Metabolic Syndrome: A window of opportunity

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Metabolic Syndrome (MetS): IDF definition[1]

- Central Obesity: defined as waist circumference
  - Plus 2 other factors
    - Raised TG
    - Reduced HDL
    - Raised BP
    - Raised fasting glucose

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Metabolic Syndrome[2]

- Cluster of well-defined metabolic factors
- Frequently precedes the onset of Type 2 diabetes (T2DM) and cardiovascular disease
- San Antonio Heart Study concluded that metabolic syndrome predicts T2DM independently of other factors

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Diabetes: Where are we heading?

- In the US alone, Boyl… …icted in 2001 that the incid… …DM would increase by 165…
  - fi… …11 million in 2000 to 29 million in 2050
- In 2012, 29.1 million Americans had T2DM

IN ONLY 12 YEARS, NOT 50

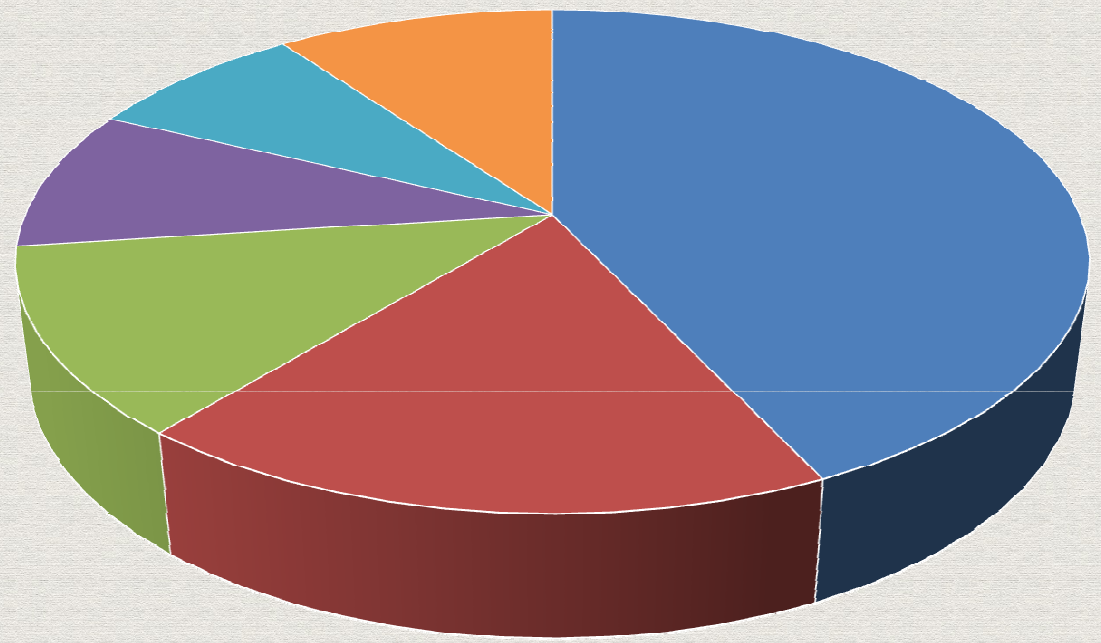
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What is the cost of T2DM?

- In 2012, T2DM cost the US $245,000,000,000[4]
  - $176 billion in direct medical costs
  - $69 billion in reduced productivity

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Direct Medical Costs of T2DM - $176 billion[4]



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What is the cost?

'The prediction that diabetes incidence will double by 2025 indicates a parallel rise in cardiovascular-related illness and death, with an inevitable and profound impact on global healthcare systems'

- International Diabetes Federation, 2006[1]

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Some quick calculations…

$245 billion ÷ 29.1 million peop

= $8419 per person p

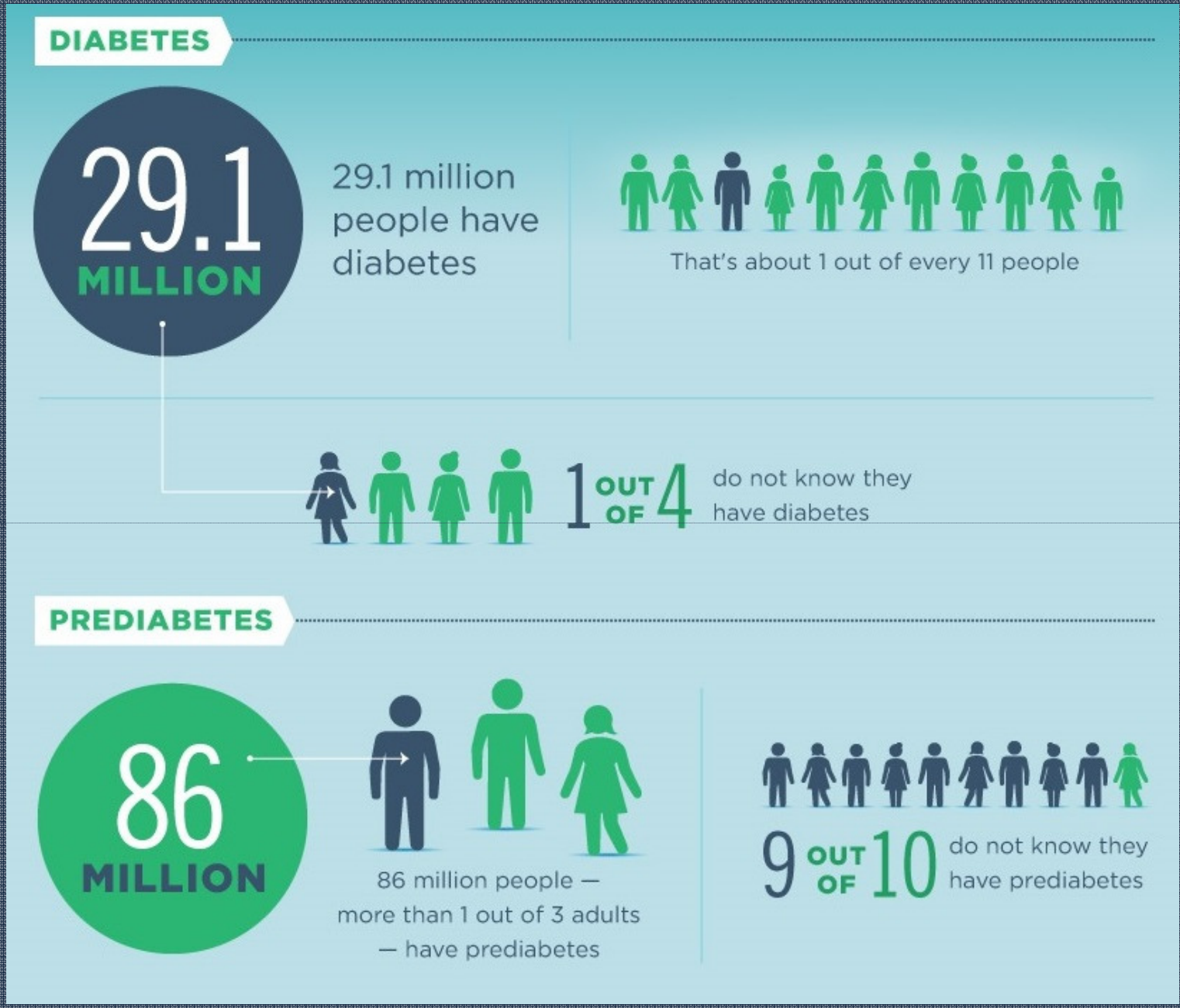
1.7 millio of T2DM per year x $8419

= $14 ion per year in the US

= SAVINGS of $8.58 billion

Intervention can prevent 60% x $14.3 billion

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Adapted from: Statistics about Diabetes, American Diabetes Associations 2014[5]

Prevention Model

- Clinical screening for MetS
- Central obesity defined as waist circumference[1]
  - Waist circumference
  - Blood pressure
  - Random blood glucose
    - Use of capillary blood as screening only[7]
- Easy, predictive of risk and low cost
- Yet rarely done in a clinical setting[6]
- Missing the 'window of opportunity'

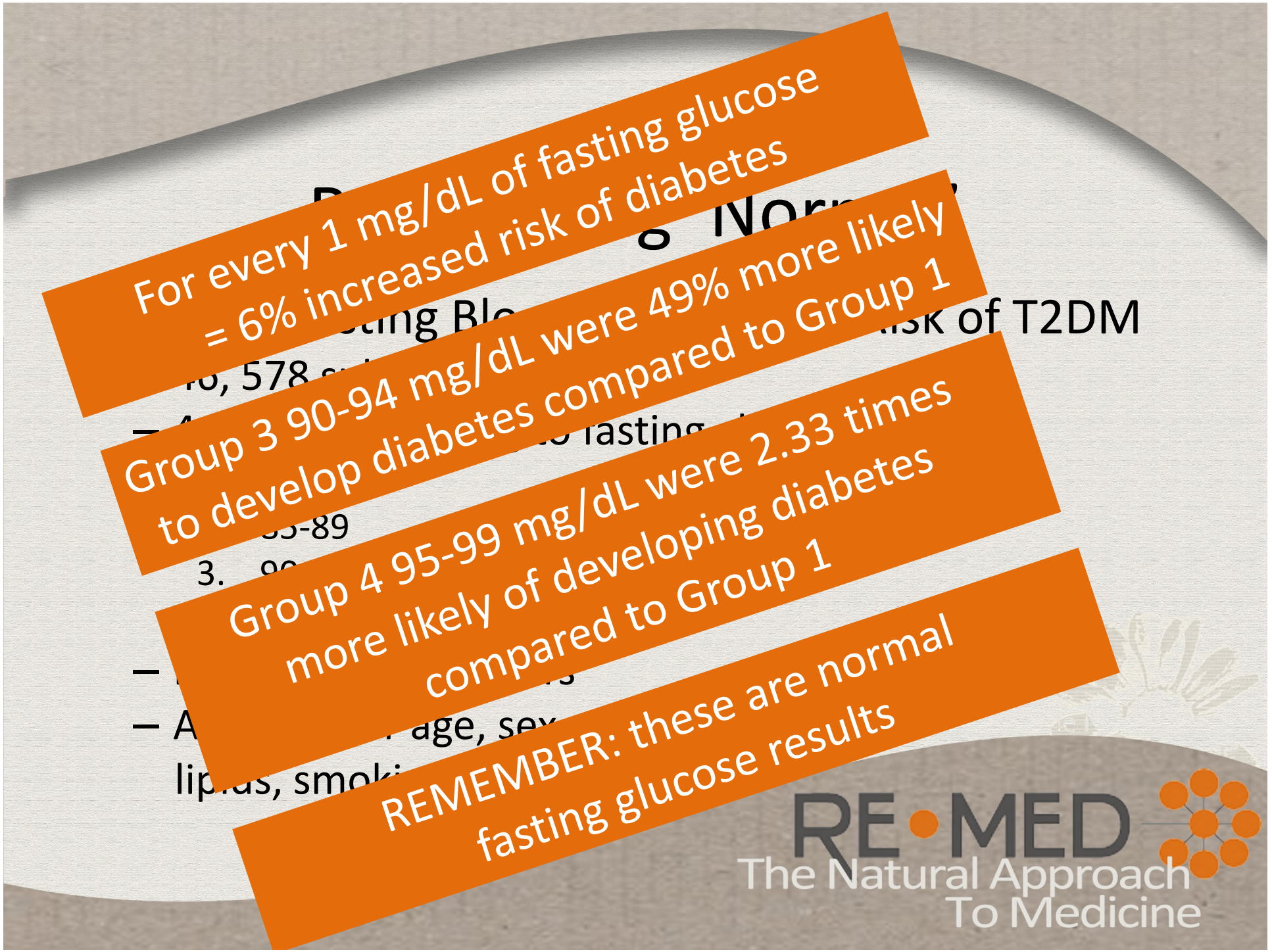
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Re-Defining ‘Normal’

- Waist Circumference

	At Risk	At HIGH Risk
Men	>94cm	>102cm
Female	>80cm	>88cm

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For every 1 mg/dL of fasting glucose
= 6% increased risk of diabetes
Group 3 90-94 mg/dL were 49% more likely
to develop diabetes compared to Group 1
Group 4 95-99 mg/dL were 2.33 times
more likely of developing diabetes
compared to Group 1
REMEMBER: these are normal
fasting glucose results
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Clinical Progression

Clinical Screening

Nutritional/Lifestyle interventions

Medical Intervention



Optimal health and wellbeing	Subjective feelings of fatigue and/or poor health	Chronic signs & symptoms	Clinical Pathology & Disease progression

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Typical Clinical Progression

1-5 years	5-10 years	10-20 years
Fatigue Poor wound healing Weight gain, central Insulin resistance Metabolic syndrome - undetected	Onset of diabetes Increased weight Deterioration of joints Continuation of high blood pressure	Microvascular; retinopathy, nephropathy, peripheral neuropathies Poor immune function Macrovascular Cardiovascular disease
Prescription	Prescription	Prescription
Statin Proton pump inhibitor Diuretic	Statin Proton pump inhibitor Diuretic ACE inhibitor/ARB Metformin NSAID	Statin Proton pump inhibitor ACE inhibitor/ARB Metformin Ca2+ Channel Blocker or B-blocker

Case Study

- 51 year female presented with osteopenia and poor weight management: 5kg weight gain in 3 years
- Currently restless legs with cramps at night
- 3 yrs prior – onset of peri-menopause
- 4 yrs prior – diagnosed with osteopenia
- 10 yrs prior – R knee injury impacting ability to exercise

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Family Medical History

- Mother: Type 2 diabetes mellitus
- Mother and father: obesity
- Father: issues with high ferritin

Current Medications

- Evista (raloxifene hydrochloride) 60mg daily
- Calcium supplement – 1 tablet daily:
  - Calcium 250mg (as citrate and hydroxyapatite)
  - Magnesium 125mg (as oxide)
  - Vitamin D3 100IU

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Standard Point of Care Screening

Clinical Outcome	Initial Measurement
Height (cm)	155
Weight (kg)	81.5
BMI	33.9 (Obese)
Waist circumference (cm)	100
Random Blood Glucose (RBG)	155 mg/dL (8.7 mmol/L) 90 min pp
Random Total cholesterol (R T chol)	227 mg/dL (5.9 mmol/L)
Blood pressure	146/95
Heart rate	65
Urinalysis	NAD

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Pathology Results

Test	Value	(US Units)	Range
Vitamin D	41	(16)	75-250 (30-100)
Ferritin	152		15-165 (pre-menopausal)
Total Cholesterol	5.7	(220)	<5.5
LDL Cholesterol	2.8	(108)	<2.5
TG	1.8	(160)	<1.5 (<150)
Fasting Glucose	5.7	(102)	3.0-5.4
ALT	45		<41
Excluded thyroid and parathyroid disease			

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Diet & Lifestyle Interventions

- Education on glycaemic index
- Implemented low glycaemic index diet: as described by CSIRO[8] with emphasis on whole foods high in potassium, calcium and magnesium, plus ↓ salt intake
  - Woo *et al* (2009) found an association between low dietary magnesium and potassium with high sodium in terms of both hypertension and reduced bone density[9]
  - Dietary magnesium intake has been found to be inversely related to the prevalence of metabolic syndrome in middle-aged women[10]
- Get moving! 30 minutes 3 x per week

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Diet & Lifestyle Interventions

- Fish oils: 800mg EPA/600mg DHA daily
  - Fish oil supplementation has been found to provide a modest reduction in blood pressure and consistent for lowering TG [11, 12]
- Magnesium diglycinate: 150mg bd
  - Improving intracellular magnesium has been shown to improve insulin sensitivity, hyperglycaemia and vascular tone [13,14]

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Diet & Lifestyle Interventions

- Vitamin D3: 5000IU/day
  - Improved vitamin D status with supplements has been shown to enhance glucose tolerance and insulin sensitivity[15] plus beneficial for maintaining bone density
- Increase dietary calcium in conjunction with 500mg supplemented daily to achieve 1300mg/day (RDI)[16]
- Cinnamon: 3g dietary consumption daily

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Clinical Progression

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Clinical Outcomes

Clinical Outcome	Initial	Post-12 weeks	Difference
Height (cm)	155	155	0
Weight (kg)	81.5	71.9	-9.6
BMI	33.9 (Obese)	29.9 (Overweight)	-4.0
Waist circumference (cm)	100	91.5	-8.5
RBG (mmol/L)	8.7 (90min pp)	5.8 (60min pp)	-2.9
R T Chol (mmol/L)	5.9	5.7	-0.2
Blood pressure	146/95	125/85	-21/10
Heart rate	65	70	+5
Urinalysis	NAD	NAD	N/A
*Resolution of restless legs and cramps at night and burning sensation in feet			

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Screening for Metabolic Disorders

- Point of Care screening can be utilised to improve compliance and client motivation[17]
- Restrictions on ‘real world’ monitoring[6]
- Redefining ‘normal’ range
- Don’t wait until its too late

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Herb in



Cinnamon

- Traditional use for dyspepsia, gastric complaints and diabetes
- Part used: bark
- Species: there are hundreds of species of Cinnamon. Most commonly used for therapeutic uses are Cinnamomum zeylancium, Cinnamomum verum and Cinnamomum cassia

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Herb in

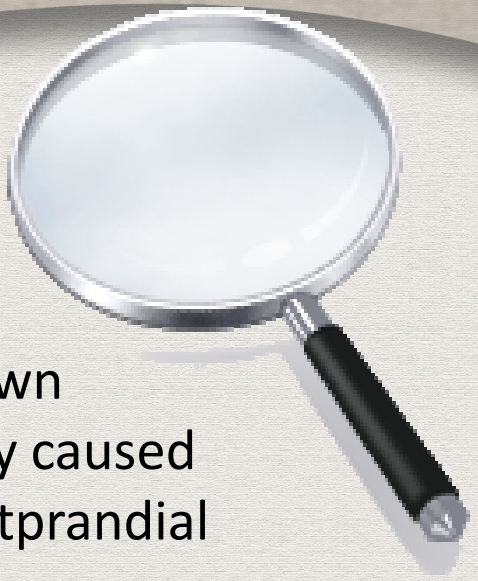


Chemistry

- Primary constituents of cinnamaldehyde;
  other phenols and terpenes, including eugenol.
- C. cassia seems to be the most favourable species for glucose management[18]
- Polyphenols that possess insulin-like activity and have demonstrated a dose-dependent increase in glucose utilization in animal muscle tissue[19]
- Varying sources of material and extraction techniques alter the chemical composition
  of the extracts

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Herb in



- **Cinnamon**
  - Short-term studies have shown that 3g cinnamon given orally caused a significant reduction in postprandial glucose and insulin response.
  - The effect was observed for 12 hours[20]
  - No improvements were noticed with 1g given[20]
  - 3g daily for 8 weeks showed improvements in fasting blood glucose, insulin, glycosylated haemoglobin, total cholesterol, LDL C, Apo lipoprotein 1 and B[21]
  - Has shown to have hypotensive, anti-inflammatory and antioxidant properties[19]

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Cinnamon

- There have been conflicting reports
- Cochrane Review 2012 concluded that there was insufficient evidence to support the use of cinnamon in diabetes[22]
- A later meta-analysis showed significant improvements in fasting glucose, total cholesterol, LDL-C and triglycerides. No impact on HbA1c[23]
- Inconsistencies seem related to species/quality of cinnamon used, population, dose and duration of study.

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Gymnema sylvestre

- Traditional ayurvedic herb
- ‘sugar destroyer’
- Active constituents include triterpene saponins – gymnemic acids, gymnemasaponins and polypeptide, gurmarin

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Herb in



- Actions of *Gymnema sylvestre*
  - Blocks sweet reception on tongue
  - Reduction in absorption of glucose
  - Modulation of incretin
  - Increased regeneration of pancreatic beta cells
  - Enhanced cell uptake of glucose
  - Reduction of total cholesterol, LDL-C, TG[24]

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Herb in



Gymnema sylvestre

- Regeneration of pancreatic islets in diabetic rats[25,26]
  - Results showed a dose-dependant normalisation of blood glucose of 20-60 days
  - Both extracts doubled the number of islet beta-cells
- Human open label study[28]
  - 500mg daily for 3 mths reduced polyphagia, fatigue, pp glucose and insulin, and beneficial shifts in lipid profiles
- Controlled Human trial given with oral hypoglycemic[29]
  - 400mg for 18 mths
  - Additional benefit seen on glucose, Hb1Ac and insulin

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Herb in



- Place 3-4 drops onto tongue
- Coat mouth/tongue
- Wait 30 seconds
- Trial oral intake of sugar
- Dramatic, reliable, reversible

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References

1. International Diabetes Federation, 2006. The IDF Consensus Worldwide Definition of the Metabolic Syndrome http://www.idf.org/webdata/docs/IDF_Meta_def_final.pdf [accessed 27/07/14].

2. Lorenzo C, Okoloise M, Williams K et al, 2003. The Metabolic Syndrome as Predictor of Type 2 Diabetes: The San Antonio Heart Study. Diabetes Care http://www.care.diabetesjournals.org [accessed 1/09/14].

3. Boyle JP, Honeycutt AA, Narayan KM, et al. 2001. Projection of diabetes burden through to 2050: impact of changing demography and disease prevalence in the US. Diabetes Care Nov; 24(11): 1936-40

4. American Diabetes Association, 2014. The Cost of Diabetes http://www.diabetes.org [accessed 01/10/2014].

5. American Diabetes Association, 2014. Statistics about Diabetes; data from the National Diabetes Statistics report http://www.diabetes.org/diabetes-basics/statistics [accessed 25/09/2014].

6. Waterreus A, Laugharne J, 2009. Screening for the metabolic syndrome in patients receiving anti-psychotic treatment: a proposed algorithm

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References

7. Diabetes Australia Detection and Diagnosis Guideline. http://diabetesaustralia.com.au/PageFiles/763/Final%20Case%20Detection%20and%20Diagnosis%20Guideline%20August%202009.pdf [accessed 27/05/2013].

8. Clifton P, Keogh J, Noakes M, 2008. Long-term effects of a high-protein weight-loss diet. AmJ Clin Nutr; 87:23-9

9. Woo J, Kwok T, Leung J, Tang N, 2009. Dietary intake, blood pressure and osteoporosis. J Hum Hypertens; 23(7):451-5

10. Song Y, Ridker P, Manson J, et al. 2005. Magnesium intake, C-reactive protein, and the prevalence of metabolic syndrome in middle-aged and older US women

11. Abeywardena M, Patten G, 2011. Role of w3 long-chain polyunsaturated fatty acids in reducing cardio-metabolic risk factors. Endocr Metab Immune Disord Drug Targets; 11(3):232-46

12. Kalupahana N, Claycombe K, Moustaid-Moussa N, 2001. (n-3) Fatty acids alleviate adipose tissue inflammation and insulin resistance: mechanistic insights. Adv Nutr; 2(4): 304-316

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References

13. Houston M, 2011. The role of magnesium in hypertension and cardiovascular disease. J Clin Hypertens; 13(11):843-7

14. Barbagallo M, Dominguez L, Galioto A, et al. 2003. Role of magnesium in insulin action, diabetes and cardio-metabolic syndrome X. Mol Aspects Med; 24(1-3):39-52

15. Sung C, Liao M, Lu K, Wu C, 2012. Role of Vitamin D in insulin resistance. J Biomed Biotechnol; online: 634195 [accessed 28/05/14]

16. NHMRC Nutrient Reference Values for Australia and New Zealand http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/n35.pdf [accessed 27/05/14]

17. Point of Care testing in General Practice, 2009. http://www.appn.net.au/Data/Sites/1/SharedFiles/Publications/200901-poctfinalreport27jan09amended5feb09.pdf [accessed 28/05/14]

18. Howard ME, White ND, 2014. Potential Benefits o Cinnamon in Type 2 Diabetes. Pharmacy Review http://www.ajl.sagepub.com [accessed 12/10/2014]

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References

19. Anderson RA, Broadhurst CL, Polansky et al, 2004. Isolation and Characterization of Polyphenol Type-A Polymers from Cinnamon with Insulin-like Biological Activity. H Agric Food Chem 52, 65-70.

20. Vafa M, Mohammadi F, Shidfar F, et al, 2012. Effects of Cinnamon consumption on glycemic status, lipid profile and body composition in Type 2 diabetic patients. Int J Prev Med; 3(8):531-6.

21. Qin B, Panickar K, Anderson R, 2010. Cinnamon: Potential Role in the prevention of insulin resistance, metabolic syndrome, and Type 2 diabetes. J Diabetes Sci Technol; 4(3):685-93

22. Leach MJ, Kumar S, 2012. Cinnamon for diabetes mellitus. Cochrane Database Review, Sep 12;9.

23. Allen RW, Schwartzman E, Baker WL et al, 2013. Cinnamon Use in Type 2 Diabetes: An Updated Systematic Review and Meta-Analysis. Ann Fam Med Sep;11(5):452-459

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References

24. Tiwari B, Mishra BN, Sangwan NS, 2014. Phytochemical and Pharmalogical Properties of Gymnema sylvestre: An important medicinal plant. Biomed Res Int 2014; 830285 http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3912882 [accessed 13/09/14].

25. Snigur GL, Samokhina MP, Pisarev VB, Spasov AA, Bulanov AE, 2008. Structural alterations in pancreatic islets in streptozotocin-induced diabetic rats treated with bioactive additive on the basis of Gymnema sylvestre. Morfologiia; 133(1):60-4.

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References

26. Shanmugasundaram ER, Gopinath KL, Radha Shanmugasundaram K, Rajendran VM, 1990. Possible regeneration of the islets of Langerhans in streptozotocin-diabetic rats given Gymnema sylvestre leaf extracts. J Ethnopharmacol Oct;30(3):265-79.

27. Nichols GA, Hillier TA, Brown JB, 2008. Normal fasting plasma glucose and risk of type 2 diabetes diagnosis. Am J Med Jun;121(6):519-24.

28. Kumar SN, 2010. An open label study on the supplementation of Gymnema sylvestre in type 2 diabetics. J Diet Suppl Sep;7(3):273-82

29. Ulbricht C, *et al,* 2011. An Evidence-Based Systematic Review of Gymnema by the Natural Standard Research Collaboration. J Diet Suppl;8(3):311-30.

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