

## Nutrition for Diabetes: An Executive Summary

Diabetes has been diagnosed in 23.7 million Americans, and 57 million more have been diagnosed with pre-diabetes. This disease costs our healthcare system over \$218 billion per year. New cases of diabetes are more prevalent in the age group from 40 to 59—an increasing trend. Diabetes is the seventh leading cause of death and the leading cause of blindness in adults aged 20 to 74 years. Diabetic retinopathy causes 12,000 to 24,000 new cases of blindness each year. Overall, the risk for death among people with diabetes is about twice that of people without diabetes within similar age groups.

As primary eye care providers, we focus time and energy on how to treat the ocular complications associated with diabetes. However, we can do a lot within our scope of practice to prevent type 2 diabetes from ever developing. We need to concentrate on lifestyle modification, including proper dietary strategies and exercise concepts. Here are some tips on how to address some of these with your patients.

### Discussing Diet

There are many concepts of the “proper” diet for any weight control issue, including diabetes prevention. Depending on the severity and length of time the condition has existed, varying amounts of proteins, fats, fiber and carbohydrates are recommended.

The American Diabetes Association recommends a diet consisting of:

- Total fat intake that equals 25% to 35% of total calories.
- Saturated fat, less than 7% of total calories.
- A total cholesterol intake under 200 mg/d (low-density lipoprotein < 100; high-density lipoprotein > 40).
- Carbohydrate intake equal to about 50% to 60% of total calories.
- Fiber between 20gm/d to 30gm/d.

However, many healthcare practitioners find this a poor balance due to the high carbohydrate allowance, since carbohydrate processing is one of the main concerns for a patient with diabetes. Glucose is the body’s primary energy source, fueling the activities of nearly every cell in the body.

The availability and storage of blood glucose is tightly controlled by a process called glucose homeostasis, which involves the hormone, insulin. Insulin is produced by the beta cells of the pancreas in response to changes in blood sugar, and works to maintain blood glucose levels within an optimal range, or homeostasis. Overeating, physical inactivity, and aging result in increased pro-inflammatory cytokine production. The over production of pro-inflammatory cytokines may represent a triggering factor in the origin of heart, blood sugar, and other metabolic concerns. Thus, reducing carbohydrates reduces the strain on the pancreas to produce more insulin.

### Supplements

When considering nutrient supplements for diabetes, few recommendations are ever suggested because ODs are not comfortable doing so. Here are some nutrients that have proven beneficial for the diabetic patient.

- Omega-3 essential fatty acids: Omega-3 fatty acid supplements have been shown to prevent cardiac arrhythmias and ameliorate clinical depression in type II diabetic patients. Several studies have demonstrated that docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) decrease amounts of plasma triglycerides, visceral fat (and concomitant production of inflammatory cytokines), free fatty acids, C-reactive protein, glucose and insulin, and they also reduce peripheral insulin resistance.

- Xanthophyll carotenoids. Patients who demonstrate high levels of serum lutein/zeaxanthin and lycopene are 67% less likely to develop diabetic retinopathy than those with low levels.
  - Vitamin D. Vitamin D deficiency impairs insulin sensitivity and is associated with type I and II diabetes and metabolic syndrome, as well as increased risk of cancer.
- Benfotiamine: Benfotiamine is a lipophilic analog of vitamin B1 that reduces activity in all four biochemical pathways implicated in micro-vascular diabetes complication.
- Alpha-lipoic acid (ALA): ALA is a “super antioxidant” that preferentially distributes to mitochondria. It blocks glycosylation of protein, improves glucose transport into insulin dependent tissues and reduces both small and large blood vessel complications of diabetes in animal models.
  - Pycnogenol. This standardized extract of French maritime pine bark is composed of procyanidins and phenolic acids, which appear to have anti-inflammatory properties.
  - Taurine. This amino acid supports glial function within the retina. Higher doses may lower blood glucose in humans.
  - Chromium. Chromium potentiates the insulin receptors and consequently prevents insulin insensitivity.
  - Vanadium. This mineral has been proven effective in the enhancement of insulin receptor site function, in turn lowering the need for constant excessive insulin production. In the absence of excess insulin, the receptor sites work more efficiently. The end result is lowered blood sugar levels.
  - Herbal supplements. White mulberry is gaining popularity as a treatment for type 2 diabetes. This shrub has white or pinkish fruit, similar to that of a blackberry. But, it is the leaf of white mulberry that might be beneficial for diabetes. Its extract inhibits alpha-glucosidase enzymes in the gut, which prevents digestion of carbohydrates. This is similar to the mechanism of the prescription diabetes medications Precose (acarbose, Bayer Pharmaceuticals) and Glyset (niglitol, Pfizer). Evidence shows that taking 1g of white mulberry leaf powder t.i.d. for four weeks significantly reduces fasting blood glucose by about 27% in patients with type 2 diabetes. This is a promising holistic therapy, but more evidence is needed about long-term safety and effectiveness.

The mission of the Ocular Nutrition Society is to promote excellence in the care of patients through nutritional support for eye diseases and disorders through professional education and scientific investigation. Go to: [www.ocularnutritionociety.org](http://www.ocularnutritionociety.org) for more information.