

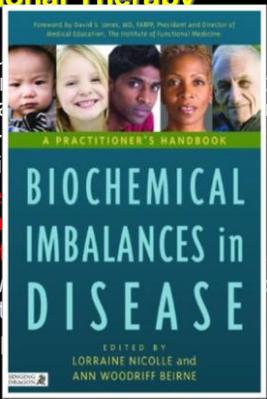
'The role of Nutritional Therapy in the care of individuals with cardiovascular related problems'

Michael Ash
 BSc (Hons) DO ND F DiplON
 mBANT NTCC
 Osteopath
 Naturopath
 Nutritional Therapist
 Researcher
 Author

Clinical Education

Nutritional Therapy

- A Functional approach to
- 8 Practical steps to
- Integrate with the
- Gas and digestive system
- How to provide a
- Support



Approach to
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NUTRITIONAL THERAPY THE PROCESS

BANT

CLIENT GOALS

ENVIRONMENTAL INPUTS - IBC, DIET, EXERCISE

IB FUNCTION

MIND AND SPIRIT

IMMUNE AND INFLAMMATORY PROCESSES

HORMONAL & NEUROTRANSMITTER REGULATION

STRUCTURAL INTEGRITY

ASSESSMENT ANTECEDENTS TRIGGERS MEDIATORS

ENERGY PRODUCTION OXIDATIVE STRESS

REGENERATION BIOTRANSFORMATION

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Client Goals

ASSESSMENT
ANTECEDENTS
TRIGGERS
MEDIATORS



Overview

Determine their aims and outcomes – the purpose of the plan is to support the patients goals with evidence based strategies

Identify realistic goals, obtain agreement that these are achievable and describe plan

Medical history review and systems analysis assess the:

Antecedents: Sex, Age, Genetics, Lifestyle, Experiences, Trauma, Childhood, Stress, etc.

Triggers: Events that initiate illness or symptoms – stress, infection, environmental toxins, food. etc. – look to see if they can be removed or controlled

Mediators: Cytokines, prostaglandins, free radicals, neurotransmitters, fear, personal value, behavioural conditioning, poverty, etc.



Evolutionary Nutritional Therapy

- In physiology, foetal nutritional stress appears to flip an evolved switch that sets the body into a state that protects against starvation.
- When these individuals encounter modern diets, they respond with the deadly metabolic syndrome of obesity, hypertension, and diabetes.*

- Barker DJ, Eriksson JG, Forsén T, Osmond C. Fetal origins of adult disease: strength of effects and biological basis. *Int J Epidemiol.* 2002 Dec;31(6):1235-9. [View Abstract](#)
- Barker DJ. The malnourished baby and infant. *Br Med Bull.* 2001;60:69-88. [Review. View Abstract](#)
- Neel JV, Julius S, Weder A, Yamada M, Kardia SL, Haviland MB. Syndrome X: is it for real? *Genet Epidemiol.* 1998;15(1):19-32. [View Abstract](#)




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Overview

Set outcomes attached to strategic benchmarks

Have patient agree to terms of recommendation, establish review points, share information with medical professional or other colleagues, be prepared to adapt and evolve

Individualised Strategies

The hall mark of Functional Medicine approaches to health care. Nutritional Therapy is the cornerstone of Functional Medicine and needs to play a key role in the therapeutic journey.

Other vital components are required to be part of the overall strategy and comprehension of these reduces likelihood of conflict, contraindication, adverse events and professional clashes.



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8



8 Components Prioritise According To Evidence/Competence

- Each one may represent a significant event
- Each one should have evidence based strategy
- Each one requires co-operation
- Each one has a component either partially or fully related to nutrition
- Each practitioner will have personal and professional influences that need to be managed in relation to the needs of the patient and the approved outcomes.

Berlin EA, Fowkes WC Jr. A teaching framework for cross-cultural health care. Application in family practice. West J Med. 1983;39:934-938. [View Paper](#)



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Mind & Spirit



L-E-A-R-N

Is Religiosity or Spirituality Protective For Heart Disease?

- L**isten - With sympathy and understanding to the patients perception of the problem
- E**xplain - your perceptions of the problem
- A**cknowledge - and discuss the differences and similarities
- R**ecommend - treatment
- N**egotiate - agreement

“Our results do not confirm those of previous studies associating greater religiosity with overall better health risks and status, at least with regard to CVD. There was no reduction in risk for CVD events associated with greater religiosity.”

•Berlin EA, Fowkes WC Jr. A teaching framework for cross-cultural health care. Application in family practice. West J Med. 1983;39:934-938. [View Paper](#)
•Feinstein M, Liu K, Ning H, Fitchett G, Lloyd-Jones DM. Burden of cardiovascular risk factors, subclinical atherosclerosis, and incident cardiovascular events across dimensions of religiosity. The Multi-Ethnic Study of Atherosclerosis. Circulation. 2010;121:659-666 [View Abstract](#)



INDIVIDUALISED PROGRAMME

Environmental Inputs – inc Diet, Exercise



Exercise

Set outcomes attached to strategic benchmarks
Approximately **2.5 hours** per week of moderate to vigorous physical activity has been shown to lower the risk of cardiovascular disease, but the dose-response curve is not well defined.

Total volume of activity may be associated with the greatest reduction in risk, however,and that increased physical activity, even vigorous activity, did not appear to have any detrimental effects.

Chomistek AK, Rimm EB. Physical activity and incident cardiovascular disease: investigation of the effect of high amounts of vigorous-intensity activity. EPI. 2010; March 3, 2010; San Francisco, CA. [View Abstract](#)





Fat & Immunity – CVD risk

- **Adiponectin** is another adipose hormone that is receiving a lot of attention in the medical literature for the last several years. adiponectin levels **decrease** with visceral obesity.
- Most abundantly produced **adipokine**, appears to be a strong link in the metabolic syndrome: diabetes, hypertension, high cholesterol, high uric acid levels, and obesity.
- Calorie restriction, muscle mass, niacin, curcumin and resveratrol increase adiponectin levels

Shibata R, Ouchi N, Murohara T: Adiponectin and cardiovascular disease. Circ J. 2009 Apr;73(4):608-14. Epub 2009 Mar 3. [View Abstract](#)



Adiponectin

- Sensitises insulin. < adiponectin causes insulin resistance - Type II Diabetes
- Reduces liver glucose production
- Increases glucose uptake in the muscles and adipose tissues
- Causes oxidation of fats which leads to less lipid production
- Has anti-inflammatory properties
- Protects the heart against ischemia and reduces myocardial infarct size
- Acts as an anti-clotting factor
- Increases NO production in the vasculature leading to a greater dilation of the vessels.



Adiponectin

- Adiponectin has several anti-inflammatory properties that leads to the overall health of the body.
- Obesity leads to a decrease in adiponectin which increases the risk of developing the metabolic syndrome.
- High fructose intake, Vitamin D deficiency, and a high carbohydrate intake all contribute to lowering adiponectin levels.
- Resveratrol, in red wine, increases adiponectin levels - partially explains the French Paradox.

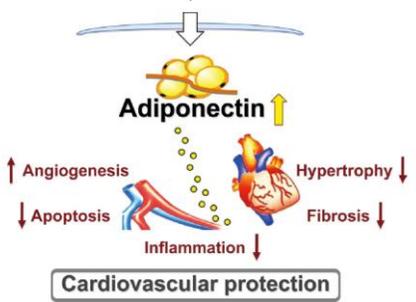


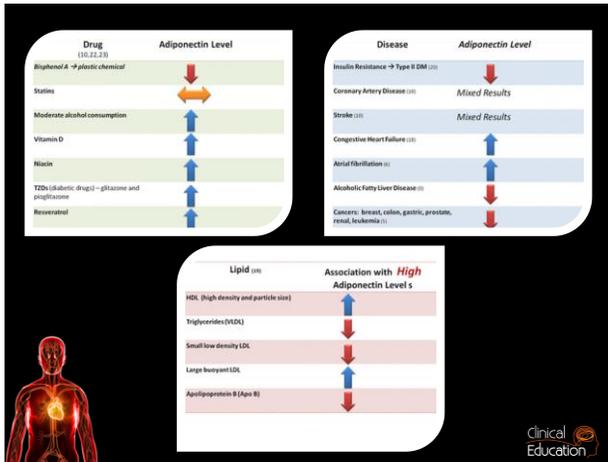
Resveratrol

- Because of resveratrol's antiplatelet property, patients who take anticoagulants or antiplatelet medications or who use herbs that have the potential to increase bleeding risk, such as garlic, feverfew, ginger, ginkgo, ginseng, red clover, and turmeric, should be cautious in their consumption of resveratrol.
- *In vitro*, resveratrol has been shown to be more potent as an anti-inflammatory agent than aspirin and ibuprofen; to inhibit nitric oxide generation in activated macrophages; to improve mitochondrial function; and to reduce interleukin-1 (IL-1), IL-8, and granulocyte macrophage colony-stimulating factor.



Weight Loss, Muscle Density, Caloric Restriction, Resveratrol, Tumeric, Vitamin D





Wt Loss – Effective Immune Controller

- A modest weight loss of as little as 13.2 pounds (6kg) is enough to bring the pro-inflammatory nature of circulating immune cells back to that found in lean people.
- 80% reduction of pro-inflammatory immune cells, which circulate in the blood. These inflammatory cells are involved in promoting coronary artery disease and other illnesses associated with obesity

Vierdel A, Lord RV, Samaras K. The Effects of Weight Loss and Gastric Banding on the Innate and Adaptive Immune System in Type 2 Diabetes and Prediabetes. J Clin Endocrinol Metab. 2010 Apr 7. [View Abstract](#)

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Vitamin D - Observational Study

- Inadequate levels of vitamin D are associated with an increase in the risk of cardiovascular disease and death
- 27,000 > 50 no Hx of CVD for just over a year very low levels of vitamin D
- ≤15 ng/mL - 77% more likely to die, - 45% more likely to develop CAD, and
- - 78% more likely to have a stroke than those >30 ng/mL

< Vit D - 2 x likely to develop heart failure

Bair TL, et al. Vitamin D Deficiency is Strongly Associated With Incident Death and Cardiovascular Disease in a General Healthcare Population (Circulation. 2009;120:S455.) [View Abstract](#)

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- In general, a supplement of 100 IU of vitamin D per day will increase blood levels of vitamin D by 1 ng/mL,
- Those taking 1000 IU per day should have blood levels in the range of 25-32 ng/mL and those taking 4000 IU should have levels of 40-50 ng/mL.

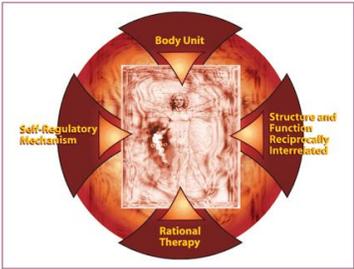
“ Right now, I think the evidence for vitamin D is probably stronger than the evidence for other vitamins.”




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Mechanics of Cardiovascular Health

Principle focus is to facilitate physical activity and maintain optimal mobility





Stress, Inflammation, And Yoga Practice.

- **CONCLUSION:** The ability to minimise inflammatory responses to stressful encounters influences the burden that stressors place on an individual. If yoga dampens or limits stress-related changes, then regular practice could have substantial health benefits.

Houts CR, Malarkey WB, Emery CF, Glaser R, Stress, Kiecolt-Glaser JK, Christian L, Preston H, inflammation, and yoga practice. Psychosom Med. 2010 Feb;72(2):113-21. Epub 2010 Jan 11. [View Abstract](#)

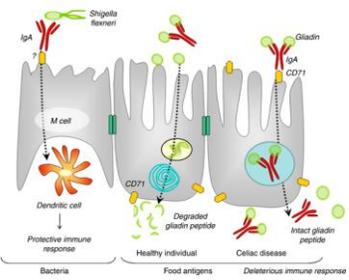



Immune Suppression Siga

- The ability to produce secretory IgA (slgA) also appears to be influenced by stress, inability to manage stress through Adrenal Fatigue may result in increased risk for mucosal immune activation.

- Martin RA, DobbinJP. Sense of humor, hassles, and immunoglobulin A: evidence for a stress-moderating effect of humor. *Int J Psychiatry Med* 1988;18:93-105. [View Abstract](#)





Multiple facets of intestinal permeability and epithelial handling of dietary antigens
 S Ménard, N Cerf-Bensussan and M Heyman. *Mucosal Immunology* (2010) 3, 247-259



INDIVIDUALISED PROGRAMME

AntiOxidants

Chronic and acute overproduction of reactive oxygen species (ROS) under pathophysiologic conditions forms an integral part of the development of cardiovascular diseases (CVD), and in particular atherosclerosis.

These ROS are released from different sources, such as xanthine oxidase, lipoxygenase, nicotinamide adenine dinucleotide phosphate oxidase, the uncoupling of nitric oxide synthase and, in particular, mitochondria.

Victor VM, Apostolova N, Herance R, Hernandez-Mijares A, Rocha M. Oxidative stress and mitochondrial dysfunction in atherosclerosis: mitochondria-targeted antioxidants as potential therapy. *Curr Med Chem*. 2009;16(35):4654-67. Review. [View Abstract](#)



What About Antioxidants

- While a significant body of epidemiological and clinical data suggests that antioxidant-rich diets reduce blood pressure and cardiovascular risk.
- Yet randomised trials and population studies using natural antioxidants have yielded disappointing results.
- Fat soluble antioxidant derived from seaweed, ecklonia cava has shown ability to reverse atherosclerosis, reduce cholesterol, regenerate endothelial lining, inhibit antiplasmin and ACE.



[Read Article here](#)



Reasons May Include Combination Of:

- Ineffective dosing regimens,
- The potential pro-oxidant capacity of some of these agents,
- Selection of subjects less likely to benefit from antioxidant therapy (too healthy or too sick),
- Inefficiency of nonspecific quenching of prevalent ROS versus prevention of excessive ROS production.
- Commonly used antioxidants include Vitamins A, C and E, L-arginine, flavanoids, and mitochondria-targeted agents (Coenzyme Q10, acetyl-L-carnitine, and alpha-lipoic acid).



CoQ10

- CoQ10 depletion may also be a contributory factor for why statin intervention has not improved outcomes in CHF. There is an emerging evidence base in support of CoQ10 as an adjunctive therapy in CHF.
- Statins inhibit the HMG-CoA pathways, shared by COQ-10 so depletion and associated myopathy may be managed with supplementation.
- *Molyneux SL, et al Coenzyme Q10; an adjunctive therapy for congestive heart failure? N Z Med J. 2009 Oct 30;122(1305):74-9. [View Abstract](#)*
Young JM, Florkowski CM, Molyneux SL, McEwan RG, Frampton CM, George PM, Scott RS. Effect of coenzyme Q(10) supplementation on simvastatin-induced myalgia. Am J Cardiol. 2007 Nov 1;100(9):1400-3. Epub 2007 Aug 16. [View Abstract](#)



CoQ10

- Three clinical trials with a total of 96 participants were evaluated for the effects of coenzyme Q10 on blood pressure compared to placebo. Treatment with coenzyme Q10 in subjects with systolic BP (SBP) > 140 mmHg or diastolic BP (DBP) > 90 mmHg resulted in mean decreases in SBP of 11 mmHg (95% CI 8, 14) and DBP of 7 mmHg (95% CI 5, 8).



Ho MJ, Bellusci A, Wright JM. Blood pressure lowering efficacy of coenzyme Q10 for primary hypertension. Cochrane Database Syst Rev. 2009 Oct 7;(4):CD007435. Review. [View Abstract](#)



Dark Chocolate

- Lowers CRP
- Reduces cholesterol related risk
- Beneficially affects platelets and lipids
- Reduces hypertension
- 70% cocoa solids approx 5.7gms -180mgs



• di Giuseppe R, et al Regular consumption of dark chocolate is associated with low serum concentrations of C-reactive protein in a healthy Italian population. J Nutr. 2008 Oct;138(10):1939-45. [View Abstract](#)

• Engler MB, et al Flavonoid-rich dark chocolate improves endothelial function and increases plasma epicatechin concentrations in healthy adults. J Am Coll Nutr. 2004 Jun;23(3):197-204. [View Abstract](#)

• Taubert D, Roosen R, Lehmann C, Jung N, Schömig E. Effects of low habitual cocoa intake on blood pressure and bioactive nitric oxide: a randomized controlled trial. JAMA. 2007 Jul 4;298(1):49-60. [View Abstract](#)



INDIVIDUALISED PROGRAMME

Detoxification

The role of heavy metals, xenobiotics, and other exogenous and endogenous chemicals on cardiovascular health.

Genetics /environment – epigenetic's

Poor elimination of naturally and non naturally occurring chemicals may reduce the stress on liver function allowing for reduction in oxidation and cholesterol metabolism

DETOXIFICATION BIOTRANSFORMATION



Evolutionary Nutritional Therapy

- Pharmacology emphasises individual variation in genes encoding cytochrome P450s, but their evolutionary origins in processing dietary toxins are just being fully appreciated.
- Cytochrome p450s support the oxidative, peroxidative and reductive metabolism of such endogenous and xenobiotic substrates as environmental pollutants, agrochemicals, plant allelochemicals, steroids, prostaglandins and fatty acids amongst others.



Danielson PB. The cytochrome P450 superfamily: biochemistry, evolution and drug metabolism in humans. *Curr Drug Metab.* 2002 Dec;3(6):561-97. Review. [View Abstract](#)
 Kizhakekuttu TJ, Widlansky ME. Natural Antioxidants and Hypertension: Promise and Challenges. *Cardiovasc Ther.* 2010 Mar 29. [View Abstract](#)



INDIVIDUALISED PROGRAMME

Could Changes In Intestinal Function And Morphology Underlie Chronic Heart Failure?

Chronic heart failure (CHF) is a state of chronic inflammation

Chronic heart failure is a multisystem disorder in which intestinal morphology, permeability, and absorption are modified. Increased intestinal permeability and an augmented bacterial biofilm may contribute to the origin of both chronic inflammation and malnutrition.



*Sandek A, et al. Altered intestinal function in patients with chronic heart failure. *J Am Coll Cardiol.* 2007 Oct 16;50(16):1561-9. Epub 2007 Oct 1. [View Abstract](#)
 *Krack A, Sharma R, Figulla HR, Anker SD. The importance of the gastrointestinal system in the pathogenesis of heart failure. *Eur Heart J.* 2005 Nov;26(22):2368-74. Epub 2005 Jun 24. Review. [View Abstract](#)



Leaky GUT

- Gut barrier function is maintained by a well-balanced intestinal flora, an intact mucosa, and a normal functioning immune system. If one or more of these three protective mechanisms are disrupted, viable bacteria [or bacterial products like endotoxin (i.e. lipopolysaccharide, LPS)] may cross the gut mucosa and spread to the mesenteric lymph nodes or more distant organs, such as the liver and the spleen, a process termed bacterial translocation



INDIVIDUALISED PROGRAMME

IMMUNE & INFLAMMATORY PROCESSES



Immune and Inflammation

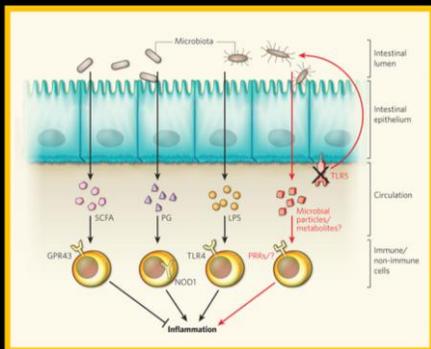
Current thinking suggests "damage" rather than "foreignness" as the actual trigger of the immune system, which has caused a dramatic change in how we tend to view the aetiology of most types of heart disease. (see P Matzingers work)

Promoted by innate receptor activation and first promoted by Virchow in terms of infection, there is increasing interest in the role of commensal bacteria in the generation of metabolic syndrome etc.

'abnormal activation of the host's innate immune system, characterised by low-grade, chronic inflammation, and a role for the gut microbiota have both been implicated'

complex communication between the gut microbiota and the innate immune system is involved in metabolic homeostasis. TH1 & TH2 & Th17 and Treg





Ping Li & Gökhan S. Hotamisligil. Metabolism: Host and microbes in a pickle. Nature Volume: 464, Pages: 1287-1288. Date published: 29 April 2010. DOI: doi:10.1038/4641287a. Published online: 29 April 2010. [View Abstract](#)

Nakamura T, et al Double-stranded RNA-dependent protein kinase links pathogen sensing with stress and metabolic homeostasis. Cell. 2010 Feb 5;140(3):338-46. [View Abstract](#)



Role for Immunomodulation

- CVD and atherosclerosis are linked to adverse inflammation events.
- Th1, Th17 Cytokine induction
- Treg, IL-10, TGF-B potent inhibitors of atherosclerosis
- Probiotics are able to induce local and systemic benefits offering a novel therapy.

- Hansson GK. Inflammation, atherosclerosis, and coronary artery disease. N Engl J Med. 2005 Apr 21;352(16):1685-95. [View Abstract](#)
- Mallat Z et al. Protective role of interleukin-10 in atherosclerosis. Circ Res. 1999 Oct 15;85(8):e17-24. [View Abstract](#)

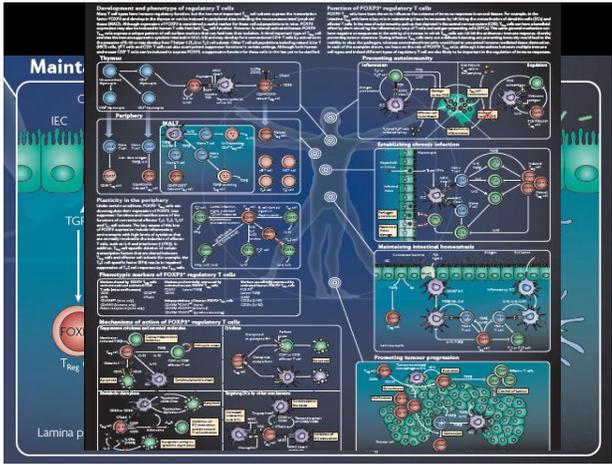



Hygiene Hypothesis

- If immune dysregulation means alteration in Treg function, which is the preferred explanation linking the hygiene hypothesis to the susceptibility to immuno inflammatory disorders – the atherosclerosis and other inflammatory driven episodes may be initiated and amplified by loss of immunological tolerance.
- The gut is the largest source of Tregs and greatest site of immunological activity.



Clinical Education



Hypertension

- Immunosuppressive effects of transferred **Treg** cells ameliorated cardiac damage and accounted for the improved electric remodeling independently of blood pressure–lowering effects.
- Results provide new insights into the pathogenesis of hypertensive cardiac damage and could therefore lead to new therapeutic approaches that involve manipulation of the immune system.



Clinical Education

The Cytokine Cascade

the NEW ENGLAND JOURNAL of MEDICINE

Although cytokines at all steps have important biologic effects, their amplification at each step of the cascade makes the measurement of downstream mediators such as Hs CRP particularly useful for clinical diagnosis.

Hansson G. N. Engl J Med 2005;352:1685-1695

Clinical Education

Immune Response and Atherosclerosis

Classical Risk factors: Diabetes Mellitus, Hyperlipidemia, Hypertension, Smoking

Diet & Lifestyle influences both Classical Risk factors and Adaptive Immunity.

Innate Immunity:

- Responder Cells: Dendritic cells, monocytes, macrophages, neutrophils, NKC, EC, mast cells
- Receptors: Scavenger Receptors (CD36, CD68, CXCL16, LXR-1), phagocyte receptors (immune receptor, receptors for opsonins), Toll-like receptors
- Ligands: exogenous (PAMP), endogenous (apoptotic cells, modified lipoproteins, extracellular matrix)
- Cytokines: TNF α , IL-1, IL-6, IL-10, IL-12, IL-15, IL-18, chemokines, IFN- γ

Adaptive Immunity:

- Responder cells: Dendritic cells, monocytes, macrophages, T cells, B cells, EC
- Recognizing molecules: Ig, MHC, TCR
- Ligands: antigens of microbes (bacteria, e.g. Chlamydia; viruses, e.g. CMV, Influenza A) and autoantigens (HSP, oxLDL)
- Effector cells: T cells, B cells, plasma cells, phagocytes
- Cytokines: IL-2, IL-4, IL-5, IL-10, IL-13, TGF- β , IFN- γ

Subsequent cellular events: Endothelial cell activation/apoptosis/repair, Leukocyte adhesion, migration/activation/differentiation, Smooth muscle cell proliferation, Fibroblast proliferation, Platelet aggregation

Outcomes: Atherosclerosis, Myocardial infarction, Stroke, Peripheral artery occlusion

Role of innate and adaptive immunity in atherogenesis. NKC, natural killer cells; EC, endothelial cells; PAMP, pathogen-associated molecular pattern; Ig, immunoglobulin's; MHC, major histocompatibility complex; TCR, T-cell receptor; CMV, cytomegalovirus; HSP, heat shock proteins; oxLDL, oxidized LDL. Mehta H, Weis M. Atherogenesis and inflammation—was Virchow right? Nephrol Dial Transplant. 2007 Jul;22(7):1823-7. Epub 2007 Apr 16. Review. [View Paper](#).

NUTRIENT + STRATEGIES

Clinical Education

Niacin

- Risk of heart attack, stroke or mortality from hypertension is nearly negligible at $\leq 115/75$. At 135/85, the risk *doubles*. At 155/95, the risk *quadruples*.
- Statins are used to treat an isolated number (LDL) and pathetically fail to deliver meaningful reductions in cardiac death or events (15-22% average relative risk reduction *versus* Vitamin B3/niacin 70-90% relative risk reduction) or coronary calcification progression.



Clinical Education

Niacin and Immune Function

- Niacin lowers LDL, raises HDL, and decreases triglycerides
- Niacin may lower BP when administered over a longer period of time.
- Recent studies indicate that niacin increases vascular endothelial cell redox state, resulting in the inhibition of oxidative stress and **vascular inflammatory genes, key cytokines involved in atherosclerosis**
- Bays HE, Rader DJ. Does nicotinic acid (niacin) lower blood pressure. *Int J Clin Pract.* 2009 Jan;63(1):151-9. Epub 2008 Nov 28. Review. [View Abstract](#)
- Kamanna VS, Kashyap ML. Mechanism of action of niacin. *Am J Cardiol.* 2008 Apr 17;101(8A):20B-26B. Review. [View Abstract](#)



Clinical Education

Evolutionary Aspects Of Diet, Essential Fatty Acids And Cardiovascular Disease

- Palaeolithic period intake of $\Omega 6$ & $\Omega 3$ estimated equal.
- Epidemiological, experimental and clinical intervention studies have shown that $\Omega 3$ fatty acids:
- Modify eicosanoid products in the cyclooxygenase and lipoxygenase pathways, reduce synthesis of cytokines and platelet-derived growth factor by influencing gene expression and alterations in leukocyte and endothelial cell properties



Simopoulos AP. Evolutionary aspects of diet, essential fatty acids and cardiovascular disease. *Eur Heart J Suppl.* (2001) 3 (suppl D): D8-D21. [View Abstract](#)

Clinical Education

EFA's Immune Gene Expression

- $\Omega 6$ & $\Omega 3$ influence gene expression.
- $\Omega 3$ suppress $IL-1\beta$ $TNF\alpha$, $IL-6$
- $\Omega 6$ tend to be pro-inflammatory.
- Inflammation is at the base of coronary heart disease, dietary intake of $\Omega 3$ an important role in the manifestation of disease, esp. genetic variation, as for example in individuals with genetic variants at the 5-lipoxygenase (5-LO).



Clinical Education

Type of Fats & Ratio

- Increased dietary arachidonic acid (AA) significantly enhances the apparent atherogenic effect of genotype, whereas increased dietary intake of omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) blunts this effect.
- In the secondary prevention of cardiovascular disease, a ratio of 4/1 was associated with a 70% decrease in total mortality

• Simopoulos AP. The omega-6/omega-3 fatty acid ratio, genetic variation, and cardiovascular disease. *Asia Pac J Clin Nutr.* 2008;17 Suppl 1:131-4. Review. [View Abstract](#)



Clinical Education

Ratio's ?

- Studies indicate that the optimal ratio may vary with the disease under consideration.
- This is consistent with the fact that chronic diseases are multigenic and multifactorial.
- Therefore, it is quite possible that the therapeutic dose of omega-3 fatty acids will depend on the degree of severity of disease resulting from the genetic predisposition.
- The importance of the omega-6/omega-3 fatty acid ratio in cardiovascular disease and other chronic diseases.

• Simopoulos AP. *Exp Biol Med* (Maywood). 2008 Jun;233(6):674-88. Epub 2008 Apr 11. Review. [View Abstract](#)



Clinical Education

Effect of Combination Pantethine, Plant Sterols, Green Tea Extract, Delta-tocotrienol and Phytolens on Lipid Profiles in Patients with Hyperlipidemia

Conclusions: The non-pharmacological treatment of hyperlipidemic individuals with a nutraceutical supplement containing pantethine, plant sterols, green tea extract, delta-tocotrienols and Phytolens® improves lipid profiles and diastolic blood pressure as measured at the end of a two-month trial.

Dr Mark Houston MD published the results of his trial using LipidSirt in the Journal of American Nutraceutical Association
[Full Paper](#)



Further Information on the natural treatment of hypertension
Can be found here www.nleducation.co.uk/
