Nutritional Planning by the Pharmacist for Patients with Chronic Disease

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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
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.)
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.
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.


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.
- Tremulusness, 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/](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: \((71 \times 10\text{Gms})/100 = 7.1\)
  - Lentil Beans: \((29 \times 30\text{Gms})/100 = 8.7\)
  - Spaghetti: \((41 \times 60\text{Gms})/100 = 24.6\)
  - Baked Potato: \((85 \times 60\text{Gms})/100 = 51.0\)

Thus, portion size \textbf{and} Glycemic Index must be considered in order to control blood sugar, lose fat, and obtain nutrients.
High Versus Low Glycemic Index

![Graph showing blood glucose levels over time for high and low glycemic index foods.](image-url)
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*.

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

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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 (% body fat * 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.
Macro–Nutrient Requirements

- Female per Kgm of lean body weight:
<table>
<thead>
<tr>
<th>Protein</th>
<th>Calories</th>
<th>Cho</th>
<th>Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>1.9 Gm</td>
<td>25.6</td>
<td>3.1Gm</td>
</tr>
<tr>
<td>Day 2</td>
<td>1.97 Gm</td>
<td>25.9</td>
<td>3.14Gm</td>
</tr>
<tr>
<td>Day 3</td>
<td>2.12 Gm</td>
<td>29.9</td>
<td>3.74Gm</td>
</tr>
</tbody>
</table>

- Male per Kgm of lean body weight:
<table>
<thead>
<tr>
<th>Protein</th>
<th>Calories</th>
<th>Cho</th>
<th>Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>1.92 Gm</td>
<td>23.72</td>
<td>2.99 Gm</td>
</tr>
<tr>
<td>Day 2</td>
<td>1.91 Gm</td>
<td>26.5</td>
<td>3.01 Gm</td>
</tr>
<tr>
<td>Day 3</td>
<td>2.08 Gm</td>
<td>27.85</td>
<td>3.84 Gm</td>
</tr>
</tbody>
</table>

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

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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.
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.
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.
- Magnesium intake was inversely associated with the incidence of type 2 diabetes.
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.


References/Additional Reading


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