

Nutrition in Cardiovascular diseases (CVD)

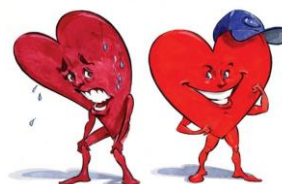
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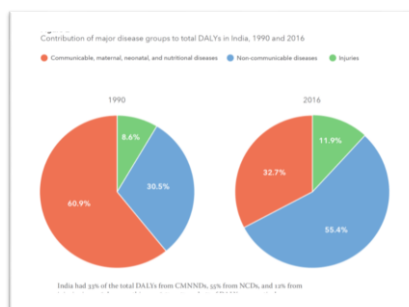
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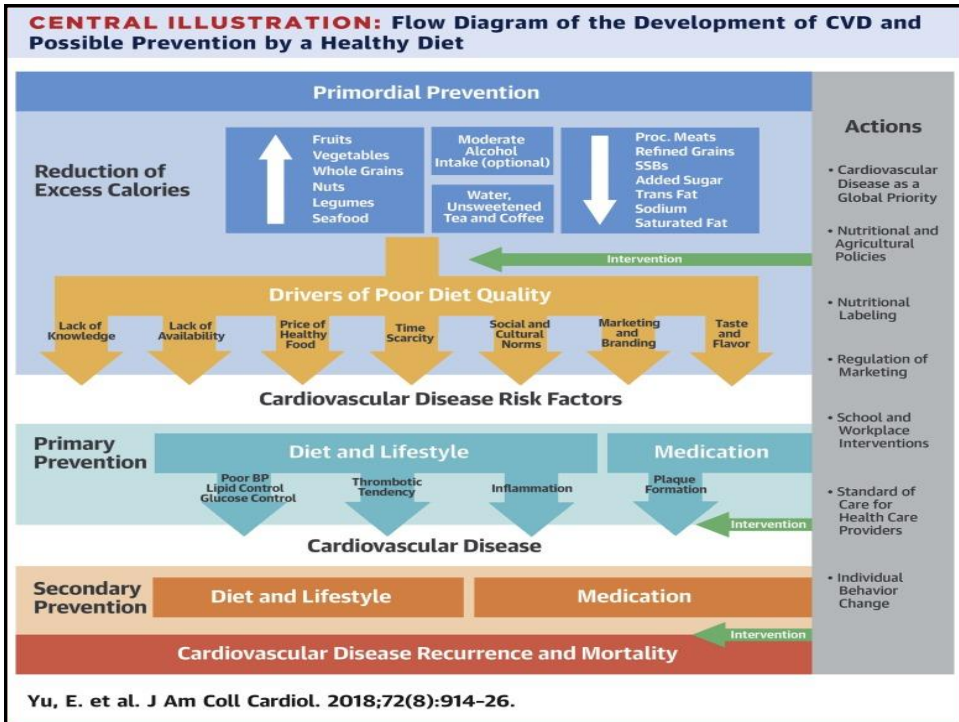
6 Oct 2018



Diet and NCDs

- Poor diets reduce our productivity and increase premature morbidity and mortality (*Foresight report, 2016*).
- Suboptimal diet was responsible for an estimated **1 in 5 premature deaths** globally from 1990 to 2016. (GBD- Lancet 2017)
- **All forms of malnutrition predispose to NCDs.**
- ~45% of cardio-metabolic deaths in 2012 (318,000/702,000) were “associated with” top 10 dietary factors:
 - fruits, vegetables,
 - nuts/seeds, whole grains,
 - unprocessed red meats, processed meats,
 - sugar-sweetened beverages,
 - polyunsaturated fats, seafood omega-3 fats,
 - sodium.

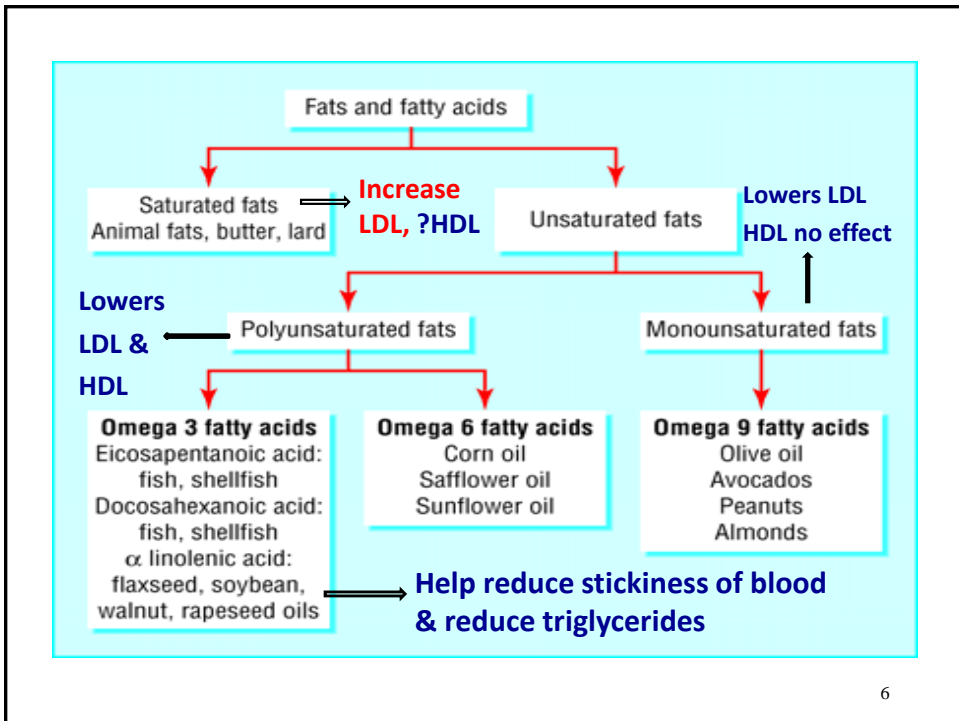
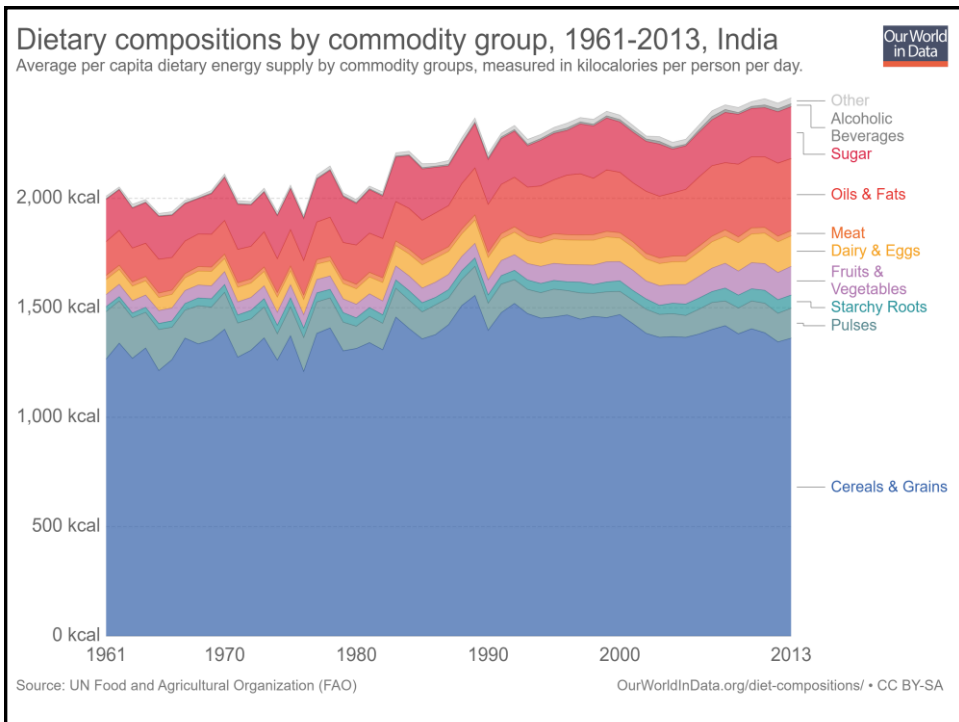




Bottom Line



- Multiple landmark trials/studies have documented the profound effect of nutritional intake on CVD incidence/severity including:
 - The Diet And Reinfarction Trial (DART),
 - Lyon Heart study,
 - The European Prospective Investigation into Cancer and Nutrition study (EPIC),
 - Prospective Urban Rural Epidemiology (PURE) study
 - Dietary Approaches to Stop Hypertension (DASH) and
 - Prevención con Dieta Mediterránea (PREDIMED)
- **Healthy lifestyle (regular physical activity, healthy diet, normal BMI, no/min alcohol, not smoking)** is associated with 45– 81% decreased HF incidence.
- **Limit intake of sweets, sugar-sweetened beverages, and red meats.**
- **Limit HFSS foods!**



AHA PRESIDENTIAL ADVISORY

Dietary Fats and Cardiovascular Disease

A Presidential Advisory From the American Heart Association

- RCTs- low dietary SFA and replacement with PUFAs **reduced CVD by $\approx 30\%$** , similar to statin treatment.
- Replacement of SFA with refined carbohydrates and sugars is **not associated** with lower CVD.
- Replacement of SFA with unsaturated fats lowers LDL-c.
- **SUMMARY:** Shift from sat to unsat fats should occur simultaneously in an overall healthful dietary pattern such as DASH or the Mediterranean diet.



Circulation. 2017;136:e1–e23. DOI: 10.1161/CIR.0000000000000510

Pufas and cvd – Cochrane 2018

- Increasing PUFA intake:
 - **little or no effect on:**
 - **all-cause mortality** (7.8% to 7.6%, risk ratio (RR) 0.98, 19,290 participants in 24 trials), **all moderate-quality evidence.**
 - **cv mortality** (RR 1.02; 16 trials, 15,107 participants) **all low-quality evidence.**
 - **slightly reduces risk of:**
 - **CHD events** from 14.2% to 12.3% (RR 0.87, 15 trials, 10,076 participants) and **CVD events** from 14.6% to 13.0% (RR 0.89, 17,799 participants, 21 trials), **all moderate-quality evidence.**
 - **CHD death** (6.6% to 6.1%, RR 0.91, 9 trials, 8810 participants) & **stroke** (1.2% to 1.1%, RR 0.91, 11 trials, 14,742 participants) **all low-quality evidence.**

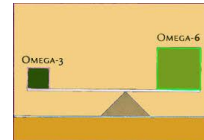


N6 and CVD

- Chowdhury et al (2014): **8 RCTs** ω -6 PUFA larger reduction in **coronary risk** than with ALA or ω -3 supplementation (RR: 0.89).
 - ω -6 PUFAs reduce LDL & non-HDL-c in a dose-dependent manner compared with dietary carbohydrate, and have a neutral effect on BP.



- Observational studies:** higher intake of ω -6 PUFAs, when compared with SFAs or carbohydrate, **lower risks for CVD events** (10–30%), CVD and total mortality (10–40%), and T2D (20–50%).



- Despite the concern that ω -6 fatty acids increase inflammation, current evidence from studies in humans does not support this view.

Adv Nutr 2018;9:1–13. 9

n-3 PUFAs- Cochrane 2018

Long chain n3s

- Little/no effect on all-cause mortality, cv mortality, cv events, CHD mortality, stroke or arrhythmia** (high quality)
- Reduced CHD events** (RR 0.93, n=84,301; 5469 CHD events in 28 RCTs); **not maintained in sensitivity analyses – LC n-3 makes little or no difference to CHD event risk.** (moderate GRADE)



Short chain n3s

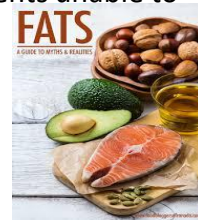
- little or no difference to all-cause mortality, cv mortality, CHD events.**
- slightly reduce risk of cv events** (from 4.8% to 4.7%, RR 0.95, n=19,327 ; 884 CVD events, 5 RCTs, **low-quality evidence**), **CHD mortality** (1.1% to 1.0%, RR 0.95) **and arrhythmia** (3.3% to 2.6%, RR 0.79)
- Effects on **stroke** are unclear.

Omega 3: omega 6 ratio?

.0

Why is there such an inconsistency in fat and cardio-metabolic risk relationships?

- All Sat fats are not the same
- Differences in long & medium chain fatty acids and even and odd chain fatty acids in saturated fats
 - Sat fats from dairy products (odd chain) may be better
- Sat fats raise both LDL and HDL-C (meta-analyses: Every 1% increase in energy from SFAs, LDL-c increase by 12.7– 17.4 mg/L and HDL-c increase by 4.3– 5.0 mg/L)
- Differential effects on TC and TC/HDL-c
- Large measurement error for fats; Dietary instruments unable to discriminate between different fatty acids
- Small inter individual variation



Trans fatty acids (TFAs)

- Total trans fat intake associated with:
 - all cause mortality (1.34, 1.16 to 1.56),
 - CHD mortality (1.28, 1.09 to 1.50), and
 - Total CHD (1.21, 1.10 to 1.33).
- Industrial, but not ruminant, trans fats associated with:
 - CHD mortality (1.18 (1.04 to 1.33) v 1.01 (0.71 to 1.43))
 - CHD (1.42 (1.05 to 1.92) v 0.93 (0.73 to 1.18)).



<https://www.bmj.com/content/351/bmj.h3978>

2 % increase in energy intake from TFA is associated with a 23 % increase in the incidence of CHD.

Source: Mozaffarian et al. *New Engl J Med.* 2006;354:1601-1613.

Dairy and CVD: PURE study

- **Higher intake of total dairy (>2 servings/d compared with no intake) associated with lower:**
 - risk of the composite outcome (HR 0.84),
 - total mortality (0.83)
 - non-cv mortality (0.86), cv mortality (0.77),
 - major cvd (0.78), and stroke (0.66).
- **No significant association with MI.**
- Higher intake (>1 serving vs no intake) of **milk** (HR 0.9) and **yogurt** (0.86) associated with **lower risk of composite outcome**,
- **Cheese intake not significantly associated with composite outcome.**



Lancet, sep 2018

American Heart Association Guidelines 2018

- Limit total fat <25-35% total energy
- Limit saturated fat <7% total energy
- Limit trans fat <1% total daily energy
- Remaining fat should come from sources of unsaturated fat e.g nuts, seeds, fatty fish, vegetable oils

Eg. 2000 cals daily intake should have <15g saturated fat, <2g trans fat ,55-77g total fat from other sources

<https://www.heart.org/en/healthy-living/healthy-eating/eat-smart/nutrition-basics/aha-diet-and-lifestyle-recommendations>

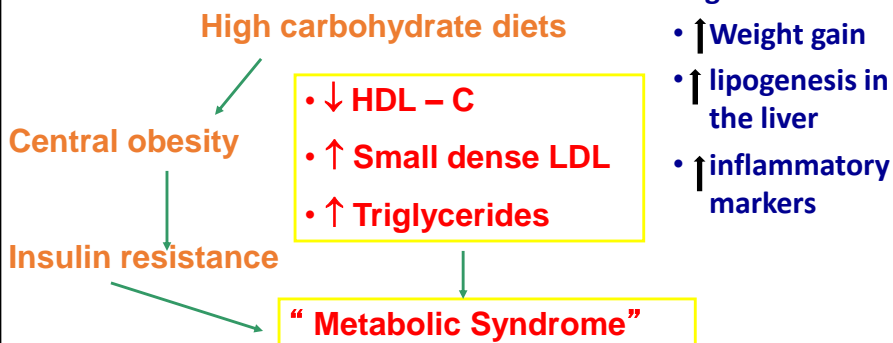
Contd...

- Recommend lowering saturated fat intake in the context of a healthy diet to improve CVD risk factors and outcomes
- **The AHA/ACC panel does not specify macronutrient substitution, but notes beneficial lipid profile shifts when sat fat is replaced with PUFAs, followed by MUFAs, then whole grains.**
- Dairy fat is presumably not as harmful as other animal fats, but unsaturated fats and whole grains are superior selections.
 - replacement of dairy fat with whole grains reduced risk by 34%

<https://www.ahajournals.org/doi/full/10.1161/01.cir.0000437740.48606.d1>

DIETARY CARBOHYDRATES & CVD

•Carbohydrates and metabolic syndrome



- High-carb diets with high glycemic index may adversely impact on glucose control and have been linked to an increased risk of CHD
- Nature of carbohydrate important in relation to the reduction of CVD

Carbohydrates

- In the meta-analysis (n=432179), both low (<40%) and high CHO consumption (>70%) conferred greater mortality risk.

- **50-55% energy from carbohydrate - lowest risk of mortality.**
- Source of macronutrients imp:
 - mortality increased when carbohydrates were exchanged for animal-derived fat or protein and
 - mortality decreased when substitutions were plant-based (0-82)



[Lancet Public Health](#), 2018 Sep;3(9):e419-e428, doi: 10.1016/S2468-2667(18)30135-X. Epub 2018 Aug 17.17

Proteins

- ✓ Inverse association between protein intake & CVD
 - ✓ meat protein-weight gain over 6.5 years, with 1 kg of weight increase per 125 g of meat per day.
 - ✓ In the Nurses' Health Study, diets low in red meat, containing nuts, low-fat dairy, poultry, or fish, were associated with a 13% to 30% lower risk of CHD compared with diets high in meat.
- ✓ Replacement of SFA/CHO by proteins : beneficial effects on CV risk factors (TG, LDL and SBP)
- ✓ **Plant proteins** (nuts, beans) and Tuna rich in L-arginine improves endothelial dysfunction
- ✓ Dairy proteins appear to be beneficial.

Kris-Etherton and Fleming AJ Adv Nutr 2015

FRUITS AND VEGETABLES

• Ness (1997): Systematic Review-

- 9/10 ecological studies
- 2/3 case-control studies
- 6/16 cohort studies

Protective against CHD

- 3/5 ecological studies
- 6/8 cohort studies

Protective against Stroke

Similar findings from :

- ◆ Women's Health Study (Liu et al, 2000)
- ◆ Physicians' Health Study (Liu et al 2001)
- ◆ Finland (Kuopio; Riassen TH, 2003) : 34% less risk of CVD Death
- ◆ NHANES FOLLOW-UP (Bazzano, Am J Clin Nutr 2002)

Overall 20-30% reduction in the incidence of stroke and CHD and mortality due to stroke and CHD.

Inter Heart study : Fruits/vegetables > 5 servings: 30 % risk reduction for MI

Sodium and CVD



AHA Presidential Advisory

Sodium, Blood Pressure, and Cardiovascular Disease Further Evidence Supporting the American Heart Association Sodium Reduction Recommendations

Paul K. Whelton, MB, MD, MSc, FAHA, Chair; Lawrence J. Appel, MD, MPH, FAHA; Ralph L. Sacco, MD, MSc, FAHA; Cheryl A.M. Anderson, PhD, MPH, MS, FAHA; Elliott M. Antman, MD, FAHA; Norman Campbell, MD; Sandra B. Dunbar, RN, DSN, FAHA; Edward D. Frohlich, MD, FAHA; John E. Hall, PhD, FAHA; Mariell Jessup, MD, FAHA; Darwin R. Labarthe, MD, MPH, PhD, FAHA; Graham A. MacGregor, MB, BCH; Frank M. Sacks, MD, FAHA; Jeremiah Stamler, MD, FAHA; Dorothea K. Vafiadis, MS, FAHA; Linda V. Van Horn, PhD, RD, LD, FAHA

Abstract—Recent reports of selected observational studies and a meta-analysis have stirred controversy and have become the impetus for calls to abandon recommendations for reduced sodium intake by the US general population. A detailed review of these studies documents substantial methodological concerns that limit the usefulness of these studies in setting, much less reversing, dietary recommendations. Indeed, the evidence base supporting recommendations for reduced sodium intake in the general population remains robust and persuasive. The American Heart Association is committed to improving the health of all Americans through implementation of national goals for health promotion and disease prevention, including its recommendation to reduce dietary sodium intake to <1500 mg/d. (*Circulation*. 2012;126:2880-2889.)

- Meta-analysis: RCTS (at least 4 weeks) reported a reduction in sodium intake of 2300 mg/day would reduce SBP by 5.8 mmHg (95% CI – 2.5 to – 9.2mmHg) (He et al, *BMJ*, 2013)
- **Average global sodium intake is approximately 3950 mg/day** (range 2180 to 5510 mg/day) vs recommended levels (2000–2400 mg/day) (Mozaffarian et al, *NEJM*, 2014)

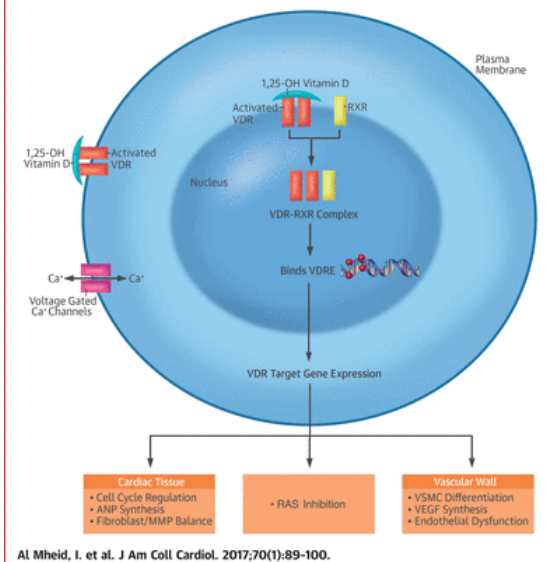
Vitamins, Antioxidants & CVD

- A biological rationale exists for protection against CHD
- Observational studies suggested protective role for vitamins (E, folate, B12 and carotenes) & inconsistent and weak evidence for vitamin C.
- Large clinical trials with supplements have shown no benefit in the case of vitamin E and an actual increase in risk with carotenes.
- **Current evidence does not support antioxidant supplementation; but intake of their primary food sources should be encouraged.**

Vitamin D and CVD

- Vitamin D- cardiovascular pleiotropic effects:
 - activating its nuclear receptor in cardiomyocytes and vascular endothelial cells
 - regulating the renin-angiotensin-aldosterone system,
 - adiposity, energy expenditure, and pancreatic cell activity.
- Meta-analyses -**failed to show clear improvements in BP, insulin sensitivity, or lipid parameters.**
- Link between vitamin D def & CVD may be an epiphenomenon.

CENTRAL ILLUSTRATION: Mechanisms by Which Vitamin D Deficiency May Confer Cardiovascular Risk

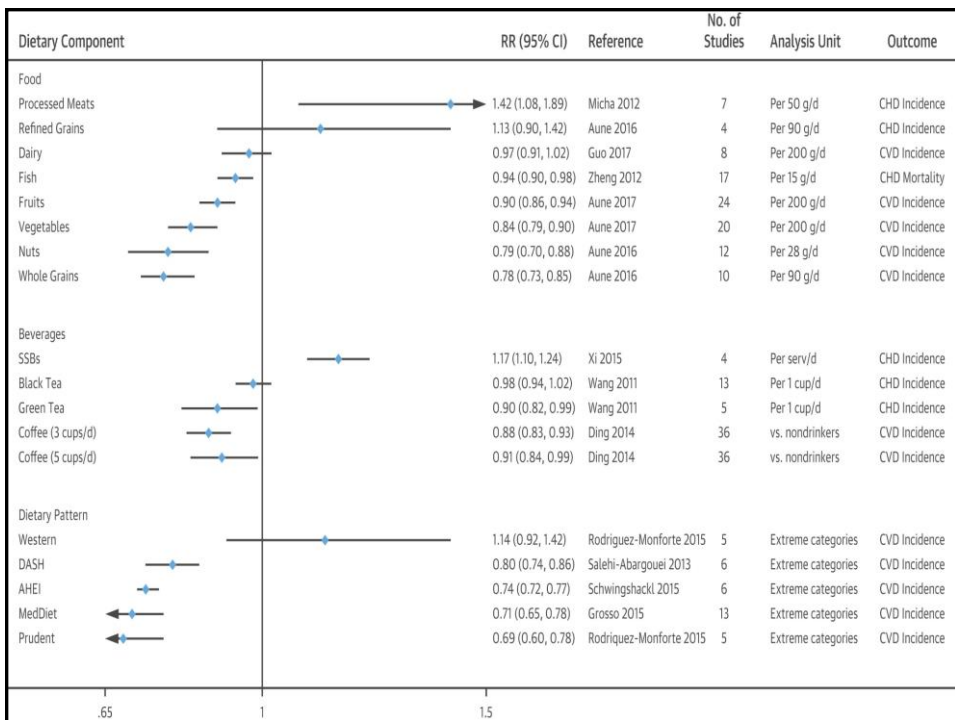


COMPOSITE “healthy” DIETS

- Mediterranean diet
- DASH diet
- Okinawa diet
- Oriental Diet
- Polymeal



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Final take away for those who are still listening 😊



Bob devises the ultimate weight-loss system.

- **Whole natural foods than isolated fractions any day!**
- Healthy balanced portions from variety of foods and diverse food groups
- Keep your weight controlled
- Lots of PA
- Stay hydrated
- Sleep well!