Webinar Will Begin Momentarily

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Professional Education Series

Support. Inform. Educate. Empower.

Measuring & Improving Metabolic Health to Improve or Reverse Disease

TODAY'S AGENDA:

- Introduction & Housekeeping
- Speaker Introduction
- Presentation
- Q&A
- Closing

WEBINAR HOST:

Keith Hine MS, RD
VP of Healthcare, Sports & Professional Education
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WEBINAR PRESENTER:

Tom Rifai MD FACP DipABLM
President and CEO, Reality Meets Science Inc.
US Medical & Wellness Director, Magna International

Measuring & Improving Metabolic Health

Presenter: Tom Rifai MD FACP DipABLM

President and CEO, Reality Meets Science Inc.

US Medical & Wellness Director, Magna International

Table of Contents

Optimize Longevity KPIs: Blood Pressure, Heart Rate, Lipids, Glucose/Insulin, Kidney Function, Body Composition, Physical Fitness and <u>Happiness</u>!

What are Mind Matters™?

Virtually anything that has, or can have, significant influence on thoughts and feelings

Ranging from mental health history/influencers to mindfulness skills to mindset/perspective

Think and Consider:

- What patient brings to the table
  (history)

- What you bring to the table
  (skills, attitude, guidance, compassion)

Mind Matters / 3 Zones

1. Mindset

2. Mental Health

3. Mindfulness

- **Soul searching "WHY" we value health**
- Attitude: Progress IS Perfection attitude
- SLIPs are opportunities, not crises
- 5% fun zone Flex5-philosophy (discipline without extremism against personal "non-negotiables")
- Acceptance of 3 levels of control and forgiveness (self/others)
- Skill-power over willpower
- Purpose and values driven heathy lifestyle – not just "diet & exercise"

Mind Matters / 3 Zones

1. Mindset

2. Mental Health

3. Mindfulness

- **Acknowledge, validate, integrate and address mental health history**
- Anxiety/depression
- Trauma, Unresolved loss/grief/loneliness
- Emotional/maladaptive eating patterns (e.g., binge eating)
- Stress sources (finances, work, health, interpersonal situations)
- **Sleep**

Mind Matters / 3 Zones

1. Mindset

2. Mental Health

3. Mindfulness

- **Self awareness** (e.g., of personality tendencies and stressors) for when "strategic resting" is needed
- Sense when "tactical rests" from "goal-driving" needed
- Knowing when to say "no thank you"
- Diaphragmatic breathing, mediation/yoga, therapeutic floating
- Being "guilt-free in the moment" for "5% fun zone"
- **Hunger/satiety management / intuitive eating principles**

Mind Matters
Assessing Readiness for Change

Before assessing stage of readiness for change:

- Ask permission to discuss TLC

- Target readiness level, not degree of disease

- May nudge, but don't "push" past level of readiness (remember 3 levels of control)

- If a patient is not ready, manage/save your energy for those that are (for your own sake and theirs)

You may lead a horse to water...

but can only carefully nudge most to drink.

Precontemplation
Express concern and ask permission, leave door open, but don't battle

Contemplation
Explore WHY's (motivations) why TLC would be beneficial and perceived challenges

Preparation
Assist with getting a good start, reinforcing WHY's and basic skills within "non-negotiable" guard-rails

Action
Goal assessments/revisions; redirecting with positive psychology/CBT. Direct advice when appropriate. We are navigators, not pilots.

Maintenance
Expectation setting, use 5 Keys as a toolkit to see where "tweaking time" is best spent

Assessing Readiness: QUIZ time!

Based on this statement:

"I can't keep eating like this! What can I do?"

What stage of readiness in the transtheoretical model of behavior change is the patient in?

A. Precontemplation

B. Contemplation

C. Preparation

D. Action

Your role as clinician/TLC coach

- We are partners and navigators, not pilots!
- Non-judgmental (to yourself nor others)
- Validator and vulnerable partner
- Information/resource provider
- Adjust style to subject's needs
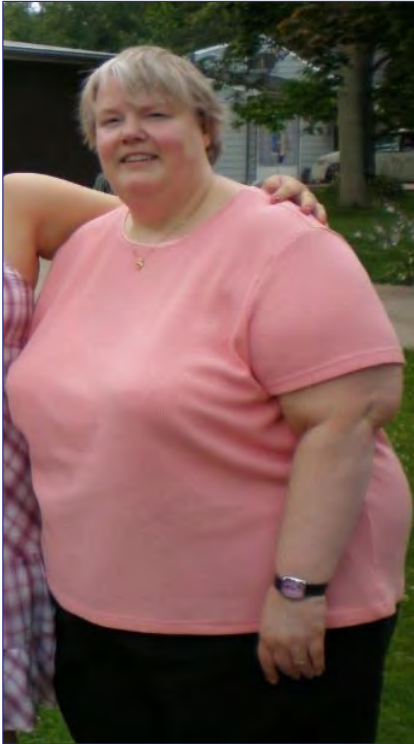- Consider lifestyle coach training

The Diabetes Pandemic

90M with **Prediabetes**

30M with **T2D**
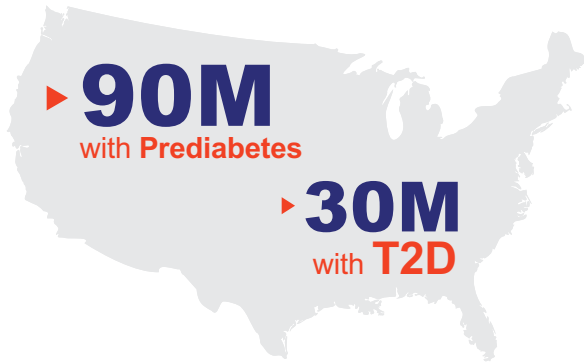
Approximately **90%** of those with Prediabetes and **25%** of those with T2D are unaware of their condition

Annual Costs per Person

Prediabetes	$510 (medical costs only)	
T2D	UN-diagnosed: $4,030	Diagnosed: $10,970

Two less common forms of Diabetes Mellitus

Autoimmune

LADA (screen with anti-GAD titer)

Latent **A**utoimmune **D**iabetes of **A**dults

Genetic

MODY (genetic testing for 14 subtypes)
*GCK, HNF1A and HNF4A = 95% of all variants

Maturity **O**nset **D**iabetes of the **Y**oung

What is Insulin?

- Hormone made by pancreas

- Pancreas 'beta cells' detect carbohydrate and protein intake

- Fat does not affect insulin release, but insulin does inhibit release of fat from adipocytes

- Beta cells release insulin to help cells take in 'extra' carbs/protein*

Note: active muscles activate insulin independent uptake of glucose via GLUT4 receptors

What causes T2D?

Mainly Insulin Resistance (IR)

IR driven by excess calorie intake combined with mismatched regular level of physical activity (i.e., modern, sedentary, lifestyle)

- IR is NOT intimately associated with BMI vs abdominal circumference or radiologically measured visceral fat and body composition.

- ~10% in US with pre-diabetes have "normal BMI"

Hyperinsulinemia can be detected via elevated fasting insulin many years before blood glucose rises

Canaries in the pre-T2D coal mine

IR signs *before* prediabetes include full spectrum of the Cardiometabolic Syndrome:

- Elevated, IDF ethnic specific, abdominal circumference

- Elevated blood pressure

- High triglycerides

- Non-isolated low HDL

- High uric acid (gout)

- Elevated ALT (fatty liver)

- Elevated ferritin*

- Gestational diabetes history

- Skin findings (acanthosis)
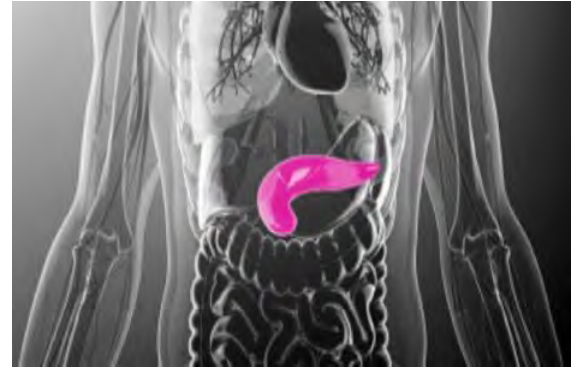
What causes T2D?

- "Pre" diabetes = chronic IR/hyperinsulinemia AND beginning of permanent damage to insulin producing beta cells

- UPSHOT: "Pre"diabetes is not "pre" except for elevated not yet reaching formal T2D

- Majority of macrovascular CVD risk vs full T2D already established

- Damage already occurring to arteries, cerebral cells, and growth of insulin sensitive cancer cells

IR is not just about "body fat," muscle matters too

- Muscle loss or inadequate use (usually in combination), independently increases T2D risk

- T2D with "normal weight" = double the risk of death as T2D with excess weight (double edged sword of over identifying T2D risk in terms of scale weight)

- Harder to gain muscle than lose fat

- Muscle loses insulin sensitivity within double digit minutes of sitting and is activated within single digit minutes of movement (even light activity)

The Stages from IR to T2D

IR   **T2D**

Years | Stage 1 | Stage 2 | Stage 3 | Stage 4

- Birth into western lifestyle → low activity + remarkable reliance on CRRAHP™ food/low satiety beverage calories

- Over years fat gained +/- muscle lost, or poor use

- Calorie overloaded (and sedentary) muscle, fat and liver cells become IR

- Pancreas pumps out extra insulin (measurable but rarely done) to compensate and maintains normal blood sugar… for now…

Stage 1: Pre-metabolic Syndrome

IR   T2D

Years | Stage 1 | Stage 2 | Stage 3 | Stage 4

Q When sugar is "normal" (fasting <100 mg/dL), how can we practically test for IR?

A Fasting Insulin (FI)

- "Normal" FI is always reported as higher than ideal (e.g., > 9 miu/L)
- **IDEAL LIKEY:** Normal fasting glucose with fasting insulin of < 5

Note on fluctuating fasting insulin

- Fasting insulin (FI) somewhat pulsatile
- FI should be checked over lifestyle transition multiple times to look for trending average

Ultimate trifecta of insulin sensitivity:

- Fasting glucose < 100 mg/dL
- Fasting insulin of < 5 miu/U
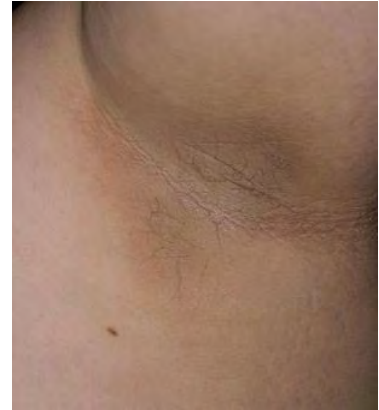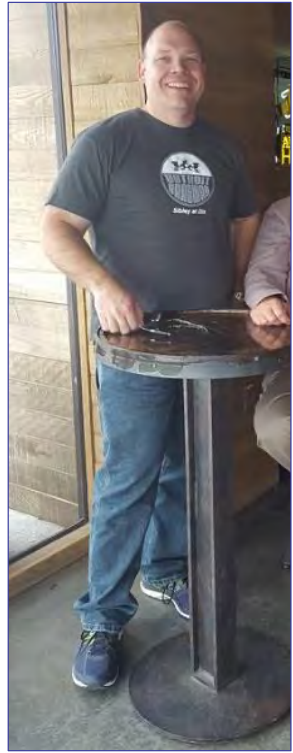- A1C <5.5%

Stage 1 Pre-metabolic Syndrome

IR **T2D**

| Years | Stage 1 | Stage 2 | Stage 3 | Stage 4 |

Other tests/signs of IR beyond fasting insulin:

- Optimal ALT: < 20 for women; < 30 for men
  (note: "normal" in US vs optimal distinctly different)

- Ferritin >200 (a measure of body iron storage/load)

Acanthosis
Dark skin patches commonly on back
of neck, armpits or other body folds

ALT: A notable liver test

- **If elevated above 20/30 female/male may reflect fatty liver**
- Ideal is likely lower half of normal range
- **Fatty liver goal: >10% healthful weight reduction**
- Consider suggesting liver ultrasound/FibroScan™
- Consider Hep C screen, esp if born 1945-65
- Other issues: alcohol, acetaminophen, autoimmune and other causes of hepatitis

Stage 2: Metabolic Syndrome

> 3 of 5 criteria (IDF)

IR

T2D

Years | Stage 1 | Stage 2 | Stage 3 | Stage 4

- IDF requires: Abdominal Circ > 37 inches for men*
  > 31.5 inches for women

- Average resting BP >130/85 (either one), OR on BP meds

- Fasting triglycerides > 150, OR on triglyceride lowering med(s).
  E.g., fenofibrate, atorvastatin, niacin, omega

- Low HDL ("good") cholesterol < 40 men /< 50 women
  OR on HDL raising meds (same as triglyceride meds above)

- Well hydrated fasting glucose > 100 mg/dL

Stage 2

Beyond and before formal Metabolic Syndrome

IR   T2D

Years	Stage 1	Stage 2	Stage 3	Stage 4

- Optimal resting BP is <120/80

- AHA now considers ideal fasting triglycerides as <100

- Low HDL is the weakest criteria in terms of targeting therapy

- Ex: a healthy low-fat eating with low triglycerides and low HDL = longest-lived population on earth (Okinawa).

- Low HDL is mostly concern in context of concomitantly occurring elevated triglycerides/insulin resistance. Target IR with TLC

Stage 3: from MetSx to Prediabetes

Years	IR Stage 1	Stage 2	Stage 3	T2D Stage 4

Prediabetes is better described as "chronic insulin resistance with early insulin production burnout". Cardiovascular risk is very high in prediabetes.

- Well hydrated * 'fasting' glucose: > 100mg/dL

- A1C** > 5.5-6.4 (usually high before fasting glucose)

- 2-hour OGTT*** level: 140-199

*Dehydration can cause a non-insulin related elevation in fasting glucose

**5.7 for ADA; A1C can OVER-estimate glu levels in iron def., most African-Americans

***OGTT = Oral Glucose Tolerance Test is gold standard but time/resource intensive

Stage 4: Type 2 Diabetes

IR   T2D

Years | Stage 1 | Stage 2 | Stage 3 | Stage 4

Standard DM criteria are:

- Well hydrated fasting' glucose: > 126*

- A1C > 6.5*

- 2-hour OGTT level: > 200 (1H at > 190 for GDM)

- Non fasting glucose >200 if + "classical signs" of T2D**

*Repeated for confirmation

**Excessive thirst, hunger and/or urination and/or unintentional weight loss (polydipsia, polyphagia, polyuria)

Assessing Metabolic Success

Additional tests

- Accurate resting blood pressure

- GFR and Urine Tests (kidneys)

- Serum Uric Acid

- Coronary Calcium Score (cash pay)

- 3 superior cholesterol measures
  - NMR Lipoprofile
  - Apo B
  - Non-HDL cholesterol

- Lipoprotein(a)

- Inflammatory markers (hs-CRP)

- Thyroid (not lifestyle except iodine)

- DEXA body composition analysis

- PHQ-9, GAD-7

- Epworth and Berlin/STOP-BANG Sleep Questionnaires
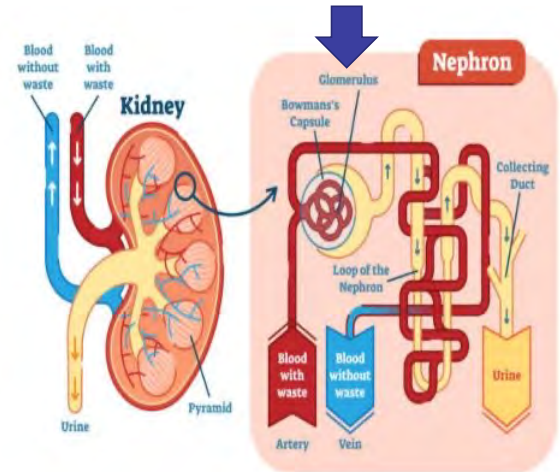
*GFR: Your Kidneys' Cleaning Capacity

GFR = How many milliliters of blood your kidneys are "cleaning" (filtering) per minute

Calculated based on age, race, sex, creatinine and BUN

- Ideal > 90 ml/min
- < 60-30 Stage 3 **CKD
- 29-15 Stage 4 CKD
- <15 = Renal failure

GFR = Glomerular Filtration Rate

CKD = Chronic Kidney Disease

Beyond GFR: What Pee Can Reveal

- Standard Urinalysis (UA) can reveal larger amounts of protein in the urine, which can reflect CKD irrespective of GFR

- Urine Protein Commonly = Inflamed Kidneys at Risk

- Since UA cannot detect smaller, but still meaningful amounts of protein in the urine we have the following urine test:

- Spot Urine Albumin:Creatinine ratio

- <30 is normal

- 30-300 = microalbuminuria* (not detected on UA)

- >300 = macroalbuminuria

- Even microalbuminuria = increased heart attack / stroke risk

- Beyond gout and renal stones, high uric acid can be a harbinger of CV risk and incipient MetSx

- Target for gout suppression also reflects what is likely ideal: < 6mg/dL

- Caveat: healthy weight loss, especially if brisk, may temporarily increase uric acid and gout risk (like gallbladder stone risk), but once stabilized ultimately lowers uric acid and gout risk
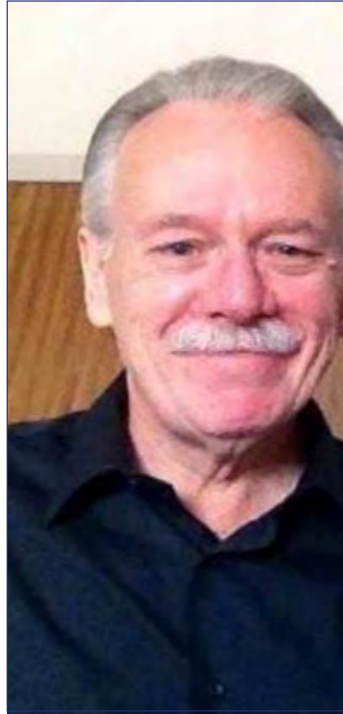
Better Ways to Measure Cholesterol

NMR Lipoprofile
Measures LDL Particle Number

For reversal <700 nmol/L

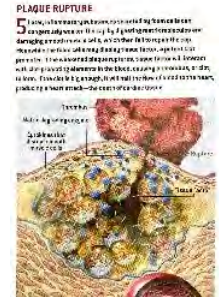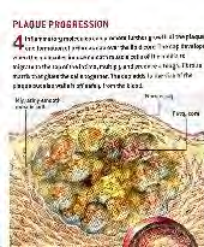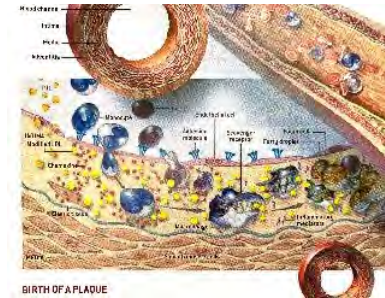Very good <1000 nmol/L

50th percentile:1300 nmol/L

ApoB
For reversal < 80 mg/dL

Very good < 100 mg/dL

Non-HDL
For reversal < 80 mg/dL

Very good <100 mg/dL

From Inflammation to Heart Attack

BIRTH OF A PLAQUE

PLAQUE PROGRESSION

PLAQUE RUPTURE

RMS

An Underappreciated Genetic Cholesterol Issue

- Lipoprotein (a)

- Lp(a): most common inherited cholesterol disorder

- Cannot be modified lifestyle, but lifestyle can modify risk (by improving other factors that you can control)

- Levels > 30mg/dL are usually considered abnormal

- Worth checking at least once in a lifetime, especially if there's any suspected family history of early heart disease, stroke or aortic valve stenosis

High Sensitivity CRP

- Aka: hs-CRP, cardio-CRP – but NOT regular CRP

- Not specific (can be elevated due to non-CVD influences)

- Therefore low (i.e., < 1.0) is great but >2.0 is not necessarily bad (ex: Bolivian Tsimane)

- Targeting core issues of IR typically addresses level

- IMO, more specific inflammatory markers can be more confusing and worrisome than worthy

- Rarely are any residually and meaningfully/actionably elevated after maximally addressing BP, lipids and IR via therapeutic lifestyle

Measure BP right & pay attention to HR

A resting BP should be done with:

- Both feet flat on the floor
- Back against backrest
- Resting (2 min at least), quiet environment
- Arm supported at ~heart level
- Appropriate size cuff
- No caffeine, alcohol or nicotine for >30 min

Notes

- Normal to have some fluctuating discrepancy
- If difference is regularly >10 points = investigate for PAD and use arm with higher pressure to direct overall CV therapy
- Measure both at least annually

Measure BP right & pay attention to HR

Resting BP goal is LESS than 120/80

- 120-129 for top # is considered "pre-hypertension"
- >130 is now considered hypertension for top (systolic) #
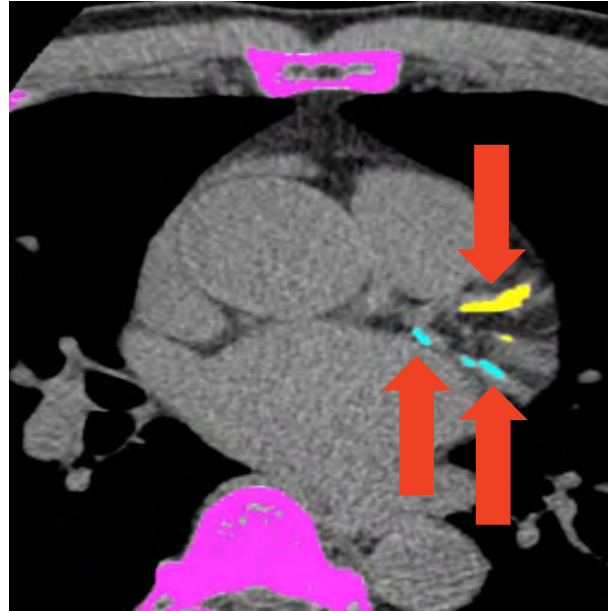- > 80 for bottom (diastolic) #

Resting HR goal is <80

- >80 = higher risk for kidney and heart disease as well
- As a general sign of poor cardiovascular fitness

CT Coronary Artery Calcium Scan
(usually cash pay)

Coronary Artery Calcium Scan

- Low radiation CT scan of the heart arteries
- Calcium = coronary cholesterol plaques
- Increases accuracy of predicting heart attack
- In 1/3 of people with coronary artery disease, the first "sign" is sudden death
- Usually not covered by insurance – out of pocket cost typically $100-200

CACS Scoring: What Does It Mean?

- Zero is ideal score – anything > 0 predicts higher mortality. Need TLC to maintain low risk

- 1-10 is a "grey zone" re: aspirin, but makes TLC argument stronger

- >10-99 – ask about 81mg aspirin + TLC

- >100 – ask about aspirin, medication + TLC

*Aspirin risks; Statin risks

Other medications: Ezetimibe, PCSK9 inhibitors ($$$)

CBC = Complete Blood Count

For metabolic purposes, notable concerns are:

- *Hemoglobin (Hg)
- *WBC (White Blood Cell count)

Ferritin = Body Iron Storage

- Normal range typically 15-300+
- Ideal range likely 75-150
- Low = <50 iron insufficiency (e.g., RLS aggravator)
- High (~200 or higher) = IR/liver inflammation
- *Rx: Lifestyle to resolve IR +/- blood donation?

Thyroid Testing

Low thyroid

- Most common cause autoimmune (Hashimoto's – older female prevalence), also thyroid ablation and surgical removal; rarely iodine deficiency

- Symptoms are non-specific: fatigue, dry skin, constipation

Risks of inadequately supplemented low thyroid:

- Elevated cholesterol

- Increased risk of muscle pain, damage from cholesterol meds

High thyroid

- Common cause autoimmune (Grave's), functional nodules

- Symptoms: anxiety, heart palpitations

Thyroid Stimulating Hormone (TS)

- TSH: "normal" range: 0.5 to 5.0

- Hypothyroid = elevated cholesterol, increased risk of myopathy on statins and independent CVD risk

- Screening test to assist in benefit/risk of starting supplementation: anti-TPO antibodies

Age related TSH targets:

- Upper half of normal >65yo

- Lower half of normal <60yo

- 60-64?

- Generic vs brand name supplements (brand name best)

Considerations

- DEXA Body Composition Analysis

Questionnaires:

- PHQ-9 (Depression)

- GAD-7 (Anxiety)

- Epworth (Sleep Quality)

- Berlin or STOP-BANG (Sleep Apnea)

Summarizing Optimized Metabolic Biomarkers

- Resting BP <120/80 and HR <80

- Fasting insulin <5 / Fasting glucose <100

- A1C < 5.5

- Non-HDL / ApoB <100

- Fasting triglycerides <100

- hs-CRP <1.0

Notables: TSH and 25-Vitamin D

- Uric Acid < 6.0

- ALT <20/30 (F/M)

- Ferritin 75-150

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