

Nutritional Planning by the Pharmacist for Patients with Chronic Disease

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Diabetic Patient and Comorbidities

- Glucose toxicity results in most diabetic patients having co-morbidities including:
 - Dyslipidemia
 - Coronary Artery Disease
 - Peripheral Vascular Disease
 - Hypertension
 - Neuropathy
 - Retinopathy
 - Non-Alcoholic Fatty Liver Disease
 - Renal Disease which leads to renal failure

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Diabetic Patient and Comorbidities

- ▶ Women with diabetes have a 27% increase in breast cancer risk.
- ▶ Obese patients have a higher incidence of cancer than lean patients.
- ▶ Cancer cells have dysfunctional mitochondria and thus require glucose as an energy source in order to grow.
- ▶ All of this results in the requirement to have complex pharmacotherapy.

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Diabetes Type I & II: which patients have a higher risk of dying?

- ▶ Study focused on patients who diagnosed with diabetes between the ages of 15 and 30 years.
- ▶ Type 2 group had a significantly higher mean BMI, 32 vs 25.6.
- ▶ The use of statins and antihypertensives were significantly higher (49.3% vs 24.6% for antihypertensives and 38.3% vs 21% for statins).
- ▶ Type 2 group had significantly higher albumin-creatinine ratios and higher prevalence of albuminuria)

Diabetes Type I & II: which patients have a higher risk of dying?

- ▶ Macro-vascular disease including ischemic heart disease (12.6% vs 2.5%, $P < 0.0001$, stroke (4.3% vs 0.7%, $P < 0.002$), and composite end point of any macro-vascular disease (14.4% vs 5.7%, $P < 0.0001$).
- ▶ Deaths among the type 2 patients occurred significantly sooner in the course of diabetes, at an average of 26.9 years vs 36.5 years.
- ▶ Deaths in both groups occurred at relatively young ages, at a mean of 52.9 years for type 2 and 57.4 years for type 1.

Carbohydrates – Danger

- ▶ Large amounts of dietary carbohydrates can raise cholesterol, triglyceride, and insulin serum concentrations.
- ▶ This is **particularly true for certain types of carbohydrates ingested:**
 - * High Glycemic Index (BAD CHO)
 - * Portion size of CHO is critical because High Glycemic Load results in increased body fat and serum fatty acids.
- ▶ The intake of Low Glycemic Index Carbohydrates and reduction in portion size reduces Glycemic Load.

Tight Blood Glucose Control!!!

- ▶ Requires understanding of the medication therapy plan.
- ▶ Development of a **nutritional and exercise plan**.
- ▶ Drug Therapy management including insulin as well as oral and anti-diabetic agents.
- ▶ **Patient Self Blood Glucose Monitoring (SBGM)**.
- ▶ Monitoring of the patients Hemoglobin A1c and/or Fructosamine.
- ▶ Once a patient is started on the appropriate **Low Glycemic Index and Low Glycemic Load nutritional plan** it is critical for patient SBGM and pharmacist monitoring and management.

Symptoms of Hypoglycemia: the Patient Must Understand

- ▶ Anxiety, headache, mental confusion.
- ▶ Perspiration, pallor (pale appearance).
- ▶ Visual disturbances, lack of coordination.
- ▶ Tremulousness, dizziness, seizures.
- ▶ Weakness, ataxia
- ▶ Hunger
- ▶ Nausea and vomiting
- ▶ **Caution:** Established diabetic patients that are started on the Low Glycemic Index and Low Glycemic Load nutritional plan may develop hypoglycemic symptoms.

Glycemic Index

- ▶ Defined as the incremental area under the glucose response curve after a standard amount of carbohydrate from a test food relative to that of a control food (**white bread or glucose**) is consumed.
- ▶ Glycemic Index:
 - Instant white rice = 91 Peanuts = 14
 - White Bread = 100 Baked Potato = 85
 - Apple = 36 Spaghetti = 41
 - Lentil Beans = 29 Corn Flakes = 84

Web site for Glycemic Index and Glycemic load values of foods: <http://www.glycemicindex.com/>

Glycemic Load

- ▶ Calculated as the Glycemic Index multiplied by grams of food/carbohydrate per serving size and then divided by 100.

Carrot: $(71 * 10\text{Gms}) / 100 = 7.1$

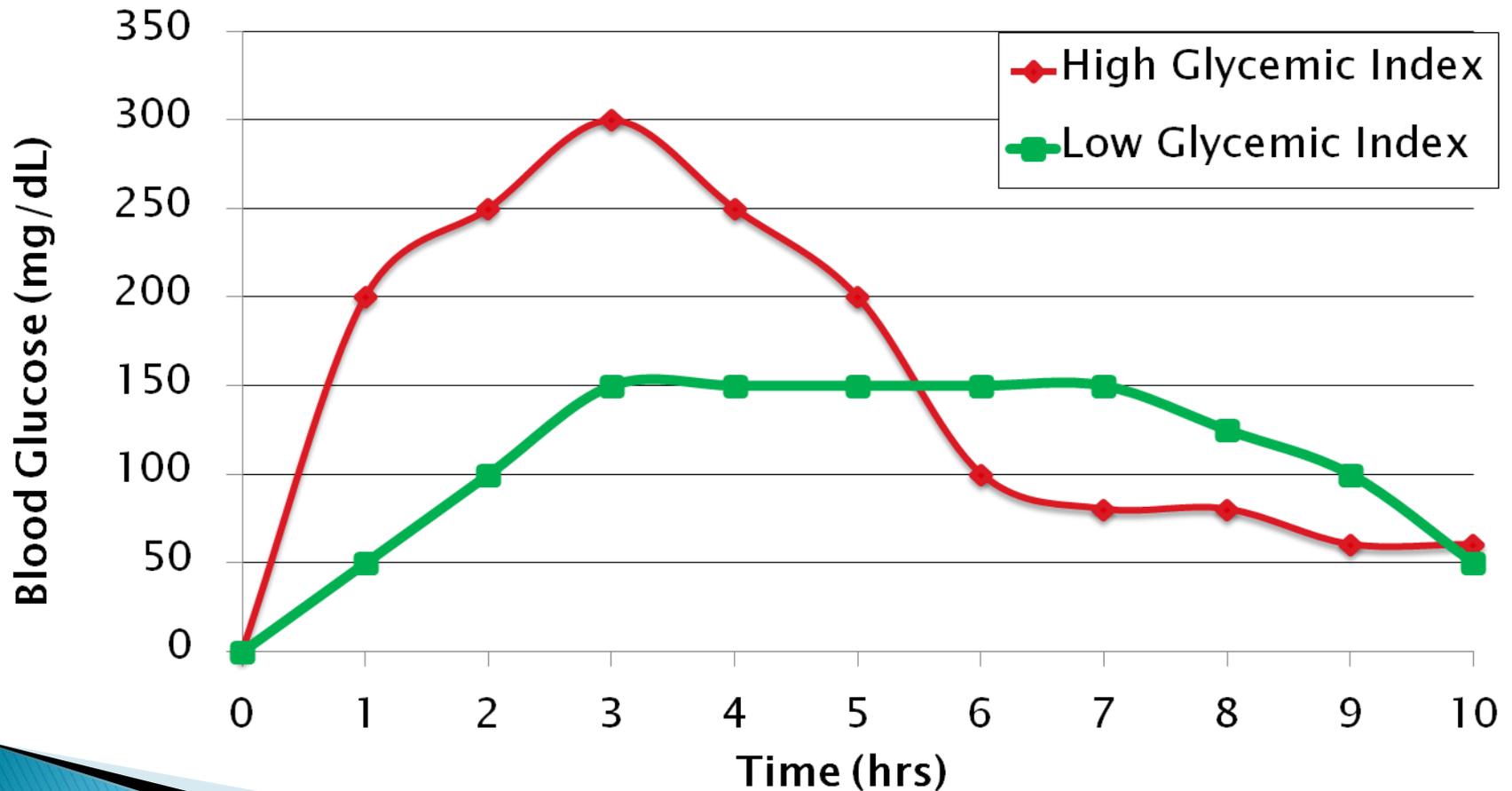
Lentil Beans: $(29 * 30\text{Gms}) / 100 = 8.7$

Spaghetti: $(41 * 60\text{Gms}) / 100 = 24.6$

Baked Potato: $(85 * 60\text{Gms}) / 100 = 51.0$

Thus, portion size and Glycemic Index must be considered in order to control blood sugar, lose fat, and obtain nutrients.

High Versus Low Glycemic Index



Glucose and Cancer Treatment

- ▶ “Is There a Role for Carbohydrate Restriction in the Treatment and Prevention of Cancer?*
- ▶ Cancer has been consistently reported to be very rare among uncivilized hunter–gatherer societies.
- ▶ The occurrence and prognosis of cancer seems positively associated with both the prevalence of these diseases and the GI and GL of the individuals diet.
- ▶ High–CHO diet increases risk for colon cancer reoccurrence*.

* Klernent RJ, Kammerer U, Is there a role for carbohydrate restriction in the treatment and prevention of cancer ,Nutrition & Metabolism, 2011, 75:1–16.

Developing the Nutritional Plan

- First allow a new patient to select preferred foods from a Personnel Food list selection form.

www.carepartnersconsulting.com

- The food list includes only carbohydrates with lower Glycemic Index.
- The concept is that while the patient is select preferred foods they are selecting foods which will produce a lower rise in blood glucose which will also be sustained at a lower glucose concentration.
- This avoids high serum glucose which is converted to fat and it will also produce a reduce appetite for an extended period.

Developing the Nutritional Plan

- ▶ Determine the patient's total weight and height.
- ▶ Using bio-impedance and/or infrared technology to determine Body Density, in particularly % body fat.
- ▶ Measure waist and hip circumference.
- ▶ Measure the patient's blood pressure and pulse.
- ▶ Determine the patient's hemoglobin A1c level.
- ▶ Document all values/results in the patient's medical record maintained by the pharmacist.

Body Density Using Infrared Technology: Futrex



Body Density Using Bio-Impedance Tanita \$624.99



Developing the Nutritional Plan

- ▶ Calculate the patients daily protein, carbohydrate, and fat requirement based on lean body weight.
- ▶ Calculate lean body weight by subtracting fat weight ($\% \text{ body fat} * \text{weight}$).
- ▶ Multiple lean body weight in Kg by nutrient requirement per Kg for each day.
- ▶ Menu is developed for Day 1, Day 2, and Day 3.
- ▶ Day 3 is high carbohydrate day to avoid slowing of metabolic rate.
- ▶ The patient then repeats the 3 day menu plan.
- ▶ USDA nutritional content of foods–Web site:
<http://www.nal.usda.gov/fnic/foodcomp/search/>

Macro-Nutrient Requirements

- ▶ Female per Kgm of lean body weight:

	Protein	Calories	Cho	Fat
Day 1	1.9 Gm	25.6	3.1 Gm	0.56Gm
Day 2	1.97 Gm	25.9	3.14Gm	0.60Gm
Day 3	2.12 Gm	29.9	3.74Gm	0.60Gm

- ▶ Male per Kgm of lean body weight:

Day 1	1.92 Gm	23.72	2.99 Gm	0.41 Gm
Day 2	1.91 Gm	26.5	3.01 Gm	0.45Gm
Day 3	2.08 Gm	27.85	3.84 Gm	0.46Gm

- ▶ On day 4 go to day 1 on the menu plan.

Electrolyte Requirements and Managing Hypertension and Heart disease

- ▶ DASH diet is high in fruits and vegetables which are high in potassium and magnesium while low in sodium.
- ▶ American diet provides a potassium to sodium ratio of 0.3 to 1, while the Mediterranean Diet has a ratio of 3–10 to 1, again it is a diet high in fruits and vegetables which have a low GI.
- ▶ The DASH and Mediterranean Diet also are high in Magnesium.

Electrolyte Requirements and Managing Hypertension and Heart disease

- ▶ Dash and Mediterranean diets are associated with reduced blood pressure, stroke, and cardio-vascular disease.
- ▶ Higher dietary potassium intake is associated with lower rates of stroke and total cardio-vascular disease.
- ▶ Low urinary magnesium excretion is independently associated with a higher risk of ischemic heart disease.
- ▶ DASH diet is high in fruits and vegetables which are high in potassium and low in sodium.

Electrolyte Requirements and Managing Hypertension

- ▶ **Mediterranean Diet** improves the function of the microvasculature as shown by increased endothelium-dependent vasodilatation.
- ▶ The high potassium content of these diets contribute to the effect on microvasculature.
- ▶ Potassium depletion activates the sodium-hydrogen transporters in the proximal renal tubule causing sodium retention.

Electrolyte Requirements and Managing Hypertension

- ▶ WHO has issued Sodium and Potassium Intake Guidelines: Sodium daily intake should be less than 2000 mg and the minimum daily intake of potassium should be 3510 mg. A potassium to sodium ratio of 1.76.
- ▶ Mortality doubles with high calcium intake plus supplements.
- ▶ Physiologically calcium and magnesium should be balanced to reduce the increased risk of cardiac disease associated with high calcium intake.
- ▶ Low serum magnesium has been linked with AF

Electrolyte Requirements and Managing Hypertension

- ▶ Providing a Low Glycemic Index diet to reduce body fat and lower blood sugar requires the use of fruits and vegetables which provides a high potassium and low sodium diet.
- ▶ The Low Glycemic Index diet also provides a higher magnesium intake than the standard American diet.
- ▶ The electrolyte content of the Low Glycemic Index, Dash, and Mediterranean diets not only help low blood glucose, but also reduce blood pressure as a result of balanced electrolytes.

Managing Nutrition Has Additional Benefits

- ▶ Whole grains have been linked to lower pre-diabetes risk.
- ▶ Insulin sensitivity improved with Mediterranean-Style diet.
- ▶ HbA1c decline of 0.8% cut the 5-year death rate in half in type 2 diabetics.
- ▶ Oral magnesium supplementation reduces insulin resistance in non-diabetic subjects.
- ▶ Magnesium intake was inversely associated with the incidence of type 2 diabetes.

Water: One of the Most Important Nutrients

- ▶ Daily maintenance fluid requirement is 1500 ml/m².
- ▶ Average adult lean male is 1.7 m², thus the daily maintenance fluid requirement is 2,550 ml.
- ▶ This is 85oz's per day so the average adult should drink 10 8oz glasses of water.
- ▶ Muscle is predominately water so to build muscle we need water.
- ▶ Many Americans are dehydrate because the drink the wrong fluids which also contain high sodium.
- ▶ Water is a critical part of the nutritional plan.

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