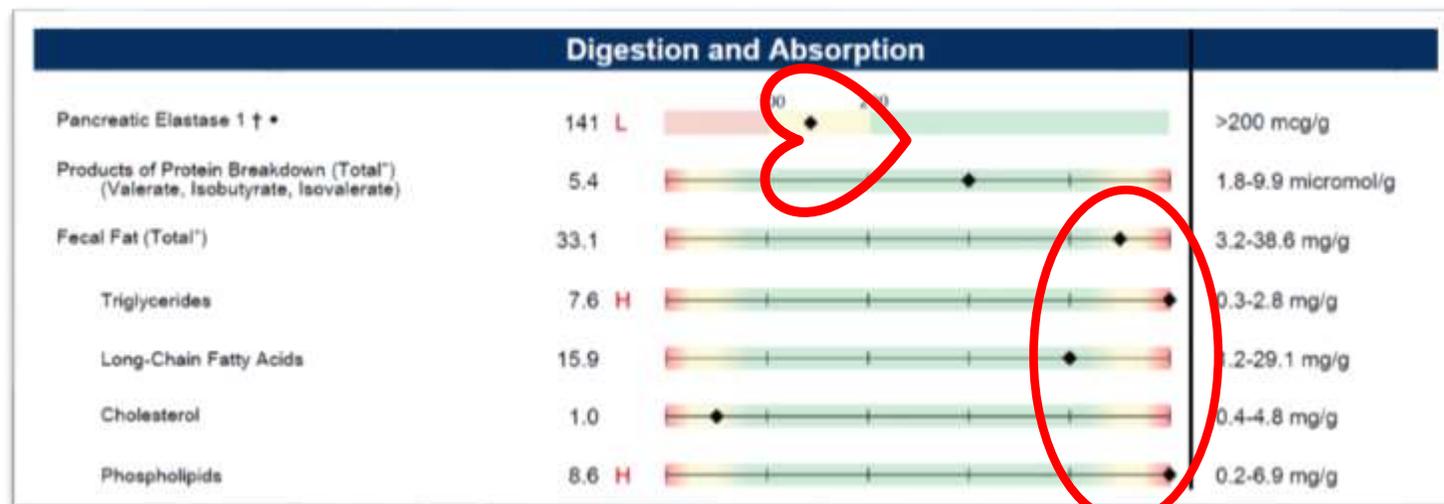
- Transitioned from Prilosec to Zantac
- Restarted her bone building multivitamin
- Still on BHRT





Case Study #1 M.P.

- Currently on Zantac
- Recent cholecystectomy
- Requiring more vitamin D
- On BHRT





Case Study #1 M.P.

	Result	Expected Value
Fecal Occult Blood♦	Negative	Negative
Consistency††	Formed/Normal	
HpSA - <i>H. pylori</i>	Positive	Negative
<i>Campylobacter</i> spp♦	Negative	Negative
<i>Clostridium difficile</i> ♦**	Negative	Negative
Shiga toxin <i>E. coli</i> ♦**	Negative	Negative

- Her gastroenterologist advised against treatment for *H. pylori*
- We added digestive enzymes, bile acids, Ca D Glucarate, Sacc boulardi, bone building MVI
- Added probiotics

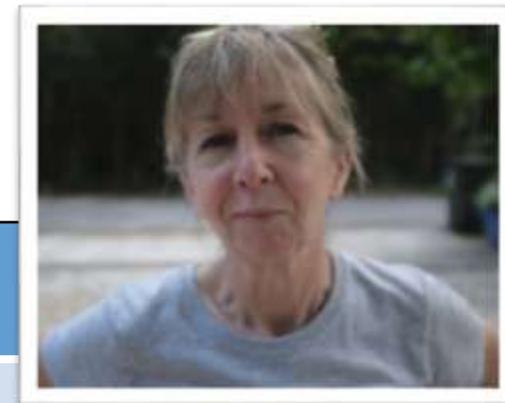
Mycology (Culture)

Candida tropicalis 1+ NP 





Case Study #1 M.P.



T- score	12-2009	12-9-2010	1-5-2012	1-17-2013	* 2014	1- 2015	1- 2017
L1	-2.1	-2.7	-2.4	-2.2		-2.3	-2.1
L2	-1.8	-2.2	-2.2	-2.1		-2.2	-2.1
L3	-2.2	-1.8	-1.7	-1.6		-1.8	-1.7
L4	-1.9	-2.3	-1.8	NA		NA	NA
Neck L hip	-1.8	-1.4	-1.5	-1.8		-1.8	-1.7
Neck R hip	?	-1.6	-1.9	-1.8		-1.8	-1.8
AGE	64	65	67	68		70	72

- 2014 had a cholecystectomy and was started on a PPI, quickly reverted to an H2 blocker



Gut Absorption & Digestion

- PPIs
- Hydrochloric acid deficiency
- Acute pancreatitis
- Cholestasis
- Malabsorption
- GI infections
- Celiac disease
- SIBO

Use of proton pump inhibitors is associated with fractures in young adults: a population-based study

RESULTS: We identified 124,799 cases and 605,643 controls. The adjusted odds ratio for the **risk of fracture** associated with PPI exposure was 1.13 (95% CI 0.92 to 1.39) among children aged < 18 years old and 1.39 (95% CI 1.26 to 1.53) among young adults aged 18-29 years old. In young adults but not children **we observed a dose-response effect with increased total exposure to PPIs** (p for trend <0.001).



Gut Absorption & Digestion

Reduced Bone Mineral Density in Children with Screening-detected Celiac Disease

RESULTS: At diagnosis, screening-detected celiac disease children as compared to controls had a mean -0,03 g/cm reduced BMD of both total body and spine ($p = 0.009$ and $p = 0.005$ respectively), a mean -11.4 nmol/L lower level of 25(OH) vitamin D3 ($p < 0.001$) and a mean +1.0 pmol/L higher PTH level ($p < 0.001$). Systemic levels of the cytokines IL-1 β , IL-6, IL-8, IL-10, IL12p70, IL13, and TNF α were all increased in screening-detected celiac disease as compared to controls ($p < 0.001$). **No difference in BMD, 25(OH) vitamin D3, PTH and cytokine levels were detected in children on a gluten-free diet compared to controls.**



Gut Absorption & Digestion

Physiologic, pathophysiologic, and pharmacologic regulation of gastric acid secretion

RECENT FINDINGS: Gastric acid kills microorganisms, assists digestion, and **facilitates absorption of iron, calcium, and vitamin B12**. The main stimulants of acid secretion are the hormone gastrin, released from antral G cells; paracrine agent histamine, released from oxyntic enterochromaffin-like cells; and neuropeptide acetylcholine, released from antral and oxyntic intramural neurons. Gastrin is also a trophic hormone that participates in carcinogenesis. *Helicobacter pylori* may increase or decrease acid secretion depending upon the acuity and predominant anatomic focus of infection; most patients manifest hypochlorhydria. Although generally considered well tolerated, **concerns have been raised regarding associations between PPI use and dementia, kidney disease, myocardial infarction, pneumonia, osteoporosis, dysbiosis, small bowel injury, micronutrient deficiency, and fundic gland polyps.**



Gut Absorption & Digestion

Relationship between Helicobacter pylori infection and bone mineral density: a retrospective cross-sectional study

BACKGROUND: Helicobacter pylori (H. pylori) infection can induce individual inflammatory and immune reactions which associated with extra-digestive disorders. Our aim is to investigate the association between H. pylori infection and bone mineral density.

METHODS: This retrospective cross-sectional study was performed by using the data from the health examination database in a medical center of southern Taiwan in 2013. We investigated the relationship between sex, age, body mass index (BMI), waist circumference, lipid profile, H. pylori infection, the findings of upper gastrointestinal endoscopy and bone mineral density (BMD). Because of nonrandomized assignment and strong confounding effect of age on BMD, the 1:1 propensity score match was applied for age adjustment. The simple and multiple stepwise logistic regression analysis were performed to assess the risk factors of decreased BMD in these well-balanced pairs of participants.

RESULTS: Of the 867 subjects in final analysis with the mean age of 55.9 ± 11.3 years, 381 (43.9%) subjects had H. pylori infection, and 556 (64.1%) subjects had decreased BMD. In decreased BMD group, the portion of woman was higher than a normal BMD group (37.2% versus 29.6%, $P = 0.023$), the age was significantly older (59.4 ± 9.8 versus 49.8 ± 11.3 , $p < 0.001$) and BMI was significantly lower (24.7 ± 3.5 versus 25.4 ± 3.7 , $p = 0.006$) than the normal BMD group. The prevalence of H. pylori infection was 39.9% and 46.2% in the normal BMD group and the decreased BMD group respectively ($P = 0.071$). The multivariate analysis which was used for these possible risk factors showed that only advanced age (OR 1.09, 95% CI 1.08-1.11, $P < 0.001$), and low BMI (OR 0.91, 95% CI 0.87-0.95, $P < 0.001$) were independently significantly associated with decreased BMD in this nonrandomized study. In the propensity score-matched participants, the multiple stepwise logistic regression analysis revealed H. pylori infection (OR 1.62, 95% CI 1.12-2.35, $P = 0.011$) and low BMI (OR 0.92, 95% CI 0.87-0.97, $P = 0.001$) were independently significantly associated with decreased BMD.

CONCLUSION: H. pylori infection and low BMI were independently significantly associated with decreased BMD in selected propensity score-matched populations after age adjustment.



Case Study #2 L.B.



- CC: hypothyroidism, natural pain relief for lumbar back pain, unable to lose weight, constipation, insomnia, recently post-menopausal, Tamoxifen for Breast cancer 18mo ago
- Fam Hx:
 - Mother: osteoarthritis, hypothyroid, obesity, hypertension
 - Maternal aunt: GERD, obesity, HTN, hypothyroidism, IBS
 - Father: schizophrenia
 - Maternal grandmother: breast cancer
- Timeline:
 - Born in Georgia
 - 4: Allergy to kale and mustard greens
 - 12: Menarche
 - 20s-30s: smoker
 - 39: Dieting, lost 50 lbs eventually gained it back
 - 40: Miscarriage. Otherwise nulliparous.
 - 49: Dieting, lost 50 lbs but gained it back
 - 42: Hysterectomy (ovaries retained)
 - 53: Fall without fracture, multiple close family members died resulting in STRESS
 - 54: Breast cancer diagnosis
 - 55: Lumpectomy, tamoxifen, DEXA found to be “normal”
 - 55-56: Increasing lumbar back pain, scar pain, cannot exercise
 - 56: “Post Menopausal” based on hormones 6 months ago



Case Study #2 L.B.



- **PRIOR LABS:** Early 2017: low WBC; normal liver enzymes; TSH was 3.3 in 2003, 4.3 in 2005. Bone density scan in 2015 was normal. High B12; ALP 40
- **Current LIFESTYLE:** Poor sleep. Can't exercise due to back pain. Non GMO, organic, no soy, no gluten, no foods in mustard family, Paleo in 2015, began ketogenic 9 mo ago losing 50 pounds. Recent stress with deaths of friends/family. Friend and spouse very supportive
- **July 2017:** hsCRP: 5.7, MTHFR: compound heterozygote, ESR: 4, ANA (-), 25 OH VitD: 47, coQ10 2.46, midday cortisol: 16.3, HbA1C: 5.4, FFA: elevated, ALP: 33, TSH:0.97, free T4: 1.37, freeT3: 2.2, reverse T3: 19
- **Causes of Decreased ALK PHOS:**
 - Deficiency of Zn, Vit C, B6, B9, B12, Mag, Phos; Hypochlorhydria, Hypothyroidism, Celiac
- Now post menopausal with h/o breast cancer
- Recent 50 lb weight loss as she changed to ketogenic diet
- Decreased exercise
- DEXA from 2015 “normal bone density” Rec: calcium and vitamin D



DEXA 2017

Height / Weight: 53.0 in. 164.0 lbs. Measured: 8/22/2017 10:33:12 AM (13.80)
 Sex / Ethnic: Female White Analyzed: 8/22/2017 10:33:12 AM (13.80)

DEXA AP Spine L1-L2 (BMD)

Region	BMD (g/cm ³)	Young-Adult T-score	Age-Matched Z-score
L1	0.989	-1.2	-0.6
L2	0.964	-2.0	-1.3
L3	1.081	-1.0	-0.4
L4	1.376	1.5	2.1
L1-L2	0.976	-1.6	-1.0

Matched for Age, Weight (Between 25-100 kg), Ethnic (USA (Cauc)) (Ages 20-40) AP Spine Reference Population (n=112)
 Statistically 80% of repeat scans fall within 1SD (± 0.020 g/cm³) for AP Spine L1-L2

DEXA Left Femur Total (BMD)

Region	BMD (g/cm ³)	Young-Adult T-score	Age-Matched Z-score
Neck	0.935	-0.4	-0.3
Total	0.923	-0.1	0.2

Matched for Age, Weight (Between 25-100 kg), Ethnic (USA (Cauc)) (Ages 20-40) Femur Reference Population (n=112)
 Statistically 80% of repeat scans fall within 1SD (± 0.012 g/cm³) for Left Femur

DEXA Right Femur Total (BMD)

Region	BMD (g/cm ³)	Young-Adult T-score	Age-Matched Z-score
Neck	0.966	-0.1	0.0
Total	0.993	-0.1	0.4

Matched for Age, Weight (Between 25-100 kg), Ethnic (USA (Cauc)) (Ages 20-40) Femur Reference Population (n=112)
 Statistically 80% of repeat scans fall within 1SD (± 0.012 g/cm³) for Right Femur Total

Handwritten note in red circle: osteopenia at osteoporosis level

Height / Weight: 53.0 in. 164.0 lbs. Measured: 8/22/2017 10:27:35 AM (13.80)
 Sex / Ethnic: Female White Analyzed: 8/22/2017 10:33:12 AM (13.80)

Trend: L1-L2 (BMD)

Measured Date	Age (years)	BMD (g/cm ³)	Previous (%)	Change vs Baseline (%)
8/22/2017	56.7	0.976	-17.1*	-17.1*
8/21/2015	54.7	1.177	-	Baseline

Statistically 80% of repeat scans fall within 1SD (± 0.020 g/cm³) for AP Spine L1-L2

Trend: Total (BMD)

Measured Date	Age (years)	BMD (g/cm ³)	Previous (%)	Change vs Baseline (%)
8/22/2017	56.7	0.989	-13.7*	-13.7*
8/21/2015	54.7	1.173	-	Baseline

Statistically 80% of repeat scans fall within 1SD (± 0.012 g/cm³) for Left Femur Total

Trend: Total (BMD)

Measured Date	Age (years)	BMD (g/cm ³)	Previous (%)	Change vs Baseline (%)
8/22/2017	56.7	0.993	-14.6*	-14.6*
8/21/2015	54.7	1.165	-	Baseline

Statistically 80% of repeat scans fall within 1SD (± 0.012 g/cm³) for Right Femur Total

* Indicates significant change based on 95% confidence interval



Case Study #2 L.B.



Treatment Plan in 2015:

- “Calcium and Vitamin D”

Treatment Plan in 2017:

- “Oscal and Vit D”
- Ingredients: Calcium Carbonate, Corn Syrup Solids , Contains Less Than 2% of Talc, Corn Starch, Sodium Starch Glycolate , Polysorbate 80, Polyvinyl Alcohol, Polyethylene Glycol 3350, Titanium Dioxide, Yellow 5 Lake, Blue 1 Lake, Calcium Stearate, Methylparaben and Propylparaben (Preservative), Gelatin, Sucrose, Cholecalciferol (Vitamin D3), Di-Alpha Tocopherol
- 500mg Calcium carbonate and 200IU of Vitamin D3



Case Study #2 L.B.



Treatment Questions and Considerations:

- Her sleep was improved with magnesium and resolution of pain following the use of low dose naltrexone. So now she plans to begin an increase in exercise but what kind?
- How much did not being able to exercise impact her bone loss?
- On a ketogenic diet, can she be missing key ingredients necessary for bone growth?
- Is her high protein diet resulting in too much acid?
- Is her digestion and absorption adequate especially with a low alkaline phosphatase? Which minerals might she be missing?
- Are her low free T3 and mildly elevated reverse T3 impacting her decreasing bone density?
- Can her hormones be further optimized safely, or is it necessary in order to build bone?



Right Raw Materials:

Vitamin D, Calcium, or Combined Supplementation for the Primary Prevention of Fractures in Community-Dwelling Adults: Evidence Report and Systematic Review for the US Preventive Services Task Force

OBJECTIVE: To update the evidence for benefits and harms of vitamin D, calcium, or combined supplementation for the primary prevention of fractures in community-dwelling adults to inform the US Preventive Services Task Force.

DATA SOURCES: PubMed, EMBASE, Cochrane Library, and trial registries through March 21, 2017; references; and experts. Surveillance continued through February 28, 2018.

STUDY SELECTION: English-language randomized clinical trials (RCTs) or observational studies of supplementation with vitamin D, calcium, or both among adult populations; studies of populations that were institutionalized or had known vitamin D deficiency, osteoporosis, or prior fracture were excluded.

DATA EXTRACTION AND SYNTHESIS: Dual, independent review of titles/abstracts and full-text articles and study quality rating using predefined criteria. Random-effects meta-analysis used when at least 3 similar studies were available.

MAIN OUTCOMES AND MEASURES: Incident fracture, mortality, kidney stones, cardiovascular events, and cancer.

RESULTS: Eleven RCTs (N = 51 419) in adults 50 years and older conducted over 2 to 7 years were included. Compared with placebo, supplementation with vitamin D decreased total fracture incidence (1 RCT [n = 2686]; absolute risk difference [ARD], -2.26% [95% CI, -4.53% to 0.00%]) but had no significant association with hip fracture (3 RCTs [n = 5496]; pooled ARD, -0.01% [95% CI, -0.80% to 0.78%]). Supplementation using vitamin D with calcium had no effect on total fracture incidence (1 RCT [n = 36 282]; ARD, -0.35% [95% CI, -1.02% to 0.31%]) or hip fracture incidence (2 RCTs [n = 36 727]; ARD from the larger trial, -0.14% [95% CI, -0.34% to 0.07%]). The evidence for calcium alone was limited, with only 2 studies (n = 339 total) and very imprecise results. Supplementation with vitamin D alone or with calcium had no significant effect on all-cause mortality or incident cardiovascular disease; ARDs ranged from -1.93% to 1.79%, with CIs consistent with no significant differences. Supplementation using vitamin D with calcium was associated with an increased incidence of kidney stones (3 RCTs [n = 39 213]; pooled ARD, 0.33% [95% CI, 0.06% to 0.60%]), but supplementation with calcium alone was not associated with an increased risk (3 RCTs [n = 1259]; pooled ARD, 0.00% [95% CI, -0.87% to 0.87%]). Supplementation with vitamin D and calcium was not associated with an increase in cancer incidence (3 RCTs [n = 39 213]; pooled ARD, -1.48% [95% CI, -3.32% to 0.35%]).

CONCLUSION AND RELEVANCE: Vitamin D supplementation alone or with calcium was not associated with reduced fracture incidence among community-dwelling adults without known vitamin D deficiency, osteoporosis, or prior fracture. Vitamin D with calcium was associated with an increase in the incidence of kidney stones.



All The Right Raw Materials:

Phytonutrients

Calcium

Phosphorus

Magnesium

Vitamin K

Vitamin A

Vitamin C

Vitamin D

Vitamin B:

- B2

- B6

- B9

- B12

Boron

Manganese

Zinc

Potassium

Copper

Silica

Selenium

Fe

Amino Acids

Omega 3 FA





Right Raw Materials

Luteolin attenuates glucocorticoid-induced osteoporosis by regulating ERK/Lrp-5/GSK-3 β signaling pathway in vivo and in vitro

ABSTRACT: Glucocorticoid-induced osteoporosis (GIO) is a secondary osteoporosis with extensive use of glucocorticoids (GCs). GCs can increase bone fragility and fracture via inhibiting osteoblastic proliferation and differentiation. Luteolin (LUT), a kind of plant flavonoid, has been reported to exhibit the antioxidant activity, but the effects of LUT on GIO still remain unclear. This study aimed to investigate the effects of LUT on GIO both in vivo and in vitro and elaborate the potential molecular mechanisms. LUT increased the superoxide dismutase activity, glutathione level and decreased reactive oxygen species (ROS) level and lactate dehydrogenase release in GIO. Meanwhile, LUT decreased caspase-3, caspase-9, and Bax protein expressions and increased Bcl-2 protein expression in GIO. LUT increased the ratio of osteoprotegerin (OPG)/receptor activator of nuclear factor- κ B Ligand (RANKL) messenger RNA (mRNA) expression and mRNA expression levels of osteogenic markers, including runt-related transcription factor 2, osterix, collagen type I, and osteocalcin. LUT also enhanced the extracellular signal-regulated kinases (ERK) phosphorylation, glycogen synthase kinase 3 β (GSK-3 β) phosphorylation, mRNA expression levels of lipoprotein-receptor-related protein 5 (Lrp-5) and β -catenin. Further study revealed that Lrp-5 small interfering RNA (siRNA) and ERK-siRNA reduced the effects of LUT on GSK-3 β phosphorylation, alkaline phosphatase (ALP) activity and the ratio of OPG/RANKL mRNA expression. Moreover, ERK-siRNA decreased Lrp-5 mRNA expression in vitro. These results indicated **that LUT promoted proliferation by attenuating oxidative stress and promoted osteoblastic differentiation** by regulating the ERK/Lrp-5/GSK-3 β pathway in GIO.





Right Raw Materials

Calcium:

- Calcium carbonate not well absorbed unless acid present
- Chelated calcium like calcium citrate and calcium malate
- Beware of sources that may contain lead (dolomite, oyster shell and bone meal)
- Daily dose 1000 mg

Vitamin D3:

- Use the active form
- Dose varies depending on genetics and BMI
- Monitor levels every 3 months – 6 months

B Vitamins: Homocysteine metabolism, all B's but especially, B2, B6, B12

Magnesium:

- 60% is stored in bone
- Supports production of hydroxyapatite and bone marrow stromal cells as well as 1,25(OH)₂D vitamin synthesis
- Deficiency via hypocalcemia elevates parathyroid hormone synthesis and subsequently osteoclast activity
- Osteoblastic number and activity declines during magnesium deficiency and leads to decreased trabecular volume and alteration of bone microarchitecture in a way similar to osteomalacia
- Daily dose 320-420 mg
- Hypermagnesemia (e.g. chronic renal failure) disturbs calcium/magnesium ratio, which may lead to a defect in mineralization and osteoblasts differentiation



Right Raw Materials

Vitamin K:

- K1 is found in leafy greens → K2 created by microbiota
- K2 activates osteocalcin and attracts calcium to be anchored into hydroxyapatite crystals that form bone
- Activates matrix Gla protein keeps calcium out of arteries
- MK-4: 10-45 mg and MK-7: 90-200 mcg longer acting
- Decreased dosages if on blood thinners

Boron:

- Stimulates bone growth & bone metabolism
- Boron activates 1,25(OH)₂D₃ production & increases bone mineralization especially for trabecular bone microarchitecture and cortical bone strength
- Daily dose to support bone health is 3 mg





Right Raw Materials

Copper:

- Necessary for bone growth regulation and skeletal development by inducing lysine crosslinks in collagen and elastin
- Limits osteoclastic activation by free radicals and decreases osteoclastic bone resorption directly
- Dose for bone health 0.9 mg/day

Iron:

- Stimulates synthesis of bone matrix via lysyl hydroxylase and activates 25-hydroxycholecalciferol hydroxylase to support mineralization of bone matrix through vitamin D
- In excess, ferric ion activates osteoclastic differentiation
- Daily dose varies

Manganese:

- Positively modulates RANKL/OPG ratio in the process of bone formation, determining thickness of trabecular bone area and increasing trabecular number
- Daily dose for bone health is 1.8 – 2.3 mg



Right Raw Materials

Selenium:

- Restores antioxidant capacity in bone cells and inhibits NF- κ B – RANKL axis and osteoclast differentiation. In high doses, selenium induces apoptosis of mature osteoclasts
- Dose is at least 55 μ g/day

Zinc:

- Positively influences the strength, flexibility and architecture of bone
- It increases osteoblastic activity and promotes synthesis of collagen while inhibiting osteoclastic bone resorption
- Additional benefit for osteoblasts that have been exposed toxic elements, such as lead or cadmium and excessive alcohol
- 15 mg is necessary to increase bone density balanced with 1 mg copper daily



Right Raw Materials

Strontium ranelate as a possible disease-modifying osteoarthritis drug: a systematic review

ABSTRACT: Considering that osteoarthritis (OA) is the most prevalent joint disease worldwide, multiple pharmacological treatments have been proposed to alter the articular structure with potential benefit in the progression of the disease. The so-called disease-modifying OA drugs have been frequently investigated but conclusive findings are rare. **Strontium ranelate (SrRan) is a drug usually prescribed to treat osteoporosis, with proven effects in decreasing the risk of fractures** and possible effect in reducing the progression of OA. The objective of this review was to demonstrate the current panorama of knowledge on the use of SrRan in clinical and experimental models, clarifying its mechanisms of action and describing possible anti-nociceptive and anti-inflammatory effects. The systematic review was based on the PRISMA statement and included articles that are indexed in scientific databases. Fifteen studies were included: seven pre-clinical and eight clinical studies. Despite the limited number of studies, the results suggest **a positive effect of SrRan in patients with OA, through changes in functional capacity and reduction of progression of morphological parameters and joint degradation**, with moderate quality of evidence for those clinical outcomes. Novel studies are necessary to elucidate the molecular targets of SrRan, focusing on anti-inflammatory effects and histological changes promoted by SrRan, which seemed to reduce the progression of OA in the experimental and clinical studies.



Right Raw Materials: OMEGA 3 FA

A New Insight to Bone Turnover: Role of ω -3 Polyunsaturated Fatty Acids

“In conclusion, strong evidences featured in the scientific literature available to date support the benefits of ω -3 fatty acids in bone health. Several mechanisms have been proposed (affecting bone formation, bone resorption, serum calcium and vitamin D, oxidative stress, and inflammatory mediators). However, neither the exact benefit nor the exact mechanism of action of essential fatty acids has been determined yet.”





A Functional Approach Treatment Plan

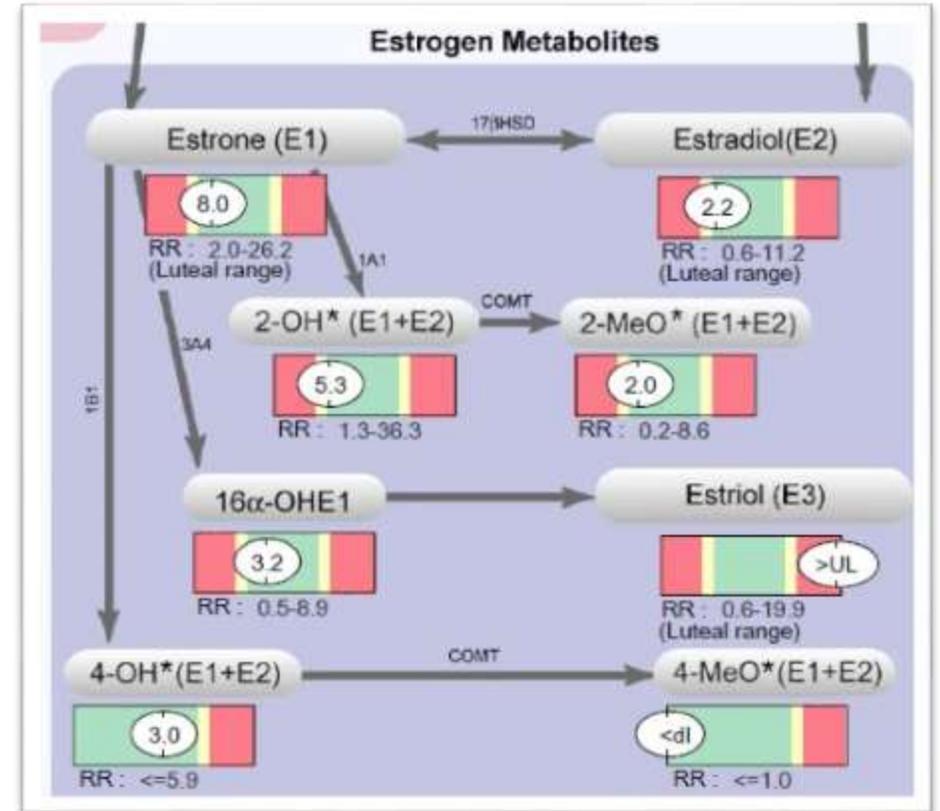
- Gut: digestion and absorption
- Right raw materials





Case Study #3 F.D.

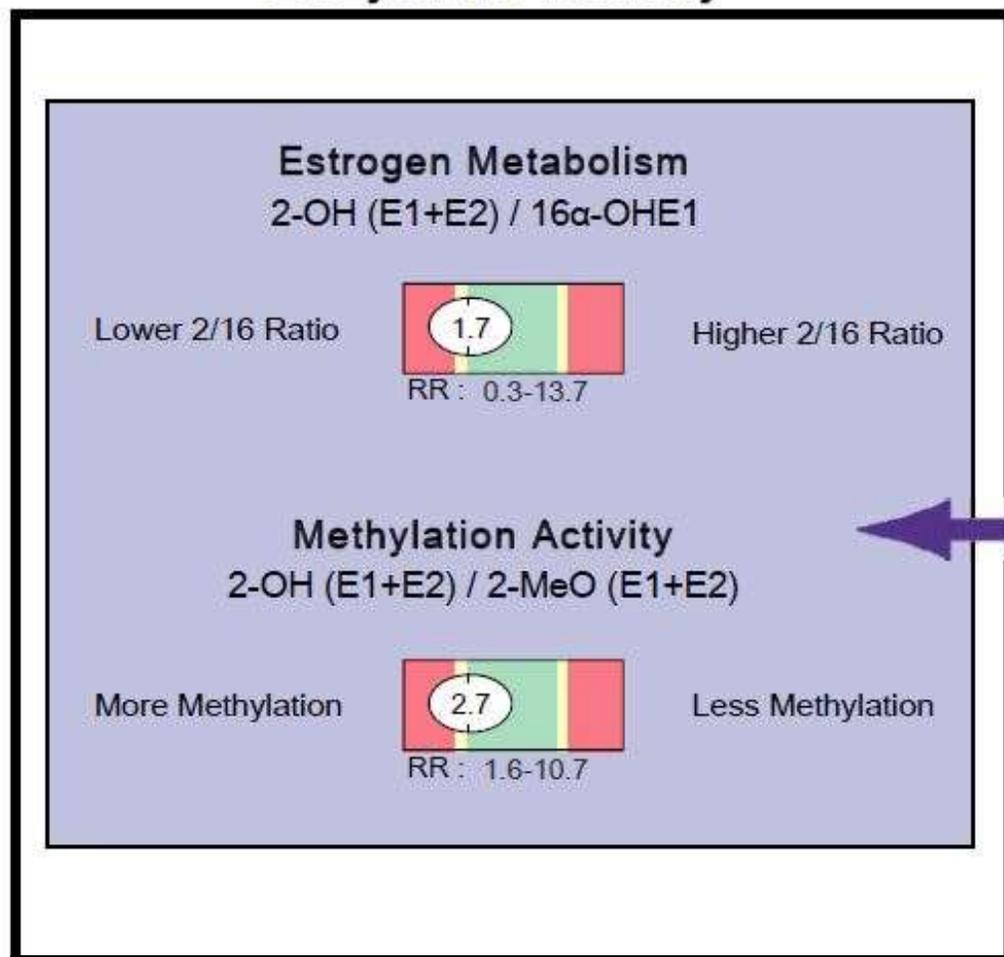
- 75 y/o white female with a past history of shoulder and wrist fractures and osteoporosis
- At 71 her PCP stopped her BHRT
- Insomnia
- Frozen shoulder
- Constipation
- vaginal dryness
- Weight gain
- Wrist fracture
- Restarted her BHRT, 2 yrs later had inflammation via thermogram
- Complete hormones through Genova
- Began DIM, more magnesium, methylated B vitamins, corrected Constipation, turmeric
- Inflammation resolved
- Normal mammogram



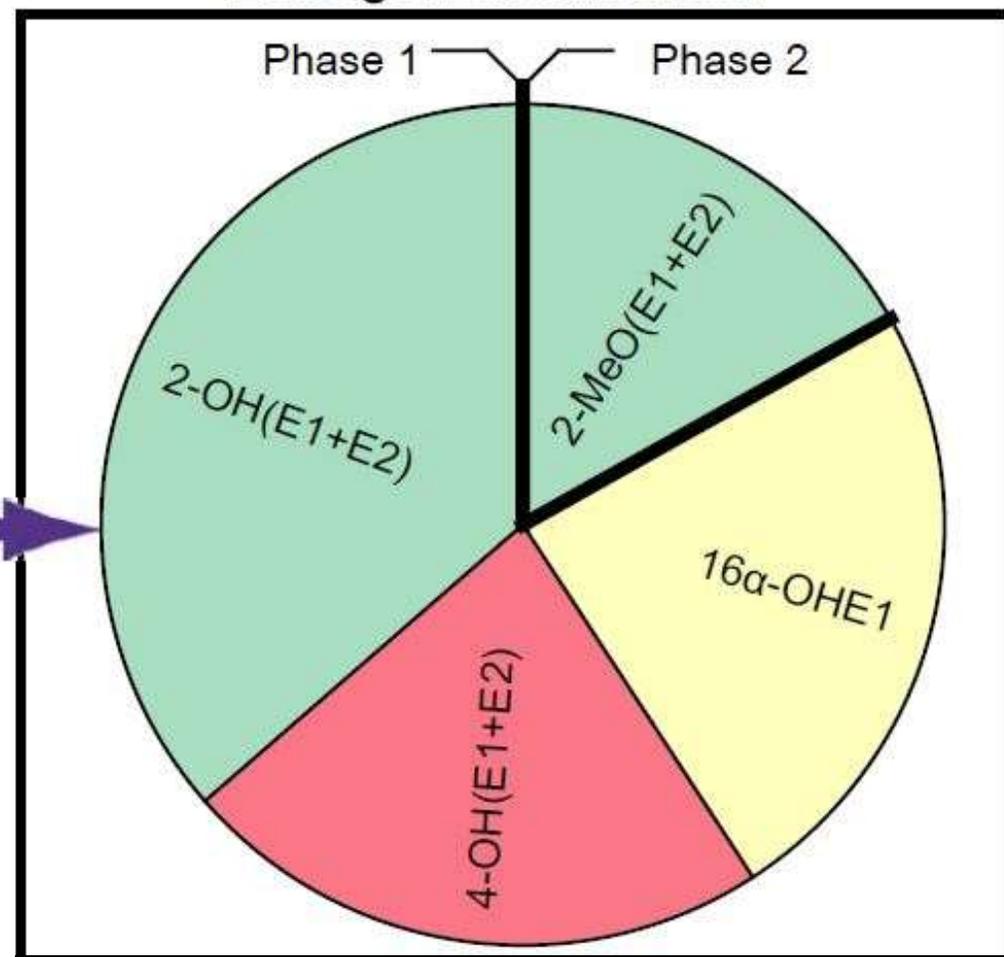


Case Study # 3 F.D.

Enzymatic Activity



Estrogen Metabolism





Optimization of Hormones

Menopausal hormone therapy for primary prevention: why the USPSTF is wrong

- When these women fail to use MHT, in addition to an increase in mortality risk, they also experience accelerated risks for major diseases including CVD, osteoporosis, dementia, mood disorders, and sexual dysfunction
- Unlike bisphosphonates, which have been associated with excessive bone mineralization, estrogen facilitates normal bone architecture
- Effects of osteoporosis medications on bone quality. There is no question that estrogen is an effective and metabolically appropriate preventive strategy for osteoporotic fractures, and that osteoporosis is a chronic disease with tremendous impact in postmenopausal women



Optimization of Hormones

Negative spinal bone mineral density changes and subclinical ovulatory disturbances--prospective data in healthy premenopausal women with regular menstrual cycles

ABSTRACT: Subclinical ovulatory disturbances (anovulation or short luteal phases within normal-length menstrual cycles) indicate lower progesterone-to-estrogen levels. **Given that progesterone plays a bone formation role, subclinical ovulatory disturbances may be associated with bone loss or less than expected bone gain...** a meta-analysis of prospective studies in healthy premenopausal women to determine the overall relationship of subclinical ovulatory disturbances to change in bone mineral density. Two reviewers independently identified from serial literature searches 6 studies meeting inclusion criteria: a 2-year study in 114 young adult women, 2006-2009, Vancouver, Canada; a 2-year study in 189 premenopausal women, 2000-2005, Toronto, Canada; a single-cycle study in 14 young women, 1996-1997, Melbourne, Australia; an 18-month study in 53 women, 1990-1995, Santa Clara, California; a 4-year study in 27 women, 1988-1995, Vancouver, Canada; and a 1-year study in 66 women, 1985-1988, Vancouver, Canada. This meta-analysis included a combined sample size of 473 observations in 436 premenopausal women studied over 1-4 years and aged 14-47 years. The percentage of women with ovulatory disturbances varied significantly from 13% to 82%. Women with more frequent ovulatory disturbances had more negative percentage changes in spine bone mineral density (weighted mean difference = -0.86; P = 0.040) for random-effects analysis. There was significant heterogeneity among these 6 studies (I(2) = 80%). **In summary, these data show that regularly menstruating women with more frequent ovulatory disturbances experience more negative changes in bone (approximately -0.9% per year).** These cycles with silent estrogen/progesterone imbalance may be clinically important.



Optimization of Hormones

80% of our bone mass develops BEFORE the age of 18. Bone mass then begins to slope downward at the age of 35 for women and 45 for men

Anorexia:

- Adolescents have decreased rates of bone accrual raising “concerns of suboptimal peak bone mass and future bone health”
- Rec regain weight and menstrual function
- Bisphosphonates generally are not recommended in women of child bearing age due to their long half-life and potential for teratogenicity
- Risedronate did improve hip and vertebral bone density in women with AN





Hormone	Effect
SEX HORMONES Estrogens	Decreases production & activation of osteoclasts, (to a lesser extent) stimulates osteoblasts
Progesterone	Boosts production and activation of osteoblasts (which have progesterone receptors)
Testosterone	Deficiency in men = osteoporosis, in women and men helps maintain muscle mass
Cortisol	Long term elevations reduce calcium absorption from gut and inhibits osteoblasts
DHEA	Precursor to androgens and ultimately estrogens
Thyroid Hormones	Euthyroid to balance bone remodeling cycle, hyper and hypothyroidism lead to osteoporosis
Parathyroid Hormone	Signals osteoclasts to break down bone, increase calcium in blood and stimulate kidneys to reabsorb calcium
Calcitonin	Decreases calcium absorption in gut, signals the kidneys to release calcium in the urine, keeps calcium in the bone and retards activity of osteoclasts
Calcitriol (active form Vit. D)	Increases calcium absorption of gut, reabsorbs calcium by the kidneys
IGF-1	Increases, maintains muscle mass and stimulates osteoblasts to build bone
Leptin	Increases linear growth and skeletal mass as observed in childhood obesity



A Functional Approach Treatment Plan

- Gut: digestion and absorption
- Right raw materials
- Optimize Hormones





Withdraw Bone Saboteurs

Prevention of glucocorticoid morbidity in giant cell arteritis

ABSTRACT: Glucocorticoids are the mainstay of treatment for GCA. Patients often require long-term treatment that may be associated with numerous adverse effects, depending on the dose and the duration of treatment. Trends in recent decades for glucocorticoid use in GCA suggest increasing cumulative doses and longer exposures. Common adverse events (AEs) reported in glucocorticoid-treated GCA patients **include osteoporosis**, hypercholesterolemia, hypertension, posterior subcapsular cataract, infections, diabetes mellitus, Cushingoid appearance, adrenal insufficiency and aseptic necrosis of bone. AEs considered most worrisome by patients and rheumatologists include weight gain, psychological effects, **osteoporosis**, cardiometabolic complications and infections. The challenge is to maximize the benefit-risk ratio by giving the maximum glucocorticoid treatment necessary to control GCA initially and then to prevent relapse but to give the minimum treatment possible to avoid glucocorticoid-related AEs. We discuss the safety issues associated with long-term glucocorticoid use in patients with GCA and strategies for preventing glucocorticoid-related morbidity.



Withdraw Bone Saboteurs

Associations of urinary polycyclic aromatic hydrocarbons with bone mass density and osteoporosis in U.S. adults, NHANES 2005-2010

ABSTRACT: Polycyclic aromatic hydrocarbons (PAHs) are environmental endocrine disruptors, which may modify the bone mineralization. However, epidemiological evidences on this issue were scant. We aimed to investigate the associations of PAHs with bone mass density (BMD) and osteoporosis based on a nationally-representative sample from general U.S.

PAHs are released from burning coal, oil, gasoline, trash, tobacco, and wood

Hydroxyphenanthrene, 2-Hydroxyphenanthrene and 9-Hydroxyfluorene had significantly decreased BMD levels [coefficient (β) = -0.023 to -0.014, $p < 0.05$] or increased likelihoods of osteoporosis [odds ratios (ORs) = 1.86 to 3.36, $p < 0.05$] at different bone sites. Whereas, elevated BMD levels ($\beta = 0.021$, $p < 0.05$) at trochanter and decreased likelihoods of osteoporosis (OR = 0.33, $p < 0.05$) at intertrochanter were observed among women at the second tertiles of 1-Hydroxypyrene and 2-Hydroxynaphthalene, respectively. Similar results were found for all the population, i.e., combination of men and women. Most of the significant associations disappeared among adult men only. Furthermore, **Associations between U-PAHs and BMD were stronger for postmenopausal women** when compared with premenopausal group. In conclusion, associations of U-PAHs with BMD and osteoporosis varied by specific U-PAHs and bone sites, as well as menopausal status and genders in U.S. adults.



Rising Lead Levels During Menopause

- “With respect to lead and menopause, most research, including an earlier study in the Nurses’ Health Study cohort (Korrick et al. 2002), has focused on the effects of menopause on blood lead levels (Garrido Latorre et al. 2003; Jackson et al. 2010; Nash et al. 2004; Potula and Kaye 2006; Vahter et al. 2004). Release of lead from bone to blood as a consequence of increased bone turnover following menopause has been proposed as a mechanism that may explain cross-sectional associations between menopause and blood lead levels.”
- Higher lead levels were associated with early menopause



Withdraw Bone Saboteurs

Lead:

- Disrupts enzyme function and negatively impacts osteoblasts
- >90% stored in bone and released into blood stream during periods of bone remodeling
- Khalil et.al. (2008) showed that increases in circulation lead levels as low as 8mcg/dl decreases hip BMD and increases risk of falls and fractures
- Deficiencies in Zn, Ca, Fe and Mg exacerbate lead toxicity

Pesticides: Exposure decreases BM in multiple species

Mercury: Indirectly by uncoupling bone remodeling mechanisms, replacing Zn, neurotoxicity, reduce hormone effectiveness.

Sunscreen chemicals

Exposure to Endocrine Disrupting Chemicals

Glyphosate:

- Glyphosate has been shown to severely deplete Mn levels in plants
- Chondroitin sulfate synthesis depends on Mn, and its deficiency leads to osteoporosis and osteomalacia



Withdraw Bone Saboteurs

Toxic Elements		
Element	Reference Range	Reference Range
Lead	0.040	⇔ 0.048 mcg/g
Cadmium	0.001	⇔ 0.001 mcg/g
Tin	<dl	⇔ 0.0009 mcg/g

Toxic Elements		
Element	Reference Range	Reference Range
Lead	0.038	⇔ 0.048 mcg/g
Cadmium	0.001	⇔ 0.001 mcg/g
Tin	<dl	⇔ 0.0009 mcg/g

Toxic Elements		
Element	Reference Range	Reference Range
Lead	0.038	⇔ 0.048 mcg/g
Mercury	<dl	⇔ 0.0039 mcg/g
Antimony	0.001	⇔ 0.002 mcg/g
Arsenic	0.011	⇔ 0.071 mcg/g
Cadmium	0.001	⇔ 0.001 mcg/g
Tin	<dl	⇔ 0.0009 mcg/g

Toxic Elements		
Element	Reference Range	Reference Range
Lead	0.042	⇔ 0.048 mcg/g
Mercury	<dl	⇔ 0.0039 mcg/g
Antimony	0.001	⇔ 0.002 mcg/g
Arsenic	0.025	⇔ 0.071 mcg/g
Cadmium	0.001	⇔ 0.001 mcg/g
Tin	<dl	⇔ 0.0009 mcg/g

Perimenopausal

Toxic Elements		
Element	Reference Range	Reference Range
Lead	0.049	⇔ 0.048 mcg/g
Mercury	<dl	⇔ 0.0039 mcg/g
Antimony	0.001	⇔ 0.002 mcg/g
Arsenic	0.009	⇔ 0.071 mcg/g
Cadmium	0.000	⇔ 0.001 mcg/g
Tin	<dl	⇔ 0.0009 mcg/g

Toxic Elements		
Element	Reference Range	Reference Range
Lead	0.047	⇔ 0.048 mcg/g
Mercury	<dl	⇔ 0.0039 mcg/g
Antimony	0.001	⇔ 0.002 mcg/g
Arsenic	0.021	⇔ 0.071 mcg/g
Cadmium	0.001	⇔ 0.001 mcg/g
Tin	<dl	⇔ 0.0009 mcg/g

Toxic Elements*		
Element	Reference Range	Reference Range
Lead	2.29	⇔ 2.81 mcg/dL
Mercury	0.28	⇔ 4.38 mcg/L
Arsenic	<DL	⇔ 13.7 mcg/L
Cadmium	0.18	⇔ 1.22 mcg/L
Tin	<DL	⇔ 0.39 mcg/L

* All toxic Elements are measured in whole blood. Pathology ICP-MS

Toxic Elements*		
Element	Reference Range	Reference Range
Lead	1.83	⇔ 2.81 mcg/dL
Mercury	0.27	⇔ 4.38 mcg/L
Arsenic	<DL	⇔ 13.7 mcg/L
Cadmium	0.28	⇔ 1.22 mcg/L
Tin	<DL	⇔ 0.39 mcg/L

* All toxic Elements are measured in whole blood. Pathology ICP-MS

B
H
R
T

NutrEval of a 52 yo Perimenopausal female, postmenopausal at the time of the fourth blood draw, began hormones at the time of the 7th blood draw



Withdraw Bone Saboteurs

Cadmium

- Stimulates the formation and activation of osteoclasts
- Limits the osteoblast ability to form bone collagen
- Half life of 20-40 years
- Stored mainly in the kidneys and liver
- Fe and Zn deficiency increase vulnerability to cadmium toxicity
- Disrupts the production of progesterone by the ovary
- Women with a urinary cadmium level of 0.5-1 mcg/gram of creatine had a 43% increased chance of hip osteoporosis compared with women <0.5 mcg/g creatinine



Withdraw Bone Saboteurs

- High protein, high acid
- Processed foods
- Coffee
- Sugar
- Alcohol
- Stress
- Tobacco
- Sodas with phosphoric acid
- Medications: PPIs, steroids, etc.





A Functional Approach Treatment Plan

- Gut: digestion and absorption
- Right raw materials
- Optimize Hormones
- Withdraw Bone Saboteurs





Stimulate Bone Growth

- Most of us are sedentary at work only or at work and home
- Bedridden, not moving against gravity = up to 1% of bone mineral loss per week!
- With weight bearing exercise can gain 1-3% per year
- Strengthens muscles: improves balance & stability

Type of Exercise:

- Dynamic rather than static
- Vary routine
- Weight bearing against gravity
- Stretch to maintain flexibility
- Balance work
- Posture
- Focus on extension and avoid flexion
- Strengthen pelvic and abdominal stabilizing muscles which attach to vertebral spine





Stimulate Bone Growth

Whole-body vibration training and bone health in postmenopausal women: A systematic review and meta-analysis

BACKGROUND: The aims of the present systematic review and meta-analysis were to evaluate published, randomized controlled trials that investigate the effects on whole-body vibration (WBV) training on total, femoral neck, and lumbar spine bone mineral density (BMD) in postmenopausal women, and identify the potential moderating factors explaining the adaptations to such training.

METHODS: From a search of electronic databases (PubMed, Web of Science, and Cochrane) up until September 2017, a total 10 studies with 14 WBV groups met the inclusion criteria. Three different authors tabulated, independently, the selected indices in identical predetermined forms. The methodological quality of all studies was evaluated according to the modified PEDro scale. For each trial, differences within arms were calculated as mean differences (MDs) and their 95% confidence intervals between pre- and postintervention values. The effects on bone mass between exercise and control groups were also expressed as MDs. Both analyses were performed in the total sample and in a specific class of postmenopausal women younger than 65 years of age (excluding older women).

RESULTS: The BMD of 462 postmenopausal women who performed WBV or control protocol was evaluated. Significant pre-post improvements in BMD of the lumbar spine were identified following WBV protocols ($P = .03$). Significant differences in femoral neck BMD ($P = .03$) were also found between intervention and control groups when analyzing studies that included postmenopausal women younger than 65 years.

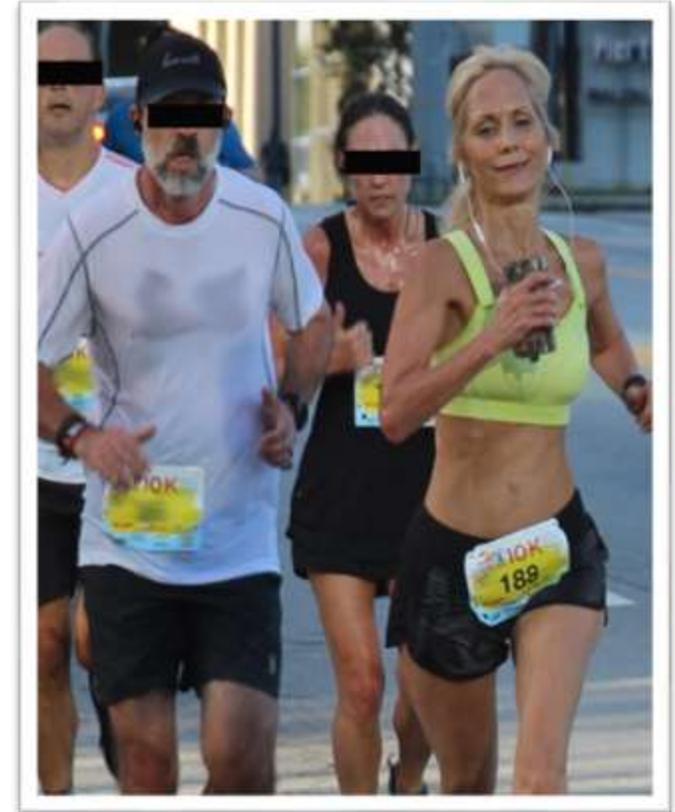
CONCLUSION: WBV is an effective method to improve lumbar spine BMD in postmenopausal and older women and to enhance femoral neck BMD in postmenopausal women younger than 65 years.



Stimulate Bone Growth

Ranking of osteogenic potential of physical exercises in postmenopausal women based on femoral neck strains

ABSTRACT: The current study aimed to assess the potential of different exercises triggering an osteogenic response at the femoral neck in a group of postmenopausal women. The osteogenic potential was determined by ranking the peak hip contact forces (HCFs) and consequent peak tensile and compressive strains at the superior and inferior part of the femoral neck during activities such as (fast) walking, running and resistance training exercises. Results indicate that fast walking (5-6 km/h) running and hopping induced significantly higher strains at the femoral neck than walking at 4 km/h which is considered a baseline exercise for bone preservation. Exercises with a high fracture risk such as hopping, need to be considered carefully especially in a frail elderly population and may therefore not be suitable as a training exercise. Since superior femoral neck frailness is related to elevated hip fracture risk, exercises such as fast walking (above 5 km/h) and running can be highly recommended to stimulate this particular area. **Our results suggest that a training program including fast walking (above 5 km/h) and running exercises may increase or preserve the bone mineral density (BMD) at the femoral neck.**





A Functional Approach Treatment Plan

- Gut: digestion and absorption
- Right raw materials
- Optimize hormones
- Withdraw bone saboteurs
- Stimulate bone growth





Balance and Fall Prevention

Effect of a balance-training programme on postural balance, aerobic capacity and frequency of falls in women with osteoporosis: A randomized controlled trial

OBJECTIVE: To investigate the effect of a 12-month complex balance-training programme on static and dynamic postural balance, aerobic capacity and frequency of falls in women with established osteoporosis.

DESIGN: Randomized controlled trial in which the intervention group was assigned a 12-month exercise programme (3 times a week for 30 min) and the control group had no intervention.

SUBJECTS: A total of 100 osteoporotic women with at least one previous fracture.

METHODS: Performance-based Timed Up and Go (TUG), Berg Balance Scale (BBS) and stabilometric platform tests were used to evaluate balance. Aerobic capacity was measured by bicycle ergometry. Frequency of falls was assessed using a falls diary.

RESULTS: After 1 year, there was a statistically significant difference between the improvement achieved in the intervention and control groups on the performance-based TUG, BBS and stabilometric platform tests ($p < 0.05$). Mean metabolic equivalent (MET) value decreased in the intervention group, from 4.91 to 3.82 (a significant difference from the change achieved in the control group; $p = 0.05$). Relative risk of falls was 0.534 at 1 year ($p = 0.17$).

CONCLUSION: The 12-month balance-training program significantly improved postural balance and increased aerobic capacity in women with established osteoporosis.



Balance and Fall Prevention

Over 90% of hip fractures are a result of falls

PT after fracture: “At all times, increased strength may prevent falls by improving confidence and coordination as well as maintaining bone mass by stimulating bone formation and by decreasing bone resorption and by preserving muscle strength.”

“Large trials have shown that it is possible to reduce falls, but randomized studies have not shown any significant decrease in fracture risk. Some randomized trials have shown that wearing hip protectors can markedly reduce hip fracture risk, particularly in the elderly living in nursing homes. A meta-analysis of well-conducted randomized controlled trials, however, casts some doubt about the anti-fracture efficacy.”

Modifiable Factors To Reduce Falls:

- Impaired gait and balance
- Impaired mobility and disability
- Neuromuscular or musculoskeletal disorders
- Age
- Impaired vision
- Neurological, heart disorders
- History of falls
- Medication decreasing blood sugar or blood pressure
- Cognitive impairment



Balance and Fall Prevention

Factors that Increase the Risk of Falling and Fractures

Neurologic disorders

- Parkinson disease
- Proximal myopathy
- Peripheral neuropathy
- Prior stroke
- Dementia
- Impaired gait or balance (or both)

Autonomic dysfunction with orthostatic hypotension

Impaired vision

Impaired hearing

Frailty and deconditioning

Sarcopenia

Medications

- Sedatives, hypnotics, opiates
- Antihypertensive agents

Environmental factors

- Poor lighting
- Stairs
- Slippery floors
- Wet, icy, or uneven pavement
- Uneven roadways
- Electric or telephone cords
- Pets—small or large
- Throw rugs
- Positioning in a wet or dry bathtub





A Functional Approach Treatment Plan

- Gut: digestion and absorption
- Right raw materials
- Optimize hormones
- Withdraw bone saboteurs
- Stimulate bone growth
- Balance & fall prevention





Case Study #5 D.C.

- 63 yo petite female, French artist who teaches meditation
- CC: recent 2013 DEXA: osteoporosis
- Rec'd Prolia she cannot afford this medication

Timeline:

- Childhood: Eczema, h/o anemia
- 20-60: exposure to cadmium
- 53: Menopause
- 59: gum surgery
- 61: DEXA 2011: T scores: Vertebral -1.6 L femur -2.1 R femur -2.2
 - Began Premarin, vit D and calcium
- 61: Began 18 months of PPI
- 63: Stopped dairy and fatty meals and was able to wean off PPI
- 63: DEXA 2013: T scores: vertebral -1.8 (L4 -3.2) L femur -2.6





Case Study #5 D.C.

- **Lifestyle:**
 - Vegan
 - Walk/jog/aerobics 4 x a week
 - Pilates & yoga
- **Treatment Plan:**
 - GI: gut restoration, HCL trial, digestive enzymes
 - Raw materials: calcium, strontium, boron, methylated all B vitamins, phosphorus, magnesium, fish oil
 - Optimize hormones: DHEA, estriol, progesterone
 - Withdraw the saboteurs: decrease caffeine to one or less cups of coffee per day, minimize alcohol, meditation for stress
 - Stimulate bone growth: weight bearing, continue yoga and pilates
 - Balance: yoga, balance exercises



Case Study #5 D.C.



I am not actually "D. C."

T score 2011	T score 2013 Discovery C S/N 47894	T score 2015 Discovery C S/N 47894	T score 2017 Discovery C S/N 47894
L3	-1.7	-1.1	-1.1
L1-L4	-1.6	-1.8	-1.2
Neck femur	-2.1	-2.3	-2.2
Total Hip	-1.6	-1.6	-1.6

No fractures and the patient is thrilled



Lahnor Powell, ND, MPH
Moderator



Elizabeth Board, MD
Presenter

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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 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!



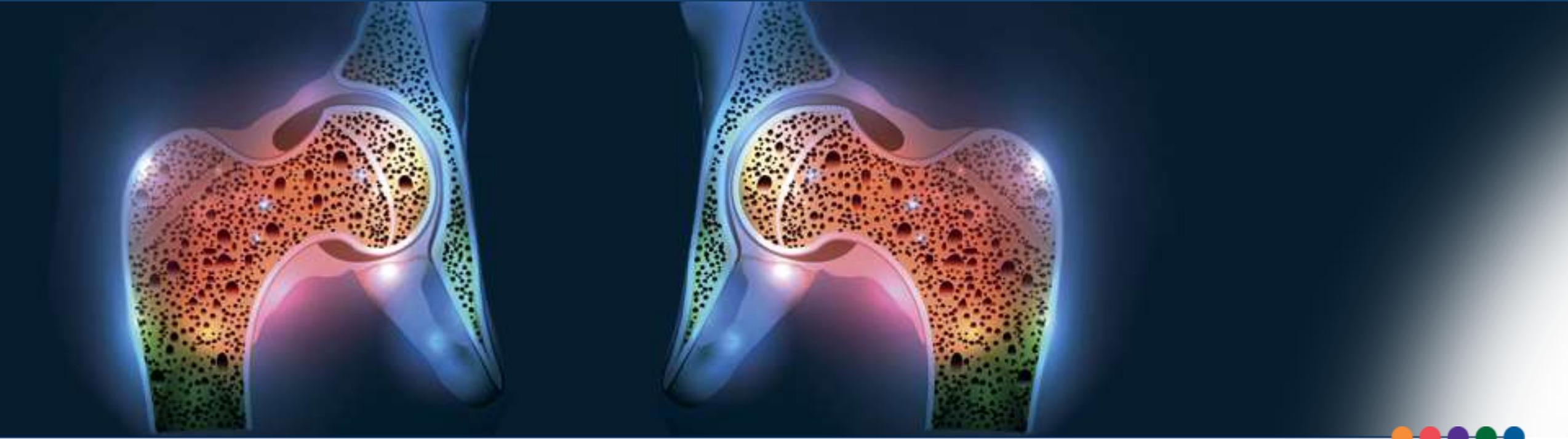
Upcoming ^{LIVE} GDX Webinar Topics

October 24, 2018

Register for upcoming ^{LIVE} GDX Webinars online at WWW.GDX.NET

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Functional Medicine Approach To Osteoporosis Prevention & Treatment

Elizabeth M. Board, MD



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