

Reverse Diabetes Now



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Background of a Healthcare Crisis



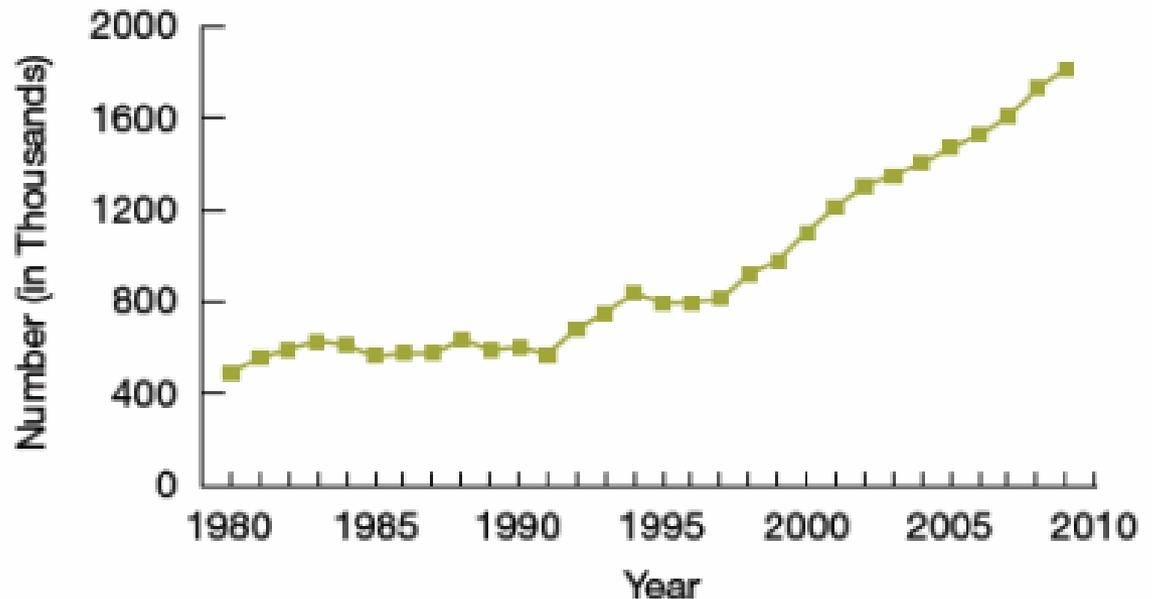
- ❧ 29.1 million Americans (9.8%) have diabetes
 - ❧ Of these, 8.1 million are undiagnosed
- ❧ 86 million (37%) US adults (over age 20) have pre-diabetes
- ❧ Type I diabetes is dominant type in people diagnosed before age 20
- ❧ Type II diabetes is the dominant form for those diagnosed after age 20.
 - ❧ This is beginning to surpass Type I diabetes among teenagers

Background of a Healthcare Crisis



The rate at which new cases or diagnosed has quadrupled in the past 25 years.

**New Cases of Diagnosed Diabetes Among U.S. Adults
Aged 18–79 Years, 1980–2009**



Source: <http://www.cdc.gov/diabetes/statistics/incidence/fig1.htm>.

Medication use



- ❧ 12 million use oral medications to manage diabetes
- ❧ 3 million are on insulin alone
- ❧ 3 million use both insulin and oral medications
- ❧ Despite heavy use of medication:
 - ❧ AACE and ACE algorithm considers HbA1c of 6.5% as “Controlled Diabetes”²

We Can Do Better!!



- ☞ In today's lecture we will cover:
 - ☞ Etiology/Pathophysiology of Diabetes
 - ☞ Multi-disease involvement in Diabetes
 - ☞ Ayurvedic principles to promote healthy metabolism
 - ☞ Treating the whole person: Ayurvedic insights
 - ☞ Herbal support for diabetic
 - ☞ Case studies: learn to reverse diabetes and take people off medications

Etiology: Type I DM



☞ Type I diabetes

☞ Less than 10% have defined genetic pre-disposition (HLA gene, Insulin gene and others)³

☞ Predisposing exposures:

☞ Viral or Bacterial exposure.

☞ Entero-virus – infection of β -cells can cause development of HLA class I and INF- α in β -cell islets.^{3,4,5}

☞ Other environmental factors:

☞ Cross-reactivity with milk proteins, wheat protein, etc.

☞ Vit. D deficiency

Etiology: Type I DM



∞ Insulinitis:⁶

∞ Cross-reactivity model:

∞ Exposure to viral DNA and protein antigens.

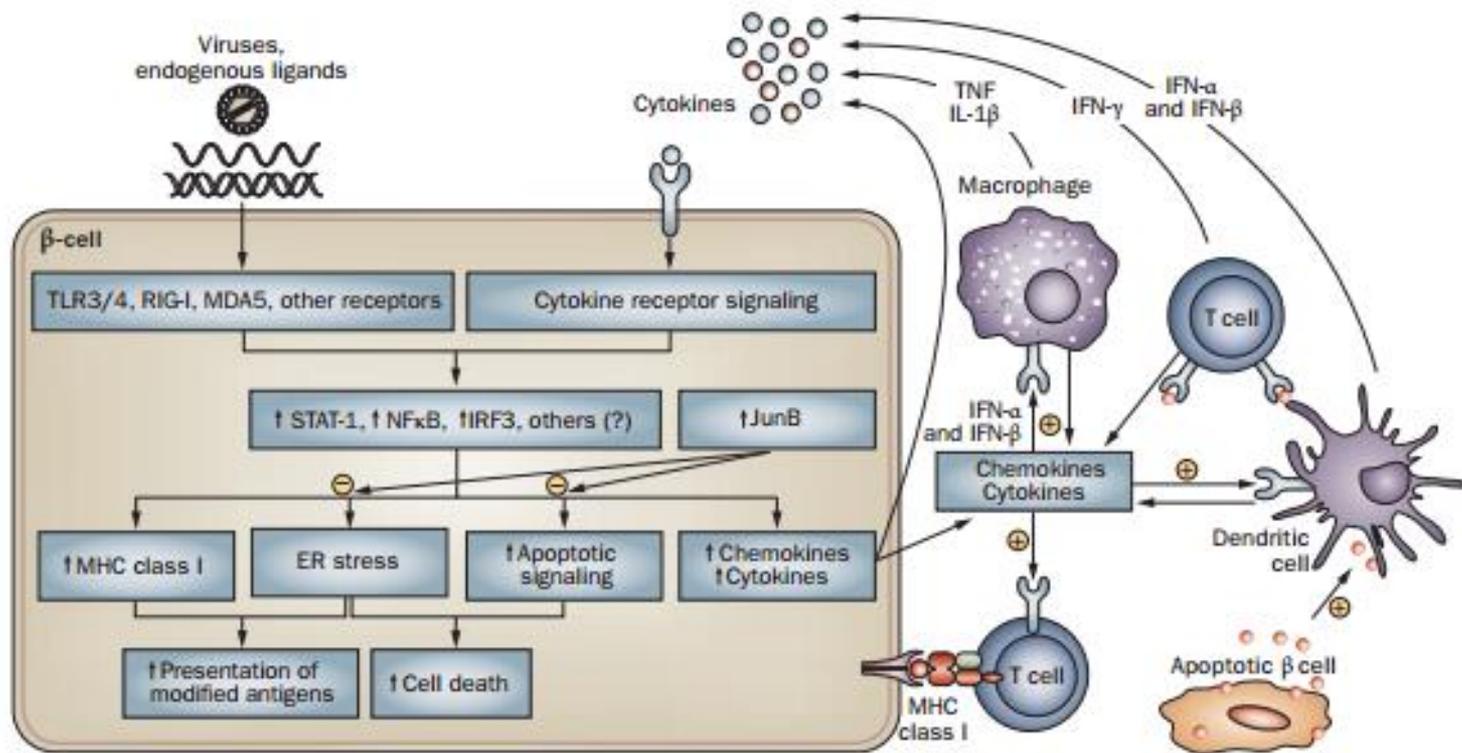
∞ Exposure to Toll-like receptor and peptide antigens from mal-absorbed foods

∞ Such cross-reactivity has been related with the cause of many auto-immune conditions.

Pathogenesis: Type I DM



- Insulinitis: “Interaction of β cells and immune cells leads to induction and amplification of insulinitis, and the transition from innate to adaptative immune response.”



Etiology: Type I DM



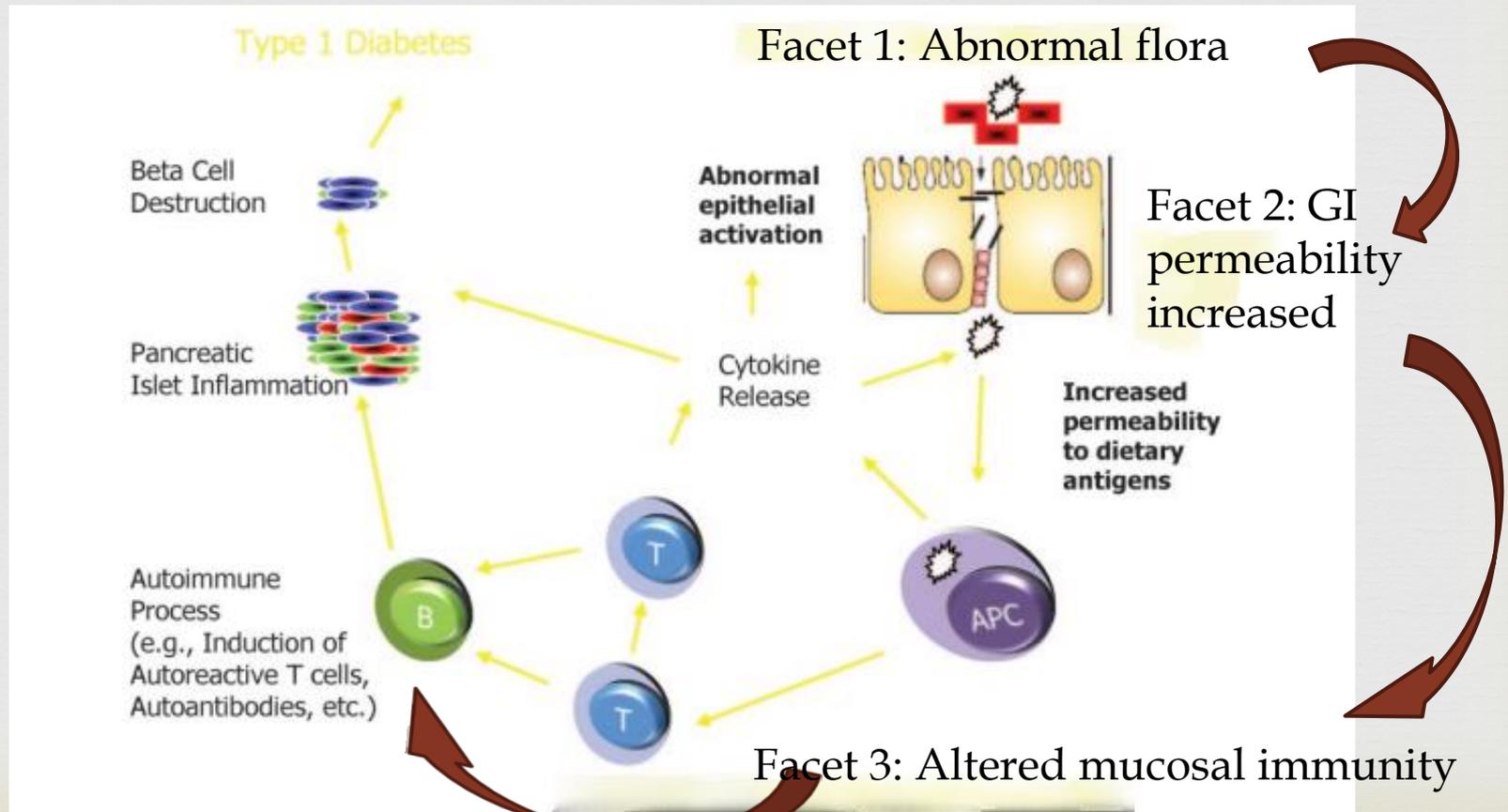
☞ GI Microbiome:⁷

Growing evidence suggests “a synergism between aberrant intestinal microbiota, a “leaky” intestinal mucosal barrier, and altered mucosal immunity” contributes to pathogenesis of Type I diabetes.

Pathogenesis: Type I DM



GI Microbiome:



Etiology: Type II DM



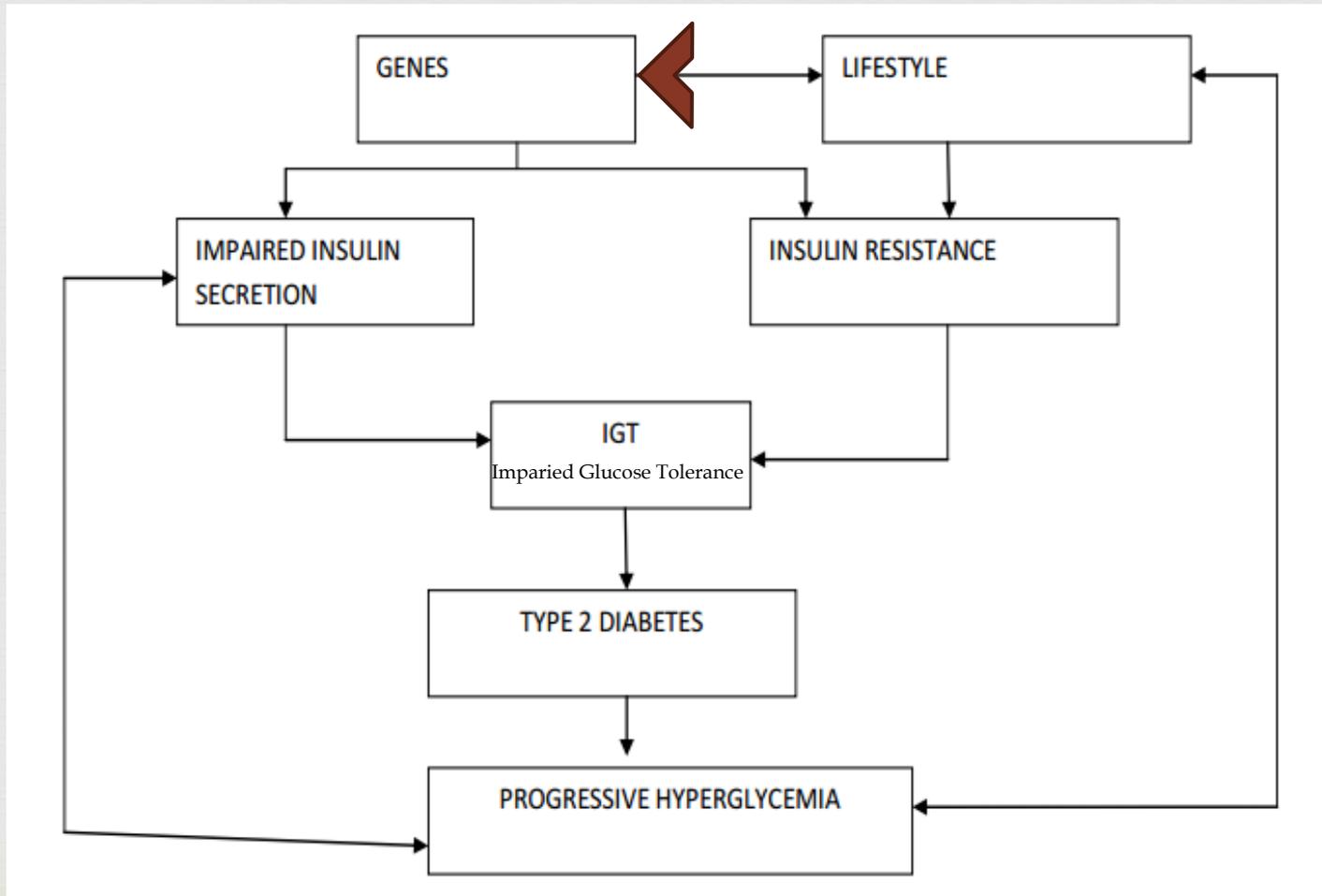
- ☞ Type II DM accounts for over 90% DM cases.
- ☞ Prevalence in Developing (69%) versus Developed (20%) countries:⁸
 - ☞ “This increase is inextricably linked to changes towards a Western lifestyle (high diet with reduced physical activity) in developing countries and the rise in prevalence of overweight and obesity”⁹

Etiology: Type II DM



- ❧ “Type 2 diabetes is a heterogenous disorder caused by a combination of:¹⁰
 - ❧ Genetic factors related to impaired insulin secretion
 - ❧ Insulin resistance
 - ❧ and environmental factors such as:
 - ❧ obesity, over-eating
 - ❧ lack of exercise,
 - ❧ As well as stress and aging

Pathogenesis: Type II DM



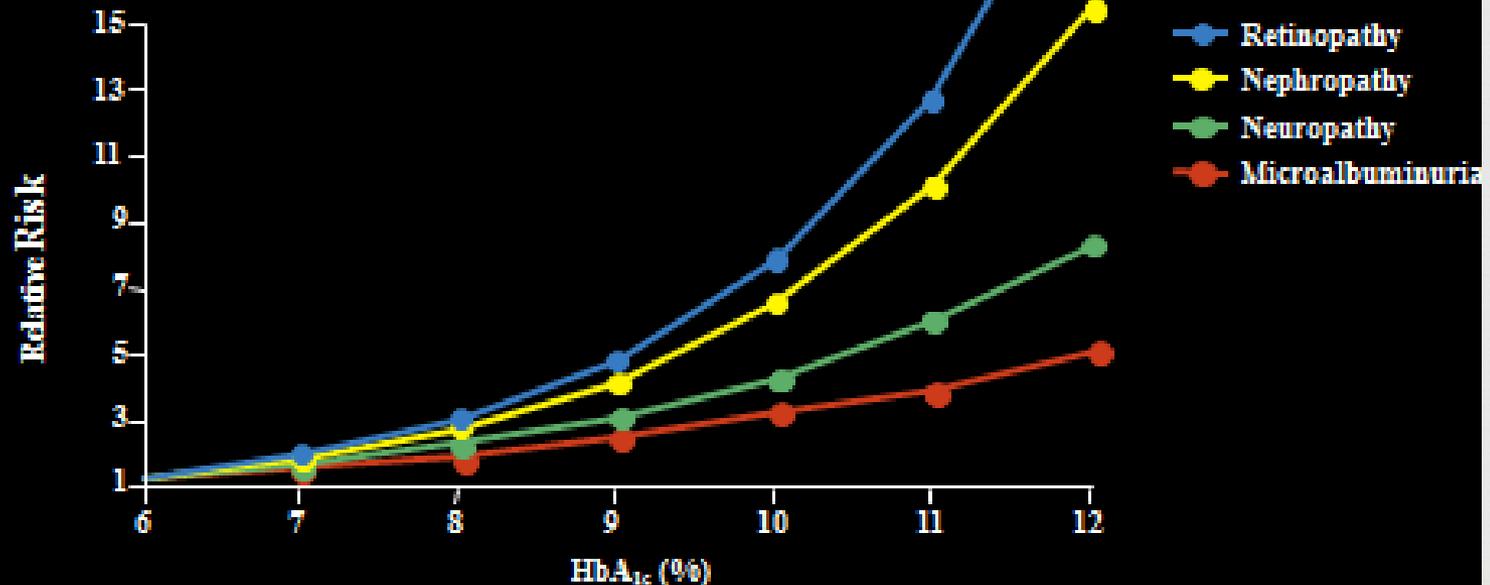
Co-morbidities of DM



- ❧ Cardiovascular disease: 65% with diabetes die from CVD.¹²
- ❧ Kidney failure: 40% of those with DM develop progressive nephropathy¹³
- ❧ Retinopathy and Blindness
- ❧ Amputation: # 1 cause of non-traumatic limb amputations.

Co-morbidities of Diabetes

Relationship of HbA_{1c} to Risk of Microvascular Complications



Co-morbidities of Diabetes

Lowering HbA_{1c} Levels Reduces Complications in Patients With Type 1 and Type 2 Diabetes Mellitus

Complications	DCCT	Kumamoto	UKPDS
HbA _{1c}	9.1% → 7.3%	9.4% → 7.1%	7.9% → 7.0%
Retinopathy	↓ 63%	↓ 69%	↓ 17%-21%
Nephropathy	↓ 54%	↓ 70%	↓ 24%-33%
Neuropathy	↓ 50%	Significantly improved	NA
Macrovascular disease	↓ 41%*	NA	16%*

- **Abbreviations:** DCCT, Diabetes Control and Complications Trial; HbA_{1c}, glycated hemoglobin; NA, not applicable; UKPDS, United Kingdom Prospective Diabetes Study.

Sources: DCCT Research Group. *N Engl J Med.* 1993;329(14):977-986; Ohkubo Y et al. *Diabetes Res Clin Pract.* 1995;28(2):103-117; UKPDS Group. *Lancet.* 1998;352(9131):837-853.

- ↓* Not statistically significant.

Prevention of DM type 1



- ❧ **Avoid early exposure to Cow's Milk** (before 6 months of age)
 - ❧ Bovine insulin in milk may cause autoimmunity.
- ❧ **Avoid early gluten exposure.**
 - ❧ Early exposure to solid food can increase rate of type 1 DM.
- ❧ **Omega-3 Fatty acids** in diet reduces rate Islet cell autoimmunity.
- ❧ **Regular well-child exams** are essential for preventive screening.

Prevention of DM type 2



Table 3. Recommendations and Resources for Lifestyle Modification for Diabetes Prevention

General Recommendations for Lifestyle Modification for the Prevention of Diabetes

- Moderate-level physical activity (e.g., brisk walking) for at least 30 minutes per day, 5 days per week
- Weight-loss goals of 5–15% of starting weight, with target 1–2 lb weekly
- Limit fat content to < 30 % of total daily calories
- Reduce portion sizes and daily caloric intake
- Increase fruits, vegetables, and fiber in diet

Benefit of Dietary/Lifestyle intervention



☞ Plant based diet with moderate amount of fat; combined with moderate level activity.

Table 1—Long-term effectiveness of diabetes prevention trials

Study	Intervention	n	Intervention duration (years)	Risk reduction (%)*	Total follow-up time (years)	Follow-up risk reduction (%)	CVD events/total mortality reduction (%)
Da-Qing Study China (6,10)	Diet	130	6	31	20	43	2/4
	Exercise	141		46			
	Diet + exercise	126		42			
	Control	133					
DPS Finland (1,14,15)	Diet + physical activity	265	3.2	58	7	43	4†/43
	Control	257					
DPP U.S. (16,17)	Diet + physical activity	1,079	2.8	58	10	34	No data
	Metformin	1,073		31			
	Placebo	1,082					

*During the randomized trial period. †Higher in the intervention than control group.

Benefit of Dietary intervention



❧ Dietary interventions for diabetes:

❧ 93 patients with HbA1c greater than 7.0%;¹⁹

❧ 45 were counseled on healthy diet and physical activity – then, followed up 6 months later.

❧ 48 were in control group.

❧ Patients in study group had reduction:

❧ 0.5% in HbA1c

❧ 1.6 cm reduction in waist size

❧ 0.5 point reduction in BMI

Benefit of Dietary intervention



❧ Mediterranean diet pattern alone caused a **drop of HbA1c by 1.1% over 6 months**

❧ As well as provided CVD protection:

❧ Lower CRP

❧ Lower TNF-alpha

❧ Lower IL-6

Benefit of Dietary intervention



❧ Dietary interventions for diabetes:

❧ Review of Dietary interventions – **holistic change is most beneficial** compared single interventions.

❧ **Mediterranean** dietary pattern – **diet w/ best results** in review of studies:

❧ Rich in olive oil

❧ fruits and vegetables

❧ including whole grains, pulses and nuts

❧ low-fat dairy

❧ and moderate alcohol consumption (mainly red wine)

Dietary Protocol



☞ Daily Dietary protocol:

- ☞ 4-6 servings of seasonal vegetables – half green leafy vegetables and half other colorful variety.
- ☞ Minimize grains and breads to 1-2 serving per day.
- ☞ Protein: 3-4 servings daily
 - ☞ Vegetarian protein (best): beans, lentils, tofu, nuts and seeds
 - ☞ Non-vegetarian: chicken, turkey, duck, other wild game
- ☞ Elimination of refined sugars.
- ☞ 1-2 tablespoon of variety of oils
- ☞ 1-2 handful of variety of treenuts and seeds

☞ 4-5 small meals per day:

- ☞ Breakfast – snack – lunch – snack - dinner

Dietary Protocol



☞ Eat small and regular meals:

☞ Balance each of the main meals, breakfast, lunch and dinner with equal amount of protein-to-carb.

☞ Add in 2 snack meals between breakfast – lunch – dinner.

☞ One snack may be a 1-2 servings of fruits.

☞ The second snack can be protein-rich, like 1-2 handfuls of raw tree nuts, 1-2 tablespoons of hummus or 1 tablespoon of deli meat or cheese.

☞ Alternate between a variety of foods:

☞ Tree nuts: almond, cashews, walnuts, pistachio, pecans, brazil nuts, etc.

☞ Seeds: flax seeds, sunflowers seeds, hemp seeds, pumpkin seeds, etc.

☞ Eat organic and seasonal vegetables and fruits.

Lifestyle interventions



- ☞ **Physical activity** – moderate activity for 30 mins daily – upto 150mins/week;
 - ☞ plus, 1 hours of weight-bearing exercise weekly.
- ☞ **The benefits:**²²
 - ☞ 5-10% weight loss support 58% risk reduction in DM.
 - ☞ 16 weeks resistance training – increase insulin action by 48% and reduce fasting BG by 7.1%
 - ☞ Also, benefits on lipid profile and hypertension.

Lifestyle interventions



☞ Yoga and Pranayama:

☞ Benefits of 9 day trial among 98 diabetics:²³

TABLE 2. MEAN FASTING PLASMA GLUCOSE ($n = 77$) AND SERUM LIPID PROFILE ($n = 98$) AT THE BEGINNING AND END OF THE COURSE

<i>Variable</i>	<i>Initial (Day 1)</i>	<i>Final (Day 10)</i>	<i>p</i>
Fasting plasma glucose (mg/dL)	106.7 ± 32.6	100.2 ± 29.7	<0.001
Total cholesterol (mg/dL)	193.2 ± 36.4	185.8 ± 32.7	<0.001
LDL cholesterol (mg/dL)	119.3 ± 30.1	114.9 ± 27.1	<0.01
HDL cholesterol (mg/dL)	43.1 ± 8.6	44.3 ± 9.0	<0.001
VLDL cholesterol (mg/dL)	29.4 ± 14.7	26.3 ± 13.8	<0.01
Total:HDL cholesterol	4.6 ± 1.2	4.3 ± 1.0	<0.001
Triglycerides (mg/dL)	130.2 ± 50.9	120.3 ± 45.1	<0.01

LDL, low-density lipoprotein cholesterol; HDL, high-density lipoprotein cholesterol VLDL, very low-density lipoprotein cholesterol.

Lifestyle interventions



Pranayama alone:

Benefits for healthy versus diabetic individuals:²⁴

Table 2 : Immediate effect of pranayama on blood glucose in normal volunteers

	Before	After
Fasting Glucose (mg%)	89.05	55.23*

* P < 0.001

Table 3 : Effect of pranayama on blood glucose levels in type 2 diabetics (n=28)

Blood glucose (mg/dl) mean \pm SD	Before	After
Fasting	148.19 \pm 43.13	108.19 \pm 21.05
Post prandial	278.50 \pm 43.13	188.50 \pm 79.37*

*p < 0.001

Table 4 : Blood glucose in type 1 diabetic subjects before and after pranayama

Blood glucose (mg/dl) mean \pm SD	Before (n=4)	After (n=4)
Fasting	254.75 \pm 179.13	128.25 \pm 88.02
Post prandial	414.50 \pm 175.78	275.00 \pm 81.34

Lifestyle interventions



☞ Yoga alone:

☞ Benefits for healthy versus diabetic individuals:²⁴

Table 8 : Effect of yoga on HbA_{1c} and drug score

(n=108)	Before	After 3 months
HbA _{1c}	10.41	8.45*
Drug score	1.71	1.06**

*p <0.05, **p<0.001

Table 7 : Effect of different groups of asanas on blood glucose levels

	Fasting		Postprandial	
	Before	After	Before	After
Group A				
Naukasana	118.8± 13.8	98.8± 9.3	223.8±14.8	184.8±15.3*
Bhujangasana				
Group B				
Halasana	135.8±21.8	121.8±15.7	271.9±38.3	187.8±38.0**
Vajrasana				
Group C				
Yogamudra	94.8±14.8	108.2±10.9	217.8±24.8	189.1±16.7
Shalabasana				
Group D				
Dhanurasana	188.7±19.3	120.8±9.2	322.0±40.3	194.0±19.8
Ardhamatsyendrasana				

Lifestyle interventions



- ❧ **Yoga benefits for cardiovascular parameters:**
 - ❧ **Systemic review indicates:²⁵**
 - ❧ Lower fasting blood glucose
 - ❧ Lower total cholesterol, LDL, triglycerides
 - ❧ Improves HDL levels
 - ❧ Lower weight and BMI
 - ❧ **Maintains or improve nerve conduction velocity.****
 - ❧ Lowers diabetic complications

Lifestyle interventions



☞ Yoga lowers systemic oxidative stress (3 months trial):²⁶

☞ Lower cortisol and Superoxide dismutase concentration

☞ Increase antioxidant levels (Vit E, Vit C, Glutathione)

Table 1—Parameters at baseline and after 3 months

	Yoga group (n = 60)			Control group (n = 63)			P
	Baseline	After 3 months	Change at 3 months	Baseline	After 3 months	Change at 3 months	
FPG (mmol/L)	8.1 ± 2.6	7.3 ± 2.3	-0.8 ± 0.3	8.6 ± 3.1	9.0 ± 3.0	0.4 ± 0.1	<0.001
PPPG (mmol/L)	12.0 ± 4.0	10.9 ± 3.6	-1.1 ± 0.4	12.3 ± 5.1	12.6 ± 4.7	0.3 ± 0.4	<0.03
HbA _{1c} (%)	8.4 ± 1.3	8.3 ± 1.5	-0.1 ± 0.2	8.0 ± 1.5	8.5 ± 1.8	0.5 ± 0.3	<0.001
BMI (kg/m ²)	25.9 ± 3.5	25.4 ± 3.4	-0.5 ± 0.1	25.3 ± 3.9	25.5 ± 4.1	0.3 ± 0.2	<0.001
Waist circumference (cm)	92.9 ± 9.5	92.7 ± 9.4	-0.2 ± 0.1	90.5 ± 9.8	90.0 ± 9.1	-0.5 ± 0.7	0.903
Waist-to-hip ratio	0.93 ± 0.08	0.91 ± 0.07	-0.02 ± 0.01	0.93 ± 0.06	0.93 ± 0.05	0.0 ± 0.01	0.080
Systolic blood pressure (mmHg)	137.8 ± 17.9	133.3 ± 13.8	-4.5 ± 4.1	139.6 ± 21.0	138.0 ± 15.4	-1.6 ± 5.6	0.166
Diastolic blood pressure (mmHg)	82.8 ± 9.3	79.8 ± 7.4	-3.0 ± 1.9	84.1 ± 9.9	83.9 ± 8.5	-0.2 ± 1.4	0.072
Malondialdehyde (μmol/L)	53.0 ± 11.3	42.2 ± 9.9	-10.8 ± 1.4	50.7 ± 9.3	52.3 ± 10.9	1.6 ± 1.6	<0.001
Glutathione (μmol/gmHb)	7.5 ± 2.6	8.3 ± 2.5	0.8 ± 0.1	7.1 ± 3.6	6.3 ± 2.4	-0.8 ± 1.2	<0.001
Vitamin C (μmol/L)	29.0 ± 27.8	37.0 ± 21.0	8.0 ± 6.8	30.0 ± 29.0	23.8 ± 18.2	-6.2 ± 10.8	<0.002
Vitamin E (μmol/L)	58.0 ± 18.6	59.7 ± 23.9	1.7 ± 5.3	59.7 ± 24.2	58.0 ± 23.5	-1.7 ± 0.7	0.238
Superoxide dismutase (units/gmHb)	5,669.9 ± 1,410.7	5,249.0 ± 1,247.2	-420.9 ± 163.5	5,691.6 ± 1,641.4	5,593.1 ± 1,768.0	-98.5 ± 126.6	0.121

Data are means ± SD. P values are significance values in yoga group compared with the control group.

Pancreas Stimulating Breathing Exercise



<https://www.youtube.com/watch?v=hMoCu24LlfQ>

Herbal Interventions



BioGymnema

Supplement Facts

Serving Size: 1 capsule
Servings Per Container: 90

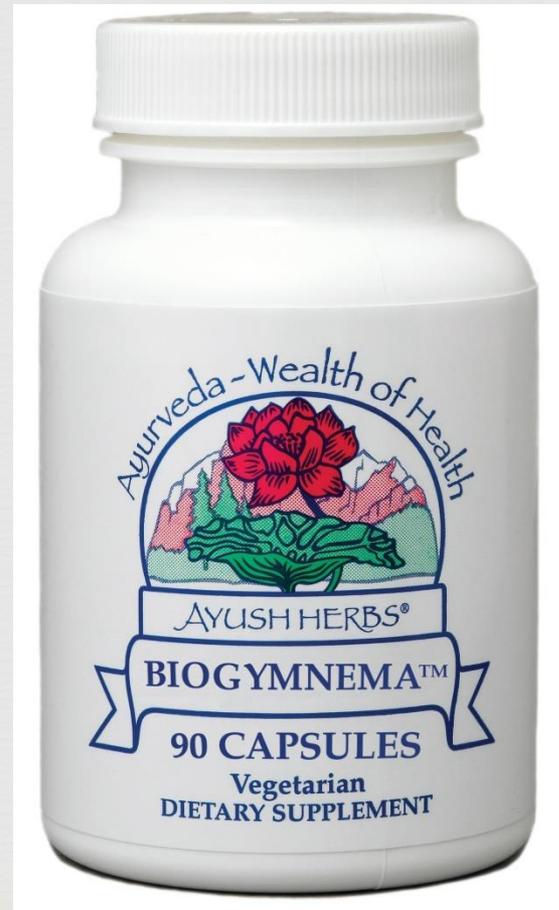
Ingredients:	Amount Per Serving	%DV
d-Biotin	2150 mcg	716%
Chromium (as Chromium Polynicotinate)	10.6 mcg	9%
Betaine-HCl	200 mg	*
Extracts of:	Amount Per Serving	%DV
<i>Gymnema sylvestre</i> (75% Gymnemic acids)	300 mg	*
<i>Pterocarpus marsupium</i>	100 mg	*
<i>Ocimum sanctum</i>	100 mg	*
<i>Momardica charantia</i> (20% bitters)	50 mg	*
<i>Eugenia jambolanum</i>	50 mg	*
<i>Azadirachta indica</i>	50 mg	*

* Daily value not established

Other ingredients: Vegetarian Capsule (Chlorophyll Green Cellulose), Magnesium Stearate, Silicon Dioxide.

Free from Milk, Soy, Egg and Wheat.

-Magnesium stearate from vegetarian source-



Herbal Interventions



❧ *Gymnema sylvestre* (Gurmar)

❧ Regenerate β -cell in the pancreas and improves insulin secretion²⁷

❧ 3 month intervention, 500mg extract of *Gymnema*) in open-label trial improved:²⁸

❧ Fasting and post-prandial BG

❧ TSH

❧ HbA1c

Herbal Interventions



☞ *Gymnema sylvestre*

☞ Systemic review (2010) outlines following benefits of the herb:

Stimulates insulin release; anti-inflammatory effect; regenerates pancreatic beta cells

↓ fasting BGL; ↓ PPG; inhibits intestinal absorption of glucose; ↑ glycolysis; ↑ normalizes gluconeogenesis; ↑ hepatic & muscle glucose uptake

↓ HbA1c; ↓ GPP; normalizes sorbitol dehydrogenase activity

↓ Total lipids; ↓ vascular degeneration of diabetic kidney

G y m n e m a s y l v e s t r e

Herbal Interventions



☞ *Pterocarpus marsupium*

☞ In vitro studies also **demonstrate β -cell protective and regenerative properties.**³⁴

☞ Diabetes animal models also confirm:^{35,36}

☞ **Restoration** of normal insulin secretion

☞ **Regeneration** of β -cells

Herbal Interventions



☞ *Eugenia spp.*

☞ Open-label clinical trial demonstrated improvement in HbA1c, insulin secretion and TSH level.

☞ Indicated improved metabolic efficiency

Variable	Before treatment	After treatment	p-value
Fasting glycemia (mg/dL)	142±30	134±28	0.120
2 h postprandial glycemia (mg/dL)	150±49	148±47	0.911
Glycosylated hemoglobin (%)	7.6±1.0	→ 6.7±0.9	0.013 ^a
Basal insulin (μU/mL)	11.2±10.2	→ 8.5±8.3	0.028 ^a
TSH (μU/mL)	3.2±2.6	2.5±1.6	0.044 ^a
usCRP (mg/L)	5.5±6.4	2.5±3.8	0.035 ^a

Herbal Interventions



☞ Latest insight into ancient wisdom:³⁸

☞ *Pterocarpus marsupium*, *Eugenia jambolana* and *Gymnema sylvestre* benefits though:

☞ Act as **Dipeptidyl peptidase-4 (DPP-4) inhibitor** – similar to oral hypoglycemic – Gliptin

☞ Results in **increase of glucagon-like peptide-1 (GLP-1)** – promotes post-prandial insulin secretion.

Herbal Interventions



❧ *Mormordica charantia*

❧ **Contains insulin-like peptide** that contribute to hypoglycemic effect.³⁰

❧ **Lower blood glucose**, acting similar to slow-acting insulin – **peak effect at 6 hours post-intake.**

❧ Clinical trial demonstrated **better glycemic control with bitter melon** compared to Rosiglitazone (Avandia)³¹

Herbal Interventions



☞ *Mormordica charantia*

☞ Studies demonstrate improvement of Beta cell function and increased sensitivity to insulin.^{32, 33}

Table 1
Clinical studies of *M. charantia*.

Study design	Subjects	Form of <i>M. charantia</i> administered	Treatment duration	Outcome measures	Statistical significance	Reference
Open-label uncontrolled supplementation trial	42 individuals	4.8 g lyophilized wild type bitter gourd powder in capsules	3 months	MetS risk factors	Yes	[105]
Random design	26 subjects	Tablets	4 weeks	fructosamine assays	Yes	[60]
Multicenter, randomized, double-blind, active-control trial	4 groups	Capsule contained 500 mg of dried powder of the fruit pulp, containing 0.04–0.05% (w/w) of charantin	4 weeks	Fructose amine	Yes	[32]
Double-blind randomized controlled trial	40 with T2D (twenty trial and twenty control subjects)	Commercial herbal supplement capsules	3 months	HbA1c	No	[106]
Controlled trial	15 with T2D in 3 groups	Methanol extract of ground whole fruit	1 week	Fasting + postprandial blood glucose	Yes	[107]
Randomized controlled trial	50 with T2D (26 trial and 24 control subjects)	Tablets from dried whole fruit	4 weeks	(1) Fasting postprandial blood Glucose (2) Fructose amine	No	[108]

Herbal Interventions



☞ *Ocimum sanctum* (Holy Basil)

☞ Randomized placebo-controlled trial with holy basil extract.³⁹

Test	Change
Fasting BG	-21mg/dL (-17.6%)
Post-prandial BG	-15.8mg/dL (-7.3%)

☞ Protective against insulin resistance – demonstrated in animal models.⁴⁰

Herbal Interventions



☞ *Ocimum sanctum* (Holy Basil)

☞ **Antioxidant activity:**⁴¹

☞ Diabetic animal models demonstrated:

☞ **Lower TBARS** (Thiobarbituate reactive acid substances)

☞ **Restore levels of antioxidant enzymes** (SOD, catalase, and glutathione peroxidase)

☞ **Anti-inflammatory activity:**⁴²

☞ Animal studies **demonstrates protection** from:

☞ Inflammatory injury to liver

☞ Gastric ulcers

☞ major biochemically active constituents like eugenol, carvacrol, ursolic acid, β -caryophyllene and rosmarinic acid.

Herbal Interventions



☞ *Azadirachta indica* (Neem)

Supplement Facts

Serving Size: 1 capsule
Servings Per Container: 90

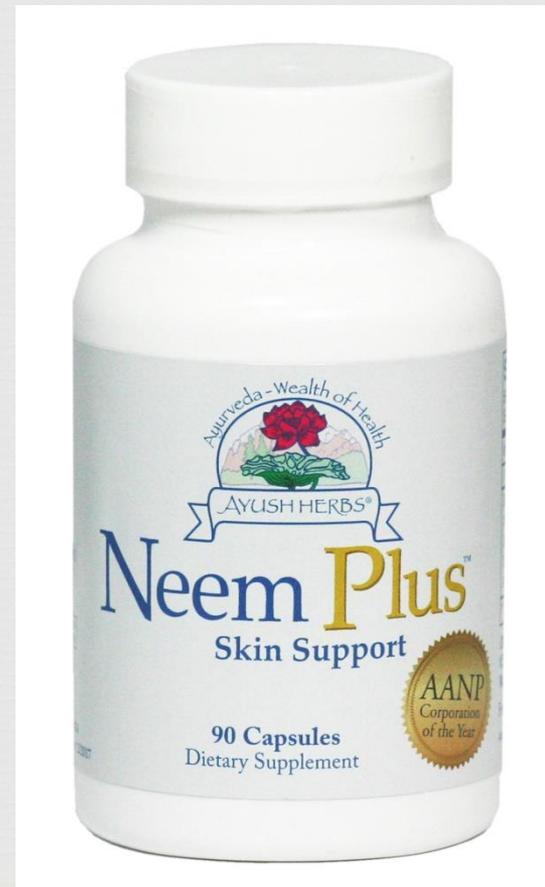
Ingredients:	Amount Per Serving	%DV
<i>Azadirachta indica</i>	300 mg	*
<i>Emblica officinalis</i>	Proprietary	*
<i>Terminalia chebula</i>	blend totaling	
<i>Terminalia bellerica</i>	200 mg	
<i>Tinospora cordifolia</i>		
<i>Rubia cordifolia</i>		

* Daily value not established

Other ingredients: Vegetarian Capsule (Chlorophyll Green Cellulose), Magnesium Stearate, and Silicon Dioxide.

Free from Milk, Soy, Egg and Wheat.

-Magnesium stearate from vegetarian source-



Herbal Interventions



❧ *Azadirachta indica* (Neem)

❧ Clinical benefit of Neem has been demonstrated in human studies for reducing:

❧ Fasting blood glucose and urine glucose within two weeks.⁴³

❧ Insulin dependence by 30-50%.⁴⁴

❧ Animal studies demonstrate histological changes:

❧ Protection from diabetic nephritis and glomerulosclerosis.⁴⁵

Herbal Interventions



❧ *Azadirachta indica* (Neem)

- ❧ 3-Deacetyl-3-cinnamoyl-azadirachtin and other compounds:⁴⁶
- ❧ **Inhibit PEPCK enzyme and G-6PD enzyme to control gluconeogenesis** that increases due to insulin resistance.

❧ Meliacinolin:⁴⁷

- ❧ **Potent inhibitor of α -Glucosidase and α -Amylase enzymes.**
- ❧ The effect is:
 - ❧ Inhibition insulin resistance,
 - ❧ Improvement of renal function, lipid abnormalities, and oxidative stress

Herbal Interventions



☞ Triphala (*Emblica officinalis* (Amla), *Terminalia bellerica* (Behara), *Terminalia Cheluba* (Haritaki))

Supplement Facts		
Serving Size: 1 capsule		
Servings Per Container: 90		
Extracts of:	Amount Per Serving	%DV
Indian goosberry (<i>Emblica officinalis</i>)	167 mg	*
Chebulic myrobalan (<i>Terminalia chebula</i>)	167 mg	*
Beleric myrobalan (<i>Terminalia bellerica</i>)	167 mg	*

*** Daily value not established**

Other ingredients: Vegetable Stearate, Vegetarian capsule (Cellulose and Chlorophyll).
Free from Milk, Soy, Egg and Wheat.

-Magnesium stearate from vegetarian source-



Herbal Interventions



☞ Triphala (*Emblica officinalis* (Amla), *Terminalia bellerica* (Behara), *Terminalia Cheluba* (Haritaki))

☞ Amla is a powerful anti-oxidant with hepatoprotective activity – also prevents oxidative injury.⁴⁸

☞ Behara possesses hypoglycemic properties – reduces dyslipidemia and atherosclerosis⁴⁸

☞ Haritaki enhances bowel motility and promotes elimination.⁴⁸

Herbal Interventions



☞ Triphala (*Emblica officinalis* (Amla), *Terminalia bellerica* (Behara), *Terminalia Cheluba* (Haritaki))

☞ Anti-diabetic properties:⁴⁹

<u>Botanical name</u>	<u>Therapeutic effect</u>
<i>Terminalia bellirica</i> -	Anti pyretic, Laxative, hypoglycemic and blood purifer. (Belliric myrobalan)
<i>Terminalia chebula</i> -	Laxative, Hypoglycemic
<i>Embilica officinalis</i> -	Diuretic, Laxative and Hypoglycemic. (Indian gooseberry)

Herbal Interventions



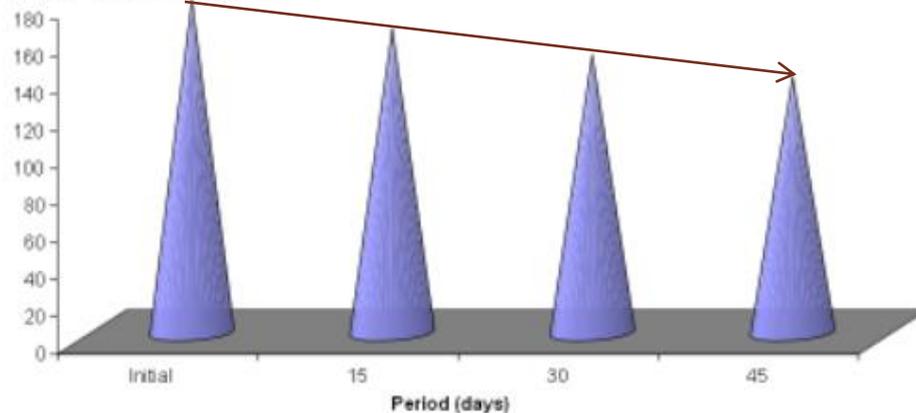
☞ Triphala (*Emblica officinalis* (Amla), *Terminalia bellerica* (Behara), *Terminalia Cheluba* (Haritaki))

22% drop in fasting blood glucose in 1.5 months.

Table I : Mean Fasting blood glucose levels of the subjects

S. No	Duration in days	Mean fasting blood glucose values (mg/dl)
1.	Initial	178± 29.48
2.	15	163.3± 30.8
3.	30	149.23± 25.6
4.	45	137.43± 24.8

Mean Fasting Blood Glucose Level



Herbal Interventions



❧ Shilajeet-Mumiyo (*Asphaltum punjabianum*)

Supplement Facts

Serving Size: 1 capsule
Servings Per Container: 60

Extracts of:	Amount Per Serving	%DV
<i>Asphaltum punjabianum</i>	125 mg	*

* Daily value not established

Other ingredients: Vegetarian capsule (Cellulose and Chlorophyll) Microcrystalline Cellulose, Magnesium Stearate, Silicon Dioxide.

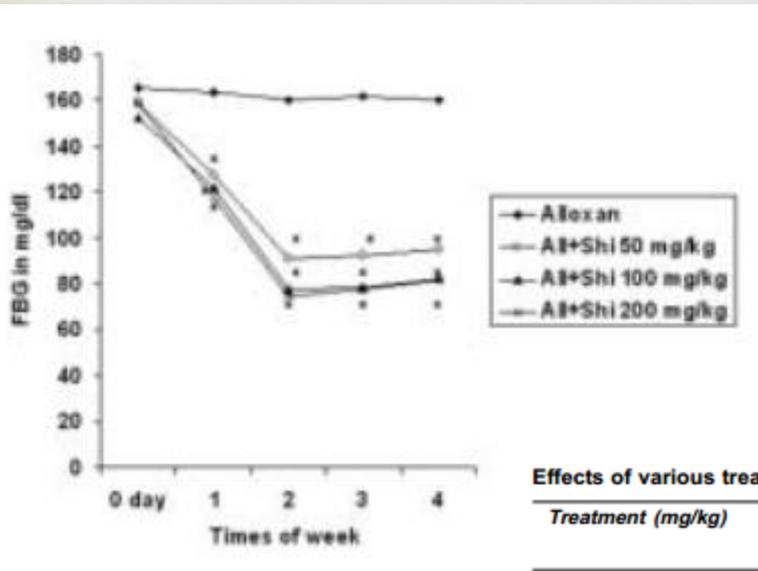
Free from Milk, Soy, Egg and Wheat.
-Magnesium stearate from vegetarian source-



Herbal Interventions



- ☞ Shilajeet-Mumiyo (*Asphaltum punjabianum*)
 - ☞ Alloxan-induced diabetic mice:
 - ☞ Each dose produced significantly lower fasting BG.



Doses tested:

- 0mg/kg
- 50mg/kg
- 100mg/kg
- 200mg/kg

Lipid profile:

- Reduces Total Cholesterol and LDL
- Raises HDL

Effects of various treatments on lipid profile (Mean \pm SEM) in euglycemic and alloxan-induced diabetic rats

Treatment (mg/kg)	TCh (mg/dl)		TG (mg/dl)		HDL (mg/dl)	
	0 day	4 week	0 day	4 week	0 day	4 week
Control (normal saline)	98.6 \pm 4.8	94.2 \pm 4.0	78.6 \pm 6.1	73.2 \pm 5.6	34.6 \pm 4.2	36.1 \pm 3.4
Shi 100	92.7 \pm 3.7	60.7 \pm 6.3***	75.9 \pm 7.1	61.8 \pm 6.3**	35.8 \pm 2.8	41.8 \pm 2.3*
Alloxan	94.2 \pm 3.5	105.7 \pm 2.8**	73.4 \pm 2.3	85.2 \pm 3.8**	34.4 \pm 4.8	31.6 \pm 5.6**
All + Shi (50)	108.1 \pm 4.2	89.7 \pm 3.9**	88.4 \pm 3.8	69.6 \pm 3.6**	31.5 \pm 5.1	38.4 \pm 3.8**
All + Shi (100)	102.4 \pm 5.1	72.8 \pm 4.8***	89.1 \pm 4.8	64.2 \pm 3.9**	31.9 \pm 2.4	43.4 \pm 2.3***
All + Shi (200)	99.6 \pm 2.9	73.8 \pm 1.8***	83.2 \pm 3.2	53.7 \pm 2.4***	31.8 \pm 4.1	42.4 \pm 3.1***

Herbal Interventions



☞ Shilajeet-Mumiyo (*Asphaltum punjabianum*)

☞ Anti-oxidant capacity:

- ☞ Controlled clinical trial: Diabetic patients, on oral hypoglycemic (glibenclamide).
- ☞ 30 day administration of 500mg BID.
- ☞ Significantly modified anti-oxidant enzyme and oxidative product concentrations:

	Catalase	Malondialdehyde
Pre-treatment	2814.22 nmol/mL	15.56 nmol/mL
Post-treatment	3151.68 nmol/mL	6.52 nmol/mL
Percent change	+12%	-58.1%

Case Studies



- **Case 1: AN, 60yo male** presents with history of Type 2 DM and secondary hypertension.
 - He had already started doing some exercise and was motivated to make dietary change.
 - **Medications:** Metformin 1000mg BID, Lisinopril 10mg
 - **Objectives:**
 - HbA1c: 7.8%
 - BP: 150/85mmHg
 - Weight: 184lbs
 - **AN** had recently lost his job of over 25 years and was very stressed with this change; additionally, he has a lifelong tendency of anxiety.

Case Studies



➤ 08/2014 intervention:

❧ **Diet:** 3-4 servings of vegetables and 1-2 fruits daily; Rotating variety of nuts and seeds, added variety oils, variety Meats (chicken, fish, turkey as protein sources), low grains, no alcohol.

❧ **Lifestyle:** Walking 30 mins/day, yoga 30min/day, Deep breathing 15mins/day

Case Studies



➤ 08/2014 intervention:

❧ Supplements:

- ❧ **Gymnema** 1 cap, TID; Support health sugar metabolism and help maintain blood glucose within health range.
- ❧ **Neem** 1 cap TID; Bitter digestive and blood sugar support
- ❧ **Carditone** 1cap, at night; cardiovascular support and maintain blood pressure within healthy range.
- ❧ **Rentone** 1cap, TID; Urinary tract support and protection for kidneys.
- ❧ **Ashwagandha** 500mg TID; mood support for helping balance anxious mind.

Case Studies



- œ With diligent work AN made quick progress.
- œ On 12/2014:
 - œ HbA1c dropped 6.0%;
 - œ Avg blood sugar: 100mg/ dL;
 - œ Weight = 173 lbs. (-11lbs)
 - œ Average BP (in office): 125/75mmHg
 - œ Plan: Cut down Metformin 750mg BID; Stop Lisinopril.
 - œ Continuing original protocol.

Case Studies



- ❧ With diligent work AN made quick progress.
- ❧ In 1/2015:
 - ❧ AN's HbA1c was down farther to 5.9%
 - ❧ at the lower Metformin dose.
 - ❧ Weight = 174lbs;
 - ❧ Avg BP: 110/70

Case Studies



- **Case 2: SK**, 38yo, male presents for check up during a stressful time in his life.
 - PMH: HbA1c: 5.6% in 2012.
 - SK was given dietary and lifestyle recommendations for prevention.

- SK returned in 09/2014:
 - He had not followed his recommendations and was worried for his health.
 - **HbA1c = 8.2%**
 - **Lipids:** Total, Chol: 215(H), LDL: 176(H), HDL: 29 (L)
 - Ht. 5'7"; Wt. 194 lbs; BMI = 30

Case Studies



œ In 10/2014

œ **Diet:**

- œ 5-6 servings of vegetables and 1-2 fruits daily;
- œ Rotating variety of nuts and seeds,
- œ added variety of oils,
- œ added variety of beans (vegetarian protein), low grains, no alcohol.

œ **Lifestyle:**

- œ Walking 30 mins/day,
- œ yoga 30min/day,
- œ weight bearing exercise 30min x 2/week;
- œ Deep breathing 15mins/day

Case Studies



œ In 10/2014

œ Supplements:

- œ **BioGymnema** – 1 capsule, TID – supportive for pancreatic function and insulin activity. This formula helps to maintain blood sugar within normal range.
 - œ **Neem plus** – 1 capsule, TID – the bitters in neem help to promote release of digestive enzymes and promote normal pancreatic function. Neem is also antifungal, acts against sugar-dependent over-growth of systemic fungus.
 - œ **Fish oil:** 2 capsule, three times a day
- œ SK returned for 1 month follow-up; feeling better and more energetic – he also lost 5 lbs.

Case Studies



œ In 1/2015

œ Follow up lab: **HbA1c = 5.4%**

œ Total Cholesterol = 199 (down from 215), LDL = 120 (down from 176)

œ He also **lost total of 18lbs = 176lbs** (down from 194lbs)

Case Studies



❧ Case 3: SS, 56yo, male

❧ PMH: Type II DM, hyperlipidemia, and hypertension.

❧ Meds:

❧ Metformin 1000 mg BD,

❧ Glipzide 5 mg TID,

❧ Simastatin 20 mg,

❧ Lisinopril 20 mg,

❧ Insulin 17 units,

❧ Lamisil 250 mg

Case Studies



Case 3: SS, 56yo, male

PMH: Type II DM, hyperlipidemia, and hypertension.

On 12/2013, His numbers showed:

Average HTN: 150/90mmHg

Hemoglobin A1c: 7.0% = Avg. 156mg/dL

Lipids:

Chol, total: 150mg/dL,

TAG: 235mg/dL,

HDL: 45mg/dL,

LDL: 58mg/dL - Controlled over several years of statin use.

Testosterone, total: 296 mg/dL

Case Studies



Case 3: SS, 56yo, male

PMH: Type II DM, hyperlipidemia, and hypertension.

On 12/2013, His numbers showed:

Average HTN: 150/90mmHg

Hemoglobin A1c: 7.0% = Avg. 156mg/dL

Lipids:

Chol, total: 150mg/dL,

TAG: 235mg/dL,

HDL: 45mg/dL,

LDL: 58mg/dL - Controlled over several years of statin use.

Testosterone, total: 296 mg/dL

Case Studies



❧ 12/2013 intervention:

❧ **Diet:**

- ❧ high vegetable intake (3-4 servings per day),
- ❧ fruit intake (1-2 servings per day),
- ❧ Protein sources (Chicken, fish, Lentils),
- ❧ Fat sources(1-2 tablespoon of oils);
- ❧ minimizing grains/bread/refined carbs/packaged foods.

❧ **Lifestyle:**

- ❧ He continued his exercise of playing tennis 3x/week;
- ❧ we also added breathing exercises and yoga to promote more calmness and parasympathetic tones.

Case Studies



❧ 12/2013 intervention:

❧ Supplements:

- ❧ **Biogymnema** one TID - Support healthy blood sugar control
- ❧ **Neem Plus** one TID - Digestive support and supports with health glucose control
- ❧ **Co-Curcumin** one Teaspoon BD - support healthy inflammatory response systemically
- ❧ **Purush** one TID - Support healthy testosterone metabolism
- ❧ **Ashwgandha** one TID - support adrenal function, balance hormone metabolism

Case Studies



œ 04/2014 follow up:

œ His new numbers were:

œ Average BP: 130/89 mmHg

œ HbA1c: 6.2% (from 7.0%) = Avg. 130mg/dL

œ **Lipids:**

œ Chol, total: 137mg/dL, (from 150)

œ TAG: 76mg/dL, (from 235)

œ HDL: 48mg/dL, (from 45)

œ LDL: 74mg/dL (from 58)

Case Studies



04/2014 intervention:

Upped his vegetable intake to 5-6 servings per day;

Dietary counseling: food plate proportions to $\frac{1}{2}$ vegetables, $\frac{1}{4}$ protein, $\frac{1}{4}$ grain-staple food; with added raw oils over the food.

Discontinued Lipitor.

Case Studies



❧ 11/2014 follow up:

❧ Complaining that his blood sugar had been too low a few times over the past month while taking the supplements.

❧ 11/2014 Intervention

❧ **Cut insulin dosage to 6 units** at night from 17 units

❧ **Continuing metformin 1000mg/day**

Case Studies



01/2015 follow-up:

Maintained lower dose of insulin.

Average BP: 120/76mmHg

HbA1c: 6.3% = 134mg/dL

Reported that he was skipping long-acting insulin some day due to healthy blood sugar control.

03/2015

Reports he's off insulin on most days Blood sugar average near 100.

HbA1c: 5.9%

Case Studies



- ❧ Case 4: YA, 19yo female; intermittently presented with headache and body aches during 2008-09.
 - ❧ Borderline blood glucose noted on two consecutive blood tests.
 - ❧ 100mg/dL on 01/2009
 - ❧ 105mg/dL on 08/2009
 - ❧ 2010: moved to New York for school... “very stressful time”.

- ❧ 02/2011 YA is sick and taken to urgent care.
 - ❧ Incidental finding of extremely high blood glucose 300+mg/dL
 - ❧ YA returned to clinic on 03/2011

Case Studies



03/2011

YA diagnosed with Type I DM from unknown origin; otherwise healthy young female.

Labs:

HbA1c: 12.6%

Lipids:

Chol. Total: 214

TAG: 54

HDL: 70

LDL: 133

Medications:

28 units of lantus (long-acting); and 6-12 units of Novolog (bolus insulin)

Case Studies



03/2011 intervention

Strict diet limiting grains and refined sugars. Eliminating allergens

Protein-to-carb ratio (1:1)

Protein: Chicken, fish, turkey, beans, lentils.

Carbs: seasonal vegetables, some whole grains (no gluten)

Dairy eliminated.

Nuts and seeds (1-2 handful daily – rotation)

Lifestyle:

Yoga: 30min every day.

Fire breath – Kapalbhathi – 5 mins x2 per day

Case Studies



03/2011 intervention

Supplements:

- Neem plus: 1 cap, TID
- BioGymnema: 1 cap, TID
- Shilajeet: 1 cap, TID
- Amlaplex: 1 teaspoon BID
- CoCurcumin: 1/2 teaspoon BID

- Zinc: 1cap BID
- B-complex: 1 cap, TID

Case Studies



04/2011

HbA1c was 8.1% (down from 12.6%)

YA was doing regular exercise and following her diet closely.

03/2012

HbA1c was 6.6%

Lipids:

Chol. Total: 144 (down from 214)

LDL: 84 (down from 133)

Case Studies



- ❧ 05/2013 follow up
 - ❧ HbA1c was 6.7% (down from 12.6%)
 - ❧ Long-acting Lantus: 9 units at night
 - ❧ Novolog: 4 units before meals.

- ❧ She discontinued:
 - ❧ All supplements during this time.

 - ❧ Self-prescribed: L-carnitine, ALA, Zinc, Magnesium and Vit. D 10,000IU

Case Studies



❧ 05/2013 intervention

❧ Dietary and lifestyle counseling

- ❧ Eat 7-8 servings of raw vegetables or 3 servings of cooked vegetables every day.
- ❧ Eat at least 2 seasonal fruits every day.
- ❧ Eat handful serving of nuts and seeds
- ❧ Eat fish 2-3 times a week. Eat Anchovies, Herring, Mackerel, Oyster, Salmon, Sardines and Trout which are low in mercury content and high in omega 3 fatty acids.
- ❧ **Exercise every day.** Walk for at least 45 minutes every day. Do light a weight lifting exercise. Breathing exercises for 15 min 2-3 times/ day.

Case Studies



05/2013 intervention

Supplements:

- Neem Plus TID.
- Biogymnema TID.
- Shilaljit TID.
- Vit D 5000 IU/day
- Ashwgandha TID

Case Studies



- ❧ 05/2014 – Continuing the protocol
- ❧ Labs:
 - ❧ **HbA1c: 6.4%**
 - ❧ **Lipids: WNL**
 - ❧ Chol, total: 167
 - ❧ LDL: 93
- ❧ **Novolog: 4 units/meal; Lantus: 7units/night (down from 28units)**
- ❧ **Added: CoCurcumin 1/2 teaspoon BID**

Case Studies



- ❧ 12/2014 – Follow up
- ❧ Labs:
 - ❧ **HbA1c: 6.5%** (with lowest insulin use so far)
 - ❧ **Lipids: WNL**
 - ❧ Chol, total: 167
 - ❧ LDL: 93
- ❧ Continued:
 - ❧ **Novolog:** 4 units/meal (down from 12 units)
 - ❧ **Lantus:** 7units/night (down from 28 units)
 - ❧ Supplements:
 - ❧ Neem Plus TID; Biogymnema TID; Shilaljit TID; Vit D 5000IU/day; Ashwgandha TID.

Thank You



Wishing You The Best of Health
Ayush Herbs Inc.