WESTERN MEDICINE INTERVENTION FOR HYPERENSION

Health Promotion *Education*:

- What is normal vs. abnormal blood pressure?
- What are the sequelas of uncontrolled blood pressure?
- Why is hypertension called the "Silent Killer"?

National High Blood Pressure Education Program

	Systolic [top #]	Diastolic [bottom#]
Ideal	< 120	< 80
Pre-HTN	120-139	80-90
Stage 1 HTN	140-159	90-99
Stage 2 HTN	>160	>100

Pre hypertension is the points at which lifestyle, diet and exercise modifications are most effective- but people say "I do not feel bad yet, so why do anything about it". BEAUSE, there is a linear progression of cardiovascular damage with consistent BPs above 120/ 80 mmHg with increased risk of stroke, renal failure, myocardial infarction etc. An increase in 20 mm Hg in systolic BP (top number); or 10 mm Hg in diastolic BP (bottom number) increases the risk for cardiovascular disease by 50%. In general the bottom number is more important.

The new onset of a BP higher than 180/110 or diastolic HTN with or without systolic HTN after 50 or before 30 years of age is unusual. Secondary (e.g. renal) HTN should be ruled out. Drugs that can cause secondary HTN are NSAIDS & COX II inhibitors, decongestants, oral contraceptives, steroids, cocaine, and herbs such as ephedra.

Health Promotion: *Prevention*

☐ **Weight Loss & Exercise** 30 to 45 minutes of aerobic exercise daily

☐ **Limiting Alcohol Intake** to < 1 standard drinks per day for men, and <0.5 for women. Three to 5 standard drinks per day increases the risk for hypertension [i].

☐ **Reducing Cholesterol and Saturated Fats**.

- Elevated LDL is a major predictor of CVD. The goal is
- Decrease elevated LDL by 30 to 40%
- Target LDL 70 to 100 mg/dl (<100 for moderate risk, or <70 if very high risk exists)
- Triglycerides <150, and a total cholesterol of <200 [iii].

☐ **Adequate Daily Mineral Intake**: calcium, magnesium & potassium.

☐ **Smoking Cessation**. Smoking causes HTN by hardening blood vessels (arteriosclerosis) and the narrowing vessels (vasoconstriction).

☐ **Limit Daily Sodium Intake** to < 2.4 gm sodium, and <6g sodium chloride. Sodium is also in condiments, antacids, and herbs (e.g. sea salt baths) etc. Limiting sodium intake is very important if someone is on a diuretic to control hypertension. As the drug's concentrations falls after the daily dose, a period of post-diuretic sodium retention may follow. If dietary salt intake is high then the amount of sodium loss in response to the diuretic may be partial or completely offset by post diuretic sodium retention [iv]. The American Public Health Association advocates a 50% reduction in the sodium content of all foods. While this would have a modest effect on individuals, the population effect on the huge number of at-risk people would significantly reduce cardiovascular morbidity and mortality [v].

SOME PEOPLE HANDLE SODIUM BETTER THAN OTHER. While 30% of the population develops hypertension as an adult, in the African-American or black community it's over 40%. It has been hypothesized that when African-Americans were transported as slaves from West Africa, those that had the genetic ability to retain/hold on to sodium [and therefore water] would survive that type of trip. African-American with this genetic profile are salt sensitive and therefore at much higher risk of hypertension. If you remove salt from an African-American's diet they tend to do

very well in normalizing their blood pressure. From the pharmaceutical data, thiazide-type diuretics tend to be beneficial for African Americans with HTN, while not having much benefit at all in other groups.

☐ **Diabetic Teaching**. Diabetics have greater than a 65% chance of dying from heart attack or stroke due to microvascular disease. BP control, along with lifestyle modifications for lipid and glycemic control are 1st line therapy for Type II Diabetes [v]. Standard of care to lower CVD risk are (1) glycemic control (target A1C is <7.0), (2) BP management, (3) statin drug therapy, and antiplatelet therapy if certain CVD risk factors exist. The goal is a BP<140/90 mmHg. However 130/80 mmHg is ideal.

Treatment

Drugs*
- Diuretics
- * ACEI / ARBS
- Adrenergic inhibitors
- Beta-blockers
- Calcium channel blockers
- Central Alpha 2-agonists,
- Vasodilators
- Postganglionic Sympathetic inhibitors

Nutrition
- Coenzyme Q10 (COQ10)
- Magnesium
- Potassium
- Omega-3 Fatty Acids
- Hawthorn
- Garlic

* ***Risk vs. benefit*** *of different medications varies by age, gender, ethnicity, and comorbidity*

*** ACE inhibitors [ACEI].** The most common class of hypertension drug, effective in lower blood pressure in pretty much all people; especially young adults with HTN due to increased sympathetic tone, including in response to stress hormones [norepinephrine & epinephrine]. The main side effect is a cough [5- 10%] due to excess bradykinins. ACE and **ARBs** may even have some benefit in reducing heart attacks & strokes. However in meta-analysis, while ACE Inhibitors → 10% reduction in All-Cause Mortality; there was no difference between those who took ARBs and those who didn't. SO ACEI are the pharmaceuticals first looked to: **Lisinopril**, **Benazepril, Ramipril, Perindopril**, **Captopril**.

*** Angiotensin 2 receptor blockers [ARBs].** As effective as ACEI in lowering the blood pressure but may not have the same long term best outcomes. However, they do not cause a cough like ACEI do. Do ARBs cause cancer? Well, a 2010 study showed that ARBs did produce a 1.2% statistically significant higher risk for cancer among the 30,000 patients studied. In a study of Olmesartan, 22 subjects with Celiac symptoms recovered once off this ARD.

*** Direct Renin Inhibitors** such as Tekturna are not used very often. They inhibit the **RAAS** (Renin-angiotensin-aldosterone) **System:** *liver renin → changes angiotensinogen to angiotensin 1 → ACE enzyme in Lung changes Angiotension 1 to 2 → increased sympathetic tone/ vasoconstriction, sodium re-absorption & pituitary anti-diuretic hormone [water retention], and aldosterone [more sodium reabsorption]* → HYPERENSION.

Guidelines & Risk Assessment

☐ ***JNC 7 Guidelines*** -Seventh Report of the Joint Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure for the diagnosis and treatment of hypertension.

☐ **Framingham Score** is based on age, HDL, systolic BP, and smoking status. A score of 20% or greater indicates risk for a heart attack in 10 years, and the need for primary care & prevention.

☐ **Metabolic Syndrome** (MetS) substantially increases risk for CVD. It is a constellation of symptoms that must include **insulin resistance** (and type 2 diabetes) plus at least 2 of the following: stage 1 HTN, elevated TG, low HDL, abdominal / central obesity (visceral fat), and albuminuria. ‘

☐ **BMI/ Obesity.** Obesity per waist-to-hip ration is highly associated with CVD. BMI > 25 is associated with a number of conditions including CVD. The more overweight, the higher the risk for hypertension. Significant amount of fat loss even unnaturally [e.g. bariatric surgery] has major effect upon normalizing blood pressure.

TESTS

- **Ophthalmic**. Cotton wool spots, papilloedema [loss of the optic disc]; flame hemorrhages & hard exudates, and retinal detachment are markers of Chronic Hypertension.

- **EKG.** S4 heard with the bell of the stethoscope at the apex of the heart with patient in the left lateral decubitus position. S4 is an extra sound occurring right before S1 and sounds like galloping. The apical PMI feels strong but diffused when the patient remains in left lateral decubitus. S4 indicates that the patient is starting to develop problems from the hypertension. ST segments should normally be totally horizontal. A **scooped out** appearance indicates heart stress and **left ventricular hypertrophy**. ***Atrial fibrillation*** Stroke Risk Score chadsvasc.org

- **Vascular Ultrasounds** identify secondary causes of hypertension. A **Cardiac Ultrasound** for those with a smoking history identifies atherosclerotisis in the distal portion of the aorta that can lead to hypertension with symptoms of erectile dysfunction or claudication symptoms upon ambulation. It is of paramount importance in the pediatrics to rule out a coarctation of the aorta [occlusion just distal to the left subclavian artery]. The PE will reveal a pulse discrepancy - *left femoral artery pulse would occur later than left brachial artery, and is indication for a MRA [magnetic resonance angiogram] looking for occlusion in that segment of the aorta*. Coarctation can be detected in persons in their 20s, 30s and even 40s.

  A **Renal Ultrasound** rules out Renal Stenosis→ renal occlusive disease -> prone to develop hypertension. Rarely you can hear a renal artery bruit by listening with the diaphragm of a stethoscope on the flank region, over the renal artery bilaterally. Otherwise it requires an ultrasound, CT angiogram or an MRA to diagnose. Renal Stenosis is a secondary cause of hypertension. However, fixing renal blockages with angioplasty and stents does not appear to have any significant benefit.

- **Echocardiogram**. This is a cross-section / short axis were ventricular thickening and radiodensity is apparent. The ventricle may contract very well but not relax well → **shortness of breath, congestive heart failure** / diastolic heart failure and dysfunction.

- **Neurological:** Hypertension in late life increases the risk of dementia

Functional Medicine Evaluation & Management of Hypertension & CVD/CAD

Never push with pharmaceuticals *or* natural remedies to the point of hypotension or adverse reactions. It is more dangerous for someone to pass out and hit their head, break a bone, injure themselves. A systolic measurement of 200 over a diastolic measurement of 110- 120 requires urgent pharmaceuticals or Emergency room intervention, especially if symptomatic: chest discomfort, shortness of breath, headaches, dizziness, numbness & tingling, weaknesses. Otherwise, there is plenty of time for holistic therapies to prevent to end organ damage: eyes/ blindness, kidney/ renal failure, heart/heart attacks, Brain/strokes.

FM RED FLAGS

- Total liver toxic load/ detox compromise
- Heavy metal toxicity: cadmium, mercury, lead
- Liver/biliary stasis
- Hyper/hypo adrenals
- Nutrient imbalance/deficiency: Magnesium, Taurine, sodium/ potassium, calcium/ phosphorous, magnesium
- Antioxidants deficiency/ oxidative stress
- Insulin burden
- Emotional & Structural stress- *Vertebral mis-alignment*
- Thyroid dysfunction
- Dehydration
- Sex Hormone imbalance: high female hormone burden or low male testosterone
- Fatty Acid Imbalance
- Chronic inflammation/ Heavy immune system burden

FM REVIEW OF SYSTEMS FOCUSES IN ON THESE COMPLAINTS:

- Headaches over the eyes, dizziness, tinnitus, blurry/loss of vision, syncope.
- Bloated after meals
- Nausea after taking supplements
- Dry skin, itchy feet
- Recovering alcoholic
- Sensitive to chemicals and car exhaust
- Chronic hemorrhoids
- History of dental/periodontal problems
- Calf test cramping at rest [abnormal if < 210 elicits pain/ cramp] = mineral dysregualtion]
- Chocolate craving [magnesium deficiency]
- Feet have strong odor [magnesium deficiency]
- Restless legs [magnesium deficiency]
- Liver/gallbladder problems
- Multiple stomach, small & large intestine complaints.
- ***TCM****: Coated tongue, kidney yin deficiency, Dark circles under the eyes, liver congestions, Bizarre, vivid dreams/disturbed sleep at 11 to 1a am, night sweats*

FM LABS: see below

IDENTIFY RISK FACTORS & NON-MANAGEMENT:

- ***AGE, HDL, Testosterone & HgbA1c*** *are THE most important independent risk factors for the severity of coronary occlusion.*
- **Non-Modifiable Risk Factors: Age**, gender, ethnicity, family history
- **Modifiable Risk Factors:**
    - **Lifestyle Choices:** Alcohol use/abuse, Smoking, Sedentary, stress.
    - **Dyslipidemias:** Blood Lipid / Lipoproteins [see Standard labs, and VAP technology]
    - **High HbgA1C** [4.5- 5.7. 0ptimal is <4.5. <4.0 means risk for hypoglycemic episodes]. It is an INDEPENDENT RISK FACTOR with or without DIABETES. The greater above 4.5 the greater the

likelihood of suffering from a heart attack, *even in non-diabetic*

- **Low Free Testosterone** [M 6.6 - 26.5, 15-26.5 is optimal. F 1.4 -2.2]. In men, Free Testosterone protects against abdominal obesity, mental depression, and CVD. Low testosterone may increase glycation processes in vessels→ 3.5 x greater thickening of the intimal lining of the carotid artery [stroke risk], poor vasodilatation d/t low nitric oxide. *Testosterone is an anabolic steroid produced by the adrenals, ovaries, testes. It builds muscle tissues, improves arterial dilation, cardiac output, decreases pro-inflammatory IL & cytokines; and increases anti-inflammatory cytokines IL10. Less than 2% is free (bioavailable), 50% binds to SBHG, and the remainder binds to albumin.*

EVALUATE DIET & LIFESTYLE

☐ **Breastfeeding** is associated with lowering of blood pressure in children, and decreases the risk of cardiovascular disease. We know that moms who breastfeed have a lower risk of cardiovascular disease.

☐ **Paleolithic or Mediterranean Diet.** The Paleo diet focuses on vegetables – organic, and local & free range grass-fed animals. Benefits blood pressure, dysglycemia/ insulin resistance, and lipid profiles. Those who eat the most vegetables & fruit have 1/4th of the risk of hypertension. Mediterranean diet lowers blood pressure, and there is plenty of literature demonstrating that the Paleo diet trumps it. The downfall of the Mediterranean diet is all the breads/carbs and dairy. **Seasonal Fruits & Veggies.** Our Paleo ancestors had fruit on a seasonal basis when fruit would turn ripe. When fruit ripen regionally in August-September-October it enables storage of fat in preparation for the lean winter months.

☐ **Reduce Added Salt & Sugar.** Added sugar → 8% increased risk in hypertension. High fructose corn syrup [a sweetener in everything now] should be completely eliminated from the diet for reason too numerous to list- *namely a greater propensity for causing obesity!* **Unrefined salt is better than Morton's *refined* iodized salt**. It contains beneficial minerals that balance out the 93% sodium chloride and is beneficial for mineral deficient-type hypertension. EKG findings may quickly normalize once *added refined salt* is removed from the diet.

☐ **Manage Chronic Pain**. Pain increases sympathetic output → high blood pressure, the retention of sodium, the release of reninangiotensin and the aldosterone phases. Some pain is autoimmune in nature and may be due to gluten, dairy, soy, or corn sensitivity or intolerance. Glyphosate is in herbicides like Round-up can be a major culprit.

☐ **Manage Stress:**

- **Sleep**. At least 7 hours of good sleep is extremely important for blood pressure control, preferably 8 hours for the majority of people. Young women who get less than 5 hours of sleep or less have 8 times the stroke risk as a woman who is getting 8 hours of sleep with all other risk factors being equal. *Go to sleep at sunset and awake with dawn.*
- **Massage Therapy** lowers blood pressure by lowering stress. Stress shunts the metabolic pathway towards the formation of aldosterone → sodium & fluid retention→ hypertension. [Journal of Human Hypertension 2015].
- **" Heart Math Transcendental Meditation"** *(www.heartmath.com)* 20" 2 x daily.

☐ **Weight Management:**

Food-combining (google a chart) + **eliminating high fructose corn syrup** (read ingredients labels) are the 2 quickest & cheapest ways to reduce visceral fat. *Visceral Fat cells/Adipocytes create these harmful pathways:*

- Increase **Leptin** → stimulates brain to increase sympathetic tone → hypertension.
- Decrease **Adiponectin** → decreased insulin sensitivity → vessel inflammation→ endothelial dysfunction→ arterial stiffness → hypertension.
- Increase **inflammatory markers**, **blood clotting**, **oxidized free fatty acids** → sodium & fluid reabsorption by kidney→ hypertension.

RULE OUT HEAVY METAL (HM) TOXICITY
HMs are associated with hypertension risk- especially cadmium, mercury, and lead (commonly elevated in HTN).

- **Vanderbilt University School of Medicine**- Heavy metal toxicity, especially mercury & cadmium, should be evaluated in any patient with hypertension, CHD, or other vascular disease. The clinical consequences of mercury toxicity include hypertension, CHD, MI, increased carotid IMT and obstruction, CVA, generalized atherosclerosis, and renal dysfunction with proteinuria.

- **Department of Molecular Biomedicine, México**- Low-level chronic lead exposure can produce hypertension and endothelial dysfunction.

- **School of Medicine, University of California**, **San Francisco**- Higher levels of lead accumulation have been shown to predict elevated risks of chronic disease such as hypertension

- **University of Kuopio, Finland**- High intake of mercury from non-fatty freshwater fish and the consequent accumulation of mercury in the body are associated with risk of acute myocardial infarction, and death from CHD.

☐ **Reduce heavy metal exposures**

☐ **Chelation Therapies that are safe & sound to do *without* professional consultation:**
- Chlorella– Cilantro herbal protocol or Chlorella-Cilantro Extract by Source Naturals (Swanson)
- Zeolite (Amazon)

☐ **Chelation Therapies requiring professional administration or consultation:**
Functional Medicine IV chelation (see Integrative Family Wellness Center, NM)
Suppositories:
- Detoxamin www.detoxamin.com.au/global-store
- Kelatox EDTA, RemedyLink Medicardium EDTA, VitaTox EDTA www.drvitaminsolutions.com

RULE OUT / TREAT C. *PNEUMONIAE*, H. *PYLORI*, STREP A, CMV, COXSACKIE)
Many infectious agents are involved in the development of atherosclerosis. A significant association between infectious burden and the extent of atherosclerosis exists. Moreover, the risk for future death was increased by the number of infectious pathogens, especially in patients with advanced atherosclerosis.

- **Johannes Gutenberg University Mainz, Germany**- Our results support the hypothesis that infectious agents are involved in the development of atherosclerosis. We showed a significant association between infectious burden and the extent of atherosclerosis. Moreover, the risk for future death was increased by the number of infectious pathogens, especially in patients with advanced atherosclerosis.

- **School of Pharmacy, University of Missouri**- C. pneumoniae antibodies are found in approximately 50% of middle-aged adults world-wide. These antibodies have been detected in atherosclerotic tissue and have been linked to increased risk of cardiovascular events.

- **BMJ**- Both H. pylori and C. pneumoniae infections are associated with coronary heart disease." Patel P, Mendall MA, et al. Association of Helicobacter pylori and Chlamydia pneumoniae infections with coronary heart disease and cardiovascular risk factors. BMJ. 1995 Sep 16;311(7007):711-4. Erratum in: BMJ 1995 Oct 14;311(7011):985.

☐ **Chinese Herbal Therapy to include:**
- **Anti COX B3-** honeysuckle
- **Anti-COX A type 16** – Field mint
- **CMV:** Frankincense**.** *Heat toxin* - bidens, centella, euonymus, forsythia, scutallaria, lemon verbena. *Summer Heat* – elsholtzia. *Antiinfammatory/Astringent* – terminalia, he zi. *Warm interior* – clove
- **H-pylori**- see protocol
- **Strep A-**

RULE OUT / PREVENT END-ORGAN DAMAGE

- ☐ **Modified Citrus Pectin**: lower galectin-3 levels and has renal protective effect. Is a marker of fibrotic heart tissue changes, and hypertensive cardiomyopathy.

- ☐ **Hawthorn (berry & flower)** has some blood pressure control benefits with long-term use over several months to remodel heart tissue. See Shan zha (Chinese Hawthorne fruit) below.

RULE OUT / PREVENT VASCULAR INFLAMMATORY DAMAGE from affecting 3 cell types: *endothelial, smooth muscle, immune cells*.

- ☐ **Enhance Nitric oxide production→** vasodilatation, suppresses smooth muscle over proliferation, and lesion formation. Nutrients that support NO are:
  - **Beetroot powder** 1 heaping tsp 2 x daily + ½ tsp of **Taurine powder** 2 x daily for hypertension. Beetroot powder and arugula are a phenomenal direct source of nitrate.
  - **Pomegranate powder** helps prevents the destruction of nitric oxide.

RULE OUT NUTRIENT DEFICIENCIES (especially Taurine & Magnesium, L-arginine & L-citrulline)

- ☐ **Taurine Powder 3 to 6 gm 2 x daily.** An amino acid with good quality literature for reducing BP, with other cardiovascular benefit [Designs for Health brand].

- ☐ **Magnesium**. Lowers systolic blood pressure on average 3 to 4 points and diastolic 2 to 3 points [European Journal of Clinical Nutrition]. Serum levels are not reflective of what is inside of the cells. Factors such as heavy metals, BPA and pollutants etc. blocking nutrients such as magnesium from getting inside the cells. **Signs of Magnesium *deficiency* per NAQ test**: Cramp in legs at rest (+3), Crave chocolate (+2), Feet have strong odor (+2), Restless legs. Topical magnesium spray dose not cause loose stools (purchase from www.solomnsseal.net). Food source of calcium and magnesium is black sesame seeds (sprouted will not cause loose stools)

- ☐ **L-arginine** & **L-citrulline** have excellent blood pressure reducing capabilities. The conversion of L-arginine into nitric oxide diminishes with age. L-citrulline is very easily absorbed and converted into L-arginine and then into nitric oxide.

- ☐ **Potassium**. Supplements and potassium-rich foods help reduce BP. Avocados are a wonderful source. 1/2 banana daily to replenish potassium depletion from non-potassium-sparing diuretics such as Lasix.

- ☐ **Vitamin K2** highly anti-atherosclerotic prevents deposition of plaque in vessels, and hardening of the arteries.

- ☐ **B vitamins:** See B Vitamin- *Stress Tabs*!

EVALUATE ESSENTIAL FATTY ACID BALANCE

- ☐ **Fish Oil** [DHA & EPA dose by condition]:
  - **Reduced Overall Mortality In Patients With CHD**: 0.3 - 6 gm of EPA + 0.6 to 3.7 gm DHA daily.
  - **Atrial Fibrillation: B**aked or broiled cold-water fish such as salmon and tuna 1+ times weekly was shown to reduce the risk for atrial fibrillation in patients aged 65 or older compared to consuming fish 1 time monthly or less. *There was No Benefit From Eating Fried Fish Or a fast-food Fish Sandwich*.
  - **Arteriosclerosis, Preventing & Reversing the Progression of**: 6 gm daily of fish oil x 3 months, followed by 3 gm daily maintenance + garlic powder 900-1200mg daily has been used to lower total cholesterol, LDL, and TG.
  - **Coronary Bypass Surgery, To Keep Veins Open After**: 4 gm Fish Oil providing 2.04 gm of EPA & 1.3 gms of DHA.
  - **High Blood Pressure**: 4 gm Fish Oil daily providing 2.04 gm of EPA + 1.4 gm of DHA.
  - **High TG**: Fish Oil 1- 4 gm daily
  - **High TG + Cholesterol**: Fish Oil providing 1800 to 2160 mg of EPA & 1200-1440 mg of DHA daily

EVALUATE ANTIOXIDANT STATUS

- ☐ ***Mixed*-favanoids + Cartenoids** are in brightly-pigmented foods such as carrots, beets, bell pepper ect.

- ☐ **Vitamin E/ Tocotrienols.** Vitamin E is made up of 4 Tocopherols (alpha, beta, gamma, delta) and 4 Tocotrienols (alpha, beta, gamma, delta). The difference between them is the structure of the molecules. Both protect against stroke-induced injury, and decrease progression of white matter lesions in vessels of the brain. But it is the **Tocotrienols** that may reverse arterial blockage, and prevent the progression of vascular wall changes in Diabetics. ***DOSE***: There is no RDA, so the estimated doses is **120 mg / kg** of body weight daily for males and **130 mg / kg** daily for females. Synthetic Tocotrienol is not commonly available, so use a vitamin E supplement and ***food sources*** (palm fruit, rice, wheat, barley, rye, and oats).

- ☐ **Queracetin** benefits the liver's role in hypertension

- ☐ **Other** _____

EVALUATE TOTAL TOXIC LOAD ON LIVER

- ☐ **Reduce Air Pollution Exposure** → higher risk of hypertension. Air filtration system, and air purifier → improvements in blood pressure and markers of inflammation.
- ☐ **Reduce BPA Exposure** [Plastics]. Associated with hypertension, and heart attack risk.

IMPROVE LIPID PROFILE WITH CHINESE MEDICINE

Prescribed based upon your constitution & presentation. Bedtime doses because cholesterol is synthesized at night

- ☐ **Sea Vegetables/ Seaweeds** first line for stage 1 HTN, mineral rich with minor detox & chelating affect.
- ☐ **Xuan Shen** for mild to moderate HTN. Takes approximately 3 months to see affect.
- ☐ **Elevated LDL**: shan zha, tea, jie geng, sanqi, cassia,
- ☐ **Elevated VLDL**: shan zha
- ☐ **Elevated TG**: shan zha, rou gui, aloe vera, lychii, fenugreek
- ☐ **Elevated T Chol**: shan zha, tea, rou gui, aloe vera, ginger, lychii, reishi, fenugreek, sanqi, pumpkin, ge gen, Chinese willow, cassia.
- ☐ **Low HDL**: tea, rou gui, ginger, reishi, lychii,
- ☐ **GI fat Absorption**: jie geng
- ☐ **Teas**: **Oolong** [neutral], **Black** [warming], or **Green** [cooling] after meals to facilitate the digestion of fats.
- ☐ **Shan Zha** digestion of fats & carbohydrates [as a beverage soaked in wine ≈ jiu]
- ☐ **Apple Cider Vinegar** sour flavor guides to the LV - place of lipid metabolism.
- ☐ **Berberine**. A chemical constituent in many plants. Helps with lipids also helps with blood sugar control and improves insulin sensitivity. It increases hepatic LDL receptors, which clear LDL out of circulation. *Cautions with preexisting CVD*.
- ☐ **Xuan Duan/ Garlic**. Lowers blood pressure, helps clear oxidized or damaged LDLs, reduce plaque formation, increase fibrynolitic activity. It is has anti-platelet, and has some HM chelating properties.

Be Well! Dr. Lori

Call me with any questions or concerns about your treatment plan & products 806-268-4894

FUNCTIONAL MEDICNE LAB TESTING

Standard Functional Medicine Tests:

☐ **Urinalysis**: proteinuria from long-standing hypertension, especially if high Indican & ESR, and Mild UTI on dipstick
☐ **CBC** with differential
- **Elevated Fasting glucose** [optimally is 65-99, normal is 80-90].
- **Elevated Fasting insulin** [6-27, optimal is <5. Over weight is 27.3/F, 27.8/M, above 15 is significant].

☐ **Liver Panel**: low albumin is suggestive of liver toxicity/oxidative stress
☐ **Metabolic / Lipid Profile**.
- **Triglycerides/TG** -rich particles are strongly linked with atherosclerosis, insulin resistance and diabetes. Elevated **uric acid** [antioxidant] occurs in ¾ of patients with elevated TG
- **Cholesterol /Total Cholesterol [180-240].** Below 180 → risk for hemorrhagic stroke, depression, and suicide. >240 → risk for CVD, and ischemic stroke. In those above 70 years old, cholesterol elevation and CV events poorly correlate- *50% who had an MI had normal cholesterol*!
- **LDL** transports cholesterol and other fatty acids from the liver → peripheral cells for metabolism, or it becomes atherosclerotic plaque. As LDL increases, HDL decreases. LDL elevation is a greater risk factors for CVD than high cholesterol. ***Small LDL particles*** is a different measurement than LDL.
- **HDL [<40/M, < 45/F, <60 is significant]** transports cholesterol and other fatty acids from peripherals cells or atherosclerotic plaque→ to liver for metabolism into bile salts.

Since a standard Lipid panel captures only 40% of those with CAD, a Functional Medicine (FM) practitioners evaluates the relationship of the above references ranges to one another in order to determine CV "Risk" and if additional specialty testing (e.g. lipoprotein subclasses) is warranted (see below):

- **Tchol** low + low **HDL** → NOT Risky
- **HDL** < 25% of **Tchol** → increased TG & LDL→ **Risky**
- **TG** high + high **cholesterol** → Risky
- **TG** higher than **Tchol** + low **HDL** → Risky
- **Tchol** high + low **HDL** → very Risky→ strong independent marker for atherosclerotic heart disease

Add- Ons for Pre existing CVD/ CAD, or HTN

☐ **CRP** [0-3M/F, optimal is <0.55M and 1.5/F]. Lowering CRP [with or without lower LDL] significantly lowers the risk for MI, and slows progression of atherosclerosis. Reducing CRP cuts heart attack risk and slows the progression of atherosclerosis. It is a greater risk factor than cholesterol in predicting MI and stroke. CRP is produced in the liver in response to IL6 inflammatory cytokine. It is elevated by high fat & high glycemic index diet, infections such as periodontal disease (which doubles the CV risk), smoking, HTN, oral contraceptives/ HRT use.
- **CRP** 3-20 = Acute infection/inflammation range
- **hsCRP** Chronic infection/ inflammation

☐ **Fibrinogen [193-423, 200-300 is optimal**]. One of the best markers of CV risk. Major blood clotting protein that is acute phase reactant [increasing in response to inflammation, injury & stress] → fibrinogen + thrombin + calcium → fibrin clot formation [fibrin, PLTS, blood, plasma]. Elevated with inflammation or tissue destruction→ increases the risk for clots. Injured endothelium converts fibrinogen into fibrin as well. Fibrinogen can lead to plaque with or without clot formation. Decreases blood flow, promotes platelet aggregation and clot formation, binds to LDL and promotes the proliferation of smooth muscle of vessels. Also check if at risk for CRC.

☐ **Homocysteine [4.3- 15.3/M, 3.3-11.6/F, optimal is <7.2, 9- 15**. Elevation doubles mortality rate, and a 25% increased risk of CVD. Causes endothelium dysfunction→ increases the risk for CVD, CRC, cervical cancer, and depression, Alzheimer's. In general a better marker of greater risk factor for stroke. Caused by B12, B6, folate deficiency, or a MTHFR enzyme defect, age and kidney→ impaired incomplete metabolism in the methylation cycle.

☐ **Hypochlorhydria Screen** [digestive dysfunction]:increased globulins, Increased BUN, Decreased calcium & phosphorous [problem with minerals], Increased MCV

☐ **Pro-BNP** /Brain Natriuretic Peptide [HD Labs], a hormone released from the heart under high pressures. Originally discovered in the brain but BNP.

☐ **Galectin-3** is a marker of heart fibrotic tissue changes, and hypertensive cardiomyopathy

☐ **Sleep Apnea Study**. Anyone with significant hypertension should have a questionnaire or questions related to sleep apnea, and a sleep study to confirm. The mask ventilation can be very helpful in treating these people.

☐ **Methylation / Genetics SNPs.** Those with MTHFR 677, 1298 genetic SNPs should be on methylated B vitamins supplementation to help control their blood pressure.

☐ **High Aldosterone** levels from an adrenal secreting tumor [very high BPs]

☐ **24-Hour Urine**
- ACTH, cortisol or aldosterone elevation due to Cushing's disease, or ACTH-releasing pituitary tumor
- Metanephrines from pheochromocytoma
- Urine protein spillage (end-organ renal damage from HTN)

<u>Specialty Functional Medicine Labs for CVD</u>

☐ **IgM→IgG Antibodies for Bacterial & Viral Infections** (Chlamydia, strep A, H Pylori, CMV, Coxsackie virus, C. pneumonia).

☐ **Toxic Element Profile** (mercury, cadmium, lead)

☐ **Cardiovascular Health Profile [MetaMetrix]** Cholesterol, LP, TG, fibrinogen, CRP, homocysteine, lipid peroxides, vitamin E, magnesium, CoQ10, insulin, total testosterone, free androgen index, SHBG, ferritin.

☐ **Cardio ION Test [MetaMetrix]** *Cardiovascular Health Profile PLUS*

- Lipoprotein Factors & Ratios/ Lipid fractionation
- Chronic Inflammatory Markers: CRP, *Ferritin, Fibrinogen, c-Reactive Protein (HS)*
- Oxidant Stress Factors/ Anti Oxidant status
- Serum vitamin D & fatty acids
- Essential Amino Acids
- RBC Nutrient & Toxic Elements
- Fatty Acids – Plasma
- Organix Comprehensive – Urine organic acid
- Compounds of bacterial or yeast/fungal

☐ **VAP [vertical auto profile] or Genova Diagnostics Comprehensive Cardiac Profile 2.0**

- **Lipoprotein** & **Lipid Subclasses** (see below)
- **Ferratin** [30-80] a measure of iron deficiency or iron overload. When all other Iron studies are normal, an elevated ferritin indicates inflammation and serves as a marker for CV health.
- **CRP** see above
- **Fibrinogen** see above
- **Homocyctein** see above
- **HbgA1c, Fasting insulin, Glucose** (see above)

☐ **Lipoprotein & Blood Lipid Subclasses** increase or decrease CV risk. For example, a normal LDL of 140 is good or bad depending on the ratios of the subclasses. Recommended for any patient with a family history of heart disease, type II diabetes; at high risk for heart disease; have already had a heart attack, stroke, angina, or heart cath.

- **HDL2** >10 most protective, tendency towards insulin resistance.
- **HDL3** >30 least protective
- **LDL** <100 [*measured* not calculated]
- **LDL** particle density [density determines CVD risk]
    - **Intermediate density lipoprotein/ IDL**. Associated with a family history of diabetes, atherosclerosis, and insulin resistance. <20 can slow minor atherosclerotic damage to vessels.
    - **Very low-density lipoproteins**: **VLDL1 & 2** <20 are least dense and least atherosclerogenic of the lipid-carrying molecules. But they do contain apo-B thus contribute to CVD risk.
    - **Very low-density lipoproteins/ VLDL3** <10 is atheroclerogenic and **Most Risky** in patients with elevated **TG**.

- **LP** [size & density ratio patterns]
    - **Pattern A**: large & less dense is **Low Risk**
    - **Pattern B**: small & dense is **Risky**. **3x Risk** of an MI, and **6 x Risk** if paired with elevated cholesterol, and CRP. Also associated with diabetes, PCOS, and IR.

- **Lipoprotein(a)/ Lp(a)** <10 is a **High/Strong Risk** factor for CVD, stroke, thrombi, and AMI. Statins have no effect on this marker, while Niacin and aspirin have a good effect in some individuals.