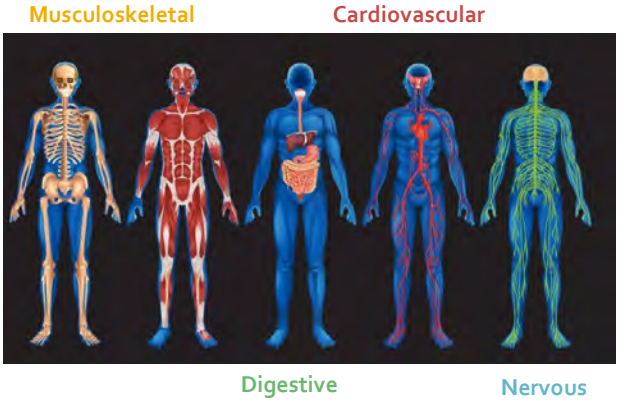
Chad Oler, ND

WCA 48 Hr Nutrition Certification Module 3: Day 2

1

Health Conditions By System



2

Cardiovascular Conditions

Dyslipidemia
Hypertension
Insulin Resistance (Covered in Endocrine section)

3

Cardiovascular Disease (CVD)

- Leading cause of death in US & globally
- In US, over 835,000 deaths/year
  - 1 of every 3 deaths in US
  - 2300 people die of CVD *every day*
  - Average of *1 death every 38 seconds*
- 1 in 2 Americans over 65 have CVD
- AND it's mostly preventable
  - You just need the right keys

Woolf SH, Aron L. US health in international perspective: Shorter lives, poorer health: National Academies Press; 2013.
Estruch R, et al. Primary prevention of cardiovascular disease with a Mediterranean die. New Eng J Med. 2013;368:1279-1290.
Burke LE, et al. Compliance with cardiovascular disease prevention strategies: a review of the research. Annals of Behav Med. 1997;19:239-263.
Shanthi Mendis; Pekka Puska; Bo Norrving; World Health Organization (2011). Global Atlas on Cardiovascular Disease Prevention and Control (PDF). World Health Organization in collaboration with the World Heart Federation and the World Stroke Organization. pp. 3–18.
https://healthmetrics.heart.org/wp-content/uploads/2018/02/At-A-Glance-Heart-Disease-and-Stroke-Statistics-2018.pdf

4

Cardiovascular Disease

Fat clogging the arteries

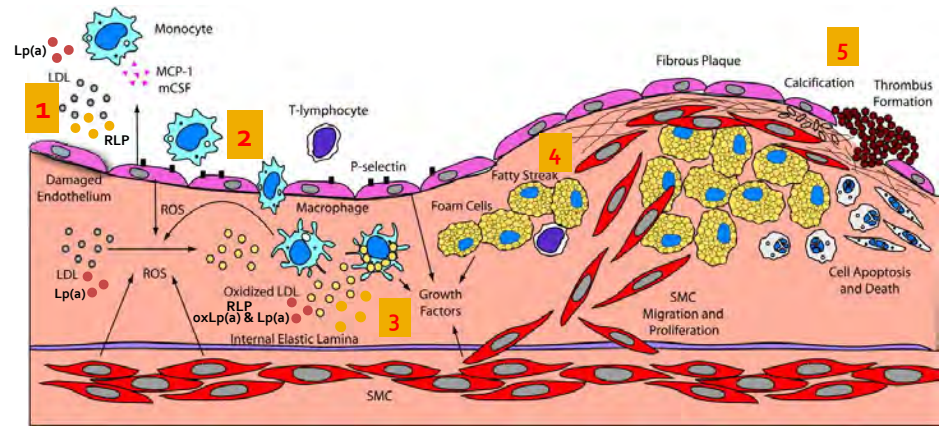
5

Cardiovascular Disease

Its more like a volcanic eruption

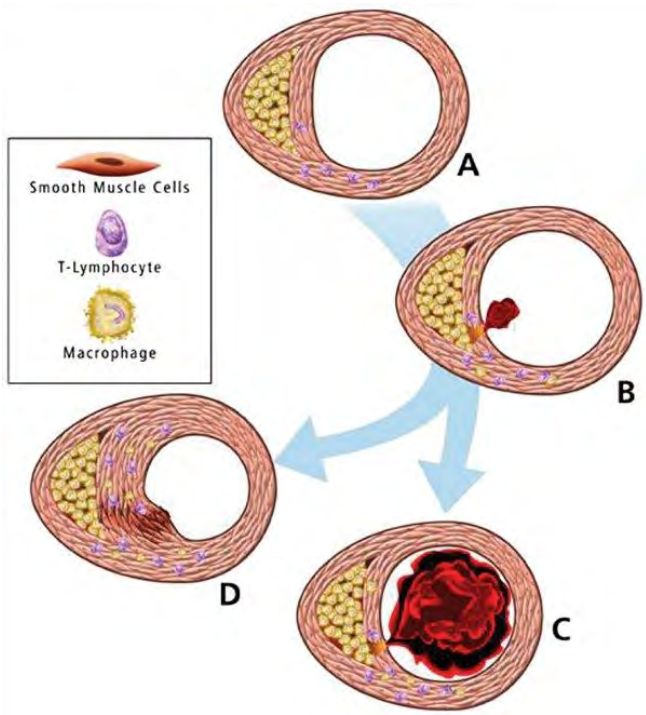
6

Atherosclerosis Development



Madamanchi NR, Vendrov A, Runge MS. Oxidative Stress and Vascular Disease. Arteriosclerosis, Thrombosis, and Vascular Biology. 2005;25:29-38.

7



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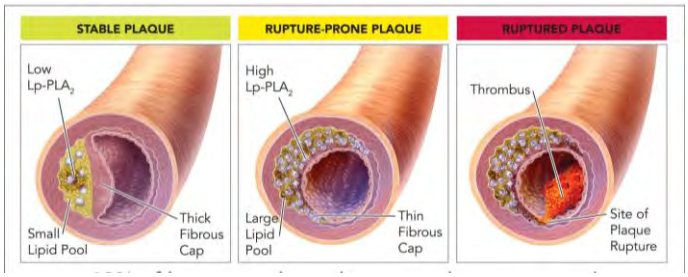
The Primary Cause of Death Due to CVD



- 68% of heart attacks and most strokes are caused by *plaque rupture and thrombosis*, NOT stenosis

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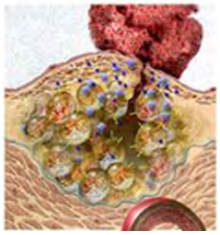
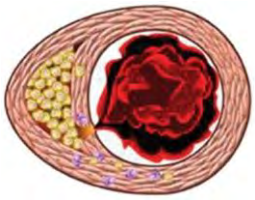
Cardiovascular Disease





- Many factors lead to this eruption
- You have control over most of them

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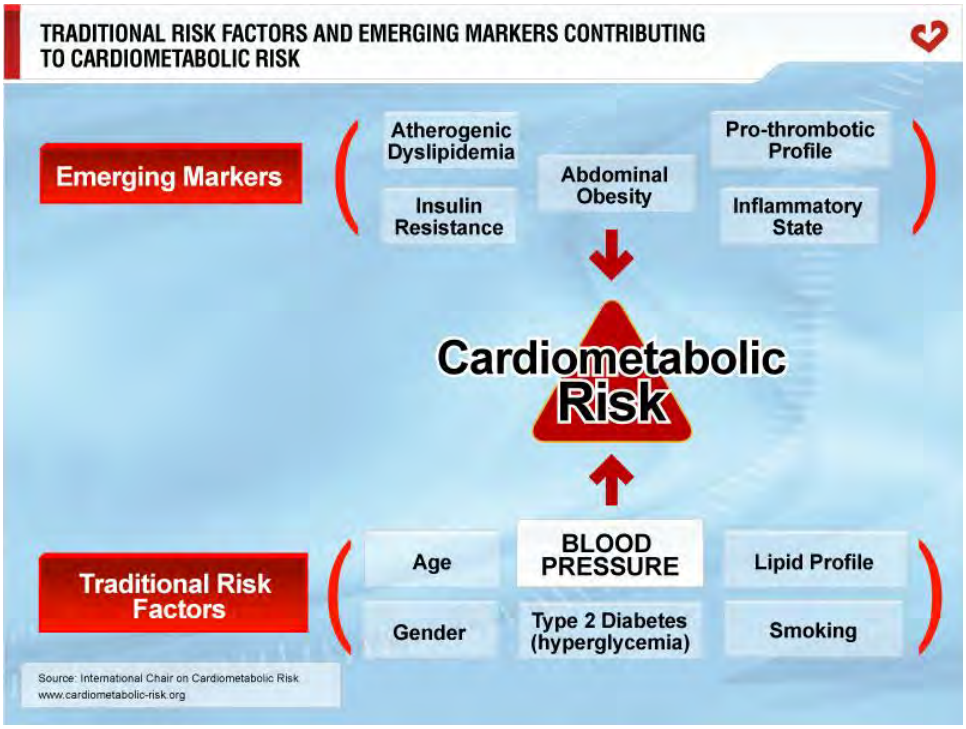
TRADITIONAL RISK FACTORS AND EMERGING MARKERS CONTRIBUTING TO CARDIOMETABOLIC RISK
Emerging Markers
Atherogenic Dyslipidemia
Insulin Resistance
Abdominal Obesity
Pro-thrombotic Profile
Inflammatory State
Cardiometabolic Risk
Traditional Risk Factors
Age
Gender
BLOOD PRESSURE
Type 2 Diabetes (hyperglycemia)
Lipid Profile
Smoking
Source: International Chair on Cardiometabolic Risk
www.cardiometabolic-risk.org

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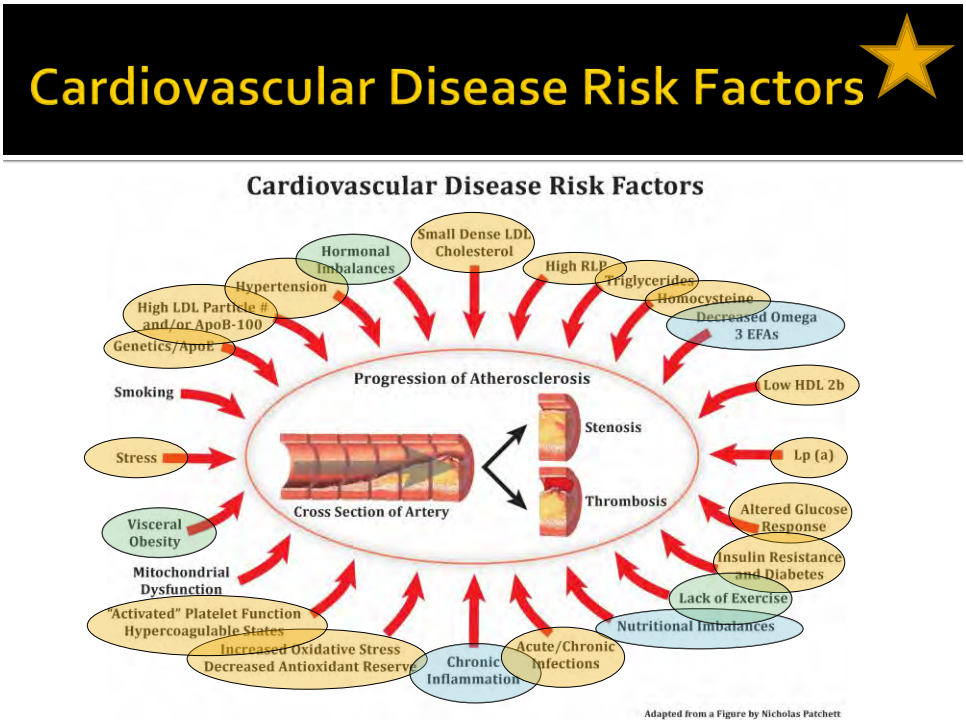
Cardiovascular Disease Risk Factors
Cardiovascular Disease Risk Factors
Small Dense LDL Cholesterol
Hormonal Imbalances
High RLP
Triglycerides
Homocysteine
Hypertension
High LDL Particle # and/or ApoB-100
Genetics/ApoE
Decreased Omega 3 EFAs
Smoking
Low HDL 2b
Progression of Atherosclerosis
Stenosis
Stress
Lp (a)
Thrombosis
Cross Section of Artery
Altered Glucose Response
Visceral Obesity
Insulin Resistance and Diabetes
Mitochondrial Dysfunction
Lack of Exercise
"Activated" Platelet Function
Hypercoagulable States
Nutritional Imbalances
Increased Oxidative Stress
Decreased Antioxidant Reserve
Chronic Inflammation
Acute/Chronic Infections
Adapted from a Figure by Nicholas Patchett

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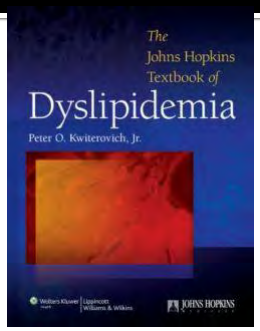
Addressing the Causes

- Dyslipidemia
- High blood pressure
- Blood sugar/insulin resistance



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Fasting Lipid Panel

- Triglycerides
  - A form of fat in blood
  - From diet or made in body from other energy sources
  - When high, deposited in adipose tissue
  - When insulin levels are high, triglyceride metabolism is impaired
  - ➢ Elevated trigs are associated with insulin resistance
  - ➢ Lower sugar, saturated/trans fat and alcohol
- Cholesterol
  - Required for all sex hormone production, cellular membranes and to modulate inflammation
  - Predominantly made by the liver
  - Also a component of atherosclerotic plaque

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Cholesterol Facts

- Cholesterol is a part of every cell membrane
- Cholesterol is a precursor of:
  - Steroid hormones (Estrogens, progesterone, testosterone, cortisol)
  - Bile acids (fat digestion)
  - Vitamin D
- Eating cholesterol has very little impact on cholesterol levels in the body
- Cholesterol problematic when
  - Oxidized
  - LDL small, dense and/or high particle number

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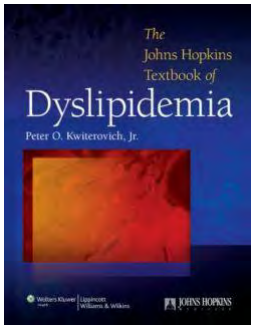
CVD: Dyslipidemia: Assessing Risk

- Standard lipid testing inadequate
  - 50% of people that have heart attacks have "normal" standard lipid markers
- VAP / NMR testing better
- LPP+ Best Option
- Additional tests:
  - Fatty acid bloodspot (Omega 3/6 status)
  - BIA (for progress tracking)



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Fasting Lipid Panel

Component	Your result	Standard range	Units
CHOLESTEROL	126	<200	mg/dL
TRIGLYCERIDE	79	<150	mg/dL
HDL	43	>/=40	mg/dL
LDL CALCULATED	67	<100	mg/dL
CHOLESTEROL/HDL	2.9	<5.0	

LIPID PROFILE

	DESIRABLE	BORDERLINE	HIGH RISK
Cholesterol	<200 mg/dl	200-239 mg/dl	240 mg/dl
Triglycerides	<150 mg/dl	150-199 mg/dl	200-499 mg/dl
HDL cholesterol	60 mg/dl	35-45 mg/dl	<35 mg/dl
LDL cholesterol	60-130 mg/dl	130-159 mg/dl	160-189 mg/dl
Cholesterol/ HDL ratio	4.0	5.0	6.0

- TC = VLDL + LDL + HDL
- Friedewald Equation: VLDL = TG/5
- Calculated LDL = TC – (HDL + TG/5)

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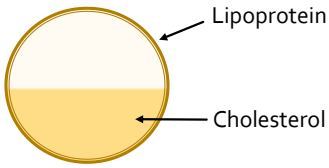
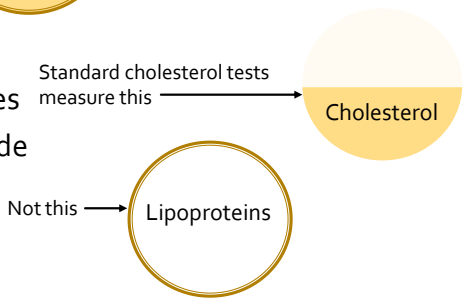
Lipoproteins vs. Cholesterol

- There is a disconnect between cholesterol and lipoproteins



- Standard cholesterol tests
  - Dissociate lipoprotein particles
  - Measures the cholesterol inside
    - Total cholesterol
    - HDL-C



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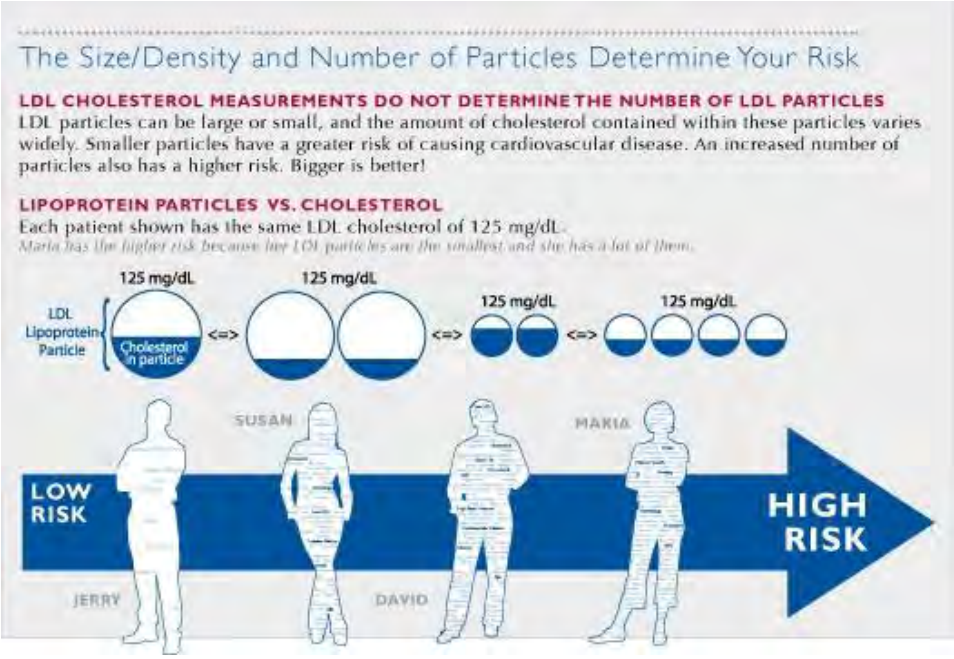
The Size/Density and Number of Particles Determine Your Risk
LDL CHOLESTEROL MEASUREMENTS DO NOT DETERMINE THE NUMBER OF LDL PARTICLES
LDL particles can be large or small, and the amount of cholesterol contained within these particles varies widely. Smaller particles have a greater risk of causing cardiovascular disease. An increased number of particles also has a higher risk. Bigger is better!
LIPOPROTEIN PARTICLES VS. CHOLESTEROL
Each patient shown has the same LDL cholesterol of 125 mg/dL.
Maria has the higher risk because her LDL particles are the smallest and she has a lot of them.
125 mg/dL
125 mg/dL
125 mg/dL
125 mg/dL
LDL Lipoprotein Particle
Cholesterol in particle
<=>
<=>
<=>
SUSAN
MARIA
LOW RISK
HIGH RISK
JERRY
DAVID

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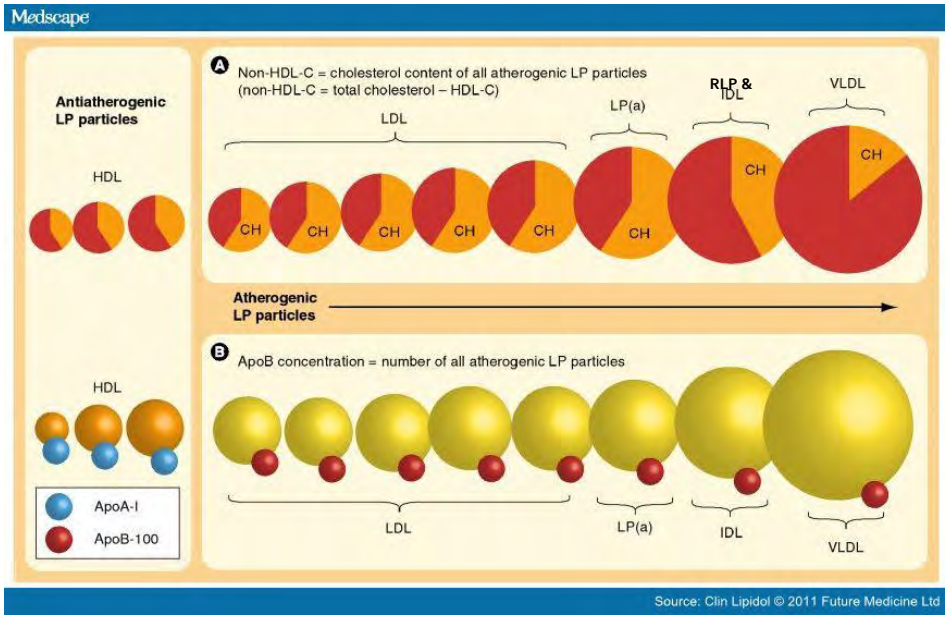
Medscape
Antiatherogenic LP particles
HDL
HDL
ApoA-I
ApoB-100
A
Non-HDL-C = cholesterol content of all atherogenic LP particles
(non-HDL-C = total cholesterol – HDL-C)
LDL
LP(a)
RLP & IDL
VLDL
CH
Atherogenic LP particles
B
ApoB concentration = number of all atherogenic LP particles
LDL
LP(a)
IDL
VLDL
Source: Clin Lipidol © 2011 Future Medicine Ltd

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Risk Factors for CVD

- High Total cholesterol
- High LDL
- Low HDL (Male: < 40 mg/dl; Female: <50 mg/dl)
- High triglycerides (> 150 mg/dl)
- Small, dense LDL (LDL III, LDL IV)
- High Lp(a) (> 30)
- Elevated RLP (Remnant Lipoprotein) (> 150 nmol/L)
- Low HDL2b
- Metabolic syndrome traits (↑ TG, ↓ HDL, ↑ LDLI II, LDL IV)
- High Apo-B-100 (measure of all non-HDL particles)
- High hs-C-Reactive Protein (> 3 mg/L)
- Elevated Insulin (fasting)
- Elevated Homocysteine (> 15 mmol/L)
- High Non-HDL Particle Number and/or high ApoB

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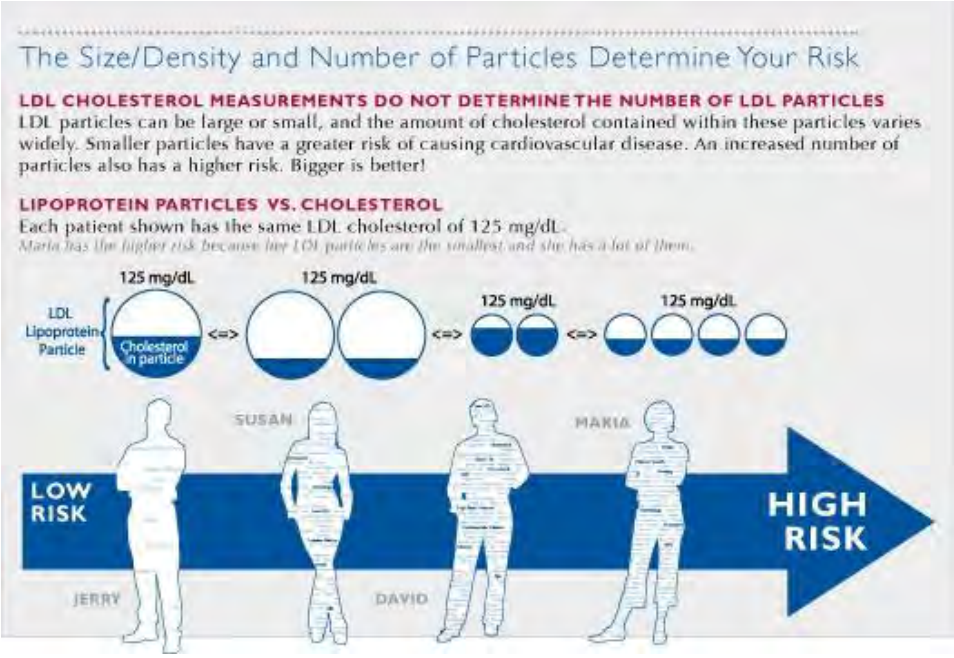

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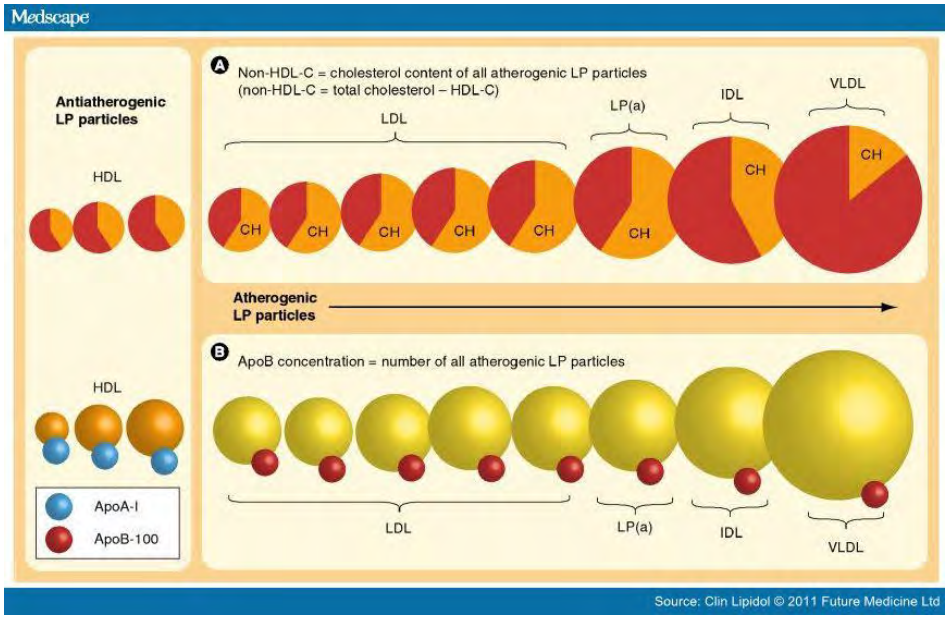
Medscape
Antiatherogenic LP particles
HDL
HDL
ApoA-I
ApoB-100
A Non-HDL-C = cholesterol content of all atherogenic LP particles
(non-HDL-C = total cholesterol – HDL-C)
LDL
LP(a)
IDL
VLDL
CH
Atherogenic LP particles
B ApoB concentration = number of all atherogenic LP particles
LDL
LP(a)
IDL
VLDL
Source: Clin Lipidol © 2011 Future Medicine Ltd

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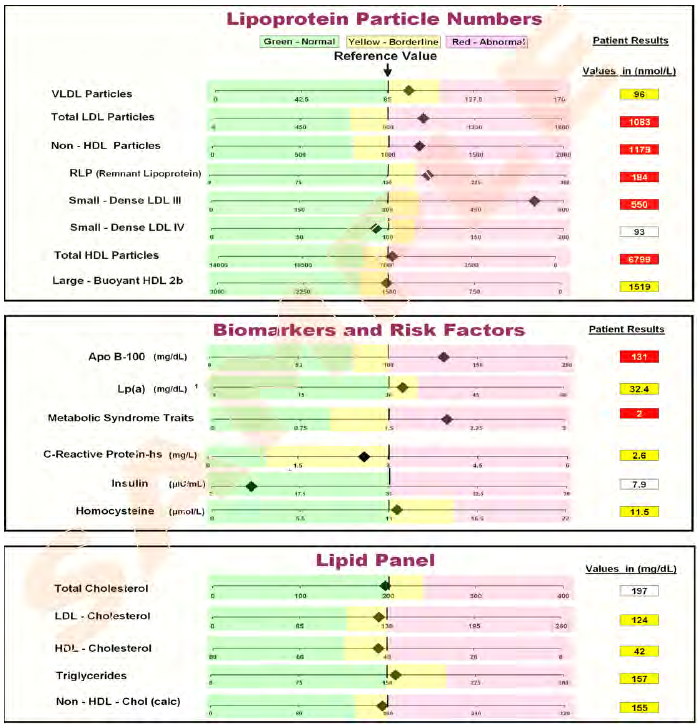
Lipoprotein Particle Numbers
Green - Normal
Yellow - Borderline
Red - Abnormal
Reference Value
Patient Results
Values in (nmol/L)
VLDL Particles 96
Total LDL Particles 1083
Non - HDL Particles 1179
RLP (Remnant Lipoprotein) 184
Small - Dense LDL III 550
Small - Dense LDL IV 93
Total HDL Particles 6799
Large - Buoyant HDL 2b 1519
Biomarkers and Risk Factors
Patient Results
Apo B-100 (mg/dL) 131
Lp(a) (mg/dL) 32.4
Metabolic Syndrome Traits 2
C-Reactive Protein-hs (mg/L) 2.6
Insulin (µIU/mL) 7.9
Homocysteine (µmol/L) 11.5
Lipid Panel
Values in (mg/dL)
Total Cholesterol 197
LDL - Cholesterol 124
HDL - Cholesterol 42
Triglycerides 157
Non - HDL - Chol (calc) 155

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Lipoprotein Particle Numbers (nmol/L)

	Value	Reference Value	Alert (Notes Page 3)
VLDL Particles	99	<85	Borderline High (12)
Total LDL Particles	1085	<900	High (13)
Non - HDL Particles	1179	<1000	High (19)
RLP (Remnant Lipoprotein)	184	<150	High (14)
Small - Dense LDL III	558	<300	High (15)
Small - Dense LDL IV	93	<100	
Total HDL Particles	6799	>7000	Low (17)
Large - Buoyant HDL 2b	1518	>1500	Borderline-M, Low-F (18)

Biomarkers and Risk Factors

	Value	Reference Value	Alert (Notes Page 3)
Apo B-100 (mg/dL)	131	40 - 100	High (20)
Lp(a) (mg/dL)	32.4	6.0 - 29.9 [1]	Borderline (6)
Metabolic Syndrome Traits	2	Zero	Probable (8)
C-Reactive Protein-hs (mg/L)	2.6	<3.0	Borderline (9)
Insulin (uIU/mL)	7.9	4.0 - 35.0	
Homocysteine (umol/L)	11.5	<11.0	Borderline High (11)

Lipid Panel (mg/dL)

	Value	Reference Value	Alert (Notes Page 3)
Total Cholesterol	197	<200	
LDL - Cholesterol	124	40 - 130	Borderline High (2)
HDL - Cholesterol	42	>40	Borderline (3)
Triglycerides	157	30 - 150	Borderline High (4)
Non - HDL- Chol (calc)	155	<160	Borderline (5)

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Who should take the LPP Test?

- All patients, and especially those who:
  - Have a family history of heart disease or diabetes
  - Have been diagnosed with heart disease or diabetes
  - Are already taking cholesterol-lowering medications
  - Have been diagnosed with Metabolic Syndrome (high blood pressure)
  - Are overweight
  - Have high LDL - the bad cholesterol
  - Have low HDL - the good cholesterol
  - Have high triglycerides

If interested in more on CVD and new evidence-based approaches, indicate on Feedback Questionnaire

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Using the LPP+ to Address CVD

- Step 1: Primary Risk Assessment
  - High non-HDL particle number & Apo B
  - Moderate/high Triglycerides
- Step 2: Modify risk using Metabolic syndrome traits, Lp(a) & hs-CRP
  - Combine metabolic syndrome traits from LPP with blood pressure, obesity (WC/BIA) & fasting glucose
    - ↑TG (>150), ↓ HDL (Male: <40; Female: <50), ↑ LDLI II, LDL IV) and/or ↑ fasting insulin = ↑ risk
    - Hypertension (BP > 140/90 or on antihypertensive Rx), obese and/or fasting glucose > 100 (or on glucose modifying Rx) = ↑ risk
  - ↑ Lp(a) and/or ↑ hs-CRP
  - Also consider family Hx, medical Hx and smoking
    - Family/medical Hx CVD or smoking = ↑ risk
  - Use standard Lipid Panel at bottom to compare with previous labs
- Step 3: Determine Therapeutic Approach
  - Refer to LPP Therapeutic Guidelines

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LPP Lipoprotein Particle Profile™
ADVANCED TESTING FOR CARDIOVASCULAR RISK

Lipoprotein Particle Testing - Therapeutic Guidelines

Lipoprotein Abnormality	Lifestyle Changes (diet & exercise)	Statins	Niacin	Fibrates	Oral Estrogens	Resins	Absorption Inhibitors	Omega-3's EPA & DHA	Alcohol (moderate)
VLDL (Triglycerides)	♥	♥	♥♥	♥♥	×	×	♥	♥♥	■
RLP (IDL)	♥	♥	♥	♥	×	×	♥	♥♥ **	■
LDL I & II Buoyant	♥	♥♥	♥	♥	♥	♥	♥	♥ **	■
LDL III - Dense	♥	♥**	♥♥	♥	♥♥	♥	♥	■	■
LDL IV - or Lp(a)	■	■	♥♥	■	♥	■	■	■	■
HDL 2b - Buoyant	♥♥	♥	♥	♥	♥	■	■	■	♥
HDL 2a & 3	♥	♥	♥♥	♥	♥	■	■	■	♥

♥♥ Therapeutic ♥ Beneficial ■ Little or No Effect × Negative Effect

*These guidelines provide some of the treatment options available to modify abnormal lipoprotein results determined by the LPP™ test.
**SpectraCell Laboratories observed response to treatment.
The National Cholesterol Education Program (NCEP) guidelines provide dosage information on the treatment options.

REFERENCES AVAILABLE ON REVERSE

Visit us at www.spectracell.com or call us at 800.227.5227

SPECTRACELL LABORATORIES
ADVANCED CLINICAL TESTING

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CVD: Dyslipidemia: Recommendations

- Anti-inflammatory diet
  - Deep sea, fatty fish (salmon, tuna, anchovies, herring, mackerel, sardines, trout) 2-3x/week
  - Eat the rainbow
  - 50-75% vegetables and fruit
  - ELIMINATE soda, sugar/white flour (processed foods), fast food, deep fried foods
  - Limit alcohol, red meat, bad fats
  - Lecithin – 1 Tbsp/day

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CVD: Dyslipidemia: Recommendations

- Niacin (nicotinic acid, inositol hexanicotinate)
  - Sustained release: 500 mg-4 grams/day
  - Extensively studied
  - Inhibits free fatty acid release from adipose tissue
  - Controls activity of TG lipase and lipolysis
  - Decrease rate of liver synthesis of LDL & VLDL
  - Increases rate of TG removal from blood
  - Significant ↓ TG, VLDL, LDL, TC, Lp(a)
    - ↓ TG: 20-52%, VLD: 36%, LDL: 8-33%, TC: 8-22%, Lp(a)35%
  - Significantly ↑ HDL: 15-31%

National Cholesterol Education Program. Cholesterol Lowering in the Patient with Coronary Heart Disease. 1997. Available at: http://www.nhlbi.nih.gov/health/prof/heart/chol/chol_low.pdf.
Wolfe ML, Vartanian SF, Ross JL, et al. Safety and effectiveness of Niaspan when added sequentially to a statin for treatment of dyslipidemia. Am J Cardiol 2001;87:476-9.
Grundy, et al. Journal of Lipid Research 1981; 22:24-36.
Luria. Arch Internal Medicine 1988 Nov (148).

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CVD: Dyslipidemia: Recommendations

- Policosanol – 20 mg/day
  - Purified from sugar cane wax
  - Studies show:
    - Significantly lower cholesterol/LDL & increase HDL
      - ↓ cholesterol 17-21%, ↓ LDL 26-29%, ↑ HDL 15-28%
      - Similar to statin Rx, but without side effects
    - Reduce excessive platelet aggregation
    - Inhibits the development of atherosclerotic plagues
    - Reduces LDL peroxidation

Berthold. American Heart Journal 2002; 143:356-65.
Mas, et al. Clin Pharmacol Ther 1999; 65:439-47.

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CVD: Dyslipidemia: Recommendations

- Phytosterols – 2 grams/day
  - Plant sterols from fruits and vegetables
  - Recommended by National Institutes of Health (NIH) and American Heart Association (AHA)
  - Similar molecular structure to cholesterol
  - Act within the intestine to block absorption of both dietary and endogenous biliary cholesterol
    - ↓ LDL 8-13%
  - May also offer cancer/BPH protection
    - Colon, breast, prostate

Vanstone, et al. American Journal of Clinical Nutrition 2002; 76:1272-8.
Journal American Diet Association 2003; 76:577-81.
Journal of Nutrition 2000; 130:2127-30.
Cancer 1995; 345:1529-32
British Journal of Urology 1997; 80:427-32.

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CVD: Dyslipidemia: Recommendations

- Pantethine – 600+ mg/day
  - B5-like vitamin
  - Significantly ↓ TG, VLDL, LDL, Apo-B
    - ↓ TG: 25-26%, VLDL: 28%, LDL: 15-38%, Apo-B: 16%
    - Produces cystamine which inhibits acetyl-CoA carboxylase -> reduces TG synthesis
  - ↑ HDL and Apo A-1
    - ↑ HDL: 20-34%
  - Also inhibits lipid peroxidation of LDL and reduces platelet aggregation

Pins JJ. Journal of Diabetes 2004; 53(suppl)2:A 406.
Pins J. American College of Nutrition 2003 Oct.
Arsenio, et al. Clinical therapeutics (volume 8, No. 5, 1986).
Maggi, et al. Cur Ther Res 1982; 32:380-86.

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CVD: Dyslipidemia: Recommendations

- Red Yeast Extract – 1-5 grams/day
  - Bulgarian monascus strain (MB100BG)
    - Does NOT contain lovastatin
  - Contains monacolins – inhibit HMG-CoA reductase, blocking cholesterol synthesis
  - Contains sterols – block reuptake of cholesterol
  - Lowers TG: 63-66% and TC: 35-27%

Becker DJ, Gordon RY, Halbert SC, et al. Red yeast rice for dyslipidemia in statin-intolerant patients: A randomized trial. Ann Intern Med 2009;150:830-9.
Halbert SC, French B, Gordon RY, et al. Tolerability of red yeast rice (2,400 mg twice daily) versus pravastatin (20 mg twice daily) in patients with previous statin intolerance. Am J Cardiol 2010;105:198-204.
Zhao, S. P., Lu, Z. L., Du, B. M., Chen, Z., Wu, Y. F., Yu, X. H., Zhao, Y. C., Liu, L., Ye, H. J., and Wu, Z. H. Xuezhikang, an extract of cholestin, reduces cardiovascular events in type 2 diabetes patients with coronary heart disease: subgroup analysis of patients with type 2 diabetes from China coronary secondary prevention study (CCSPS). J Cardiovasc Pharmacol 2007;49(2):81-84.

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CVD: Dyslipidemia: Recommendations

Supplement	Rationale	Dosage
Policosonals –Derived from sugarcane wax	•Lowers Cholesterol •Reduces platelet aggregation •Reduces development of atherosclerotic lesions •Reduces LDL peroxidation	10mg / tab BID
Phytosterols	Lowers LDL cholesterol	2 grams
Pantethine	•Lowers TG, VLD, LDL, Apo-B •Increases HDL, Apo A-1	600 mg/day
Niacin	•Lowers TG, VLDL, LDL, TC, Lp(a) •Increases HDL	500 mg – 4 grams
Red Yeast Extract	•Lowers TG and TC	1-5 grams/day

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CVD: Dyslipidemia: Recommendations

- High total cholesterol/LDL
  - Exercise – 30 min 5x/week; interval/HIIT best
  - Stress management – daily
  - *Pantesin, policosanols, phytosterols, niacin formula* – 2 capsules BID cf
    - ↓ Total chol, LDL, Trigs, Hs-CRP, Lp(a), ApoB
    - ↑ HDL, ApoA-1
  - *High EPA-DHA formula* – 2 softgels BID/TID cf
  - *Red Yeast Extract* – 1-3 caps daily – PRN
  - *Niacin (nicotinic acid)* – 1 tablet (500 mg) BID – PRN

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Pantethine, policosanols, phytosterols, niacin formula

Two sustained-release tablets supply:

Niacin..... 400 mg
Pantesin® Pantethine..... 400 mg
Phytosterols..... 500 mg
Policosanol..... 20 mg

Red Yeast Extract

One capsule supplies:

Red Yeast Extract..... 833 mg
(Bulgarian *Monascus Purpurous* Strain MB1000BG)

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CVD: Dyslipidemia: Recommendations

- Triglyceride control
  - Omega-3 EFAs
    - Reduce VLDL production by the liver
    - Increase TG & VLDL removal from blood
    - Activate PPAR process
      - Increase conversion of fatty acids to energy
  - L-carnitine
    - Increase uptake/use of fatty acids for energy

Guilliams TG. The use of fish oil supplements in clinical practice: a review. JANA. 2005; 8(1):21-34.
Rodriguez DR, endible A, Gomez N, and et al. Drug intervention program in dyslipemic children: use of L-carnitine. Revista Latina De Cardiologia - Euroamericana 1997;18(2):25-30.

38

CVD: Dyslipidemia: Recommendations

- High triglycerides, VLDL, RLP/IDL
  - Exercise – 30 min 5x/week; interval/HIIT best
  - *High EPA-DHA formula* – 2-3 softgels BID/TID cf
  - *L-carnitine* (500 mg) – 2 capsules BID sf
  - *Niacin (nicotinic acid)* – 1 tablet (500 mg) BID
  - *Red Yeast Extract* – 1-3 caps/day - PRN

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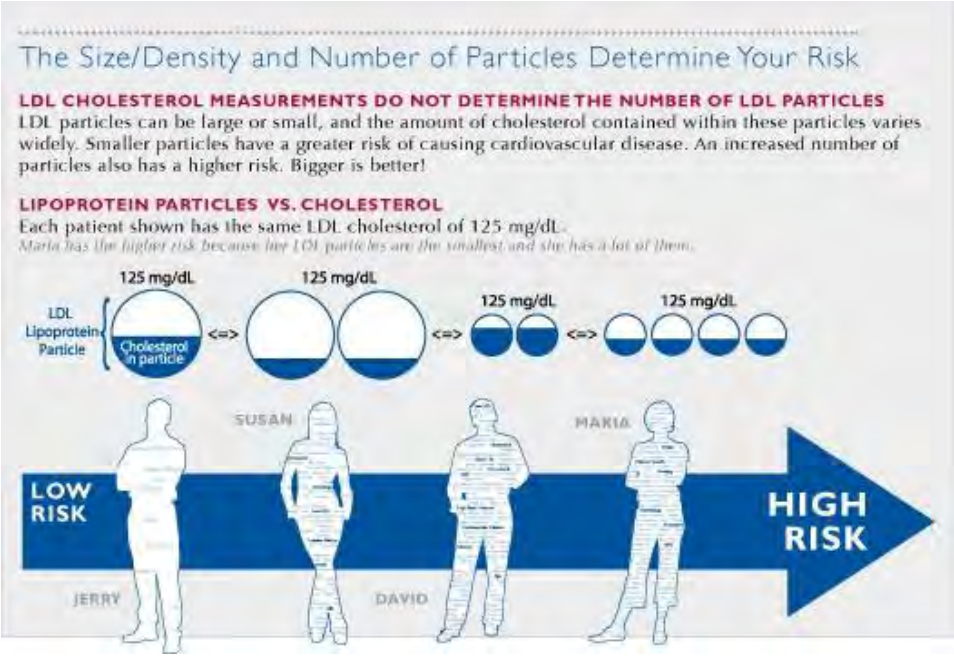

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CVD: Dyslipidemia: Recommendations

- High Small Dense LDL (III & IV) or Lp(a)
  - *Niacin (nicotinic acid)* – 1-2 tablets BID
  - *CoQ10* – 100-200 mg BID
  - Bio-identical hormone therapy
- If taking statin medications:
  - Statins inhibit HMG-CoA reductase
    - Significantly deplete CoQ10 levels in body
  - *CoQ10* (100 mg) – 1-2 gelcaps BID

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CVD: Dyslipidemia: Recommendations

- Low HDL/HDL2b
  - Exercise – 30-60 min 3-5x/week – HIIT & resistance training
  - MODERATE alcohol use (red wine best) – 4 oz. 3x/week
  - *Niacin (nicotinic acid)* – 1-2 tablets BID
  - *High allicin content garlic* – 1 tablet QD
    - Eat 2+ cloves of garlic/day

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CVD: Dyslipidemia: hs-CRP

- Marker of inflammation
  - High levels reflect over-activity of inflammatory cytokines linked to coagulation and vascular endothelium damage
  - Associated with insulin resistance and metabolic syndrome
- Strong predictor of the risk of future MI
  - hs-CRP>3 has been shown to increase risk of CV event 3x (300%)

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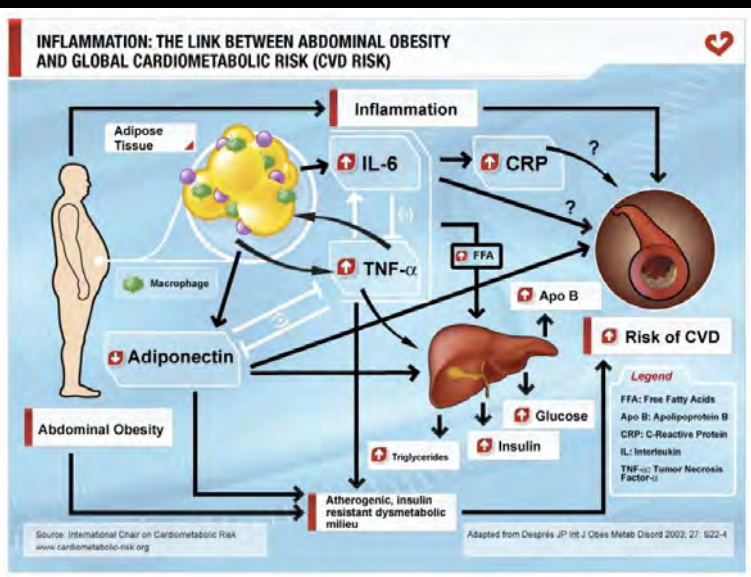
Fat = Organ of Inflammation



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CVD: Dyslipidemia: Recommendations

- High hs-CRP
  - Weight loss
  - *Buffered C formula* – 2-6 grams/day
  - Ginger, curcumin, turmeric, boswellia formula – 1-2 tablets BID
  - *High EPA-DHA formula* – 2-3 softgels TID
  - *Vitamin D3* – based on testing
  - *Synergistic Product for Inflammation* - PRN

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THIAA SKRM formula

One softgel supplies:

A Proprietary Blend of:..... 350 mg
Tetrase™ [(Tetrahydro-iso-alpha acids complex† from hops) (*Humulus lupulus L.*)], Rosemary Leaf Extract (*Rosmarinus officinalis*), and Oleanolic Acid [(from olive leaf extract) (*Olea europaea*)].

Other ingredients: Olive oil, gelatin, glycerin, yellow beeswax, water, and sodium copper chlorophyllin. **Contains:** Soy.

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CVD: Dyslipidemia: Recommendations

- High Homocysteine
  - Improve digestion/eliminate need for gastric acid inhibitors (reduce intrinsic factor)
  - Diet – may need to reduce protein
  - *Healthy Methylation and Homocysteine Formula* – 1-2 tablets daily cf
    - L-5-MTHF (folate), methylcobalamin (B12), vitamin B6, trimethylglycine and choline
    - Intrinsic factor

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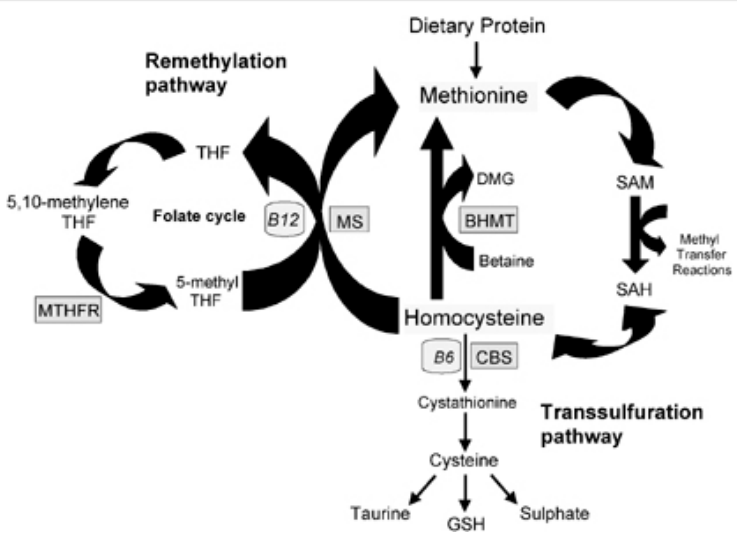
Homocysteine Metabolism



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Dyslipidemia Case Study: Lars

- 70 yo male, heart bypass surgery 1995, (-) reaction to statins
- No tobacco/alcohol use
- No familial Hx of CVD
- No current medications
- Very active/fit – daily activity/workouts
- Fasting glucose: 92; BP: 123/78
- Consumes anti-inflammatory diet; daily food diary

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Dyslipidemia Case Study: Lars

Standard Lipid Testing Results

Date	TC (mg/dl)	(Calc)LDL-C (mg/dl)	HDL-C (mg/dl)	TG (mg/dl)	TC:HDL-C	Non-HDL-C (mg/dl)
04/03/10	202	134	58	50	3.5	144
06/09/10	193	117	69	34	2.8	124
07/02/10	222	135	76	55	2.92	146
Goal (NCEP)	<200	<130	>35	<150	<5.0	<160

- Told to continue current diet/exercise program
  - "You're doing a great job. You'll be fine."

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Lars: Initial LPP Results

Biomarker	Reference Value	28-Apr-10
Total Cholesterol	<200	229
LDL-C	<130	149
HDL	>40	66
Trigs	<150	74
Homocysteine	<7	8.8
Total LDL-P #	<900	1028
RLP-P #	<150	117
Dense LDL III	<300	310
Dense LDL IV	<100	122
Buoyant HDL2b	>1500	2637
Lp(a)	<30	<5

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Using the LPP+ to Address CVD

- Step 1: Primary Risk Assessment
  - ✓ High LDL particle number (<900) & Apo B (<80 mg/dL)
  - ✓ Elevated small/dense LDL (LDL III >300 nmol/L; LDL IV > 100 nmol/L)
  - Elevated RLP (150 nmol/L); Moderate/high Triglycerides (>150 mg/dL)
  - Low HDL2b (<1500 nmol/L)
- Step 2: Modify risk using Metabolic syndrome traits, Lp(a) & hs-CRP
  - Combine metabolic syndrome traits from LPP with blood pressure, obesity (WC/BIA) & fasting glucose
  - ✓ ↑ Lp(a) and/or ↑ hs-CRP and/or ↑ homocysteine
  - ✓ Also consider family Hx, medical Hx and smoking
  - Modify risk assessment and Tx goals from Step 1 based on these criteria
  - Use standard Lipid Panel at bottom to compare with previous labs
- Step 3: Determine Therapeutic Approach
  - Determine Tx goals and therapeutic approach to address each risk factor
  - Refer to LPP Therapeutic Guidelines

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Lars CVD Risk Assessment

- Primary CVD risk assessment: HIGH
  - ↑ LDL-P
  - ↑ small, dense LDL
  - Also has elevated homocysteine
  - Significant history (triple bypass)
- Requires immediate intervention

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Recommendations: Lars

Remedy/Supplement	Upon rising	Breakfast	Mid – morning	Lunch	Mid – afternoon	Dinner	Before retiring
UltraMeal Plus 360 (Dynamic Cardio Metabolic)		2 scoops				2 scoops	
Omega Pure EPA-DHA 720		1				1	
Niacin		1					
Cardioauxin		2				2	
CoQ10 (100 mg)		1				1	
Vessel Care (Methyl Complete)		1				1	

Notes:
- **Water – drink 2-2.5 quarts of water/tea daily in divided doses (4 oz. (1/2 cup) every 30 minutes optimal)**
- **Exercise – 30-60 minutes 5-7x/week; at least 30 minutes 5x/week interval training (skiing, biking) or HIIT (weights/aerobic)**
- **Deep breathing – several times daily**
- **Take at least 30 minutes daily to do something you LOVE to do**

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Lars: Follow up LPP Results

Biomarker	Reference Value	28-Apr-10	7-Jun-11
Total Cholesterol	<200	229	224
LDL-Calc	<130	149	124
HDL	>40	66	82
Trigs	<150	74	97
TC:HDL	<4	3.47	2.73
Homocysteine	<7	8.8	5.9
LPP# - LDL Total	<900	1028	791
LPP# - RLP	<150	117	65
Dense LDL III	<300	310	222
Dense LDL IV	<100	122	102
Buoyant HDL2b	>1400	2637	3681
Lp(a)	<30	<5	<5

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Questions on Dyslipidemia??

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CVD: Hypertension – the Silent Killer

- 70% of US women and 50% of US men over 70 have diagnosed HBP
- 1 in 3 Americans have HBP
- 35% of Americans with HBP are unaware
- Affects over 65 million people in US
- Almost 250,000 deaths each year

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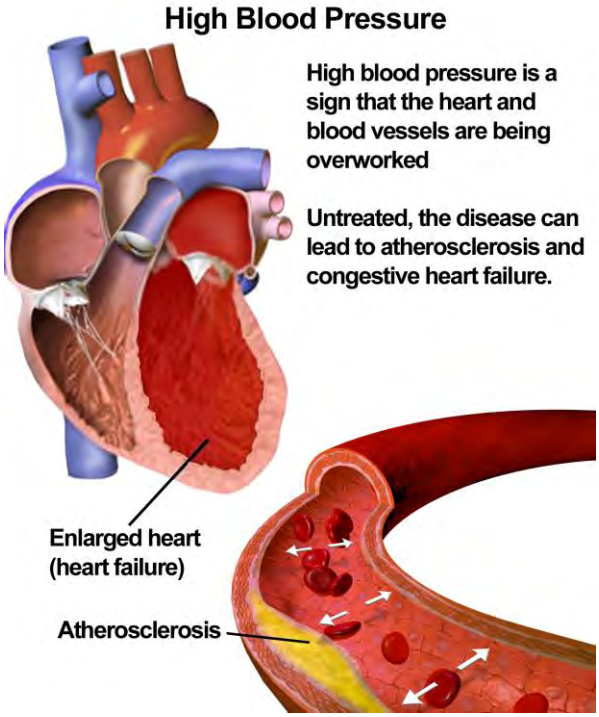

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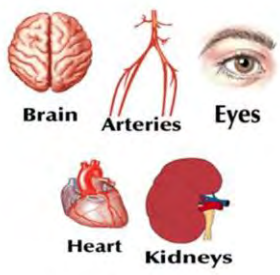
Damage Done by HBP

ORGANS AFFECTED



INCREASED RISK OF:

- Stroke
- Heart attack
- Heart failure
- Kidney failure
- Eye problems
- Cognitive decline
- Dementia

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Definition of Hypertension

- Most widely used:
  - Optimal: Systolic BP lower than 120 mm Hg, diastolic BP lower than 80 mmHg
  - Normal: Systolic BP 120-129 mm HG, diastolic BP 80-84 mm Hg
  - Borderline: Systolic BP 130-139, diastolic BP 85-89 mm Hg
  - Stage 1: Systolic BP 140-159 mm Hg, diastolic BP 90-99 mm Hg
  - Stage 2: Systolic BP 160-179 mm Hg, diastolic BP 100-109 mm Hg
  - Stage 3: Systolic BP 180 mm Hg or greater, diastolic BP 110 mm Hg or greater
- ACC/AHA 2017 Guidelines:
  - Normal: Less than 120/80 mm Hg;
  - Elevated: Systolic between 120-129 and diastolic less than 80;
  - Stage 1: Systolic between 130-139 or diastolic between 80-89;
  - Stage 2: Systolic at least 140 or diastolic at least 90 mm Hg;
  - Hypertensive crisis: Systolic over 180 and/or diastolic over 120, with patients needing prompt changes in medication if there are no other indications of problems, or immediate hospitalization if there are signs of organ damage.

Chobanian AV, Bakris GL, Black HR, et al. and the National High Blood Pressure Education Program Coordinating Committee. Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure; Hypertension. 2003;42:1206-1252, originally published December 11, 2003
Whelton PK, Carey RM, Aronow WS, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults. Journal of the American College of Cardiology Nov 2017, 24430; DOI: 10.1016/j.jacc.2017.11.006

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Almost ½ US Adults Would be Dx HBP

- Using the 2017 ACC/AHA guidelines 45.6% of US adults would have hypertension
  - 32% under previous guidelines
- Meta-analysis of 24 studies found reducing BP below 140/90 did *not* improve patient outcomes
- Increases # of US adults Dx with hypertension from 74 -> 105 million
  - ↑ of over 31 million people

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Whelton PK, Carey RM, Aronow WS, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults, Journal of the American College of Cardiology.

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Hypertension Diagnosis

Category	SBP	DBP	Lifestyle Changes	Initial Drug Therapy
Normal	<120	<80	Encourage	No antihypertensive drug indicated.
Elevated	120-129	<80	Yes	Antihypertensive drug indicated only if compelling indications present.*
Stage I	130-139	80-89	Yes	One antihypertensive drug; May consider multiple drugs.
Stage II	>140	>90	Yes	Two antihypertensive drugs for most patients.
Hypertensive Crisis	>180	>120	N/A	Seek Emergency Care

** Heart failure, post myocardial infarction, high coronary disease risk, diabetes, chronic kidney disease, recurrent stroke*

Whelton PK, Carey RM, Aronow WS, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults, Journal of the American College of Cardiology.

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Antihypertensive Medications

- 3 of top 10 most prescribed drugs:
  - Lisinopril – 87.4 million prescriptions/yea
  - Norvasc – 57.2 million prescriptions/year
  - Hydrochlorothiazide – 47.8 million prescriptions
- Only 34% respond favorably
- 97% report significant side effects
- 45-65% of patients not compliant with Rx
  - 4 out of 10 discontinue Rx due to side effects

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Antihypertensive Medications List & References

- Thiazide or thiazide-type diuretics
  - Chlorthalidone, Hydrochlorothiazide, Indapamide, Metolazone
- ACE Inhibitors (-pril)
  - Benazepril, Captopril, Enalapril, Fosinopril, Lisinopril, Moexipril, Peridopril, Ramipril
- Calcium Channel Blockers (-pine)
  - Amlodipine, Felodipine, Nifedipine, Nisoldipine
  - Diltiazem ER/SR, Verapamil IR/SR/ER
- Angiotensin II Receptor Blockers (-artan)
  - Azilsartan, Candesartan, Eprosartan, Irbesartan, Telmisartan, Valsartan, Losartan, Olmesartan
- Beta Blockers (-olol)
  - Atenolol, Bisoprolol, Metoprolol, Propranolol

Abegaz TM, et al. Nonadherence to antihypertensive drugs: A systematic review and meta-analysis. Medicine (Baltimore). 2017 Jan; 96(4): e5641.
Source: WEbMD - http://www.webmd.com/news/20110420/the-10-most-prescribed-drugs
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American Black Cardiologists Survey 1999. Summary release available at http://www.pslgroup.com/dg/14475e.htm Accessed August 3, 2005

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Hypertension – Possible Causes

- Obesity/Overweight
- Poor diet
- Dehydration
- Excess alcohol intake
- Electrolyte imbalance
  - Potassium and/or Magnesium deficiency
  - Sodium excess
- Inflammation
- EFA imbalance
- Mitochondrial dysfunction
- Dyslipidemias/high homocysteine
- Low D3
- Chronic stress
- Insulin resistance
- Thyroid dysfunction
- Dysbiosis

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Chan Q, Stamler J, Griep LMO, et al. An update on nutrients and blood pressure. J Atheroscler Thromb. 2016;23:276-89.
Tang WHW, Kitai T, Hazen SL. Gut microbiota in cardiovascular health and disease. Circ Res. 2017;120:1183-96

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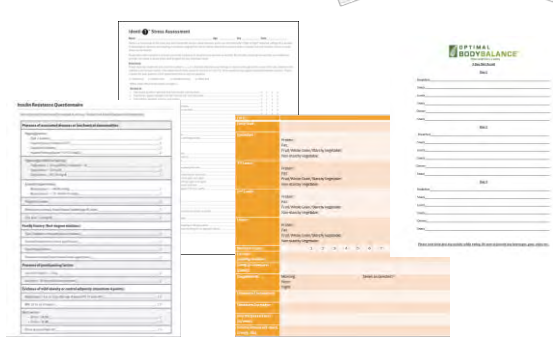
Client Packet

- Health Appraisal Questionnaire
- Detoxification Questionnaire
- Identi-T Stress Assessment
- Insulin Resistance Questionnaire
- Health History
- Diet Journal
- Exercise Log



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Hypertension – Additional Testing

- ***Client Packet***
- ***Chiropractic exam***
- ***BIA (Bioelectrical Impedance Analysis)***
- ***LPP+/Cardiometabolic Profile***
- ***Labs:***
  - ***Thyroid panel – TSH, Free T3, Free T4***
  - ***CBC w/ WBC differential***
  - ***Comprehensive metabolic panel***
  - ***25 OH Vitamin D***
  - Fibrinogen
  - GTT & Tests used for insulin resistance
  - Urinalysis
- Fatty acid bloodspot/HS-Omega-3 Index
- Adrenal Stress Profile (Cortisol/DHEA-S)
- LRA – Comprehensive panel (food hypersensitivity)

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Hypertension: Recommendations

- Test for underlying causes
- Check medications
- Implement appropriate action plan
  - Address dyslipidemia
  - Reduce oxidative stress
  - Modulate angiotensin-converting enzyme (ACE) activity
  - Support optimal nitric oxide (NO) production
  - Improve arterial elasticity

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Check Medications

- Many medications can increase blood pressure:
  - Cold & flu medicines that contain decongestants
    - Pseduoephedrine (Sudafed), Phenylephrine (Neo-Synephrine)
  - NSAID pain relievers & Acetaminophen
  - Steroids & Immunosuppressants
  - Amphetamines, stimulants & caffeine
    - Methylphenidate (Ritalin)
    - Methamphetamine, cocaine, "diet pills"
  - Birth control pills
  - Some antidepressants
    - Buproprion (Wellbutrin, Zyban), Venlafaxine (Effexor), Phenelzine (Nardil), Desipramine (Norpramin)

69

Use Nutritional Therapy First

- "Study findings demonstrated that nutritional therapy may substitute for drugs in a sizable proportion of hypertensives or, if drugs are still needed, can lessen some unwanted biochemical effects of drug treatment."
  - Stamler R, Stabler J, Grimm, et. al. Nutritional therapy for high blood pressure. Final report of a four-year randomized controlled trial--the Hypertension Control Program. JAMA 1987 Mar 20:257(11): 1184-91.

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HBP Action Plan

- Address dyslipidemia
- Reduce oxidative stress
- Modulate angiotensin-converting enzyme (ACE) activity
- Support optimal nitric oxide (NO) production
- Improve arterial elasticity

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Addressing Dyslipidemia

- The following dyslipidemias have been shown to cause/exacerbate high blood pressure:
  - Small, dense LDL particles
  - Remnant lipoprotein particles (RLP)
  - Elevated homocysteine
- Run LPP+/Cardiometabolic Profile
  - Address whatever is found

Kim YK, Seo HS, Lee EM, et al. Association of hypertension with small, dense low-density lipoprotein in patients without metabolic syndrome. J Hum Hypertens. 2012 Nov;26(11):670-6.

Haffner SM, et al. A preponderance of small dense LDL is associated with specific insulin, proinsulin and the components of the insulin resistance syndrome in non-diabetic subjects. Diabetologia. 1995 Nov;38(11):1328-36.

Joshi PH, et al. Remnant Lipoprotein Cholesterol and Incident Coronary Heart Disease: The Jackson Heart and Framingham Offspring Cohort Studies. J Am Heart Assoc. 2016 May; 5(5): e002765. Published online 2016 Apr 29.

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Yang B, Fan S, Zhi X, et al. Interactions of homocysteine and conventional predisposing factors on hypertension in Chinese adults. J Clin Hypertens (Greenwich). 2017; 19:1162-1170.

Lim U, Cassano PA. Homocysteine and blood pressure in the Third National Health and Nutrition Examination Survey, 1988–1994. Am J Epidemiol. 2002;156:1105-1113.

Sutton-Tyrrell K, Bostom A, Selhub J, Zeigler-Johnson C. High homocysteine levels are independently related to isolated systolic hypertension in older adults. Circulation. 1997;96:1745-1749.

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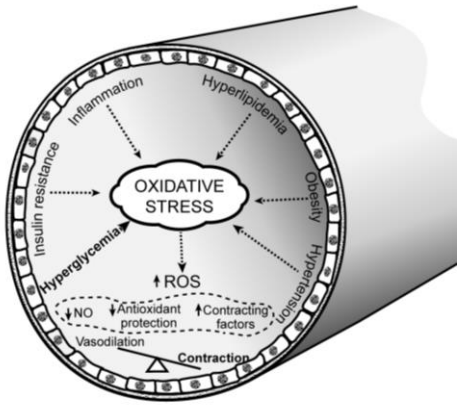
Reduce Oxidative Stress

ROS & Blood Vessels
- ↓ ability to dilate
- ↑ inflammatory responses
- Disrupt brain signaling
- ➢ Increase blood pressure

Reduce oxidative stress
- Anti-inflammatory diet
- Stress management
- Weight loss
- Supplementation
  - EFAs & antioxidants



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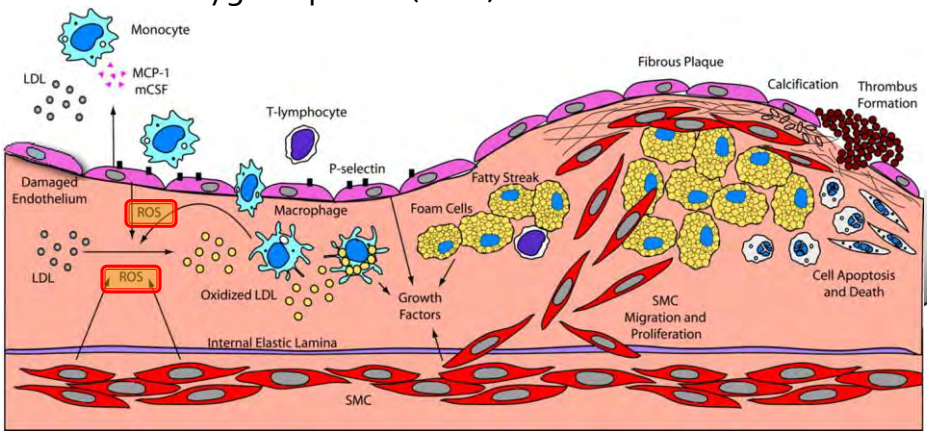
ROS and the Blood Vessels

Reactive Oxygen Species (ROS) & Blood Vessels



Montezano AC, Touyz RM. Oxidative stress, Noxs, and hypertension: Experimental evidence and clinical controversies. Ann Med. 2012;44(Suppl 1):S2–16.
Rodrigo R, González J, Paoletto F. The role of oxidative stress in the pathophysiology of hypertension. Hypertens Res. 2011;34:431–40.
Baradaran A, Nasri H, Rafieian-Kopaei M. Oxidative stress and hypertension: Possibility of hypertension therapy with antioxidants. Journal of Research in Medical Sciences : The Official Journal of Isfahan University of Medical Sciences. 2014;19(4):358-367.
Touyz RM. Reactive oxygen species, vascular oxidative stress, and redox signaling in hypertension: What is the clinical significance? Hypertension. 2004;44:248–52.

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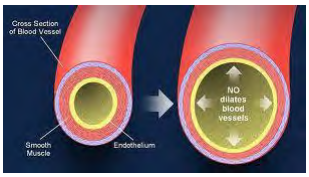
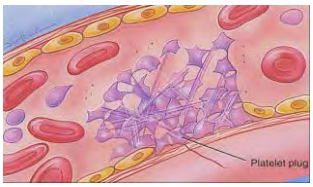
Support Nitric Oxide Production

- Nitric Oxide (NO):
  - ↑ vasodilation of blood vessels
  - ↓ platelet aggregation
  - ➢ ↓ blood pressure
- Produced from arginine & nitric oxide synthase (NOS) enzymes
- NO ↓ by oxidative stress, inflammation, ↓ NOS activity





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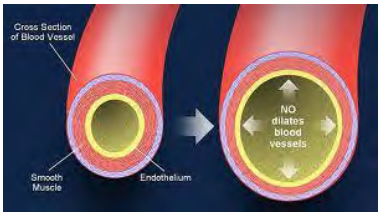
Support Nitric Oxide Production

- Reduce Oxidative Stress
- Manage Inflammation
- Stress Management
- Exercise – 30+ min (brisk walk – 3.0+ mph)
- Supplementation



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NO Boosting Supplementation

- Antioxidants
  - Grape seed extract: 300 mg/day
    - Increases NO levels
    - Improves activity of endothelia NOS
    - Acts as calcium channel blocker
  - Pomegranate extract: 400-800 mg/day
    - Improves activity of endothelial NOS
      - Makes more NO available

de Nigris F, Balestrieri ML, Williams-Ignarro S, et al. The influence of pomegranate fruit extract in comparison to regular pomegranate juice and seed oil on nitric oxide and arterial function in obese Zucker rats. Nitric Oxide. 2007 Aug;17(1):50-4.
Edirisinghe I, Burton-Freeman B, Tissa Kappagoda C. Mechanism of the endothelium-dependent relaxation evoked by a grape seedextract. Clin Sci (Lond). 2008 Feb;114(4):331-7.
Zhang TX, Niu CQ, Hu JM, Liu H, Jing HE. Vasorelaxational effects of procyanidins on rabbit aorta in vitro and decreasing arterial blood pressure in vivo.Zhongguo Zhong Yao Za Zhi. 2008 Jul;33(14):1720-3.

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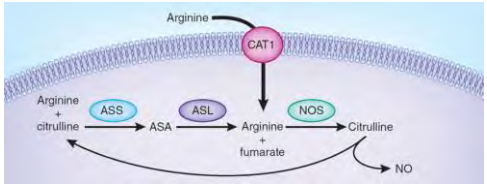
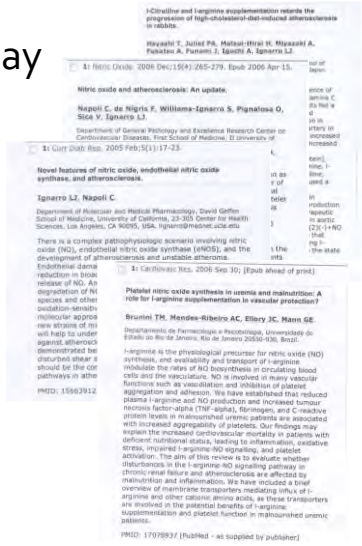
NO Boosting Supplementation

- L-arginine: 1500-3000 mg/day
  - Supports NO production





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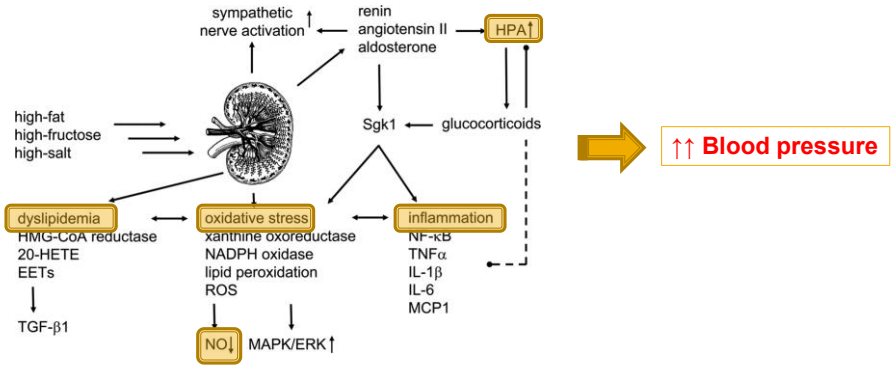
Modulate ACE Activity



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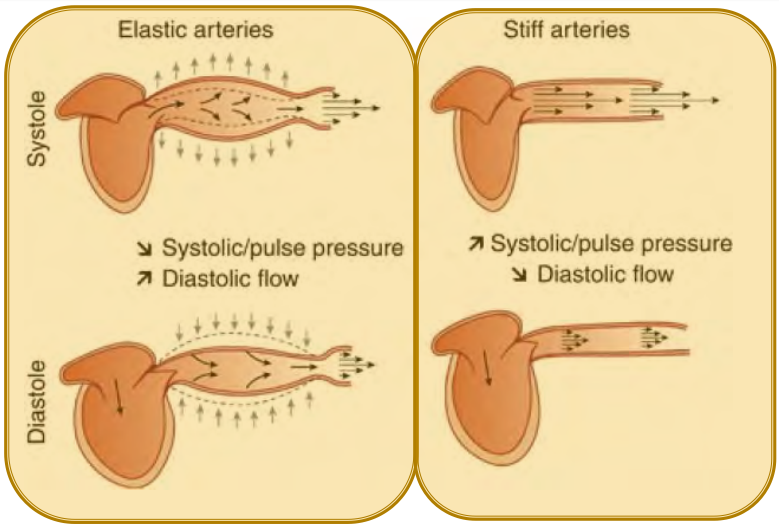
Modulate ACE Activity

- Polyphenols: Anthocyanins & Proanthocyanidins
  - Grape seed extract, resveratrol & pomegranate
  - Potent antioxidants
  - Exhibit potent ACE inhibiting effects
  - Increase nitric oxide production
  - Enhance endothelial function
  - Block vasoconstriction due to adrenaline

Melzig MF, Escher F. Induction of neutral endopeptidase and angiotensin-converting enzyme activity of SK-N-SH cells in vitro by quercetin and resveratrol. Pharmazie. 2002 Aug;57(8):556-8.
Aviram M, Dornfeld L. Pomegranate juice consumption inhibits serum angiotensin converting enzyme activity and reduces systolic blood pressure. Atherosclerosis. 2001 Sep;158(1):195-8.
Rohdewald P. A review of the French maritime pine bark extract (pycnogenol), a herbal medication with a diverse clinical pharmacology. Int J Clin Pharmacol Ther. 2002 Apr;40(4):158-68.
Erlund I Koli R, Alfthan G, et al. Favorable effects of berry consumption on platelet function, blood pressure, and HDL cholesterol. Am J Clin Nutr. 2008;87:323-31.
Aviram M, Rosenblat M, Gaitini D, et al. Pomegranate juice consumption for 3 years by patients with carotid artery stenosis reduces common carotid intima-media thickness, blood pressure and LDL oxidation. Clin Nutr. 2004 Jun;23(3):423-33.
Ojeda D, Jiménez-Ferrer E, Zamilpa A, et al. Inhibition of angiotensin converting enzyme (ACE) activity by the anthocyanins delphinidin- and cyanidin-3-O-sambubiosides from Hibiscus sabdariffa. J Ethnopharmacol. 2009 Oct 4.
Xu JW, Ikeda K, Yamori Y. Upregulation of endothelial nitric oxide synthase by cyanidin-3-glucoside, a typical anthocyanin pigment. Hypertension. 2004 Aug;44(2):217-22.

80

Improve Arterial Elasticity



Briet, Marie et al. Arterial stiffness and pulse pressure in CKD and ESRD. Kidney International , Volume 82 , Issue 4 , 388 - 400

81

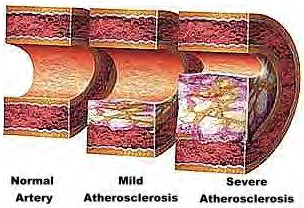
Arterial Elasticity

ELASTIC ARTERIES

STIFF ARTERIES

82

Improve Arterial Elasticity

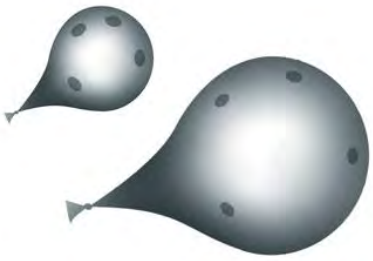


- Anti-inflammatory diet
- Address dyslipidemia
- Improve blood sugar response
- Vitamin K2 (MK-7): 100 mcg
  - Improves calcium metabolism
  - Prevents/reverses calcification of arteries
  - Works in conjunction with vitamin D
- Magnesium glycinate: 200-600 mg
  - Relaxes vascular smooth muscle
  - Reduces arterial stiffness

Preuss HG, Gondal JA, Lieberman S. Association of macronutrients and energy intake with hypertension. J Am Coll Nutr 1996;15:21-35.
Yamori Y, Nara Y, Mizushima S, et al. Nutritional factors for stroke and major cardiovascular diseases: international epidemiological comparison of dietary prevention. Health Rep 1994;6:22-7.

83

Salt and Blood Pressure



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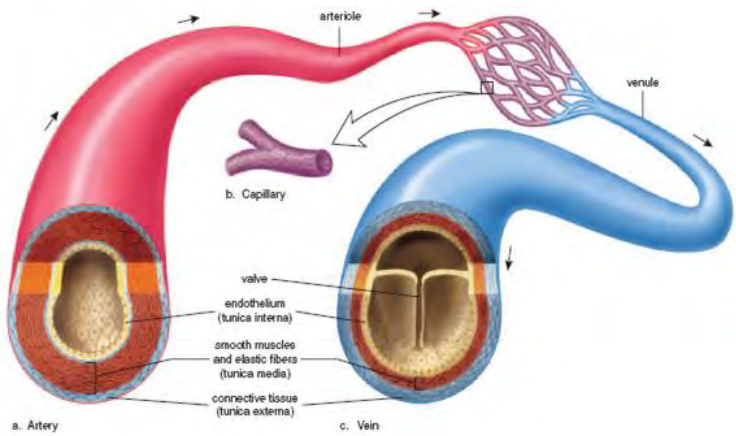
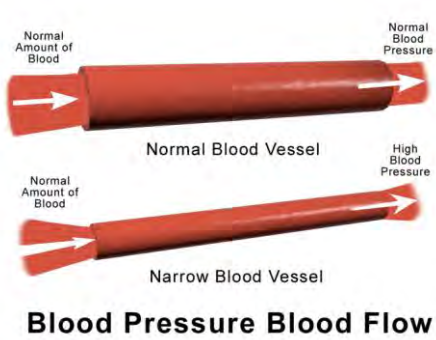
Salt and Blood Pressure



85

Salt and Blood Pressure

- Sodium intake stresses the system
  - Stimulates adrenalin production
  - Adrenalin causes blood vessel constriction



86

Tips to Reduce Salt/Sodium

- Buy fresh or frozen "no salt added" vegetables
- Use fresh poultry, fish and lean meat rather than canned, smoked or processed.
- Limit
  - cured foods (bacon & ham)
  - foods packed in brine (pickles, pickled vegetables, olives & sauerkraut)
  - Condiments (MSF, mustard, catsup, barbecue sauce, soy sauce, teriyaki sauce)
- Use spices/herbs instead of salt
- Rinse canned foods (tuna, legumes) to remove sodium

87

CVD: Hypertension - Recommendations

- Quit smoking
- Exercise
  - 30-60 min 5x/week: moderate aerobic exercise (walk/run, bike, XC ski, swim)
- Stress management
- Weight loss
- Decrease alcohol and caffeine (<1/day)
- Limit/eliminate salt

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CVD: Hypertension -Dietary Recommendations

- Anti-inflammatory dietary guidelines
- Eliminate gluten and corn & food hypersensitivities
  - Wheat, corn/corn-sugar, HFCS
- Eliminate saturated, trans & hydrogenated fats
  - ↑ total cholesterol and LDL
  - ↓ LDL particle size and apo A
  - ↑ apo B and Lp(a)
  - ➢ Most atherosclerotic substance ever made!

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Trans fats = MUST read labels

Nutrition Facts
Serving Size 1 slice

Amount Per Serving
Calories 260 Calories from Fat 90

	% Daily Values*
Total Fat 10g	15%
Saturated Fat 2.5g	12%
Trans Fat 2.5g	
Cholesterol 0mg	0%
Sodium 220mg	9%
Potassium 0mg	
Total Carbohydrate 40g	13%
Dietary Fiber 1g	4%
Sugars 19g	
Protein 2g	

Nutrition Facts
Serving Size: 1 tbsp (14g)
Servings Per Container: About 32

Amount Per Serving
Calories 70 Calories from Fat 70

	% Daily Value*
Total Fat 8 g	12%
Saturated Fat 2 g	10%
Trans Fat 0 g	
Cholesterol 0 mg	0%
Sodium 80 mg	3%
Total Carbohydrate 0 g	0%
Dietary Fiber 0 g	0%
Sugars 0 g	
Protein 0 g	0%
Vitamin A 10 %	Calcium 0 %
Vitamin C 0 %	Iron 0 %

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

INGREDIENTS: Liquid Soybean Oil, Water, Partially Hydrogenated Soybean Oil, Buttermilk*, Hydrogenated Soybean Oil, Cream*, Contains Less Than 2% of Salt, Hydrogenated Cottonseed Oil, Distilled Monoglycerides, Soy Lecithin, Potassium Sorbate (Preservative), Lactic Acid, Artificial Flavor, Vitamin A Palmitate, Beta Carotene (Color). CONTAINS: MILK AND SOY

90

Dietary Recommendations

- Anti-inflammatory dietary guidelines
- Eliminate gluten and corn
  - Wheat, corn-sugar, HFCS
- Eliminate saturated, trans & hydrogenated fats
- Eliminate oxidized oils
  - Corn, safflower; deep fried foods
  - Replace with olive oil (low heat) & flaxseed (no heat)
- Eliminate coffee/caffeine
- Eat blood pressure reducing foods

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Foods to Reduce Blood Pressure

RAW Nuts (almonds, walnuts, pecans, Brazil nuts, hazelnuts, pistachios)	RAW seeds (sesame, pumpkin, sunflower)	Deep sea fatty fish (anchovies, herring, Atlantic mackerel, salmon, sardines)
Strawberries	Cranberries	Black cherries
Blackberries	Elderberries	Blueberries
Flaxseed oil	Avocado oil	Coconut oil
Eggplant	Grapes	Pomegranate seeds
Olive oil	Beets	Carrots
Spinach	Garlic	Celery
Beans	Lentils	Peas
Onions	Parsley	Parsnips
Squash	Avocado	Cucumber
Potato skins	Walnuts	Collard greens
Swiss Chard	Turnip greens	Lettuce

92

CVD: Hypertension - Recommendations

Recommendation	Dosage
High EPA-DHA Formula	2 softgels BID with food
BP Antioxidant Formula	2 tablets BID upon waking and b4 bed
Arginine/Mg Formula	1 scoop BID
Vitamin K2 (MK-7)	1 tablet QD with food
Anti-inflammatory diet; eliminate food allergens/triggers, hydrogenated oils, fried foods, dairy, refined carbohydrates, alcohol, gluten, caffeine; limit salt	
Focus on chewing food until it is a liquid; at LEAST 30 times before swallowing	
Increase deep colored berries and foods to reduce blood pressure	
Exercise - 30-60 min 5x/week: moderate aerobic exercise; Improve stress management	
Optimize body composition	
Water – ½ body weight in ounces/day; ~1/4-½ cup every ½ hour; swish in mouth	

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BP Antioxidant Formula

Two capsules supply:

Pomella® Pomegranate Extract (30% Punicalagins)	400 mg
Curcumin C3 Complex®	375 mg
MegaNatural®-BP Grape Seed Extract (90% Polyphenols)	150 mg
Japanese Knotweed Root Extract	65 mg
Resveratrol (from Japanese Knotweed)	13 mg

Arginine/Mg Formula

Calories	15
Total Carbohydrate	4 g
Dietary Fiber	<1 g
Folate (as [6S]-5-methyltetrahydrofolic acid, glucosamine salt) (Quatrefolic®)	400 mcg DFE
Calcium	55 mg
Iron	1.3 mg
Magnesium (as magnesium citrate)	200 mg
Sodium	45 mg
L-Arginine	3 g
Beet Root Powder	2 g
Hibiscus Flower Powder	1.5 g
Taurine	1 g

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Reducing Hypertension Naturally

Dietary/Lifestyle Change	Estimated Reduction in systolic blood pressure
Dietary changes	8 to 40 mm Hg
Exercise (30+ min/day)	4 to 9 mm Hg
Reduce sodium <2400 mg/day	2 to 8 mm Hg
Limit alcohol (< 1 drink/day)	2 to 4 mm Hg
Lose weight	2.5 to 10 mm Hg for every 11 pounds
Supplementation	5 to 40 mm Hg

- In most cases, you can ↓ HBP naturally
  - Multi-functional approach often necessary

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Questions on Cardiovascular Conditions???

Dyslipidemia
Hypertension
Insulin Resistance (Covered in Endocrine section)

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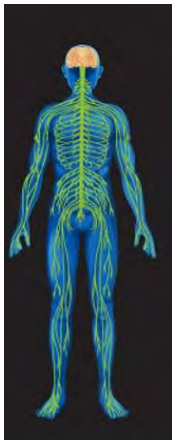
Nervous System Conditions

Peripheral	Neuropathy/neuritis, sciatica



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Peripheral Nervous System

- Neuropathy/neuritis, sciatica causes:
  - Trauma
  - Spinal subluxation
  - Blood sugar imbalance
  - Methylation imbalance
  - Free radical damage/chemotherapy
  - Vitamin D deficiency
  - Heavy metal toxicity

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Peripheral Nervous System: Sciatica

- Set of symptoms rather than a diagnosis for what is irritating the nerve/causing pain
  - Pain radiates from buttock down leg and can travel as far as feet and toes
  - Numbness, tingling or muscle weakness
- Sciatic nerve is the longest nerve in the body
- Sciatica is generally caused by compression of the lumbar nerves L4 or L5 or sacral nerves S1, S2, S3

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Peripheral Nervous System: Recommendations

- Vitamin D

ARCHIVES OF INTERNAL MEDICINE

Vol. 168 No. 7, April 14, 2008

Research Letters

Vitamin D as an Analgesic for Patients With Type 2 Diabetes and Neuropathic Pain

Paul Lee, MBBS (Hons); Roger Chen, MBBS (Hons), FRACP, PhD

Arch Intern Med. 2008;168(7):771-772.

…"found that vitamin D supplementation cut nerve pain from diabetic neuropathy almost in half, prompting researchers to suggest that vitamin D could be used as an effective pain killer for this condition"

impact on neuropathic pain has not been previously evaluated. Our objective was to evaluate the impact of vitamin D repletion on neuropathic pain in patients with type 2 diabetes and vitamin D insufficiency.

Methods

A total of 51 patients with type 2 diabetes with typical neuropathic pain, including burning, tingling, numbness, and throbbing sensations, and physical examination findings of reduced sensation to monofilament, were included. Severity of pain was evaluated by the short form of the McGill pain questionnaire (MPQ) and a 5-cm

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Peripheral Nervous System: Recommendations

- Alpha-lipoic acid: 600-1200 mg/day
  - Water and fat soluble antioxidant
    - Can regenerate endogenous antioxidants
  - Modulates inflammatory response
  - Improves neuropathy/diabetic neuropathy
  - Reduces pain and inflammation
  - Prevents oxidative damage

Ziegler D, Hanefeld M, Ruhnau K, et al. Treatment of symptomatic diabetic polyneuropathy with the antioxidant alpha-lipoic acid: A 7-month, multicenter, randomized, controlled trial (ALADIN III Study). Diabetes Care 1999;22:1296-301.
Reljanovic M, Reichel G, Rett K, et al. Treatment of diabetic polyneuropathy with the antioxidant thioctic acid (alpha-lipoic acid): A 2-year, multicenter, randomized, double-blind, placebo-controlled trial (ALADIN II). Alpha Lipoic Acid in Diabetic Neuropathy [abstract]. Free Radic Res 1999;31:171-7.
Ruhnau KJ, Meissner HP, Finn JR, et al. Effects of 3-week oral treatment with the antioxidant thioctic acid (alpha-lipoic acid) in symptomatic diabetic polyneuropathy. Diabet Med 1999;16:1040-3.

101

Peripheral Nervous System: Recommendations

- Gamma Linolenic Acid (GLA)
  - Anti-inflammatory
  - Research indicates effective in reducing low-back pain and sciatica
  - No clear evidence that surgery is more beneficial than conservative treatment in the form of supplementation plus rehabilitation

Int J of Immunopathology and Pharmacology, 2009 (22); 45-50.
J of Brachial Plexus and Peripheral Nerve Injury 2010 (5); 15.

102

Peripheral Nervous System: Recommendations

Recommendation	Dosage
High EPA Formula	1 softgel BID/TID with food
GLA 240	1 softgel BID with food
Alpha-lipoic acid	600-1200 mg/day
Vitamin D3	5000-10000 IU/day (based on testing)
Inflammation-Eze Formula	2 caps BID as needed
Anti-inflammatory diet; eliminate food allergens/triggers, hydrogenated oils, fried foods, dairy, refined carbohydrates, alcohol, gluten, caffeine;	
Focus on chewing food until it is a liquid; at LEAST 30 times before swallowing	
Exercise/rehab – as energy/pain permits	
Optimize body composition	
Water – ½ body weight in ounces/day; ~1/4-½ cup every ½ hour; swish in mouth	

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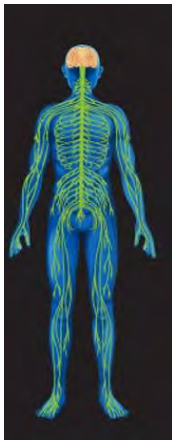
Questions on Nervous System Conditions??

Peripheral	**Neuropathy/neuritis, sciatica**



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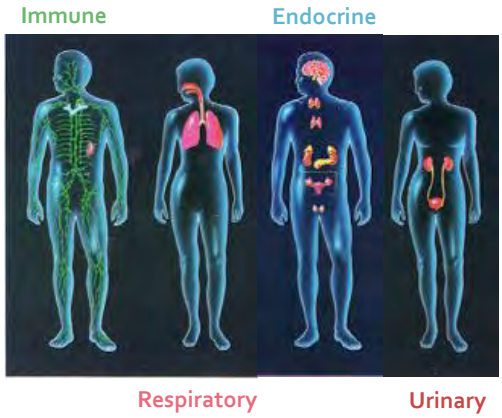
Health Conditions By System (con't)



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Immune Conditions

Basic Immune Support
Colds and flus
Upper respiratory tract infections (URTIs)
Tonsillitis/throat infection
Ear Infections
Sinus infection
Chronic viral infection
Seasonal allergies/hay fever

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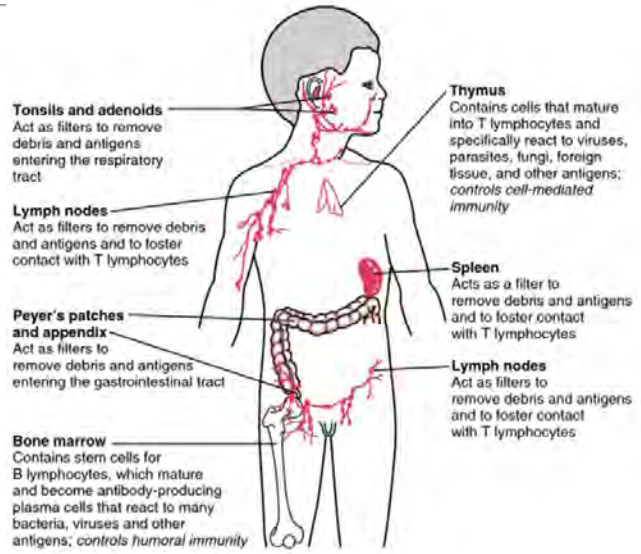
Organs of Immune System



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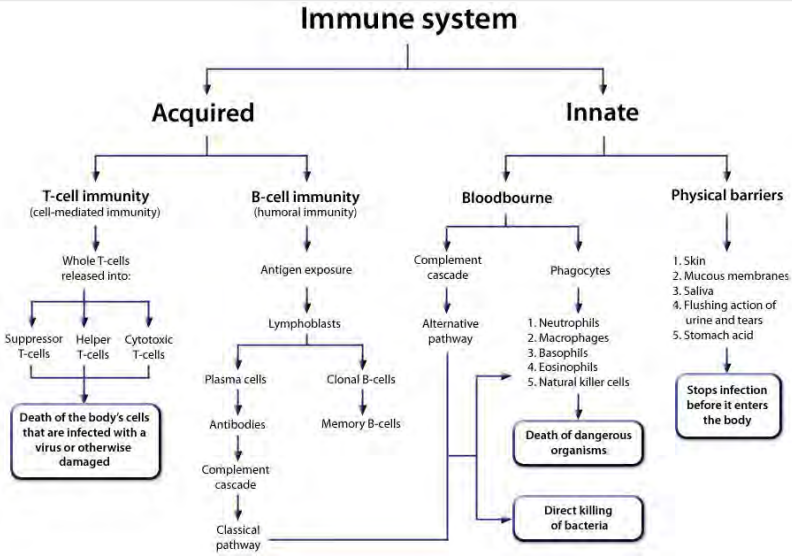
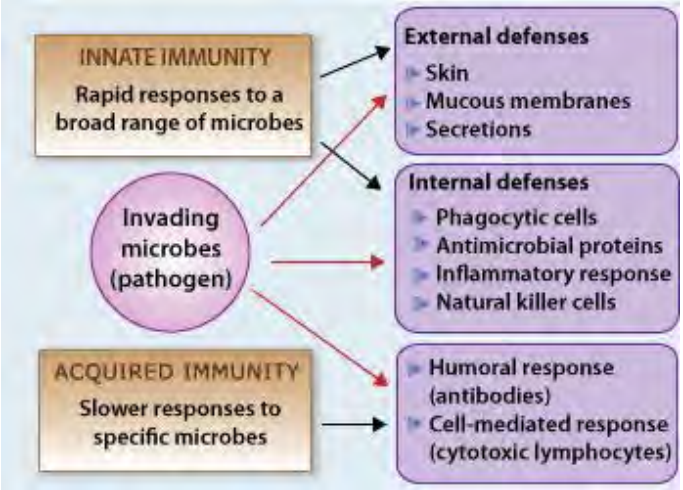
Components of Immune System



108

Components of Immune System



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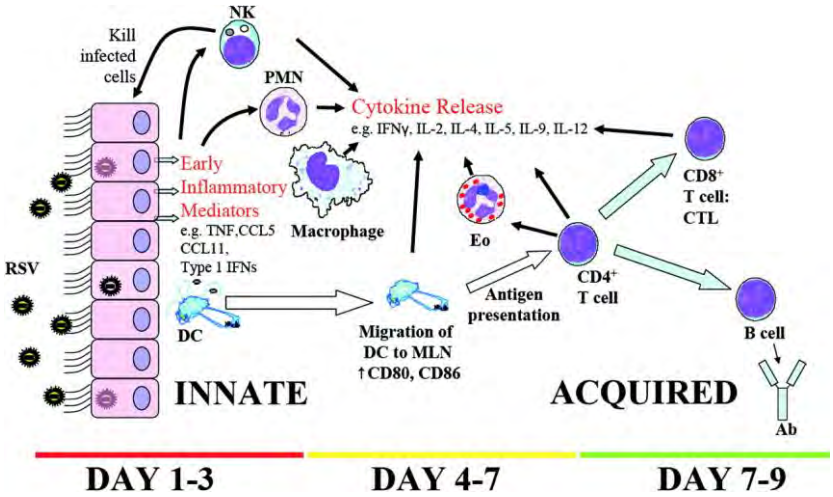
How the Immune System Works



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Basic Immune Support: Recommendations

- Lifestyle Recommendations
  - Sleep!
    - Sleep deprivation invokes stress response, inflammation and immunodeficiency
    - Sleep deprivation suppresses immune system function
    - The more the better; at least 8-10 hours, the more hours before midnight the better
  - Exercise regularly
  - Manage stress
  - Wash hands frequently

Besedovsky L, Lange T, Born J. Sleep and Immune function. Pflugers Arch. 2012 Jan; 463(1):121-37.
Dinges DF, Douglas SD, Hamarman S, et al. Sleep deprivation and human immune function. Adv in Neuroimmunology. 1995; 5:97-110.

111

Basic Immune Support: Recommendations

- Dietary Recommendations
  - Avoid sugar
    - 100 gr of glucose, fructose, sucrose, honey or orange juice all significantly decreased phagocytic activity of neutrophils for *at least 5 hours*
  - Eat sufficient protein
    - Necessary to create immune cells and facilitate communication & repair
  - Eat anti-microbial & immune-boosting foods
    - Garlic, onion, ginger, deep colored fruits and vegetables

Sanchez A. Reeser JL, Lau HS, et al. Role of sugars in human neutrophilic phagocytosis. Am J Clin Nutr. 1973 Nov; 26(11): 118084.

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Basic Immune Support: Recommendations

Immune Boosting Foods

Vegetables	Nuts, Grains & Seeds	Fruits
Asparagus, Beets	Almonds	Apricots
Broccoli	Brown rice	Bananas
Cabbage, Carrots	Flaxseed	Blackberries
Celery, Cucumbers	Pumpkin seeds	Black cherries
Dandelion	Sunflower seeds	Black figs
Dried olives		Blueberries
Garlic, Ginger		Cranberries
Horseradish		Figs
Kohlrabi,		Gooseberries
Leafy greens, Okra		Peaches
Onions, Potato skins,		Prunes
String beans, Turnips		Strawberries
		Watermelon

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Basic Immune Support: Recommendations - Supplementation

- Vitamin C – 500-3000 mg/day
  - Clinically tested immune protection and support
    - Vit C levels in phagocytes and lymphocytes are 100x higher than plasma
    - Increase T-lymphocyte activity/responsiveness, phagocyte function, leukocyte mobility, antibody production and interferon production
  - Antioxidant protection
    - Protect tissues against reactive oxygen species that are produced by phagocytes during a viral infection
- Zinc – 15-30 mg/day
  - Supports mucosal integrity
  - Supports production/function of neutrophil, NK cell and T-lymphocytes
  - Antioxidant protection

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Basic Immune Support: Recommendations - Supplementation

- Selenium – 100-400 mcg
  - Supports differentiation and function of neutrophils, macrophages, NK cells & T-lymphocytes
  - Antioxidant protection
    - Activates glutathione peroxidase
      - Reduces oxidative stress from free radicals and H_2O_2
- Oleanolic acid – 150-300 mg
  - Anti-inflammatory
    - Promotes healthy eicosanoid synthesis
  - Antioxidant support

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Basic Immune Support: Recommendations - Supplementation

- Mushrooms extracts: 600-1000 mg (10:1 extract)
  - Reishi (*Ganoderma lucidum*), Shiitake (*Lentinus edodes*), Fu-ling (*Poria cocos*), Turkey Tail Mushroom (*Coriolus versicolor*), Oyster Mushroom (*Pleurotus ostreatus*), Cordyceps (*Paecilomyces hepiali*), and Maitake (*Grifola frondosa*)
  - Contain polysaccharides that modulate immune response
    - Activate NK cells, T-lymphocytes, improve cellular communications (cytokines), phagocytosis
    - Antioxidant, antitumor, antiviral and antibacterial

Wasser SP, Weis AL. Therapeutic effects of substances occurring in higher Basidiomycetes mushrooms: a modern perspective. Crit Rev Immunol 1999;19:65-96.
Wang SY, Hsu ML, Hsu HC, et al. The anti-tumor effect of Ganoderma lucidum is mediated by cytokines released from activated macrophages and T lymphocytes. Int J Cancer 1997;70:699-705.
Yuen JW, Gohel MD. Anticancer effects of Ganoderma lucidum: a review of scientific evidence. Nutr Cancer 2005;53:11-7.

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Basic Immune Support: Recommendations - Supplementation

- Vitamin A/beta-carotene – 10,000-25,000 IU
  - Required for NK cell and B-lymphocyte growth, differentiation and activation
  - Improve cell signaling (cytokines)
  - Antioxidant protection
- Vitamin E – 400 IU
  - Improves number and function of NK-cells
  - Antioxidant; works synergistically with A, C & selenium

Food and Nutrition Board, Institute of Medicine. Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc. Washington, DC: National Academy Press, 2002. Available at: www.nap.edu/books/0309072794/html/.
Omenn GS. Chemoprevention of lung cancer: the rise and demise of beta-carotene. Annu Rev Public Health 1998;19:73-99.
Ravaglia G, Forti P, Maioli F, et al. Effect of micronutrient status on natural killer cell immune function in healthy free-living subjects aged >/=90 y. Am J Clin Nutr 2000;71:590-8.

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Basic Immune Support: Recommendations - Supplementation

- Probiotics: 15-30 billion CFU 1-2x/day
  - 70% of immune function occurs in GI tract
  - Prevent colonization of pathogenic bacteria
    - GI tract
    - Urinary tract
    - Respiratory tract
  - Vitally important for innate immune response

Reid G, Bruce AW, Cook RL, et al. Effect on urogenital flora of antibiotic therapy for urinary tract infection. Scand J Infect Dis 1990;22:43-7.
Probiotics for antibiotic-associated diarrhea. Pharmacist's Letter / Prescriber's Letter 2000;16(1):160103.
McGroarty JA. Probiotic use of lactobacilli in the human female urogenital tract. FEMS Immunol Med Microbiol 1993;6:251-64.
elraeds MM, van der Mei HC, Reid G, Busscher HJ. Inhibition of initial adhesion of uropathogenic Enterococcus faecalis by biosurfactants from Lactobacillus isolates. Appl Environ Microbiol 1996;62:1958-63.
Hyronimus B, Le Marrec C, Urdaci MC. Coagulin, a bacteriocin-like inhibitory subtances produced by Bacillus coagulans I4. J Appl Microbiol 1998;85:42-50.

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Basic Immune Support: Recommendations - Supplementation

Recommendation	Dosage
Immune Support Formula	1 tablet TID with food
7 Strain Probiotic formula	1 capsule QD/BID on empty stomach
Vitamin D3	3000-10000 IU/day based on testing
Vitamin A	10,000-20,000 IU/day
Anti-inflammatory diet; eliminate food allergens/triggers, hydrogenated oils, fried foods, dairy, refined carbohydrates/sugars, soda.	
Focus on chewing food until it is a liquid; at LEAST 30 times before swallowing	
Exercise – 30 minutes daily of moderate aerobic; 2-3x/week resistance training	
Sleep – 8-10 hours/night; more hours before midnight better	
Water – ½ body weight in ounces/day; ~1/4-½ cup every ½ hour; swish in mouth	

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Immune Support Formula

Vitamin C (ascorbic acid and as niacinamide ascorbate, sodium ascorbate, calcium ascorbate, magnesium ascorbate and potassium ascorbate)..... 333 mg
Vitamin D3 (cholecalciferol).....8.33 mcg (333 IU)
Niacin (as niacinamide ascorbate) ..... 26 mg NE
Zinc (as zinc citrate) ..... 5 mg
Selenium (as l-selenomethionine) .....67 mcg
Mixed Mushroom Blend:..... 217 mg
Reishi (fruiting body; *Ganoderma lucidum*), Shiitake Mushroom (fruiting body; *Lentinus edodes*), Fu-Ling Mushroom (sclerotium; *Poria cocos*), Turkey Tail Mushroom (fruiting body; *Coriolus versicolor*), Oyster Mushroom (fruiting body; *Pleurotus ostreatus*), *Cordyceps sinensis* (mycelium), Maitake Mushroom (fruiting body; *Grifola frondosa*)
Olive Leaf Extract (leaf; *Olea europaea*) (75% oleanolic acid).. 60 mg

7 Strain Probiotic formula

One capsule† supplies:

A proprietary blend of: .....30 billion live organisms††
Saccharomyces boulardii, *Bifidobacterium lactis* Bi-07, *Lactobacillus plantarum* Lp-115, *Lactobacillus salivarius* Ls-33, *Lactobacillus acidophilus* NCFM® *Streptococcus thermophilus* St-21, and *Bifidobacterium lactis* Bi-04

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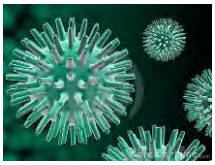
Colds and Flus

Viral Infection

- *All colds & flus*
- Most coughs
- Most sore throats
- Some sinus infections
- Clear discharge
- Systemic (i.e., body aches)
- Fever possible



Bacterial Infection

- Strep throat
- Most ear infections
- Some sinus infections
- Green/yellow discharge
- Localized (i.e., above the neck)
- Fever likely

VS

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Is It a Cold or a Flu?

Symptoms	Cold	Flu
Fever	Rare	Characteristic, high (100-102°F); lasts 3-4 days
Headache	Rare	Prominent
General Aches, Pains	Slight	Usual; often severe
Fatigue, Weakness	Quite mild	Can last up to 2-3 weeks
Extreme Exhaustion	Never	Early and prominent
Stuffy Nose	Common	Sometimes
Sneezing	Usual	Sometimes
Sore Throat	Common	Sometimes
Chest Discomfort, Cough	Mild to moderate; hacking cough	Common; can become severe
Complications	Sinus congestion or earache	Bronchitis, pneumonia; can be life-threatening

The National Institute of Allergy and Infectious Diseases, September 2005. The CDC. "Antiviral Drugs and the Flu," Oct. 22, 2005.

122

Prevalence and Economic Impact of Colds and Flus

COLDS

- Prevalence:
  - Children: 3-8/year
  - Adults: 2-4/year
- Economic Impact
  - 3.5+ billion dollars/year

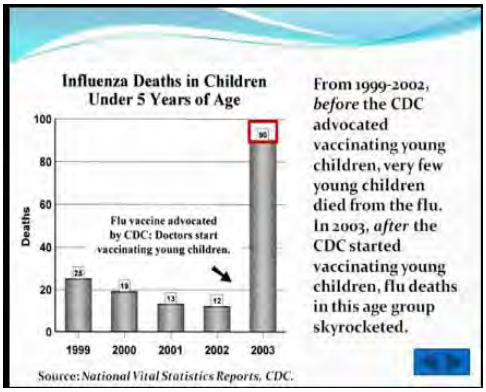
INFLUENZA

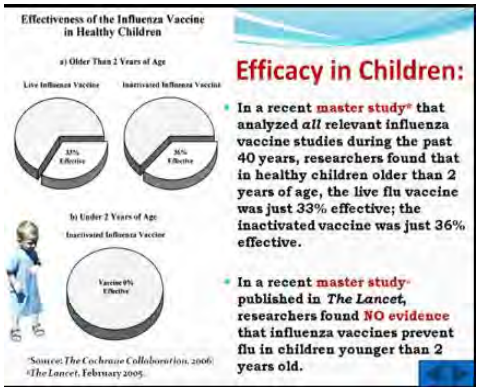
- Prevalence:
  - 5-20% of US population
  - 200,000 hospitalizations/year
- Economic Impact
  - 10+ billion dollars/year
- Complications and/or hospitalization responsible for most deaths
  - 90% of deaths are in people 65+ years of age

Disease-A-Month Volume 49 • Number 3 • March 2003
Whitehouse.gov Accessed 26 Oct 2006
Center for Disease Control: http://www.cdc.gov/vaccines/pubs/pinkbook/downloads/flu.pdf

123

Flu Vaccination: Effectiveness





The Cochrane Collaboration Report 2006

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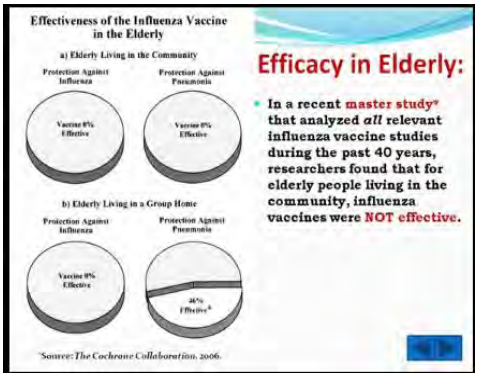
Flu Vaccination: Effectiveness



The Cochrane Collaboration Report 2006

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Flu Vaccine: Ingredients

- Thimerosal (<1 mcg mercury per dose)
- Hydrocortisone <0.0016 mcg
- Gentamicin sulfate <0.15 mcg
- Ovalbumin <1 mcg
- Formaldehyde <50 mcg
- Sodium deoxycholate <50 mcg
- Gelatin

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Cold & Flu: Recommendations

- Lifestyle
  - Wash hands frequently
  - Use saline rinse 2x/day and blow nose often
    - ¼ tsp sea salt + pinch of baking soda in 8 oz. water
  - Stay warm and rested
  - Take a steamy shower
  - Use mentholated salve under nose
  - Apply hot or cold packs around congested sinuses

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Cold & Flu: Recommendations

- Dietary
  - Avoid sugar!
  - Drink hot liquids – breaks up phlegm
  - Eat foods to boost immune function
  - If you are not hungry, don't eat
  - Drink plenty of fluids
    - Use ice chips if nausea/vomiting an issue

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Cold & Flu: Recommendations

- Echinacea purpurea root
  - Antiviral and immune system stimulant
    - Increase activity of lymphocytes, neutrophils and NK cells
    - Activate phagocytosis
  - Clinical studies showed reduce cold symptom severity and duration 10-30%
  - Most effective if started when symptoms first noticed and continued 7-10 days
  - Dose: 300 mg 4x/day (4:1 extract)

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Cold & Flu: Recommendations

- Andrographis leaf (Andrographis paniculata)
  - Contains andrographolides
    - Immunostimulant: increase antibody activity and phagocytosis by macrophages
  - Significantly improve symptoms of cold/flu when started within 72 hours of symptom onset
    - Typically takes 2-5 days of treatment for maximum relief
  - Decrease risk of developing cold/flu by 50% after 2 months of continuous treatment
  - Dose: 20 mg andrographolides BID/TID

Caceres DD, Hancke JL, Burgos RA, et al. Use of visual analogue scale measurements (VAS) to assess the effectiveness of standardized Andrographis paniculata extract SHA-10 in reducing the symptoms of common cold. A randomized, double-blind, placebo study. Phytomedicine 1999;6:217-23.
Melchior J, Palm S, Wikman G. Controlled clinical study of standardized Andrographis paniculata in common cold- a pilot trial. Phytomedicine 1996;97;3:315-8.
Hancke J, Burgos R, Caceres D, Wikman G. A double-blind study with a new monodrug Kan Jang: decrease of symptoms and improvement in the recovery from common colds. Phytotherapy Res 1995;9:559-62.
Caceres DD, Hancke JL, Burgos RA, Wikman GK. Prevention of common colds with Andrographis Paniculata dried extract: a pilot, double-blind trial. Phytomedicine 1997;4:101-4.
Puri A, Saxena R, Saxena RP, et al. Immunostimulant agents from Andrographis paniculata. J Nat Prod 1993;56:995-9.

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Cold & Flu: Recommendations

Recommendation	Dosage
Immune Support Formula	1 tablet TID with food
7 Strain Probiotic formula	1 capsule QD/BID on empty stomach
Vitamin D3	3000-10000 IU/day based on testing
Vitamin A	10,000-20,000 IU/day
Andrographis Formula	2 tablets every 2 hours for 12 hours, then 1 tablet 3-4x/day for 5 days.
Anti-inflammatory diet; eliminate food allergens/triggers, hydrogenated oils, fried foods, dairy, refined carbohydrates/sugars, soda.	
Focus on chewing food until it is a liquid; at LEAST 30 times before swallowing	
Sleep – 8-10 hours/night and rest PRN; more hours before midnight better	
Water – ½ body weight in ounces/day; ~1/4-½ cup every ½ hour; swish in mouth	

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Andrographis Formula

Two tablets supply:

Andrographis Leaf Extract (*Andrographis paniculata*)..... 400 mg
(standardized to 5% [20 mg] andrographolides)
Amla Fruit 4:1 Extract (*Emblica officinalis*)..... 400 mg
(containing a minimum of 30% [60 mg] tannins)
A 5:1† proprietary herbal extract blend of: ..... 400 mg
Glehnia (*Glehnia littoralis*) Root, Apricot (*Prunus armeniaca*) Seed, White Mulberry (*Morus alba*) Leaf, Gardenia (*Gardenia jasminoides*) Fruit, Soybean (*Glycine max*), Zhejiang Fritillary (*Fritillaria thunbergii*) Bulb, and Pear (*Pyrus pyrifolia*) Fruit.

†ChromeMate® GTF is a registered trademark of InterHealth, Inc.

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Endocrine Conditions

Adrenals	Adrenal Fatigue, Chronic Fatigue
Insulin	Insulin Resistance, Syndrome X, Diabetes Type II
Thyroid	Hypothyroid

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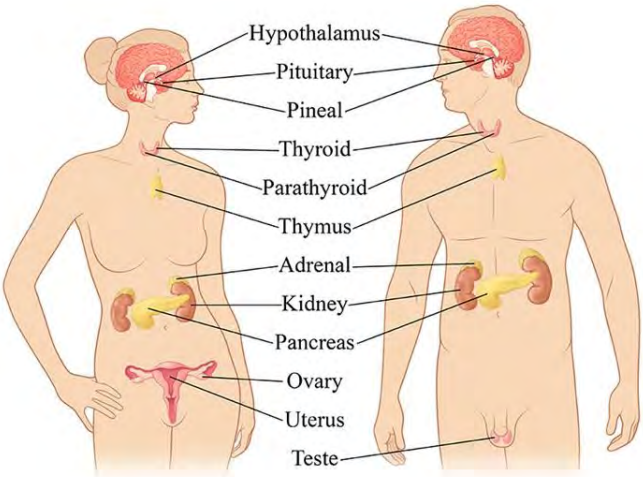
Endocrine Organs



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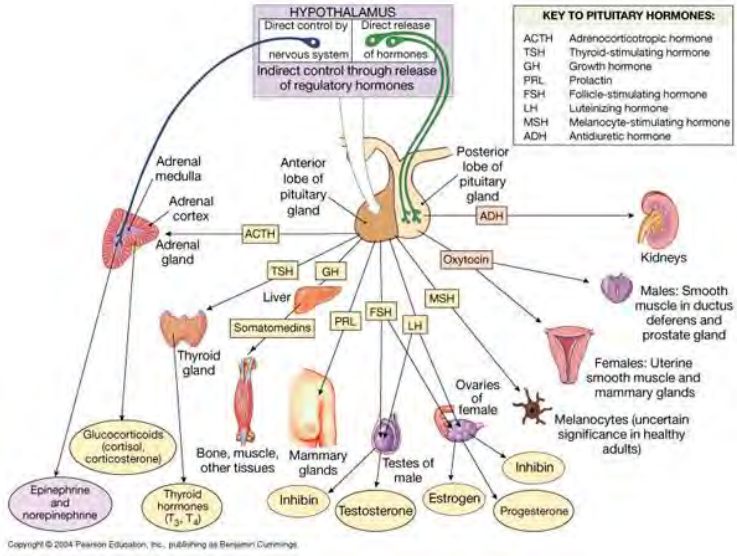
Endocrine Hormones



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Endocrine Conditions

Adrenals	Adrenal Fatigue, Chronic Fatigue
Insulin	Insulin Resistance, Syndrome X, Diabetes Type II
Thyroid	Hypothyroid

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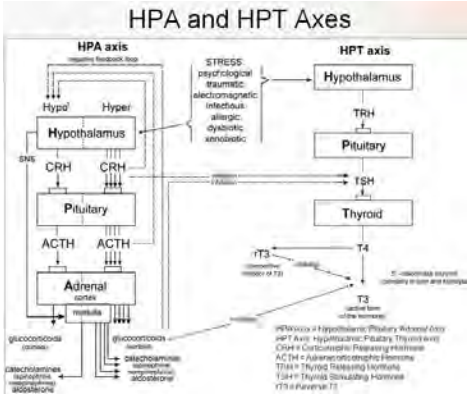
Chronic Stress Threatens our Health

- Chronic stress disrupts adrenal & thyroid function
  - Nearly 4 in 5 U.S. adults regularly experience physical symptoms associated with stress
  - Over 7 in 10 American adults commonly suffer stress-related psychological symptoms
  - Almost 1 in 2 adults in the U.S. report lying awake at night due to stress
  - Nearly 1 in 2 report that stress has had a negative impact personally and professionally



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I am sooooo stressed!

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Adrenal Stress – Classic Signs

- Waking up in the morning and not feeling refreshed?
- Feeling unusually tired most of the time?
- Needing coffee, soda or sugary snacks to get going and keep going?
- Feel physically exhausted, but your mind continues to race, filled with anxiety?
- The feeling that you are aging too quickly?
- Poor digestion?
- Struggling to lose weight in spite of dieting and exercise?
- Achy muscles and/or joints or tension in your body – particularly, your neck and shoulders?
- Diminished sex drive?
- Feeling dark or depressed or having trouble concentrating and focusing and remembering things?
- The lack of motivation to accomplish even small tasks?
- Getting sick more frequently and taking longer to recover?

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Associated Symptoms

- Pain/spasm in upper back & neck muscles
- Loss of libido
- Poor memory
- Light headed when standing
- Headaches
- Irritability/moodiness
- Alcohol intolerance
- Tenderness in low back
- Dry/thin skin
- Scanty perspiration
- Slow wound healing
- Cold intolerance
- Weakness
- Nervous/anxious
- Chronic inflammation
- Palpitations
- Weight gain
- Low blood pressure
- Sweet/salt cravings
- Unexplained hair loss
- Muscle wasting
- Poor concentration
- Frustration/confusion
- Low body temps
- Slow recovery from work outs

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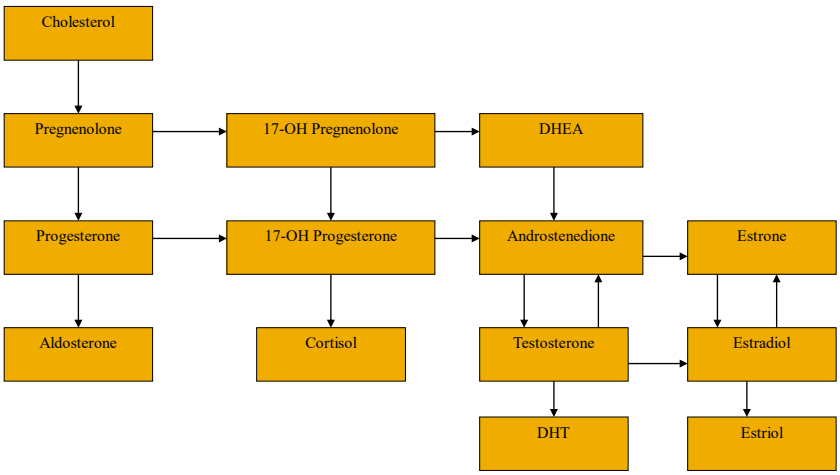
Associated Conditions

- Anxiety
- Depression
- Fibromyalgia
- PMS
- Insomnia
- Migraines
- Infertility
- Severe menopause
- Asthma
- Allergies
- Ulcers
- Cardiovascular disease
- High blood pressure
- Thyroid Dysfunction
- Celiac disease
- Osteoporosis
- Depression
- Chronic Fatigue
- Immune dysfunction
- Hypothyroidism
- Obesity
- Hypoglycemia

141

Steroid Hormone Principle Pathways



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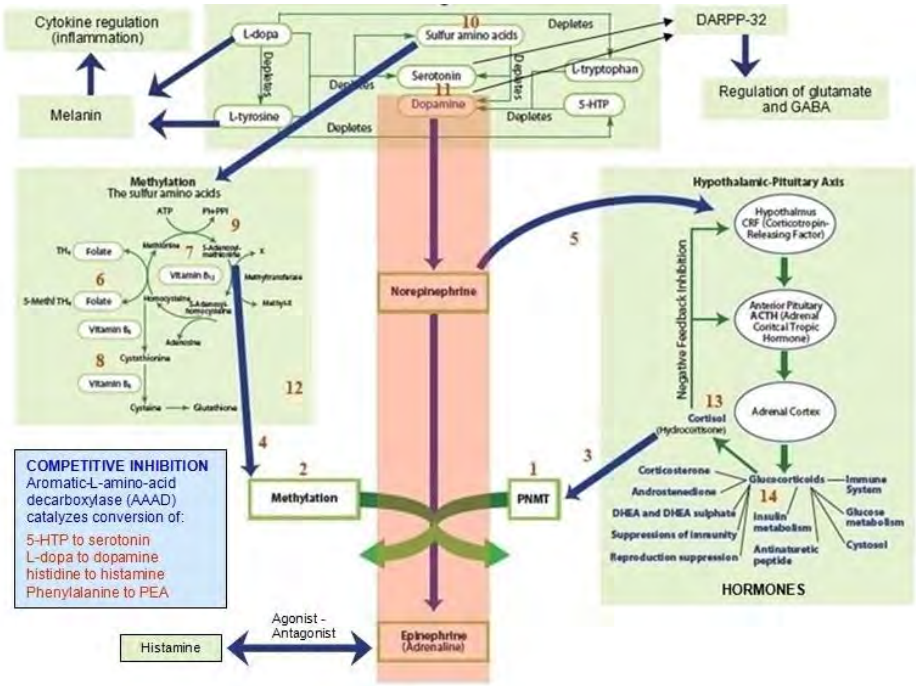
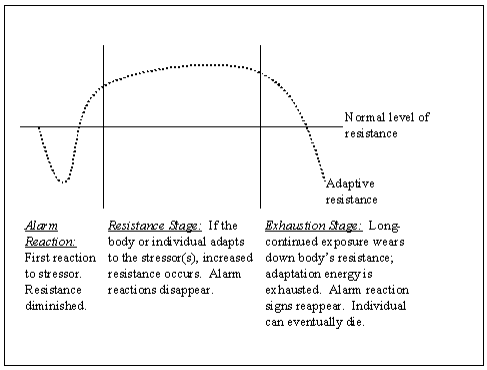
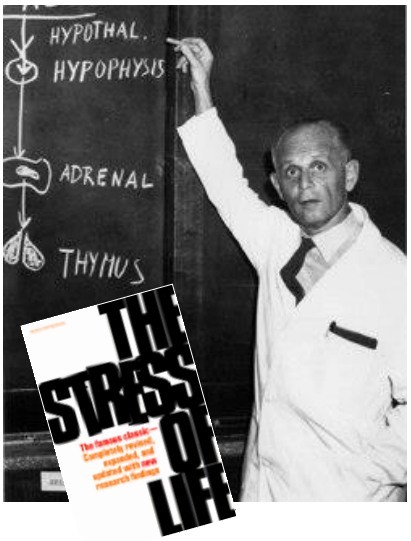


143

Defining Stress and Adrenal Fatigue

General Adaptation Syndrome (G.A.S)





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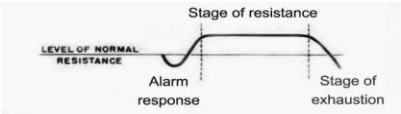
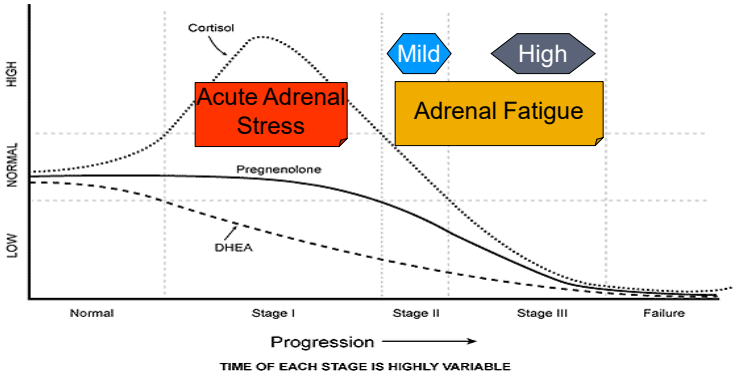
Stages of Adrenal Fatigue

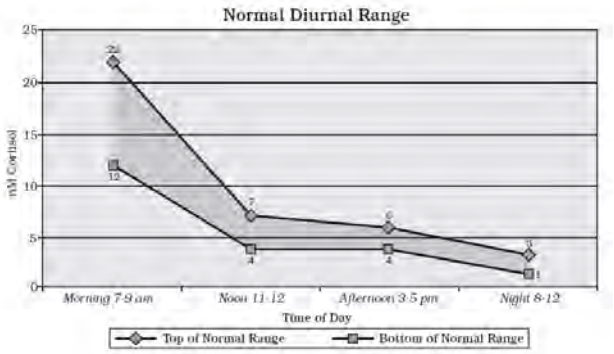


Progression of Stages of Adrenal Exhaustion



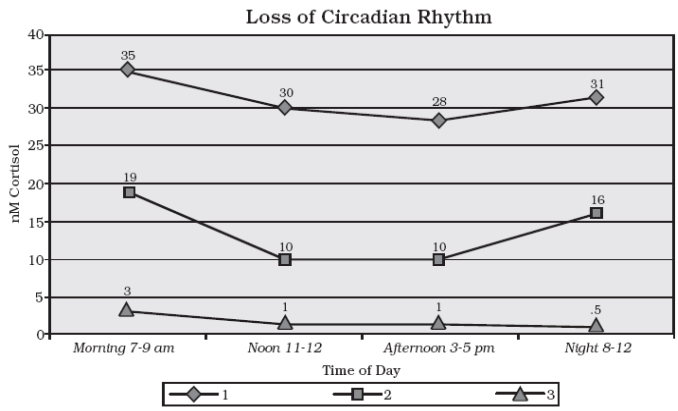
145

Normal Diurnal Range



146

Abnormal Cortisol Rhythm



147

Does your patient have Adrenal Fatigue?

- Go through the Classic Signs
- Use Identi-T Stress Assessment
- HAQ:
  - Section III: Adrenal and Thyroid
  - Section IV: Glucose Regulation
  - Section VI: Mood
  - Section VII: Immune
  - Section XII: Female

148

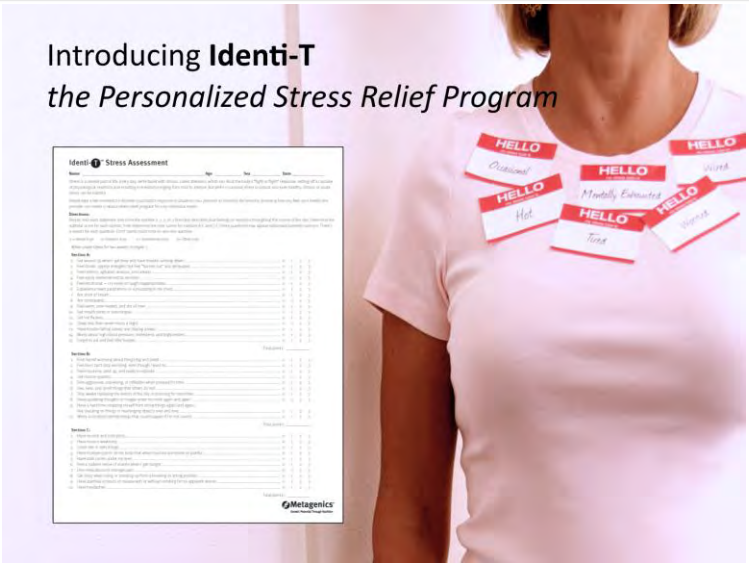
Identify the Stress Experience

Stress relief begins with identifying your unique experience to stressors.

Stress patterns express a trend toward increasing exposure to excess stress hormones and decreasing stressor tolerance.

149

Identi-T Stress Assessment



150

Identi-T Stress Assessment

- Provides information on 3 layers of stress response:
  1. The intensity of perceived stress
  2. HPA over- or under-responsiveness to stressors
  3. The relationship between stress type and the appropriate nutraceuticals and lifestyle support

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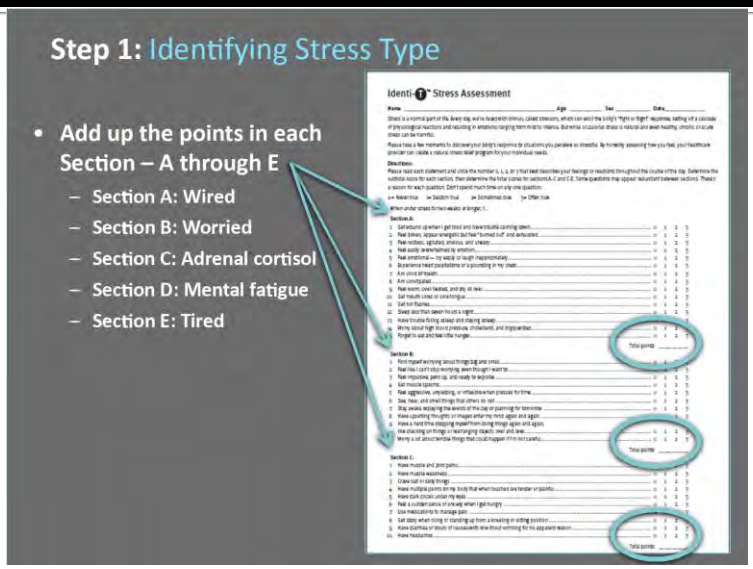
Identi-T Stress Assessment



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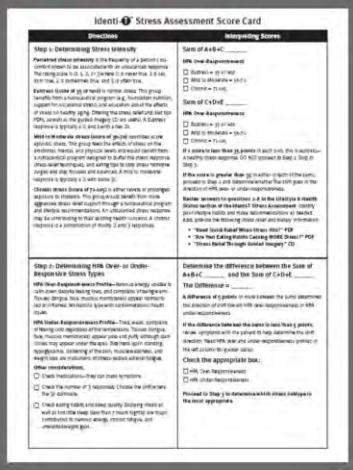
Identi-T Stress Assessment

Interpreting Identi-T Scores & Protocols

The Flow…

- ❑ Transfer individual Section and Sum scores to the Score Card
- ❑ Determine stress intensity
- ❑ Determine HPA Over- or Under-responsiveness
- ❑ Determine Stress Type within HPA path chosen
- ❑ Check adrenal function
- ❑ Check sleep questions
- ❑ Eustress recommendations
- ❑ Protocols


Identi-T Stress Assessment Score Card

Directions	Interpreting Scores
Step 1: Determining Stress Intensity	Sum of A+B+C _____
	Sum of C+D+E _____
Step 2: Determining HPA Over- or Under-Responsive Stress Types	Determine the difference between the Sum of A+B+C _____ and the Sum of C+D+E _____
	The Difference = _____
	Check the appropriate box:

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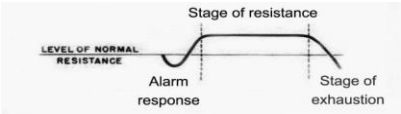
Assessment of Adrenal Function

- Serum, saliva, or urine
- Serum: Protein bound vs. free fraction
- Salivary: Diurnal rhythm of Cortisol

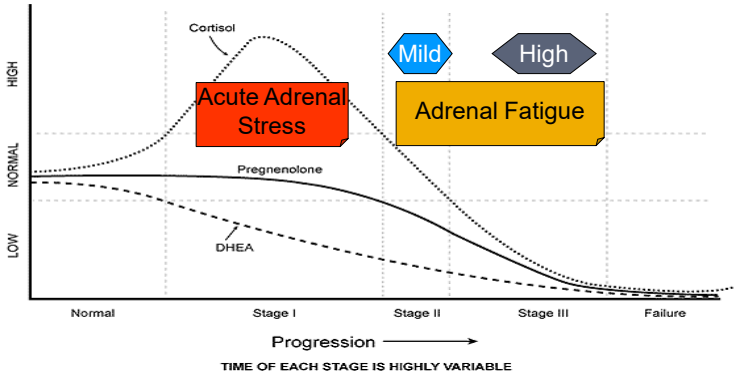
- Salivary free-fraction best option:
  - Correlated with serum free fraction
  - Measures bioavailable hormone
  - Easy at home collections throughout day/night month
  - Economical
- ➢ Adrenal Stress Profile

154

Stages of Adrenal Fatigue



Progression of Stages of Adrenal Exhaustion



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Stages of Adrenal Fatigue

Stage of adrenal fatigue	Cortisol Levels	DHEA Levels	Average time to recovery	Preferred Interventions
I: Acute Adrenal Fatigue	• At least one cortisol level is high • Total cortisol sum is high	• DHEA is borderline low, low or normal	• 1-6 months	• Lifestyle & dietary changes • Supplementation PRN
II: Mild Adrenal Fatigue	• AM, noon or afternoon cortisol is low or borderline low • Total cortisol sum is normal	• DHEA is borderline low or low	• 6-12 months	• Adrenal Support Supplementation • Targeted Lifestyle and dietary changes
III: High Adrenal Fatigue	• Most cortisol levels are low or borderline low • Total cortisol level is low	• DHEA levels are borderline low or low	• 12-24 months	• Adrenal, Neurotransmitter and/or Hormone Supplementation • Immediate lifestyle and dietary changes
IV: Adrenal Failure	• All cortisol levels are low or borderline low • Total cortisol is low	• DHEA level is low	• 18-36 months	• Hospitalization/medical attention • Adrenal, Neurotransmitter and/or Hormone Supplementation • Immediate lifestyle and dietary changes

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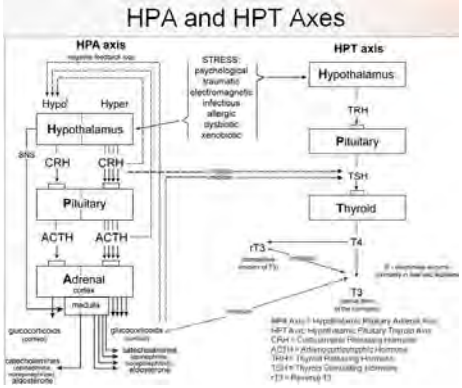
Adrenal Fatigue: Labs

- Cortisol/DHEA salivary test
- Orthostatic hypotension
- Fasting glucose
- Glucose and insulin tolerance test
- Sex hormone testing (salivary)
- Thyroid panel (TSH, Free T3, Free T4)
- 25-hydroxy Vitamin D



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Managing Stress

Only the individual is capable of defining what is and what is not stress.

1. **Change the situation**
2. **Change the response**
3. **Build resistance**

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Lifestyle Strategies

- Sleep, rest and recovery
- Exercise
- Stress management
  - Reduce work-related stress
  - Deep Breathing
  - Stretching
  - Meditation & Relaxation Response
  - Progressive Muscle Relaxation
  - Visualization
  - Find FUN

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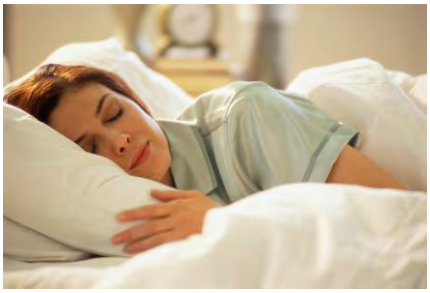
Physical Repair and Regeneration



During sleep:

Physical repair takes place from approximately **10PM-2AM**

Psychic regeneration occurs from approximately **2AM-6AM**

Under ideal circumstances, recommended bedtime is 9:00-10:00 pm

160

Sleep and Rest

- Poor quality sleep and too little sleep causes
  - Adrenal dysfunction
  - Fat deposition
  - ↑ INFLAMMATION
- Get 8-10 hours/night
  - The more before midnight the better
  - Correct sleep apnea if necessary
- If naps are restorative, take them

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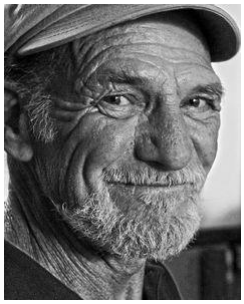
The Importance of Sleep

"A 90 year old man was asked to what he attributed his longevity and health:

'I reckon', he said, 'It's because most nights I went to bed and slept, when I should have stayed up and worried.'"



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Exercise

- Stage I or II adrenal fatigue ONLY
  - Only as energy & pain permit – NEVER to failure
  - Ideally, exercise before 2 PM
- Moderate exercise can reduce excess cortisol
  - 70-75% of MHR for 30-45 minutes 5x/week

Gardening	Walking	Biking
Dancing	Playing with kids	Sports
Running	Soccer	Volleyball
Yoga	Tai Chi	Lifting weights
Hiking	Skating	Climbing
Swimming	Jumping rope	House cleaning

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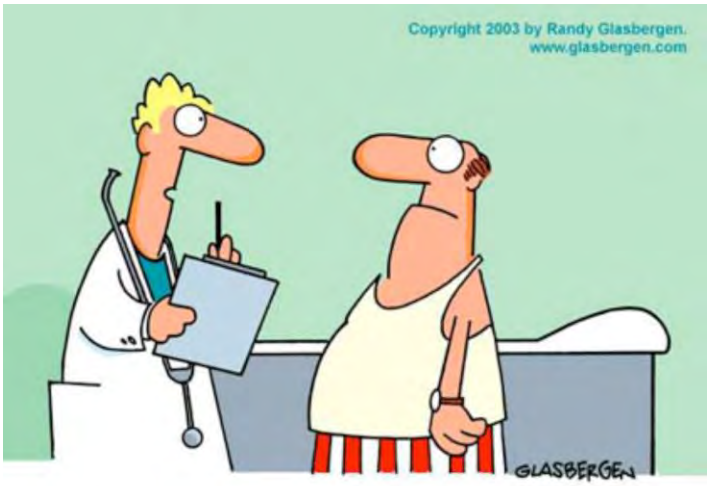

"What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?"

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Deep Breathing

- Incorporate into *daily* routine
  - Helps you slow down
  - Increase oxygen
  - Eliminates CO_2
  - Relaxes tense/tired muscles
  - Calms the adrenal response

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Deep Breathing

- Breathe deep whenever you…
  - Send/receive an email/text/phone call
  - Walk through a door
  - Get to a stop light/sign
  - Every time someone says your name

166

Dietary Strategies – Glycemic Control

- Skip the sugar
  - Refined carbs – sodas, white breads, candies, cookies
- Increase fiber, especially soluble fiber
  - Legumes (beans, peas, lentils), whole fruits and vegetables, whole grains; supplement PRN
- Eat meals/protein regularly
  - Breakfast within 60 min of waking
  - 4-5 meals/day, 10-15 grams protein every meal
- Stay hydrated – ½ body weight in ounces daily
- Increase phytonutrients – eat the rainbow
- Avoid alcohol, tobacco and caffeine

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Foods that Support Adrenal Function

Vegetables	Nuts, grains, seeds	Fruits
• Asparagus • All leafy greens • Legumes • Lima beans • Mushrooms • Okra • Olive oil • Onions • Sea vegetables • Soybeans • Sprouts	• Almonds • Brown rice • Flaxseed • Millet • Molasses • Pumpkin seeds • Whole grains • Wild rice	• Blueberries • Coconut • Figs • Gooseberries • Lemons • Prunes • Strawberries

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Adrenal Fatigue: Recommendations

- Adaptogens (herbs)
  - Non-toxic
    - No change in normal physiology
  - Helps the body adapt to stress
  - Normalizes body function

- Benefits
  - Improved blood sugar metabolism
  - Less cravings
  - Improved immunity
  - Increased energy/stamina
  - Better mood
  - Improved focus/concentration
  - Decreased anxiety
  - Better sleep
  - Improved motivation
  - Increased productivity
  - Improved muscle tone/strength

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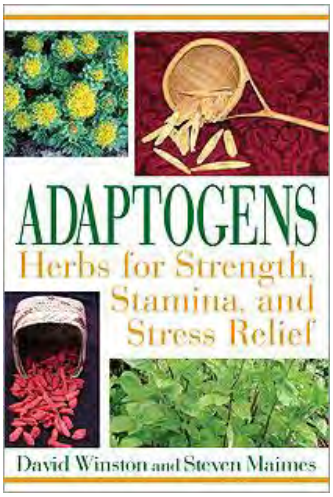
Adaptogens



- **Ayurvedic Herbs**: Amla, Ashwagandha, Guduchi, Holy Basil, Licorice, Shatavari, Shilajit
- **Chinese Herbs**: Asian Ginseng, Astragalus, Codonopsis, Cordyceps, Eleuthero, He Shou Wu, Jiaogulan, Licorice, Lycium, Prince Seng, Reishi, Schisandra
- **Western Herbs**: American Ginseng, Rhaponticum, Rhodiola

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Adrenal Fatigue: Recommendations

- Ashwagandha (Withania somnifera)
  - Ayurvedic herb used for more than 2500 years
  - Enhances adaptability to both physical and chemical stress
  - Improves endurance
  - Supports immune function
  - Can improve T3 & T4 concentrations

Bhattacharya SK, Goel RK, Kaur R, et al. Anti-stress activity of sitoindosides VII and VIII, new acylsterylglucosides from Withania somnifera. Phytother Res 1987;1(1):32 37.
Singh N, Nath R, Lata A, et al. Withania somnifera (ashwagandha), a rejuvenating herbal drug which enhances survival during stress (an adaptogen). Int J Crude Drug Res 1982;20(1):29-35
Wagner H, Norr H, Winterhoff H. Plant adaptogens. Phytomedicine 1994;1:63-76.
Mishra LC, Singh BB, Dagenais S. Scientific basis for the therapeutic use of Withania somnifera (ashwagandha): a review. Altern Med Rev 2000 Aug;5(4):334-46.
Panda S, Kar A. Withania somnifera and Bauhinia purpurea in the regulation of circulating thyroid hormone concentrations in female mice. J Ethnopharmacol 1999;67(2):233-39.

171

Adrenal Fatigue: Recommendations

- Asian Ginseng (Panax ginseng)
  - Traditionally used as/to:
    - Tonic – normalize the body
    - Enhance stamina and capacity to cope with stress
      - Person who is "overwhelmed and exhausted"
  - Contain ginsenosides (isolated from root)
    - Must be standardized
    - Need ~30-60 mg/day ginsenosides
  - Toxicity – at doses >15 g/day
    - Depression, hypertension, nervousness, sleeplessness

Huang KC. The Pharmacology of Herbs 2nd Ed. New York: CRC Press; 1999.
Bensky D, Gamble A. Chinese Herbal Medicine Materia Medica. Seattle: Eastland Press; 1993.
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Hall T, Lu ZZ, Yat P, et al. Evaluation of consistency of standardized Asian ginseng products in the ginseng evaluation program. HerbalGram 2001;52:31-59.
Cui J, Garle M, Eneroth P, et al. What do commercial ginseng preparations contain? Lancet 1994;344(8915):134.

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Adrenal Fatigue: Recommendations

- Cordyceps (Cordyceps sinensis)
  - One of most valued medicinal fungi in Chinese medicine
  - Strengthen and rebuild the body after exhaustion or long-term illness/stress
  - Specific for excessive tiredness, persistent cough, impotence, debility and anemia
  - Standardized to adenosine and cordyceptic acid
    - Cordyceptic acid: 30-60 mg/day; adenosine: 2-4 mg/day
  - Exceptionally safe; possible mild side effects at high doses include stomach upset, dry mouth, nausea

Zhu JS, Halpern GM, Jones K. The scientific rediscovery of a precious ancient Chinese herbal regimen: Cordyceps sinensis: part II. J Altern Complement Med 1998;4(4):429-57.
Hobbs C. Medicinal Mushrooms. Loveland, Colorado: Interweave Press Inc.; 1996.
Dai G, Bao T, Xu C, et al. CordyMax Cs-4 improves steady-state bioenergy status in mouse liver. J Altern Complement Med 2001;7(3):231-40.

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Adrenal Fatigue: Recommendations

- Rhodiola (Rhodiola rosea)
  - More than 180 published clinical, pharmacological and phytochemical studies over 35 years showing:
    - Increased work performance (physical and mental)
    - Increased energy and athletic performance
    - Improved cognitive function
    - Increased resistance to stress (chemical, biological and physical)
    - Improved attention and short-term memory
  - No detectable toxicity

Germano C, Ramazanov Z. Arctic Root (Rhodiola rosea): The Powerful New Ginseng Alternative. New York: Kensington; 1999.
Kelly GS. Rhodiola rosea: a possible plant adaptogen. Altern Med Rev 2001,6(3):293-302.
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Maimeskulova LA, Maslov LN. [Anti-arrhythmic effect of phytoadaptogens.] [Article in Russian] Eksp Klin Farmakol 2000;63(4):29-31.
Maslova LV, Kondrat'ev BI, Maslov LN, et al. [The cardioprotective and antiadrenergic activity of Rhodiola rosea in stress.] [Article in Russian] Eksp Klin Farmakol 1994;57(6):61-63.
Spasov AA, Wikman GK, Mandrikov VB, et al. A double-blind, placebo-controlled pilot study of the stimulating and adaptogenic effect of Rhodiola rosea SHR-5 extract on the fatigue of students caused by stress during an examination period with a repeated low-dose regimen. Phytomedicine 2000;7(2):85-89.

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Adrenal Fatigue: Recommendations

- Rehmannia (Rehmannia glutinosa) root
  - Stimulate production of adrenal hormones
  - Anti-inflammatory
    - Also used for asthma, skin diseases and arthritis
  - Improves production of sex hormones
    - Used for menopause, impotence & hormone deficiency
  - No known drug interactions
  - No documented toxicity levels

Hson-Mou Chang and Paul Pui-Hay But (eds.), **Pharmacology and Applications of Chinese Materia Medica,** (2 vols.), 1986 World Scientific, Singapore.
Shen Ziyin, et al., Kidney reinforcement regimen in the treatment of bronchial asthma, Journal of Traditional Chinese Medicine 1982; 2(2): 135–140.
Chen Shuanghou, et al., *Pharmacological study of Bushen Shengxue No.1*, Chinese Traditional and Herbal Drugs 1990; 21(6): 266–267.

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Adrenal Fatigue: Recommendations

- Schisandra Fruit (Schisanda chinensis)
  - Increases concentration, coordination and endurance
  - Has antioxidant and anti-inflammatory properties
  - Increases energy and has a tranquilizing effect
  - Increases resistance to illness and stress
  - Helps to normalize blood sugar and blood pressure
  - Improves liver function

Upton R, ed. Schisandra Berry: Analytical, quality control, and therapeutic monograph. Santa Cruz, CA: American Herbal Pharmacopoeia 1999;1-25.
Leung AY, Foster S. Encyclopedia of Common Natural Ingredients Used in Food, Drugs and Cosmetics. 2nd ed. New York, NY: John Wiley & Sons, 1996.

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Adrenal Fatigue: Recommendations

- Licorice Root (Glycyrrhiza glabra)
  - Contains glycyrrhizin & glycyrrhitinic acid
    - Can bind to glucocorticoid/mineralcorticoid receptors
    - Increase the half-life of cortisol by inhibiting breakdown
    - ➢ Increase availability of cortisol within the body
  - Exhibit anti-inflammatory, antiviral, anticuler, estrogen-balancing and adaptogen qualities
  - Especially for those with diminished adrenal function
  - Can increase blood pressure/cause water retention
  - Dosing: 200-800 mg/day for 4-6 weeks or 100 mg/day ongoing

Snow JM. Glycyrrhiza glabra L. (Leguminaceae). Protocol J Bot Med Winter1996:9-14.
Kiso Y, Tohkin M, Nikino, et al. Mechanism of antihepatotoxic activity of glycyrrhizin. I: effect on free radical generation and lipid peroxidation. Planta Med 1984;50(4):298-302.
Inoue H, Mori T, Shibata S, et al. Pharmacological activities of glycyrrhetinic acid derivatives: analgesic and anti-type IV allergic effects. Chem Pharm Bull 1987;35(9):3888-93.
Pompei R, Pani A, Flore O, et al. Antiviral activity of glycyrrhizic acid. Experientia 1980;36(3):304.
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Ojima M, Satoh K, Gomibuchi T, et al. The inhibitory effects of glycyrrhhizin and glycyyrhetinic acid on the metabolism of cortisol and prednisolone—in vivo and in vitro studies. Nippon Naibunpi Gakkai Zasshi1990;66(5):584-96.

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Adrenal Fatigue: Recommendations ★

- B-vitamins
  - Pantothenic acid – B5 – often called "anti-stress" vitamin
    - Essential for cellular energy production, hormone synthesis and neurotransmitter production
  - Pyridoxine – B6 – required for proper neurotransmitter and hormone production
  - Niacin – B3 – necessary for energy production and conversion of tryptophan into serotonin

McEvoy GK, ed. AHFS Drug Information. Bethesda, MD: American Society of Health-System Pharmacists, 1998.
Shils ME, Olson JA, Shike M, Ross AC, eds. Modern Nutrition in Health and Disease. 9th ed. Baltimore, MD: Williams & Wilkins, 1999.

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Adrenal Fatigue: Recommendations

- Stressed and tired
  - Feel weak & fatigued due to stress
  - ➢ Provide overall stress protection, increased energy, more restful sleep and enhanced mental clarity
  - ➢ Cordyceps, Asian Ginseng, Rhodiola, B-vitamins

Recommendation	Dosage
Adrenal Stressed and Tired Formula	1-2 tablets BID
B-complex	1 BID/TID with food
Sleep formula	1-2 b4 bed PRN
Exercise – as energy/pain permits; focus on getting fresh air daily	
Improve stress management; implement strategies throughout the day	
Focus on proper sleep hygiene and maintaining blood sugar levels throughout the day	

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Adrenal Fatigue: Recommendations

- Stressed and wired
  - Overworked, sleep too little, have difficulty relaxing/resting, anxious, agitated, hectic lifestyle
  - ➢ Promote inner balance and inner sense of calm
  - ➢ Rehmannia, Schisandra Fruit, Asian Ginseng, B-vitamins

Recommendation	Dosage
Adrenal Stressed and Wired Formula	2 tablets BID/TID and PRN
B-complex	1 BID/TID with food
Sleep formula	1-2 b4 bed PRN
Exercise – as energy permits – b4 2 pm ideal; focus on getting fresh air/grounded daily	
Improve stress management; implement strategies throughout the day (deep breathing)	
Focus on proper sleep hygiene and maintaining blood sugar levels throughout the day	

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Adrenal Fatigue: Recommendations

- Stressed and hot (or 'burned out')
  - Prolonged stress, exhausted, muscle ache/stiffness, difficulty adapting & doing routine tasks
  - ➢ Support immune system and improve cortisol levels
  - ➢ Licorice Root, Ashwagandha, B-vitamins (esp B5 & B6), Vit C

Recommendation	Dosage
Stress Licorice Formula	1-2 tablets BID/TID and PRN
B-complex	1 BID with food
Adrenal B Formula	1 BID with food
Sleep formula	1-2 b4 bed PRN
Stretching/yoga – as energy permits; focus on getting fresh air/grounded daily	
Improve stress management; implement strategies throughout the day (deep breathing)	
Focus on proper sleep hygiene and maintaining blood sugar levels throughout the day	

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Stressed and wired formula

Proprietary Serenity Blend ..... 1,500 mg
Rehmannia Extract (root; *Rehmannia glutinosa*)
Schisandra Extract (fruit; *Schisandra chinensis*)
Wild Jujube Extract (fruit, seeds; *Ziziphus jujuba* mill. var. *spinosa*)
Dong Quai Extract (root; *Angelica sinensis*)
Chinese Asparagus Extract (root; *Asparagus cochinchinensis*)
Ophiopogon Japonicus Extract (root; *Ophiopogon japonicus*)
Scrophularia Extract (root; *Scrophularia ningpoensis*)
Asian Ginseng Extract (stem, leaf; *Panax ginseng*; standardized to 7% ginsenosides)
Red Sage Extract (root; *Salvia miltiorrhiza*)
Poria Cocos Extract (body; *Poria cocos* (Schw.) wolf)
Polygala Extract (root; *Polygala tenuifolia*)
Platycodon Extract (root; *Platycodon grandiflorum*)

Sleep formula

Vitamin C ..... 60 mg
Thiamin (from thiamin HCl) ..... 12 mg
Riboflavin ..... 1 mg
Niacinamide ..... 50 mg
Vitamin B6 (from pyridoxine HCl) ..... 12 mg
Folic Acid ..... 300 mcg
Calcium (from 25 mg calcium lactate) ..... 3 mg
Magnesium ..... 13 mg
Zinc (from 2.5 mg zinc aspartate) ..... 0.357 mg
Potassium (from 5 mg potassium citrate) ..... 1.8 mg
Valerian Root (*Valeriana officinale*) ..... 200 mg
Passiflora incarnata Herb ..... 150 mg
Hops Strobiles (*Humulus lupulus*) ..... 100 mg
L-Tryptophan ..... 100 mg
L-Aspartic Acid ..... 75 mg
L-Methionine ..... 40 mg
St. Johns Wort Flower Extract ..... 40 mg
L-5-Hydroxytryptophan ..... 25 mg
L-Glutamic Acid HCl ..... 25 mg

Adrenal stressed and tired formula

Cordyceps Mycelium Extract ..... 800 mg
[mycelium; *Cordyceps militaris* (standardized to 0.28% adenosine)]
Asian Ginseng Powder (root; *Panax ginseng*) ..... 58 mg
Asian Ginseng Extract ..... 107 mg
[root; *Panax ginseng* (standardized to 30% ginsenosides)]
Rhodiola rosea Extract ..... 100 mg
(root; standardized to 1 mg salidroside and 3 mg rosavin)

Adrenal B formula

Vitamin C (ascorbic acid) ..... 240 mg
Vitamin B6 (as pyridoxine HCl) ..... 100 mg
Pantothenic Acid (as d-calcium pantothenate) ..... 500 mg
Calcium ..... 50 mg
(as calcium carbonate and from d-calcium pantothenate)
Magnesium (as magnesium oxide) ..... 75 mg
Citrus Bioflavonoid Complex ..... 100 mg

Stress Licorice formula

Licorice Extract (root; *Glycyrrhiza glabra*; ..... 300 mg
standardized to 25% (75 mg) glycyrrhizic acid)
Rehmannia Radix Extract (root; *Rehmannia glutinosa*) ..... 125 mg
Wild Yam Extract (root; *Dioscorea oppositifolia*) ..... 125 mg
Ashwagandha Extract (root; *Withania somnifera*) ..... 50 mg

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Case study: Chronic Fatigue

- 48 yo female
  - Chronic symptoms of fatigue and sleep disruption
  - Anxiety and mild depression
    - Depression began after birth of 2nd child at age 27
    - Spent ~10 years on antidepressant (sertraline)
      - Said it had been "helpful" but left her "in a fog" and "numb"
      - D/c 2 yr ago; put on nefazodone: improved mental fog but low energy remained
  - Decrease in libido
  - Hx – low thyroid function and acne- Rx for both
  - Family Hx significant for depression

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Case study: Chronic Fatigue con't

- Objective information
  - Ht: 61.5", Wt. 132.5 lb, BP: 110/70
  - Physical exam unremarkable
  - Rx: nefazodone – 200 mg BID; levothyroxine 0.1 mg QD; metronidzaole cream once/day
  - Lab results indicated low salivary morning and midnight cortisol; low-normal B12; low RBC count and hematocrit

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Case study: Chronic Fatigue con't

- Plan
  - Adaptogenic support
    - Stressed & Tired Formula – 1 cap BID
    - Stress Licorice Formula – 3 tablets QD
  - Iron, Vitamin B12, 5-MTHF, intrinsic factor – 1 tab BID
  - Betaine HCl, pepsin – 1-2 tabs with protein meals
  - At 3-weeks, instructed to begin Ca:Mg with Calming Herb Formula 2-4 tablets before bed

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Case study: Chronic Fatigue con't

- 2 months after beginning
  - Reported she had d/c antidepressant on her own and for the first time in 13 years she had been completely off antidepressant medication.
  - Said she "felt great", "had much more energy" and was sleeping better
  - Rated overall improvement ~40%
  - Lab results indicated normalization of salivary cortisol and vitamin B12
  - Instructed to continue same protocol while limiting refined sugars (some of her fatigue and mood swings appeared to be related to blood sugar swings)

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Case study: Chronic Fatigue con't

- 3 months after starting
  - Reported waking up feeling refreshed in the morning and having more energy in the afternoon
  - Rated overall improvement ~90%
  - Discontinued iron, B12, folate & Stress Licorice Formula
- 5 months after staring
  - Cortisol curve normalized
  - Reported that her "life had dramatically changed"; she had excellent energy, was sleeping well and her diet was under control

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Case study: Chronic Fatigue con't

- 3 months after starting
  - Reported waking up feeling refreshed in the morning and having more energy in the afternoon
  - Rated overall improvement ~90%
  - Discontinued iron, B12, folate & Stress Licorice Formula
- 5 months after staring
  - Cortisol curve normalized
  - Reported that her "life had dramatically changed"; she had excellent energy, was sleeping well and her diet was under control

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Adrenal Fatigue Case Study #2: Christy

- Going through a long-drawn out divorce; spouse uncooperative/aggressive
- Symptoms:
  - Restless, agitated, mood swings
  - Trouble falling and staying asleep, wake up tired/unrefreshed
  - Not hungry/forgets to eat
  - Muscle/joint pain and weakness
- **Lifestyle and Health Status:** perceived stress rating – 9; skips breakfast, no physical activity, no MVM/EFA, drinks coffee and smokes 1 pk daily, knee pain

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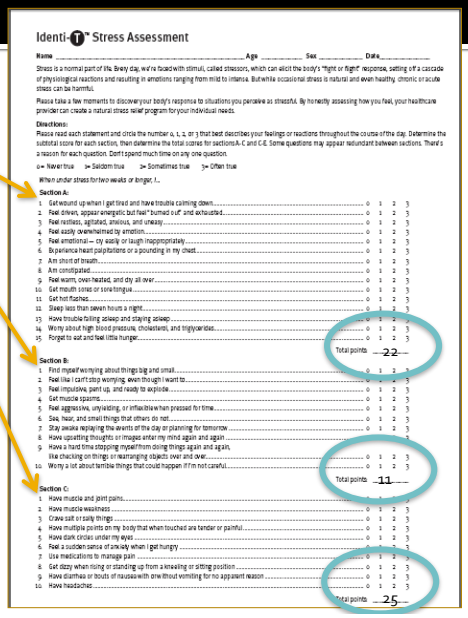
Identifying Stress Type/Intensity

- **Add up the points in each Section – A through E**
  - **Section A: Wired**
  - **Section B: Worried**
  - **Section C: Adrenal cortisol**
  - **Section D: Mental fatigue**
  - **Section E: Tired**



Identi-T™ Stress Assessment

Name _____ Age _____ Sex _____ Date _____

Stress is a normal part of life. Barely day, we're faced with stimuli, called stressors, which can elicit the body's "fight or flight" response, setting off a cascade of physiological reactions and resulting in emotions ranging from mild to intense. But while occasional stress is natural and even healthy, chronic or acute stress can be harmful.

Please take a few moments to discover your body's response to situations you perceive as stressful. By honestly assessing how you feel, your healthcare provider can create a natural stress relief program for your individual needs.

Directions:

Please read each statement and circle the number 0, 1, 2, or 3 that best describes your feelings or reactions throughout the course of the day. Determine the subtotal score for each section, then determine the total scores for sections A-C and C-E. Some questions may appear redundant between sections. There's a reason for each question. Don't spend much time on any one question.

0= Never true 1= Seldom true 2= Sometimes true 3= Often true

When under stress for two weeks or longer, I...

Section A:

1. Get wound up when I get tired and have trouble calming down 0 1 2 3
2. Feel driven, appear energetic but feel "burned out" and exhausted 0 1 2 3
3. Feel restless, agitated, anxious, and uneasy 0 1 2 3
4. Feel easily overwhelmed by emotion 0 1 2 3
5. Feel emotional – cry easily or laugh inappropriately 0 1 2 3
6. Experience heart palpitations or a pounding in my chest 0 1 2 3
7. Am short of breath 0 1 2 3
8. Am constipated 0 1 2 3
9. Feel warm, even heated, and dry all over 0 1 2 3
10. Get mouth sores or sore tongue 0 1 2 3
11. Get hot flashes 0 1 2 3
12. Sleep less than seven hours a night 0 1 2 3
13. Have trouble falling asleep and staying asleep 0 1 2 3
14. Worry about high blood pressure, cholesterol, and triglycerides 0 1 2 3
15. Forget to eat and feel little hunger 0 1 2 3

Total points 22

Section B:

1. Find myself worrying about things big and small 0 1 2 3
2. Feel like I can't stop worrying, even though I want to 0 1 2 3
3. Feel impulsive, pent up, and ready to explode 0 1 2 3
4. Get muscle spasms 0 1 2 3
5. Feel aggressive, unyielding, or inflexible when pressed for time 0 1 2 3
6. See, hear, and smell things that others do not 0 1 2 3
7. Stay awake replaying the events of the day or planning for tomorrow 0 1 2 3
8. Have upsetting thoughts or images enter my mind again and again 0 1 2 3
9. Have a hard time stopping myself from doing things again and again, like checking on things or rearranging objects over and over 0 1 2 3
10. Worry a lot about terrible things that could happen if I'm not careful 0 1 2 3

Total points 11

Section C:

1. Have muscle and joint pains 0 1 2 3
2. Have muscle weakness 0 1 2 3
3. Crave salt or salty things 0 1 2 3
4. Have multiple points on my body that when touched are tender or painful 0 1 2 3
5. Have dark circles under my eyes 0 1 2 3
6. Feel a sudden sense of anxiety when I get hungry 0 1 2 3
7. Use medications to manage pain 0 1 2 3
8. Get dizzy when rising or standing up from a kneeling or sitting position 0 1 2 3
9. Have diarrhea or bouts of nausea with or without vomiting for no apparent reason 0 1 2 3
10. Have headaches 0 1 2 3

Total points 25

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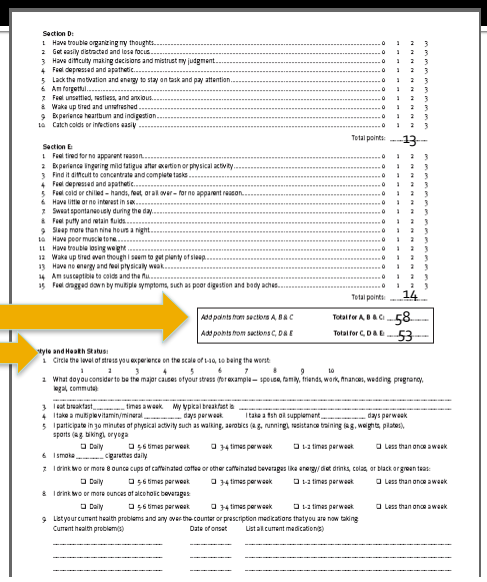
Identifying HPA Over/Under Responsiveness

- Add up the points in Sections A+B+C and C+D+E
  - Hyper vs. Hypo function
- Lifestyle & Health Status indicates need for lifestyle counseling



Section D:

1 Have trouble organizing my thoughts	0	1	2	3
2 Get easily distracted and lose focus	0	1	2	3
3 Have difficulty making decisions and mistrust my judgment	0	1	2	3
4 Feel depressed and apathetic	0	1	2	3
5 Lack the motivation and energy to stay on task and pay attention	0	1	2	3
6 Am forgetful	0	1	2	3
7 Feel unsettled, restless, and anxious	0	1	2	3
8 Wake up tired and unrefreshed	0	1	2	3
9 Experience heartburn and indigestion	0	1	2	3
10 Catch colds or infections easily	0	1	2	3

Total points: 13

Section E:

1 Feel tired for no apparent reason	0	1	2	3
2 Experience lingering mild fatigue after exertion or physical activity	0	1	2	3
3 Find it difficult to concentrate and complete tasks	0	1	2	3
4 Feel depressed and apathetic	0	1	2	3
5 Feel cold or chilled – hands, feet, or all over – for no apparent reason	0	1	2	3
6 Have little or no interest in sex	0	1	2	3
7 Sweat spontaneously during the day	0	1	2	3
8 Feel puffy and retain fluids	0	1	2	3
9 Sleep more than nine hours a night	0	1	2	3
10 Have poor muscle tone	0	1	2	3
11 Have trouble losing weight	0	1	2	3
12 Wake up tired even though I seem to get plenty of sleep	0	1	2	3
13 Have no energy and feel physically weak	0	1	2	3
14 Am susceptible to colds and the flu	0	1	2	3
15 Feel dragged down by multiple symptoms, such as poor digestion and body aches	0	1	2	3

Total points: 14

Add points from sections A, B & C	**Total for A, B & C:** 58
Add points from sections C, D & E	**Total for C, D & E:** 53

Lifestyle and Health Status:

1. Circle the level of stress you experience on the scale of 1-10, 10 being the worst:
   1 2 3 4 5 6 7 8 9 10
2. What do you consider to be the major causes of your stress (for example – spouse, family, friends, work, finances, wedding, pregnancy, legal, commute)
   _____
3. I eat breakfast _____ times a week. My typical breakfast is _____
4. I take a multiple vitamin/mineral _____ days per week. I take a fish oil supplement _____ days per week.
5. I participate in 30 minutes of physical activity such as walking, aerobics (e.g., running), resistance training (e.g., weights, pilates), sports (e.g. biking), or yoga
   ☐ Daily ☐ 5-6 times per week ☐ 3-4 times per week ☐ 1-2 times per week ☐ Less than once a week
6. I smoke _____ cigarettes daily
7. I drink two or more 8 ounce cups of caffeinated coffee or other caffeinated beverages like energy/diet drinks, colas, or black or green teas:
   ☐ Daily ☐ 5-6 times per week ☐ 3-4 times per week ☐ 1-2 times per week ☐ Less than once a week
8. I drink two or more ounces of alcoholic beverages:
   ☐ Daily ☐ 5-6 times per week ☐ 3-4 times per week ☐ 1-2 times per week ☐ Less than once a week
9. List your current health problems and any over the counter or prescription medications that you are now taking

Current health problem(s)	Date of onset	List all current medication(s)
_____	_____	_____
_____	_____	_____
_____	_____	_____

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Section C: Adrenal Cortisol Metabolism

*>10 points *may* require additional adrenal support

Section C:

1. Have muscle and joint pains	0	1	2	3
2. Have muscle weakness	0	1	2	3
3. Crave salt or salty things	0	1	2	3
4. Have multiple points on my body that when touched are tender or painful	0	1	2	3
5. Have dark circles under my eyes	0	1	2	3
6. Feel a sudden sense of anxiety when I get hungry	0	1	2	3
7. Use medications to manage pain	0	1	2	3
8. Get dizzy when rising or standing up from a kneeling or sitting position	0	1	2	3
9. Have diarrhea or bouts of nausea with or without vomiting for no apparent reason	0	1	2	3
10. Have headaches	0	1	2	3

Total points: **25**

*The score in section C is added to both the *HPA Over* and *Under-responsive* paths because adrenal gland function contributes to both scenarios. Adaptogens balance the HPA axis and relieve adrenal stress indirectly. Additional repair support may be required

A chronic score (>21) may indicate the need for an Adrenal Stress Test to determine cortisol circadian rhythm dynamics and levels.

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Adrenal Fatigue Case Study #2: Christy

- Going through a long-drawn out divorce; spouse uncooperative/aggressive
- Symptoms:
  - Restless, agitated, mood swings
  - Trouble falling and staying asleep, wake up tired/unrefreshed
  - Not hungry/forgets to eat
  - Muscle/joint pain and weakness
- **Lifestyle and Health Status:** perceived stress rating – 9; skips breakfast,no physical activity, no MVM/EFA, drinks coffee and smokes 1 pk daily, knee pain
- **A** - 22; **B** - 11; **C** - 25; **D** - 13; **E** - 14; **Sleep** responses – yes
  - A+B+C = 58, C+D+E = 53
    - HPA Over-Responsive, Issue with Cortisol metabolism, poor sleep quality

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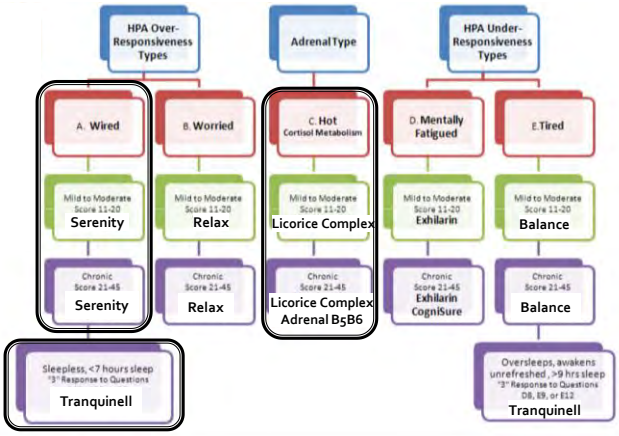
Adrenal Fatigue Case Study #2: Christy

- **A** - 22; **B** - 11; **C** - 25; **D** - 13; **E** - 14; **Sleep** responses – yes
  - A+B+C = 58, B+C+E = 53
    - HPA Over-Responsive, Issue with Cortisol metabolism, poor sleep quality



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Case Study #2: Christy: Recommendations

Remedy/Supplement	Upon rising	Breakfast	Mid – morning	Lunch	Mid – afternoon	Dinner	Before retiring
Dynamic Health Drink		1 scoop					
Essential Multi		1				1	
Omega Pure EPA-DHA 720		2				2	
Stress Essentials Serenity		1-2		1-2		1-2	1-2
Stress Essentials Licorice Complex		2				2	
Stress Essentials Adrenal B5B6		1				1	
Tranquinell – take 60 min before bed							2

- Dietary recommendations: 3-5 meals/day (use alarm); eat breakfast every day; 10-20 grams protein at every meal, 50-75% of plate vegetables/fruit
- Deep breathing exercises throughout the day; reminder every hour to take 5-10 deep breaths
- Sleep – get to bed between 9-10 PM; mediate and/or deep breathing for 10 min before bed
- Reduce cigarette smoking; do deep breathing exercises and/or go for a walk instead
- Exercise – yoga – 5-10 minutes every morning
- Get grounded every day – meditation, yoga, walk in nature, walk bare-foot in the grass, read inspiring passage
- Speak with a counsellor/therapist regarding divorce

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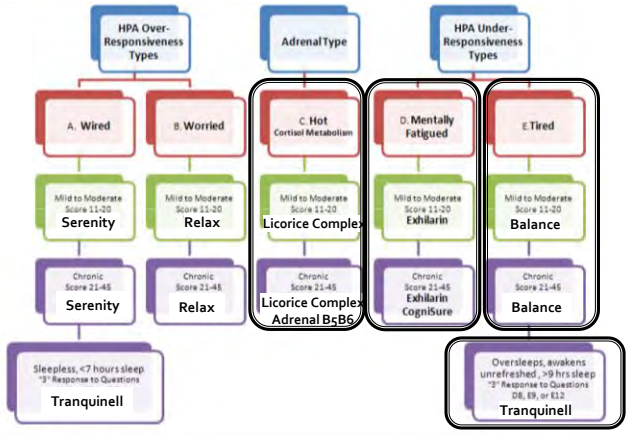
Adrenal Fatigue Case Study #3: Alan

- Symptoms:
  - Chronic fatigue, wake up feeling unrested
    - Fatigue worse after physical activity; 2-4 days to recover
  - Depression, lack of motivation
  - Poor focus, concentration
  - Joint/muscle pain, headaches
- **A** - 10; **B** - 8; **C** - 20; **D** - 21; **E** - 38; **Sleep** responses – Yes
  - **A+B+C = 38, C+D+E = 79**
- **Lifestyle and Health Status:** Perceived stress rating – 2; skips breakfast, no physical activity, MVM/EFA 3X, drinks coffee and alcohol daily

196

Adrenal Fatigue Case Study #3: Alan

- A - 10; B - 8; C - 20; D - 21; E - 38; Sleep responses –Y
  - A+B+C = 38, C+D+E = 79
    - HPA Under-Responsive, Issue with Cortisol Metabolism, poor sleep quality



197

Adrenal Fatigue Case Study #3: Alan

Remedy/Supplement	Upon rising	Breakfast	Mid – morning	Lunch	Mid – afternoon	Dinner	Before retiring
Dynamic Health Drink		1 scoop					
Essential Multi		1				1	
Omega Pure EPA-DHA 720		2				2	
D3-5000		1				1	
Stress Essentials Balance	2				2		
Stress Essentials Licorice Complex	2				2		
Tranquinell – take 60 min before bed							2

- Dietary recommendations: 5 meals/day (use alarm); eat breakfast every day; 15-20 grams protein at every meal, 50-75% of plate vegetables/fruit; avoid sugars/simple carbohydrates
- Deep breathing exercises throughout the day; reminder every hour to take 5-10 deep breaths
- Sleep – get to bed between 9-10 PM; mediate and/or deep breathing for 10 min before bed
- Get outside daily; short walks (never to fatigue) if possible
- Adrenal Stress Test if not improving in 4-6 weeks

198

The Serenity Prayer

Perhaps the best general approach for treating stress can be found in the elegant passage by Reinhold Niebuhr

"Grant me the courage to change the things I can change, the serenity to accept the things I can't change, and the wisdom to know the difference."

The process of learning to control stress is life-long, and will not only contribute to better health, but a greater ability to succeed in one's own agenda.

199

A Prayer for the Stressed!

Grant me the serenity to accept the things I cannot change,
the courage to change the things I cannot accept,
and the wisdom to hide the bodies of those people I had
to kill today because they pissed me off.

And also, help me to be careful of the toes I step on
today as they may be connected to the ass that I may have
to kiss tomorrow.

200

Endocrine Conditions

Adrenals	Adrenal Fatigue, Chronic Fatigue
Insulin	Insulin Resistance, Syndrome X, Diabetes Type II
Thyroid	Hypothyroid

201

Many Names, Common Criteria

- Metabolic Syndrome, Syndrome X, Insulin Resistance, Cardiometabolic Syndrome
- 3 or more of the following:
  - Central obesity – WC > 40" men, >35" women
  - ↑ triglycerides = >150 mg/dL
  - ↓ HDL = <40 mg/dL men, <50 mg/dL women
  - ↑ blood pressure = >130/95 mm Hg
  - ↑ fasting glucose = > 100 mg/dL

202

Insulin Resistance

- How do you know?
  - Acute symptoms/primary concern
  - Interview: Dx, Rx use(d) and Hx
  - HAQ: Part IV: Glucose Regulation
  - Insulin Resistance Questionnaire
  - Overweight/obese
    - BIA
    - WC > 40" men, >35" women
  - Labs

203

Insulin Resistance

- Lab testing:
  - Fasting glucose
  - Fasting insulin
  - GTT/Insulin response
  - HgbA1C
  - Fasting cholesterol panel/LPP+/Cardiometabolic Panel
    - Triglycerides & TG:HDL-C (mg/dl) (<3.0)
  - Blood pressure
  - hs-CRP
  - Salivary cortisol/DHEA-S rhythm

204

Optimal Lab Values

Lab Test	Optimal Values (U.S.)
Triglycerides	< 150 mg/dl
HDL	Male: > 40 mg/dl Female: > 50 mg/dl
Glucose: Fasting	80-90 mg/dl
Glucose: 2 hour	100-110 mg/dl
Insulin: Fasting	< 15 µ/ml (4 µ/ml ideal)
Insulin: 2 hour	< 30 µ/ml
Homocysteine	< 8 mmol/L
HbA1C	5.0%
Hs-CRP	< 0.7 mg/L
Blood pressure	< 130/85 mm Hg
Waist Circumference (WC)	Male: < 40" Female: < 35"

205

Insulin Resistance Questionnaire

Insulin Resistance Questionnaire

Not all products listed would be needed in all cases. Products are listed in sequence of importance.

Presence of associated diseases or biochemical abnormalities	
Hyperglycemia:	
• Type 2 diabetes	4
• Impaired glucose tolerance (IGT)	4
• Gestational diabetes	3
• Impaired fasting glucose (110-125 mg/dl)	2
Hypertriglyceridemia (fasting):	
• Triglycerides > 150 mg/dl/HDL cholesterol < 35	3
• Triglycerides > 150 mg/dl	2
• Triglycerides > 100-150 mg/dl	1
Essential hypertension:	
• Blood pressure > 140/90 mmHg	2
• Blood pressure > 125-140/85-90 mmHg	1
Polycystic ovaries	4
Premature coronary heart disease (under age 60 years)	3
Uric acid (> 8 mg/dl)	2
Family history (first-degree relatives)	
Type 2 diabetes or impaired glucose tolerance	3
Essential hypertension (under age 60 years)	2
Hypertriglyceridemia	3
Premature coronary heart disease (under age 60 years)	2
Presence of predisposing factors	
Low birth weight (< 2.5 kg)	2
Inactivity (< 90 mins aerobic exercise/week)	2
Evidence of mild obesity or central adiposity (maximum 4 points)	
Weight gain: > 4, 8, or 12 kg after age 18 years (W[a], 21 years (M[b])	1-3
BMI: 23-25, 25-27 kg/m2	1, 2
Waist (inches):	
• 28-30, > 30 (W)	1, 2
• 34-36, > 36 (M)	1, 2
Ethnic group at high risk[c]	1-3

206

Stages of Insulin Sensitivity

- Stage 1
  - Normal fasting glucose, normal fasting insulin, normal or LOW (<80 mg/dl) 2 hr glucose, ↑ 2 hr insulin (>30 µ/ml)
- Stage 2
  - Normal fasting glucose, normal fasting insulin, ↑ 2 hr glucose (>110 mg/dl), ↑ 2 hr insulin (>30 µ/ml)
- Stage 3
  - Normal fasting glucose, ↑ fasting insulin (> 4 µ/ml), ↑ 2 hr glucose (>110 mg/dl), ↑ 2 hr insulin (>30 µ/ml)
- Stage 4
  - ↑ fasting glucose (>90 mg/dl), ↑ fasting insulin (> 4 µ/ml), ↑ 2 hr glucose (>110 mg/dl), ↑ 2 hr insulin (>30 µ/ml)

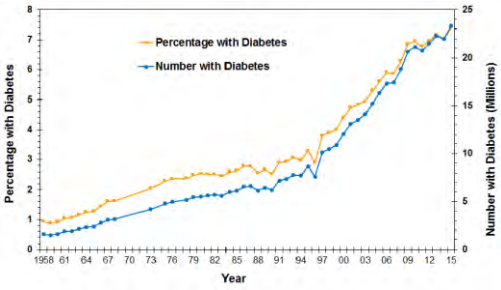
End stage of insulin resistance occurs *BEFORE* fasting glucose levels increase!

207

Do you have patients at risk?!

- **Over 115 million Americans have insulin resistance**
- **30 million have diabetes**
  - ~95% is type 2
  - Over 7.5 million are <u>undiagnosed</u>
- **~<u>85 million</u> have pre-diabetes**
  - ***Only 11.6% know they have it***

Number & % of US Population with Diagnosed Diabetes



CDC's Division of Diabetes Translation. United States Diabetes Surveillance System available at http://www.cdc.gov/diabetes/data

Centers for Disease Control and Prevention. National Diabetes Statistics Report, 2017. Atlanta, GA: Centers for Disease Control and Prevention, US Department of Health and Human Services; 2017
IDF:www.diabetesatlas.org (accessed June 6, 2018)
Benjamin EJ, Virani SS, Callaway CW, et al; on behalf of the American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics 2018 update: a report from the American Heart Association [published online ahead of print January 31, 2018]. Circulation.

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Glucose and Insulin

- Food gets absorbed across the intestines into the blood
- Blood sugar increases
- The pancreas releases insulin to drive the sugar into the cell and clear it from the blood stream

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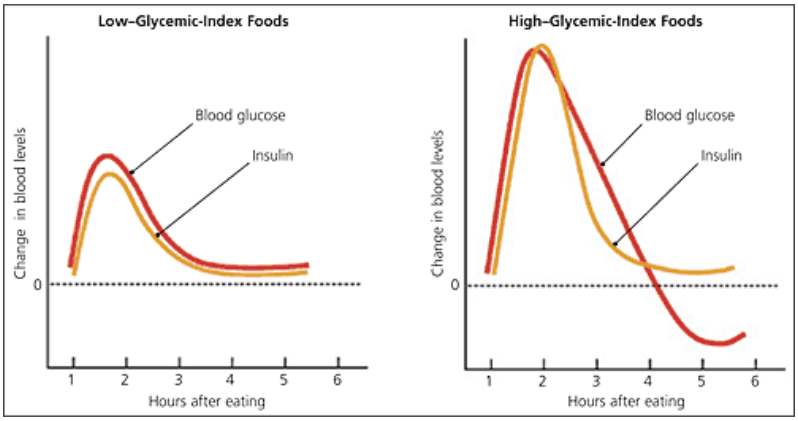
Blood Sugar Metabolism



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Insulin Resistance

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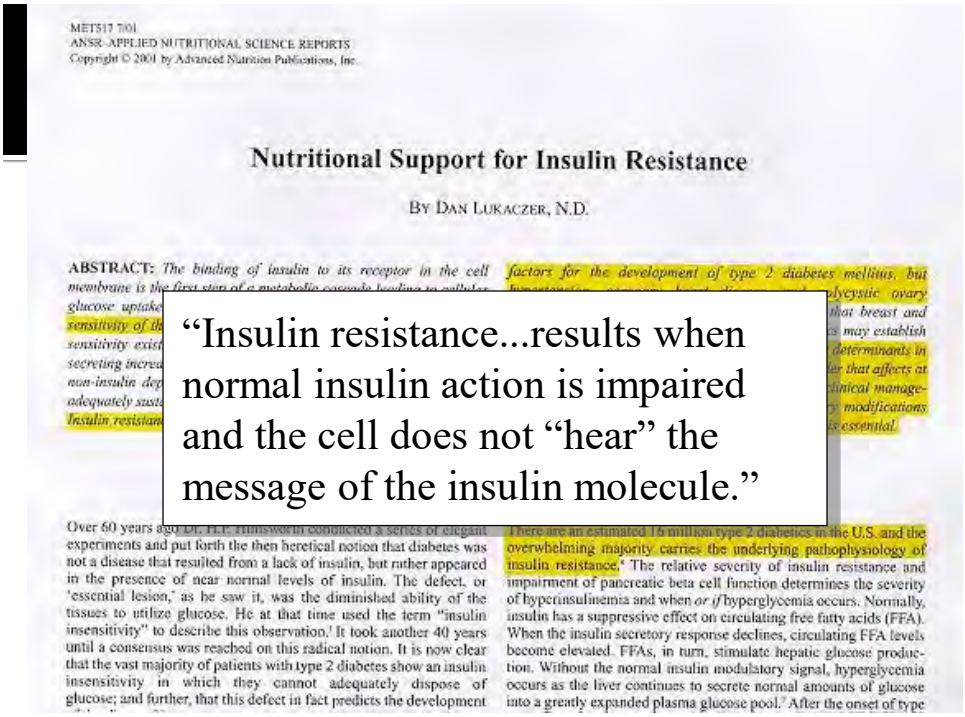

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Nutritional Support for Insulin Resistance

By Dan Lukaczer, N.D.

ABSTRACT: *The binding of insulin to its receptor in the cell membrane is the first step of a metabolic cascade leading to cellular glucose uptake* ... *sensitivity of the* ... *sensitivity exist* ... *secreting increa* ... *non-insulin dep* ... *adequately susta* ... *Insulin resistan* ... *factors for the development of type 2 diabetes mellitus, but* ... *polycystic ovary* ... *that breast and* ... *may establish* ... *determinants in* ... *that affects at* ... *clinical manage-* ... *modifications* ... *essential.*

"Insulin resistance...results when normal insulin action is impaired and the cell does not "hear" the message of the insulin molecule."

Over 60 years ago Dr. H.P. Himsworth conducted a series of elegant experiments and put forth the then heretical notion that diabetes was not a disease that resulted from a lack of insulin, but rather appeared in the presence of near normal levels of insulin. The defect, or 'essential lesion,' as he saw it, was the diminished ability of the tissues to utilize glucose. He at that time used the term "insulin insensitivity" to describe this observation.[1] It took another 40 years until a consensus was reached on this radical notion. It is now clear that the vast majority of patients with type 2 diabetes show an insulin insensitivity in which they cannot adequately dispose of glucose; and further, that this defect in fact predicts the development

There are an estimated 16 million type 2 diabetics in the U.S. and the overwhelming majority carries the underlying pathophysiology of insulin resistance.[4] The relative severity of insulin resistance and impairment of pancreatic beta cell function determines the severity of hyperinsulinemia and when *or if* hyperglycemia occurs. Normally, insulin has a suppressive effect on circulating free fatty acids (FFA). When the insulin secretory response declines, circulating FFA levels become elevated. FFAs, in turn, stimulate hepatic glucose production. Without the normal insulin modulatory signal, hyperglycemia occurs as the liver continues to secrete normal amounts of glucose into a greatly expanded plasma glucose pool.[7] After the onset of type

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Insulin Resistance is Caused By:

- Unhealthy diet
- Nutrient deficiency
- Inactivity
- Excess body fat
- Inflammation
- Excess Stress

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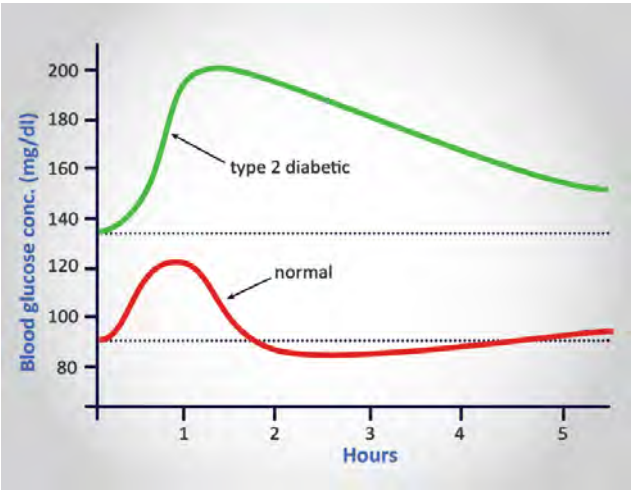
Insulin Resistance



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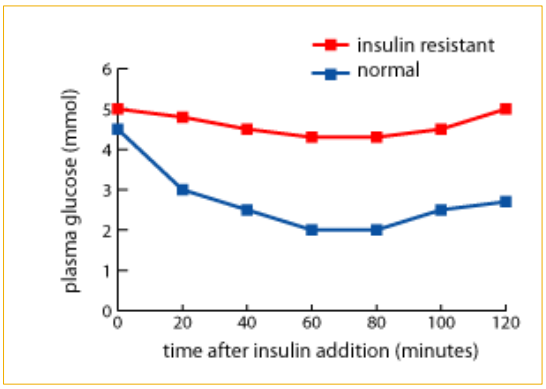
Insulin Resistance



- Insulin Resistance
  = ↑ blood sugar AND ↑ insulin

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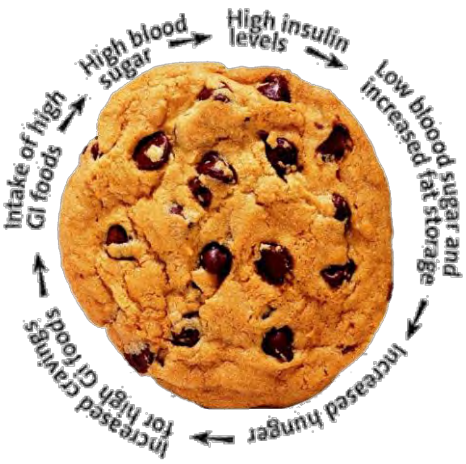
Long-Term Effects of Elevated Blood Glucose and Insulin

- Sugar/sweet cravings
- Shakiness b/w meals
- Confusion, brain fog
- Sleep disruption
- Low/variable energy, especially mid-PM
- Night sweats
- Binge eating
- Weight gain, especially in the midsection

The Vicious Cookie Cycle



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Disorders Associated with IR

- Diabetes
- Fatty Liver
- Cardiovascular Disease
- Inflammation
- Alzheimer's Disease
- Kidney stones
- Obesity/weight loss resistance
- Autoimmune Disease
- Colorectal cancer
- Sleep apnea
- Gallstones
- PCOS
- IBD
- Gout
- Infertility
- Menstrual irregularities
- Sarcopenia

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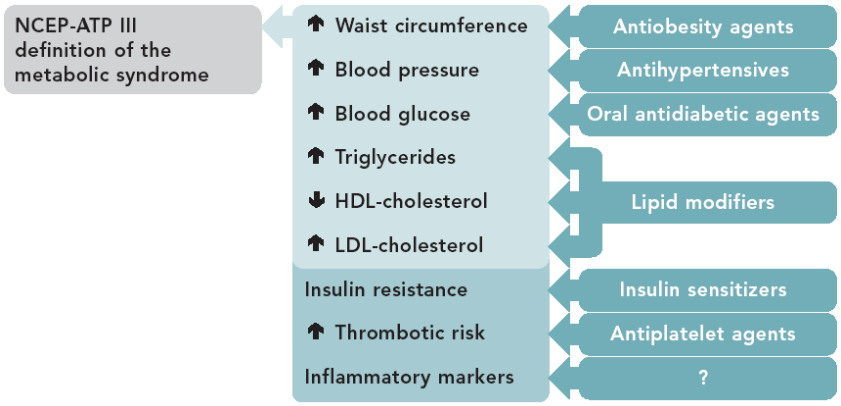
Treating The Symptoms

Exhibit 4: Current Therapies Often Address Individual Risk Factors Instead of a Root Cause



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Potential Side Effects

- Antiobesity Agents
  - Elevated blood pressure, heart palpitations, headache, difficulty breathing, anxiety, dizziness, insomnia, diarrhea, heart attack…
- Antihypertensives
  - Elevated triglycerides, decreased HDL, insulin resistance, weight gain, dry cough, dizziness, lightheadedness, headaches & impotence
- Oral antidiabetic agents
  - Hypoglycemia, blurred vision, fainting, cold sweats, confusion, weakness, irregular heartbeat, difficulty breathing

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Potential Side Effects

- Lipid lowering medication
  - Myopathy, hepatotoxicity, CoQ10 lowering, reduced insulin sensitivity, weight gain
- Insulin Sensitizers
  - GI upset (nausea, diarrhea, gas, bloating…) compromised liver and pancreas function, headaches
- Antiplatelet agents
  - Hemorrhage (severe), liver failure, confusion, colitis, ulcer, myalgia…
- Anti-inflammatories
  - Vomiting, diarrhea, dizziness, headache, edema, kidney failure, gastric bleeding, ulcer

220

National Health Organizations recommend Therapeutic Lifestyle Changes (TLC) as "first line" treatment

National Health Orgs.

- National Institutes of Health
- Am. Heart, Blood & Lung Institute
- Am. Diabetes Assoc.
- Am. Heart Assoc.
- Am. Assoc. Clinical Endocrinologists
- Arthritis Foundation
- North American Menopause Society
- Many others…

Conditions

- High Cholesterol
- High Blood Pressure
- High Blood Sugar and/or Diabetes
- Heart Disease
- Osteoarthritis
- Osteoporosis
- Metabolic Syndrome
- Menopausal symptoms
- Many others…

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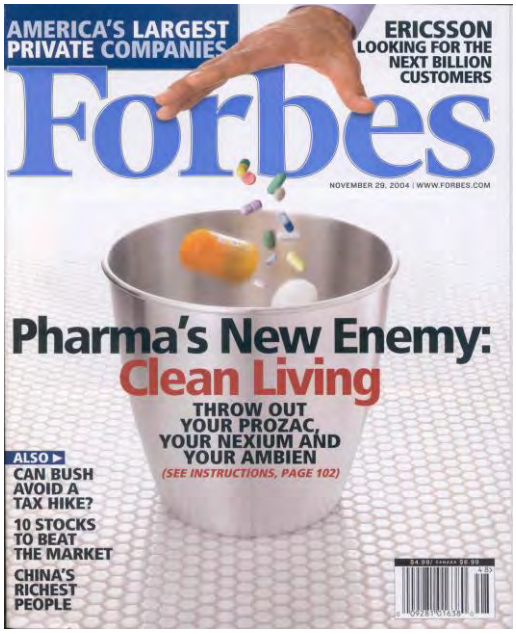

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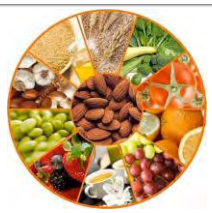
Improving Insulin Resistance

- Specific dietary modifications
- Supplementation
- Targeted exercise
- Weight loss
- Manage Inflammation
- Stress Management



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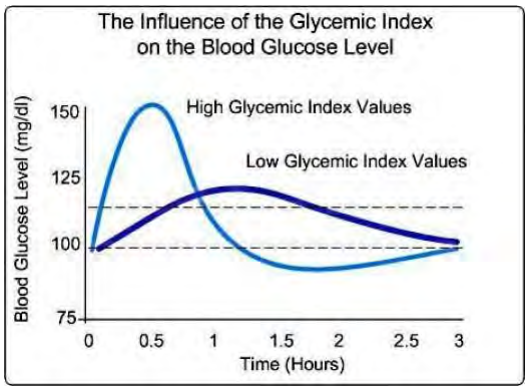
Diet Influence on Blood Sugar



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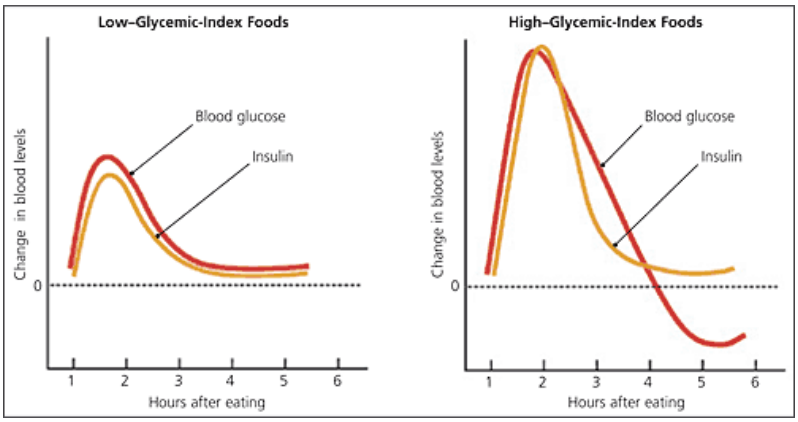
Blood Sugar Metabolism



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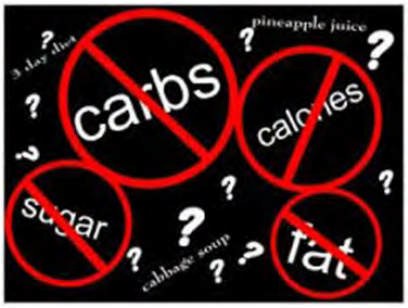
What is a balanced meal?



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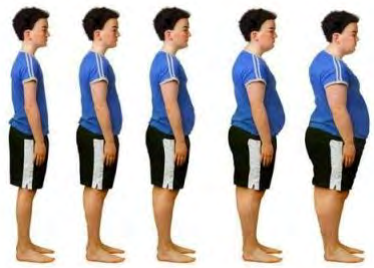
How does unbalanced eating effect you?



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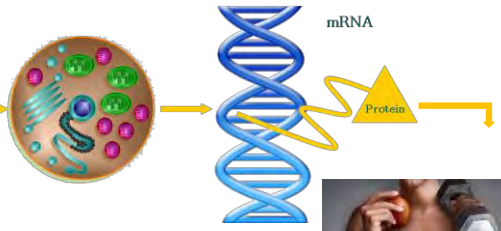
What is the message I'm sending?

Food is information…



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Dietary Recommendations

229

Dietary Recommendations

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Dietary Recommendations

- Change the quantity and quality of carbohydrates
- Focus on whole foods
  - Foods that don't need a label
  - Know the ingredients
- Small balanced meals – 4-6x/day
  - Space meals evenly – every 3-4 hours
- Balanced = carb + protein + healthy fats

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Quantity and Quality of Carbs

232

Focus on Whole Foods

233

Focus on Whole Foods

234

Start with Protein

- Determine the right amount of protein
  - BIA = 1 gram for every lb. BCM/SMM
    - Add 10-20 grams if trying to gain muscle
- Divide by # meals to get amt for each meal
  - Ex: need 80 grams protein, 4 meals/day
    - 20 grams protein at each meal

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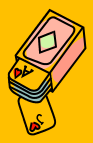
Protein Grams in Foods

Meats	Grams of Protein	Serving Sizes
Red Meat	7-9g per oz.	
Veal	8-9g per oz.	
Pork Loin	9g per oz.	3.5 - 4 oz. portion of meat = 1 deck of cards
Turkey		
White Meat	9.5g per oz.	
Dark Meat	9g per oz.	
Chicken		
White Meat	9.5g per oz.	
Dark Meat	8.5g per oz.	
Fish and Seafood		
Fish	7-9g per oz.	3 oz. of grilled fish = 1 checkbook
Shellfish	6-7g per oz.	
Eggs		
Whole	6.2g per egg	1 egg = 6 grams
White	3.5g per oz.	



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Protein Grams in Foods

Cheese and Dairy		
Feta	4g per oz.	
Cream Cheese	2g per oz.	1 oz. of cheese = 2 dice
Ricotta (1/2 c)	14g per oz.	
Cottage Cheese (1/2 c)	14g per oz.	1/2 half c of ricotta or cottage cheese = 1/2 baseball
Milk	8g per oz.	
Most Cheeses	6-7g per oz.	
Yogurt	12g per 8 oz.	
Soy Products		
Tempeh	6g per oz.	3.5 - 4 oz. of tofu or tempeh = 1 deck of cards
Miso	3.5g per oz.	
Tofu	5g per oz.	
Soybeans (1/4 c)	14g per oz.	
Nuts/Beans/Legumes		
Nuts (1oz)	4-6g per oz.	1 oz. of nut butter = 1 ping pong ball or 2 tbsp 1 oz = 20 almonds
Beans (1/2 c)	6-8g per oz.	
Legumes (1/2 c)	6-8g per oz.	1/2 cup of beans or legumes = 1/2 baseball

237

Lots of Non-Starchy Veggies

- Organic preferred (Dirty Dozen especially)
- More color the better
- Starchy veggies: white potato, corn, parsnip

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The Dirty Dozen & Clean 15

DIRTY DOZEN™ *Buy These Organic*	CLEAN 15™ *Lowest in Pesticides*
WORST 1 Celery	BEST 1 Onions
2 Peaches	2 Avocado
3 Strawberries	3 Sweet Corn
4 Apples	4 Pineapple
5 Blueberries	5 Mangos
6 Nectarines	6 Sweet Peas
7 Bell Peppers	7 Asparagus
8 Spinach	8 Kiwi
9 Cherries	9 Cabbage
10 Kale/Collard Greens	10 Eggplant
11 Potatoes	11 Cantaloupe
12 Grapes (Imported)	12 Watermelon
	13 Grapefruit
	14 Sweet Potato
	15 Honeydew Melon

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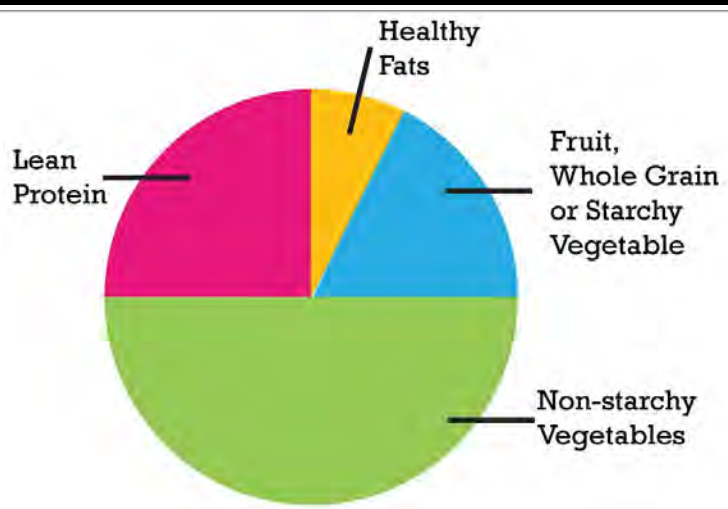
The Balanced Plate



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Balanced Meal

- What your plate should look like

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242

If someone is just starting out…

- Eat food. Not too much. Mostly plants. Protein at every meal.
- Avoid sugar and artificial sweeteners.
- Avoid corn, white potatoes, bread/pasta

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When They are Ready

- Modified Anti-inflammatory diet

CATEGORY	AVOID	RECOMMENDED (organic preferred)
Dairy & Dairy Alternatives (protein, fat)	Animal milks (all, even "lactose-free"), buttermilk, yogurt, cheese, cream, ice cream, sour cream, cream cheese, chocolate; non-dairy creamer Soy milk, cheese, yogurt	Unsweetened milk alternatives: rice, hazelnut, hemp, almond, coconut, gluten-free oat Vegan cheese from rice or almonds
Meat, Poultry & Fish (animal protein)	Eggs, egg replacers, beef, pork Poultry fed hormones/antibiotics Shellfish; farm-raised seafood Breaded patties, fish sticks Processed/canned meats, sausages	Free-range lamb, chicken, turkey Wild game Wild-caught seafood: fresh, frozen, or water-packed in can
Legumes, Nuts & Seeds (veg. protein, fat, carbs/fiber)	Soybean products: tempeh, tofu, textured vegetable protein, protein powder, edamame, wasabi peas Peanuts, peanut butter	All other canned, frozen, or dry beans/peas; hummus All other nuts/unsweetened nut butters All seeds/unsweetened seed butters
Grains, Breads, Cereals & Pastas (protein, carbs/fiber)	Cornmeal/flour, corn starch Foods with wheat and wheat flours (whole or white); processed cereals Spelt, kamut, rye, barley Oats (unless certified gluten-free)	Whole grains, flours, and other products from rice, millet, arrowroot, teff, tapioca, amaranth, quinoa, buckwheat Gluten-free oats/oatmeal Potato flour/starch*
Fruits (carbs/fiber)	Oranges, orange juice Fruits/juices/spreads/preserves with added sugars	Fresh, unsweetened, dried, frozen, or canned, water-packed fruits 100% fruit juices
Vegetables (carbs/fiber)	Corn; nightshade veggies (optional)* Breaded or creamed vegetables Veggies in cheese/butter sauces	All other fresh raw, steamed, sautéed, or roasted vegetables, greens & potatoes* Unsweetened vegetable juices

White potatoes, parsnips

244

When They are Ready

- Modified Anti-inflammatory diet

CATEGORY	AVOID	RECOMMENDED (organic preferred)
Sugars & Sweeteners	Foods with: white/brown/powdered sugar, cane sugar/juice, corn syrup, sucanat, high fructose corn syrup (HFCS or corn sugar), molasses/sorghum, glucose, sucrose, dextrose Extracts (e.g., vanilla, almond) Artificial sweeteners	Small amounts: raw honey, pure maple syrup, agave syrup/nectar, brown rice syrup, natural fructose, fruit sweeteners (juice concentrates), stevia Carob, cinnamon
Oils & Fats	Oil from soybeans, peanuts, palm Butter, margarine, shortening Processed and hydrogenated oils Mayonnaise and salad dressings with dairy, gluten, or sugars Fried foods	Oils: cold-pressed olive, flaxseed, canola, safflower, sunflower, sesame, walnut, pumpkin, almond, grapeseed, coconut Avocado; olives
Other Seasonings & Condiments	Soy sauce, wasabi (soy) BBQ sauce, ketchup, wet mustards Prepackaged seasonings with gluten/dairy/sugars	Lemon/lime juice All vinegars (except malt) Red pepper, cayenne, other peppers* Unsweetened salsa and tomato sauces* Garlic, onions, chives All other fresh or dry herbs and spices
Other Beverages	Flavored waters Sodas (all) Energy/sport drinks Drink mixes and mixers Beer, mixed alcoholic beverages	Water: tap, spring, sparkling, filtered, distilled, seltzer (add splash of fruit juice or slices to any water) Unsweetened tea and coffee (2 cups max.) Herbal teas (unlimited)

* Nightshade plants include tomatoes, tomatillos, pimentos, white/gold/red potatoes, eggplant (baba ganoush), peppers (bell, hot), and tobacco. Not in the nightshade family: black pepper, sweet potatoes, yams, and boniato (white sweet potatoes).

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Insulin Resistance: Recommendations

- Omega-3 Essential Fatty Acids (EPA/DHA)
  - Improve cellular communication/repair cell wall
    - Optimizes insulin receptor function
  - Decreases oxidative stress
  - Decreases inflammation
  - Dose: 2-10 grams/day

Klein-Platat, C., et al. Plasma fatty acid composition is associated with the metabolic syndrome and low-grade inflammation in overweight adolescents. *American Journal of Clinical Nutrition. 82(6):1178-1184, 2005.*

Pelikanova, T., et al. Insulin secretion and insulin action are related to the serum phospholipid fatty acid pattern in healthy men. *Metab Clin Exp. 38:188-192, 1989.*

Popp-Snijders, C., et al. Dietary supplementation of omega-3 fatty acids improves insulin sensitivity in non-insulin dependent diabetes. *Diabetes Research. 4:141-147, 1987.*

Calder PC. N-3 polyunsaturated fatty acids, inflammation and immunity: pouring oil on troubled waters or another fishy tale? Nutr Res 2001;21:309-41.

246

Insulin Resistance: Recommendations

Supplement	Rationale	Dose
Chromium	Glucose tolerance factor	600-3000 mcg
Vanadium	Enhance insulin sensitivity	150-300 mcg
Alpha Lipoic Acid	Transports fatty acids into mitochondria, antioxidant	200-1200 mg
Cinnamon bark	Enhances insulin sensitivity	500 mg
Catechins	Decreases blood sugar/TG	100-300 mg
B-complex	Krebs, GTF, methylation, CV	
Vitamin D	Enhance insulin sensitivity	3000-5000 IU
Fenugreek seed	Enhance insulin sensitivity	1 gr/day extract
Gymnema leaf	Reduces glucose absorption	25-100 mg

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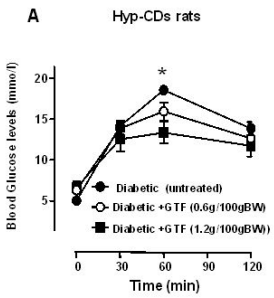
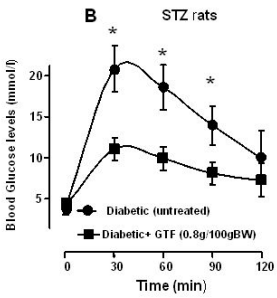
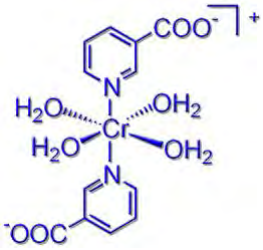
Chromium: Functions

- Blood sugar control
  - Component of Glucose Tolerance Factor
  - Involved in insulin-signaling pathway







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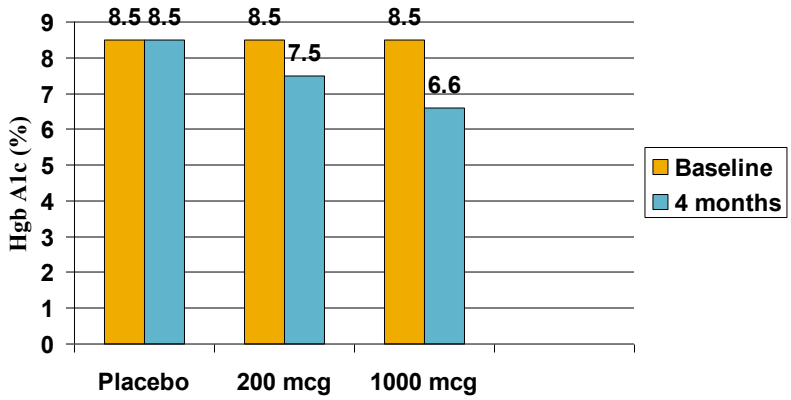
Chromium: Effect on HgbA1C



Anderson RA, Cheng N et al: Diabetes 1997 Nov;46(11):1786-91

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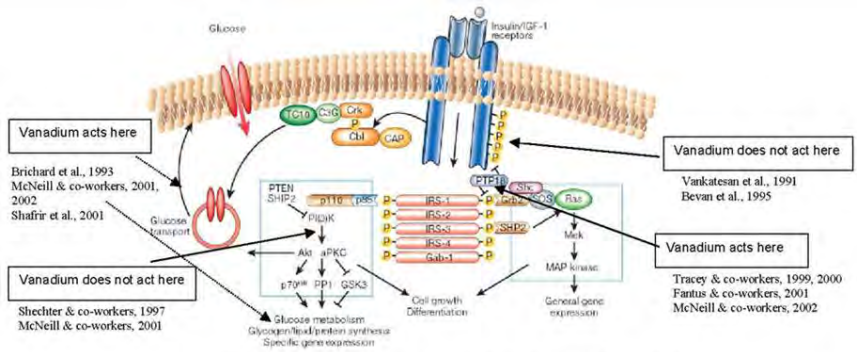
Vanadium: Functions

- Blood sugar control
  - May be able to mimic the actions of insulin
    - Activates insulin receptor
    - Stimulates glucose oxidation & transport
    - Inhibits lipolysis in adipose tissue
    - Stimulates glycogen synthesis in the liver & muscles
    - Increases glucose uptake & utilization

Harland BF, Harden-Williams BA. Is vanadium of human nutritional importance yet? J Am Diet Assoc 1994;94:891-4.
Malabu UH, Dryden S, McCarthy HD, et al. Effects of chronic vanadate administration in the STZ-induced diabetic rat. Diabetes 1994;43:9-15.
Aharon Y, Mevorach M, Shamoon H. Vanadyl sulfate does not enhance insulin action in patients with type 1 diabetes. Diabetes Care 1998;21:2194-5.
Goldwaser I, Li J, Gershonov E, et al. L-Glutamic acid gamma-monohydroxamate. A potentiator of vanadium-evoked glucose metabolism in vitro and in vivo. J Biol Chem 1999;274:26617-24.

250

Vanadium: Functions



(Modified from Fig. 2 in A. R. Saltiel and C. R. Kahn, Nature 2001, 414, 799)

251

Alpha Lipoic Acid: Functions

- Carbohydrate metabolism
  - Improves glucose uptake and fasting blood sugar
  - Improves insulin sensitivity
  - Decreases postprandial glucose levels
- Modulates inflammatory response
  - May suppress vascular inflammation
  - Inhibits NF KB
- Potent antioxidant

Konrad T, Vicini P, Kusterer K, et al. Alpha-lipoic acid treatment decreases serum lactate and pyruvate concentrations and improves glucose effectiveness in lean and obese patients with Type 2 diabetes. Diabetes Care 1999;22:280-7.
Jacob S, Henriksen EJ, Tritschler HJ, et al. Improvement of insulin-stimulated glucose-disposal in type 2 diabetes after repeated parenteral administration of thioctic acid. Exp Clin Endocrinol Diabet 1996;104:284-8.
Jacob S, Henriksen EJ, Schiemann AL, et al. Enhancement of glucose disposal in patients with type 2 diabetes by alpha-lipoic acid. Arzneimittelforschung 1995;45:872-4.
Jacob S, Ruus P, Hermann R, et al. Oral administration of RAC-alpha-lipoic acid modulates insulin sensitivity in patients with type-2 diabetes mellitus: a placebo-controlled, pilot trial. Free Rad Biol Med 1999;27:309-14.
Porasuphatana S., Suddee S., Nartnampong A., Konsil J., Harnwong B., Santaweesuk A. Glycemic and oxidative status of patients with type 2 diabetes mellitus following oral administration of alpha-lipoic acid: a randomized double-blinded placebo-controlled study. Asia Pac J Clin Nutr 2012;21(1):12-21.

252

Insulin Resistance: Recommendations

- Berberine
  - Shown to be as effective as metformin or rosiglitazone in controlling blood sugar
    - ↓FBG 26%, ↓HbA1c 18%, ↓fasting insulin 28%
  - Offers additional cardiovascular benefits:

↓Triglycerides (35+%)	↓Total cholesterol (29%)
↓LDL-C (25%)	↑HDL-C
↓Body weight/fat	↓Waist circumference
↑Pancreatic cell protection	↓Blood pressure
↓Expression of genes involved in fat storage	
↑Expression of genes involved in energy expenditure in adipose/muscle tissue	

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Insulin Resistance: Recommendations

- Cinnamon
  - Acts as an "insulin mimic"
    - Has cellular effects similar to insulin; activates receptors
  - Shown to increase glucose metabolism and significantly reduce blood glucose levels
    - Blood sugar ↓: 18-39%
  - Also reduces triglycerides
    - TG ↓: 23-30%
  - Dosing:3-6 grams/day
    - ~1/2 tsp

Kahn, A. Diabetes Care. December 2003:26; 3215-18.
Jarvill-Taylor K, et al. A hydroxychalcone derived from cinnamon functions as a mimetic for insulin in 3T3-L1 adipocytes. J Am Coll Nutr 2001, 20:327-36.

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Insulin Resistance: Recommendations

- EGCG
  - Epigallocatechin-3-gallate – derived from green tea
  - Shown to reduce fasting glucose and HbA1C
  - Lower body fat and visceral fat
  - Decrease triglycerides and cholesterol
  - Reduce inflammation

Bose M, Lambert JD, Ju J, et al. The major green tea polyphenol, (-)epigallocatechin-3-gallate, inhibits obeity, metabolic syndrome, and fatty liver disease in high-fat-fed mice. J Nutr. 2008 Sep; 138(9): 1677-83.
American Journal of Nutrition, August 2013.

255

Insulin Resistance: Recommendations

- Vitamin D
  - Deficiency increases risk of diabetes, impaired insulin secretion and insulin resistance
  - Shown to improve postprandial insulin sensitivity
  - Decrease insulin resistance
  - Dose: 3000-5000 IU/day (or based on testing)

Nagpal J, Pande JN, Bhartia A. A double-blind, randomized, placebo-controlled trial of the short-term effect of vitamin D3 supplementation on insulin sensitivity in apparently healthy, middle-aged, centrally obese men. Diabet Med. 2009 Jan;26(1):19-27.
Forouhi NG, Luan J, Cooper A, Boucher BJ, Wareham NJ. Baseline serum 25-hydroxy vitamin D is predictive of future glycemic status and insulin resistance: the Medcial Research Council Ely Prospective Study 1990-2000. Diabetes. 2008 Oct; 57(10):2619-25.
Eekhoff M. The Endocrine Society's 92nd Annual Meeting. San Diego 2010.

256

Insulin Resistance: Recommendations

- Fenugreek seed
  - Active constituents include trigonelline, 4-hydroxyisoleucine and sotolon
  - Slow glucose absorption
  - Stimulate insulin release
    - Glucose dependent (i.e., only occurs with moderate/high glucose levels – use with Type II Diabetes
  - Decrease postprandial and fasting glucose (30-40 mg/dl), improves glucose tolerance
  - Side effects: hypoglycemia, diarrhea, flatulence
  - Doses: 1 gram/day (extract)

Broca C, Manteghetti M, Gross R, et al. 4-Hydroxyisoleucine: effects of synthetic and natural analogues on insulin secretion. Eur J Pharmacol 2000;390:339-45.
Hannan JM, Rokeya B, Faruque O, et al. Effect of soluble dietary fibre fraction of Trigonella foenum graecum on glycemic, insulinemic, lipidemic and platelet aggregation status of Type 2 diabetic model rats. J Ethnopharmacol 2003;88:73-7.
Flammang AM, Cifone MA, Erexson GL, Stankowski LF Jr. Genotoxicity testing of a fenugreek extract. Food Chem Toxicol 2004;42:1769-75.
Gupta A, Gupta R, Lal B. Effect of Trigonella foenum-graecum (fenugreek) seeds on glycaemic control and insulin resistance in type 2 diabetes mellitus: a double blind placebo controlled study. J Assoc Physicians India 2001;49:1057-61.

257

Insulin Resistance: Recommendations

- Gymnema Leaf (Gymnema sylvestre)
  - Contain gymemic acids
  - Reduces intestinal absorption of glucsoe
  - Stimulate pancreatic beta cell growth
  - Increase release of insulin
  - Decrease blood sugar, triglycerides and body fat
  - Side effects: hypoglycemia (monitor blood sugar)
  - Doses: 25-100 mg gymnemic acids/day

Shanmugasundaram ER, Rajeswari G, Baskaran K, et al. Use of Gymnema sylvestre leaf extract in the control of blood glucose in insulin-dependent diabetes mellitus. J Ethnopharmacol 1990;30:281-94.
Baskaran K, Kizar Ahamath B, Radha Shanmugasundaram K, Shanmugasundaram ER. Antidiabetic effect of leaf extract from Gymnema sylvestre in non-insulin-dependent diabetes mellitus patients. J Ethnopharmacol 1990;30:295-300.
Sinsheimer JE, Subba-Rao G, McIlhenny HM. Constitents from G sylvestre leaves: isolation and preliminary characterization of the gymnemic acids. J Pharmacol Sci 1970;59:622-8.
Persaud SJ, Al-Majed H, Raman A, Jones PM. Gymnema sylvestre stimulates insulin release in vitro by increased membrane permeability. J Endocrinol 1999;163:207-12.

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Supplements for Blood Sugar Support

- Dynamic Cardio Metabolic
  - Contains synergistic blend of vitamins, minerals, sterols, pre-biotic fibers and botanicals (fenugreek, gymnema leaf & bitter melon) that:
    - Support healthy blood lipid metabolism
    - Improve insulin sensitivity
    - Improve blood pressure
    - Support cardiovascular health
    - Improve oxidative protection
- Foundational product
  - Dosing: 1 scoop 1-2x/day

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Lifestyle Recommendations

- Exercise
  - Resistance training – 2-4 days/week
    - Improves uptake of glucose (non-insulin dependent)
    - Start with 10-15 min, light wt/↑ repetition (15-20 reps)
    - Increase to 20-30 min, moderate wt/reps(10-20 reps)
  - Aerobic training – intervals/HIIT
    - Start with 10-15 min/day
    - Increase to 30-60 min/day
- Improves glucose uptake, insulin sensitivity, ↑ NO, ↓ blood glucose
- ➢ Exercise DAILY!

Musi, N, Fuji N, Hirshman MF, Ekberg I, Froberg S, Ljungqvist O, Thorell A, Goodyear LF. 2001. AMP-Activated Protein Kinase (AMPK) is activated in muscle of subjects with type 2 diabetes during exercise. Diabetes. 50:5:921-928.
Roberts C. 2003. Type 2 diabetes and exercise: Catherine Roberts explores the issues surrounding the advice, support and information on exercise given by health professionals in primary care to people with diabetes. Primary Health Care. 13;4:27-32.

260

Insulin Resistance: Recommendations

Recommendation	Dosage
Cardio-Metabolic powder	1 scoop 1-2x/day
Blood Sugar Control Formula	2 tablets BID
EPA:DHA 720	2 softgels BID with food
Vitamin D	3000-5000 IU/day or based on testing
Berberine Fromula	1 capsule TID with meals (PRN)
Alpha-lipoic Acid	300-900 mg/day
Exercise – 30 min 5-7x/week; HIIT 2-3x/week	
Improve stress management; implement strategies throughout the day (deep breathing)	
Focus on proper sleep hygiene and maintaining blood sugar levels throughout the day	

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Blood Sugar Control Formula

Biotin	2,000 mcg
Chromium (as chromium picolinate)	600 mcg
Cinnamon Bark Powder (bark; *Cinnamomum burmanii*)	500 mg
Stinging Nettle Powder (leaf; *Urtica dioica L.*)	500 mg
Fenugreek Extract (seed; *Trigonella foenum-graecum*)	500 mg
Berberine HCl (bark; *Berberis aristata corteccia*)	500 mg
Alpha Lipoic Acid	300 mg
Bitter Melon Extract (fruit; *Momordica charantia*)	250 mg
Green Tea Extract (leaf; *Camellia sinensis*; 80% polyphenols, 75% catechins, 30% EGCG)	200 mg
Gymnema sylvestre Extract (leaf; *Gymnema sylvestre*)	200 mg
Banaba Extract (leaf; *Lagerstroemia speciosa*; 1% corosolic acid)	50 mg

Cardio-Metabolic Powder

Calories	140
Total Fat	2.5 g
Saturated Fat	1 g
Total Carbohydrate	10 g
Dietary Fiber	4 g
Protein	17 g
Vitamin A (as retinyl palmitate)	375 mcg RAE
Vitamin C (ascorbic acid)	50 mg
Vitamin D3 (as cholecalciferol)	12.5 mcg (500 IU)
Vitamin E (as d-alpha tocopheryl acetate)	5 mg
Thiamin (as thiamine HCl)	5 mg
Riboflavin	5 mg
Niacin (as niacinamide)	15 mg NE
Vitamin B6 (as pyridoxal-5-phosphate)	5 mg
Folate (as (6S)-5-methyltetrahydrofolate, calcium) (Magnafolate-C™)	400 mcg DFE
Vitamin B12 (as methylcobalamin)	250 mcg
Biotin	150 mcg
Pantothenic Acid (as calcium-d-pantothenate)	2.5 mg
Calcium (as dicalcium phosphate)	120 mg
Iron	6.3 mg
Phosphorous (from dicalcium phosphate)	63 mg
Iodine (as potassium iodide)	38 mcg
Magnesium (as magnesium citrate)	100 mg
Zinc (as zinc gluconate)	15 mg
Selenium (as L-selenomethionine)	52.5 mcg
Copper (as copper gluconate)	2 mg
Chromium (as chromium polynicotinate)	1,000 mcg
Sodium	210 mg
Potassium	340 mg
Glucomannan (from umbrella arum root extract)	1.5 g
Gum Arabic Tree Gum Resin Powder	1.5 g
Plant Sterols	1.14 g
L-Lysine (as lysine HCl)	850 mg
L-Leucine	700 mg
L-Valine	500 mg
Bitter Melon Fruit Extract	250 mg
Organic Cassia Bark Powder	200 mg
Fenugreek Seed Extract	150 mg
Hops Aerial Parts Extract	125 mg
L-Isoleucine	100 mg
Gymnema Leaf Extract	67 mg

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Insulin Resistance Case Study: George

- 51 yo overweight male; concerned about weight and blood pressure
- Consumed SAD, drank coffee all day, no exercise
- Objective information
  - Ht: 69", Wt: 267.5 lbs, BP: 174/107
  - Body fat: 34.4%; lean mass 65.6%
  - Rx/supplements: None
  - Significant lab findings:
    - ↑TC, TG, LDL-C; ↓HDL-C
  - Fasting glucose: 116

TEST	Ref Range/units	Initial values
tChol	110-200 mg/dL	279
HDL-C	45-60 mg/dL	44
TG	10-175 mg/dL	213
LDL-C	95-130 mg/dL	192
T.Chol/HDL-C	> 4.0	6.34
TG/HDL-C	> 4.3	4.84

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Insulin Resistance Case Study: George

- Symptoms
  - Abdominal bloating, mild heartburn, intermittent constipation and loose stools
  - Fatigue
  - Knee pain
- Medical History
  - Peripheral vascular disease in left calf
- Health History
  - Past heavy alcohol use (controlled for previous 4 yrs)
  - Father died at age 57 of cardiac arrest

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Insulin Resistance Case Study: George

- Assessment
  - Metabolic syndrome, high blood pressure, hyperlipidemia, obesity
- Plan
  - Eat to Heal -> Modified Mediterranean Diet
  - Exercise – 30 min 5x/week
    - HIIT – 5 min warm up; 5-10 intervals 1:1; 5 min cool down

Recommendation	Dosage
Cardio Metabolic powder	2 scoops 1-2x/day
Blood Sugar Control Formula (Gluco IR)	2 tablets BID
Omega Pure EPA:DHA 720	2 softgels BID with food

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Insulin Resistance Case Study: George

- After 4 weeks:
  - Wt: 247 lbs (vs. 267.5 lbs)
  - BP: 128/86 (vs. 174/107)
  - Body fat%: 33.4% (vs. 34.4%)
  - Lean mass: 66.6% (vs. 65.6%)

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Insulin Resistance Case Study: George

- After 8 weeks:
  - Wt: 238.5 lbs (vs. 267.5 lbs.)
  - BP: 122/82 (vs. 174/107)
  - Fasting glucose: 94 (116)
  - Body fat %: 32.6% (vs. 34.4%)
  - Lean mass: 67.4% (vs. 65.6%)

TEST	Ref Range/units	Initial values	After 8 weeks
tChol	110-200 mg/dL	279	196
HDL-C	45-60 mg/dL	44	42
TG	10-175 mg/dL	213	102
LDL-C	95-130 mg/dL	192	134
T.Chol/HDL-C	> 4.0	6.34	4.67
TG/HDL-C	> 4.3	4.84	2.43

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Questions on Controlling Blood Sugar/Insulin Resistance??

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Endocrine Conditions

Adrenals	Adrenal Fatigue, Chronic Fatigue
Insulin	Insulin Resistance, Syndrome X, Diabetes Type II
Thyroid	Hypothyroid

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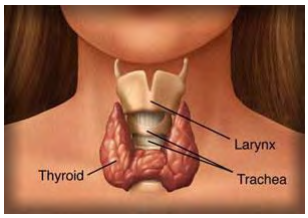
Role of the thyroid



- Small, butterfly shaped organ in neck
- Vital in regulation of metabolism
- Filled with iodine-rich hormones: T4 and T3
- Primary function of T3/T4 is to convert food into energy and to regulate body systems
- Deficiency in production or absorption of T3/T4 can cause a decline in metabolism and create many symptoms

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Symptoms of Hypothyroidism

Dry skin	Coarse, brittle hair	Hair loss (thinning of the eyebrows)
Cold hands and feet	Weakness and fatigue	Muscle weakness and or pain
Insomnia	Difficulty losing weight	Menstrual irregularities and PMS
Constipation	Swelling of the hands/feet	High total cholesterol / Low HDL
Dementia	'Brain fog"	Decreased immune function
Fluid retention	Drooping eyelids	Discoloration of the skin
Loss/gain in appetite	High triglycerides	Unexplained gain in weight
Depression	Loss of libido	High blood pressure

- Up to 34% of adult population has some form of thyroid deficiency
- More than 20 million Americans currently suffer from undiagnosed hypothyroidism

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Is Thyroid Function and Issue for Your Patients?

- Are you always tired?
- Do gain weight easily or have a hard time losing it?
- Do you have to wear socks to bed even in the summer?
- Are your hair and/or eye brows thinning?
- Do you have chronic constipation?

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Endocrine system: It's All Connected

- Under functioning thyroid affects many other hormone systems
  - Slows digestion and can lead to gut dysbiosis
  - Decreased neurotransmitter function
    - Increases cravings, appetite, depression and disturbs sleep
  - Can cause or exacerbate insulin resistance
  - Can cause or exacerbate sex hormone imbalances
- Other hormone imbalances can also negatively affect thyroid function
  - Adrenal dysfunction and excess cortisol reduce thyroid function
  - Sex hormone imbalances (estrogen dominance) reduce thyroid function

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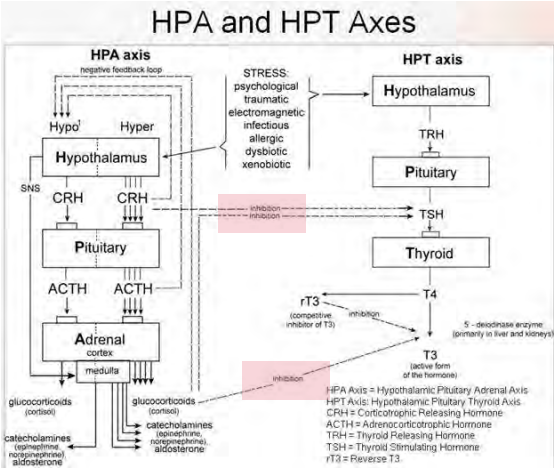
Stress and thyroid function

- CRH inhibits TSH
- ↑ cortisol inhibits
  - TSH
  - Conversion of T4->T3
- ↑ cortisol favors
  - Conversion of T4->rT3



Kelly G. Peripheral metabolism of thyroid hormones: a review. Alt Med Rev 2000;5(4):306-33.
Endocrineweb.com. Hypothyroidism: too little thyroid hormone. http://www.endocrineweb.com/hypo1.html. November, 2001.
Neeck G, Crofford LJ. Neuroendocrine perturbations in fibromyalgia and chronic fatigue syndrome. Rhuem Dis Clin North Am 2000;26(4):927-49.
Khun ER, Geris KL, van der Geyten S, et al. Inhibition and activation of the thyroidal axis by the adrenal axis in vertebrates. Comp Biochem Physiol 1998;120(1):169-74.

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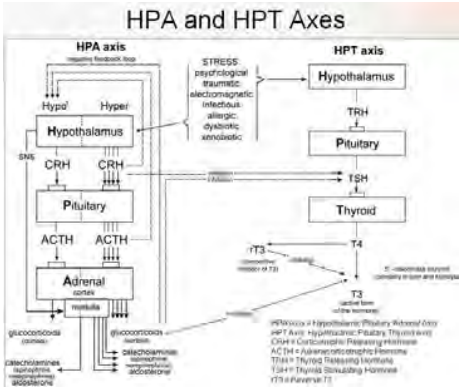
Thyroid: Labs

- Thyroid panel (TSH, Free T3, Free T4)
- Iodine stain
- Cortisol/DHEA salivary test
- Fasting glucose
- Glucose and insulin tolerance test
- Sex hormone testing (salivary)
- 25-hydroxy Vitamin D



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The Testing Controversy

- Thyroid stimulating hormone (TSH) is usually measured to diagnose hypothyroidism
  - 'High' TSH = hypothyroidism
  - The problem lies in defining the standard ranges for TSH
    - Standard range is 0.2-5.5 µU/ml
  - Studies show that TSH > 2.0 results in 'subclinical hypothyroidism and decreased health
  - Do a full panel: TSH, Free T3 and Free T4

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Barnes Basal Temperature Test

- Upon waking, take your axillary (armpit) temperature BEFORE rising
- Record the temperature for at least 3 mornings
- Menstruating women: perform days 2-4 of cycle ideally
- Take the average; any number below 97.6°F is an indication of subclinical hypothyroidism

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Axillary Temperature Test

*NAME*_____

Instructions

1. Use an oral thermometer that has been shaken down to below 95°F and place it on your bedside stand before going to sleep at night.
2. On waking, place the thermometer in your armpit for a full 10 minutes. It is important to make as little movement as possible. Lying and resting with your eyes closed is best. Do not get up until the test is completed.
3. After 10 minutes, read and record the temperature and date on the form below.
4. Record the temperature for at least three mornings (preferably at the same time of day) and bring the information back to our office. Menstruating women must perform the test on the second, third and fourth days of menstruation. Men and postmenopausal women can perform the test at any time.

Normal Range: 97.6 to 98.2

Averages **below** indicate hypothyroidism.

Averages **above** indicate hyperthyroidism.

Month _____		Month _____		Month _____	
DAY	TEMP	DAY	TEMP	DAY	TEMP
1		1		1	
2		2		2	
3		3		3	
4		4		4	
5		5		5	
6		6		6	
7		7		7	
8		8		8	
9		9		9	
10		10		10	
11		11		11	
12		12		12	
13		13		13	
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28		28		28	
29		29		29	
30		30		30	
31		31		31	

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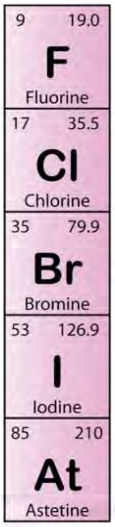
Thyroid: Recommendations

- Avoid toxicity
  - 'Endocrine disruptors' – PCBs, insecticides, mercury, fluoride and chlorine
  - Do periodic detoxification or cleansing protocols
  - Choose organic foods
  - Filter your water – RO and distilled best
  - Use fluoride free toothpaste and mouthwash
  - Avoid tap water if hypothyroid
  - May need avoid swimming pools



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Improving Thyroid Function

- Eliminate goitrogenic foods
  - They reduce the body's ability to use iodine sufficiently to convert T_4 to T_3
  - Foods that contain goitrogens: broccoli, cabbage, cauliflower, kale, kohlrabi, mustard greens, rutabaga, turnips, soybeans, peanuts, pine nuts, walnuts and millet
  - Cooking and/or fermentation deactivate goitrogens

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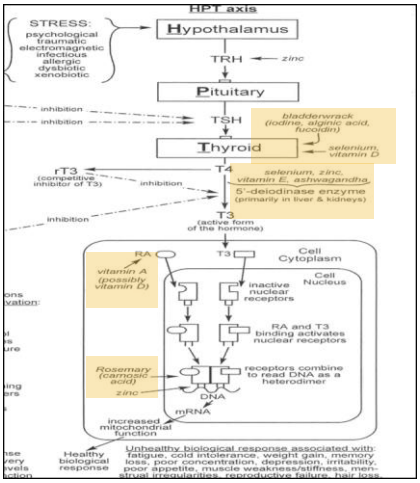
Improving Thyroid Function

- Production of T4
  - Iodine (potassium iodide, seaweed)
- T4 conversion to T3
  - Zinc
  - Selenium
- Improve tissue response to T3
  - Vitamins A & D
  - EPA/DHA
  - Rosemary



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Iodine stain

- Quick iodine assessment
- Apply 2% iodine solution to inner forearm
  - About the size of quarter
  - Cover with Band-Aid once dry
- Observe length of time until disappears
  - > 6 hours – sufficient iodine status
  - < 6 hour – indicates need for iodine

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Iodine: Sources

- Iodine-rich foods
  - Kelp, sea vegetables, seafood, eggs, dairy products
  - Iodized salt
- Supplements: 150-300 mcg/day
  - Potassium iodide (reduced form)
  - Iodine (oxidized form) – typically topical solutions
  - Kelp, Bladderwrack, Dulse
- Safe up to 30 mg/kg
- Toxicity: prolonged use of excessive iodine can cause:
  - Thyroid gland hyperplasia, goiter and severe hypothyroidism

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Iodine: Table Salt

- Iodine in Salt = 100 ppm
- ~77 micrograms/1 gm Na_{2+}
- 10% bioavailability
  - Requires 10 gm (!) of salt daily to meet RDA

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Improving Thyroid Function

- Zinc
  - Involved in synthesis of TRH
  - Necessary for conversion of T4->T3
  - Improves responsiveness of thyroid hormone receptors in tissues
- Selenium
  - Necessary for conversion of T4->T3 and to inhibit conversion of T4->rT3
  - Selenium deficiency is common in SAD

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Improving Thyroid Function

- Vitamins A & D
  - Act as pro-hormones
  - Regulate thyroid hormone-responsive genes
    - Improves thyroid hormone binding with tissues
  - Vitamin D inhibits IL-2 and IF-γ
    - Increased levels of these compounds have been associated with thyroiditis and primary hypothyroidism
- Rosemary
  - Increases expression of Vitamin A & D receptors
    - Supports T3-mediated gene transcription

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Thyroid: Recommendations

Recommendation	Dosage
Thyroid Support Formula	1-2 tablets BID with food
Thyroid Glandular Formula	1 tablets BID with food
EPA:DHA 3:2	2 softgels BID with food
Vitamin D	3000-5000 IU/day or based on testing
Anti-inflammatory diet; avoid goitrogenic foods; eat Brazil nuts (2-4/day)	
Improve stress management; implement strategies throughout the day (deep breathing)	
Focus on proper sleep hygiene and maintaining blood sugar levels throughout the day	

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Thyroid Support Formula

Vitamin A (as retinyl palmitate)	300 mcg RAE
Vitamin C (as magnesium ascorbate)	100 mg
Vitamin D3 (as cholecalciferol)	8 mcg
Vitamin E (as gamma-tocopheryl)	45 mg
Riboflavin	5 mg
Niacin (as niacinamide)	10 mg NE
Vitamin B6 (as pyridoxine HCl)	10 mg
Iodine (as potassium iodide)	75 mcg
Magnesium (as magnesium ascorbate)	8 mg
Zinc (as zinc bisglycinate chelate) (TRAACS™)	5 mg
Selenium (as selenomethionine)	50 mcg
Tyrosine	200 mg
Rhodiola rosea Extract (root; 1% (1.33 mg) salidroside)	133 mg

Thyroid Glandular Formula

Riboflavin (as riboflavin)	0.2 mg
Calcium (as amino acid chelate, citrate)	4 mg
Iodine (as Kelp leaves)(*Lessonia nigrescens*)	40 mcg
Magnesium (as bisglycinate)	11.6 mg
Zinc (as amino acid chelate, citrate)	1.1 mg
Selenium (as L-selenomethionine)	50 mcg
Manganese (as amino acid chelate, citrate)	1 mg
Potassium (as aspartate)	.08 mg
Thyroid (bovine)†	150 mg
L-Tyrosine	20 mg
Proprietary Blend:	170.5 mg

Irish Moss (*Chondrus crispus*) Whole Plant, Parsley (leaf), Suprarenal (adrenal)†, Pituitary†, Horsetail (Shavegrass) Extract, Spleen†, Thymus†, Kelp Leaves (*Lessonia nigrescens*)

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Case Study: Hypothyroidism

- 48 yo female presented with symptoms of fatigue, insomnia, thinning hair and intolerance to cold; also concerned about memory and concentration and weight gain
- Dx with hypothyroidism 5 yr ago
- Objective information
  - Ht: 60"; Wt: 142 lbs.; BP: 118/80
  - Physical exam: normal
  - Rx: levothyroxine, 0.05 mg QD
  - TSH: 5.29; Free T3 and T4 normal

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Case Study: Hypothyroidism (con't)

- Plan
  - Continue Rx
  - Continue exercise: 4-5x/week
  - Anti-inflammatory diet; avoid soy & goitrogenic foods

Recommendation	Dosage
Thyroid Support Formula	1 tablet BID with food
EPA:DHA 720	2 softgels BID with food
Vitamin D	5000 IU/day with food

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Case Study: Hypothyroidism (con't)

- Results
  - After 2 weeks: reported feeling better; felt warmer and energy improved; dry skin improved
  - After 5 weeks: felt "considerably better" and had more energy; rated fatigue 50-70% improved; no longer felt cold all the time and hands/feet were warm

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Case Study: Hypothyroidism (con't)

- Results
  - After 11 weeks: reported "feeling pretty darn good…lots better than a year ago…better energy level, and more balanced emotionally."
    - Reported having 2 regular BM/day, no more dry skin and warmer hands/feet
    - Not having mood swings or depressive symptoms as before

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Case Study: Hypothyroidism (con't)

- Results
  - After 15 weeks: reported that she continued to feel "really good"
  - Worked in A/C and didn't notice the cold anymore
  - Oral body temperature was averaging 98.8°F
  - No longer losing her hair and noticed new hair growth
  - Reported fewer lapses in memory
  - BP: 108/68 (vs. 118/80)

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Case Study: Hypothyroidism (con't)

- Results
  - After 23 weeks: reported feeling "great"
  - Wt: 131 lbs (vs. 142 lbs.)
  - TSH: 2.30 (vs. 5.29)
  - Free T3 and T4 normal
  - 90% improvement on HAQ symptoms overall
  - 56% improvement on Mental Functioning scores

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Questions on Endocrine Conditions???

Adrenals	Adrenal Fatigue, Chronic Fatigue
Insulin	Insulin Resistance, Syndrome X, Diabetes Type II
Thyroid	Hypothyroid

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Questions???

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Never Doubt

'Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed it is the only thing that ever has.'

- Margaret Mead

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For More Information

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