

At Massachusetts General Hospital, Dr. Palacios and his colleagues used passage-blocking devices to close PFOs in 110 men and women who had experienced a mystery stroke. After a little more than two years, one had suffered a second stroke and one had a mini-stroke. (*Journal of the American College of Cardiology*, June 19, 2002, pp. 2019–2025.) With warfarin or aspirin therapy, about 15% of people have a recurrent stroke or mini-stroke over a similar period.

Other research using devices to close a PFO show similar encouraging results. But these studies haven't gone on long enough to pin down the benefits and risks of closing a patent foramen ovale. Nor has closure been directly compared with drug therapy.

Who needs to “close the door”?

A look at the numbers should be reassuring. More than 25 million American adults lead normal, healthy lives with a patent foramen ovale. It's not a ticking time bomb, like a cancerous colon polyp that needs to be found and fixed. Yet it can cause problems.

As it becomes easier to close a patent foramen ovale, cardiologists are debating when it's necessary to do it. Closure is clearly in order if the opening causes symptoms such as fatigue or breathing problems, or when it causes the heart to begin enlarging.

Repairing this defect in people who have had a cryptogenic stroke is more controversial. For them, drug therapy (warfarin or aspirin) is still the standard treatment. The Food and

Drug Administration has approved the use of hole-plugging devices in people who can't tolerate warfarin or aspirin or who have another stroke in spite of it. And some cardiologists prefer to close the opening in people whose echocardiograms show evidence of a constant flow of blood through it, or those who also have an atrial septal aneurysm or other structural problem.

So far, though, use of the closure devices isn't approved for people at average risk of having another stroke or those who don't want to take warfarin or aspirin. Clinical trials comparing the risks and benefits of drug therapy vs. closure are now under way. Their results could change recommendations on closing a patent foramen ovale. ♥

Carbohydrates and health: Not that simple... or that complex

Taking control of your blood sugar and insulin levels may pay off for your heart and overall health.

Picture a roller coaster, and you'll get an idea of what happens to sugar and insulin levels in your blood. The highs that follow meals and snacks turn to lows later on.

Whether your levels look more like a kiddie coaster with gentle ups and downs or a strap-'em-in, hang-on-tight ride with steep climbs and breathtaking drops can make a difference to your health. Routinely high blood sugar and insulin have been linked with a variety of chronic diseases.

Smoothing out your blood sugar and insulin levels may keep your heart in good shape. It can help control type 2 diabetes and possibly prevent it. It may even let you control or lose weight by helping you store less fat and by keeping you from getting hungry soon after a meal or snack.

Taming this duo isn't that hard. Choosing foods that have a gentler impact on blood sugar and insulin levels can help. You can do this using the glycemic (glie-SEE-mick) index.

This research tool, developed 20 years ago, measures the ease with which your body turns carbohydrates into blood sugar.

Classifying carbohydrates

Carbohydrates are the major component of breads, pastas, cereals, fruits, vegetables, and beans. They're also the major contributor to blood sugar.

That's because all carbohydrates are made of sugar. Some are made of one or two sugar molecules. Others, like the starches in potatoes, corn, and wheat, are a tangle of sugars strung together in long, branched chains.

For years, scientists divided carbohydrates into two main groups: simple ones like glucose (the form used by the body and found in many foods) and

The problem with bad carbohydrates

When you eat a food with a high rating on the glycemic index, enzymes in your digestive system attack its carbohydrates and furiously snip off simple sugars such as glucose. These quickly slip into the bloodstream.

As blood sugar levels shoot up, cells in the pancreas churn out extra insulin. This hormone helps cells sponge up glucose. A surge of insulin also signals the body to store extra glucose as fat. Too much insulin may eventually drive blood sugar below the level your

body needs to keep things running smoothly. This triggers responses that get your blood sugar levels back into the normal range. Hunger pangs are one of these.

When you eat carbohydrates that are low on the glycemic index, blood sugar and insulin levels climb more slowly and don't crest as high as they do with quickly digested carbohydrates. Both fall more slowly, too, making it less likely that blood sugar levels will drop below the hunger point.



Glycemic index and health

The evidence that good carbohydrates are better for you than bad ones isn't yet as strong as that for good fats and bad fats. Many of the studies have been small and brief. Even so, most point in the same direction.

Weight control: Out of 16 single-day studies in which volunteers were fed meals low or high on the glycemic index, 15 showed that low-glycemic-index meals decreased hunger and subsequent eating.

Diabetes: In people susceptible to type 2 diabetes, a constant demand for insulin can exhaust insulin-making cells in the pancreas. Two of three long-term studies show that diets high on the glycemic index/glycemic load scales increase the chances of developing type 2 diabetes.

Heart disease: Blood sugar and insulin levels after eating are set to join the ranks of important risk factors for heart disease. High levels are linked with high blood pressure, high triglycerides, an unhealthy cholesterol profile (high LDL and low HDL), an increased tendency for blood clotting, and artery stiffness.

fructose (fruit sugar), and complex ones like starch and fiber. Most nutrition guidelines urge us to eat complex carbohydrates instead of simple ones.

Out with the old...

Two decades ago, a Canadian team made the bold move of actually measuring how several dozen different foods affected blood sugar levels in healthy volunteers. The results shattered long-held assumptions that the body took longer to convert complex carbohydrates into blood sugar.

Nutrition scientist David Jenkins and his colleagues compared each food's effect to that of pure glucose. The scale they devised gave glucose a score of 100.

Pure fructose, among the simplest of simple carbohydrates, barely registered on the scale, with a glycemic index value of 20. But cornflakes, carrots, and potatoes — complex carbohydrates by anyone's reckoning — raised blood sugar levels almost as much as glucose.

A later modification called the glycemic load measures how eating a normal portion of a particular food affects blood sugar. Watermelon, for example, has a fairly high glycemic index value of 72. But there's very little carbohydrate in a serving of watermelon, so its glycemic load is low.

...In with the new

Since that first effort, researchers have tested more and more foods for their glycemic index values. The latest list, published in the July 2002 *American Journal of Clinical Nutrition*, provides values for 750 foods.

The World Health Organization recommends that the glycemic index be a factor in choosing a healthy diet. In Australia, "GI" symbols now appear on foods with low glycemic index values. And the latest recommendations on diet from the National Institute of Medicine lean toward more widespread use of the glycemic index.

Not everyone, though, is enamored of this tool. The American Diabetes Association calls the glycemic index too complicated for general use. And neither the American Heart Association nor the National Institutes of Health endorse its use.

Using the glycemic index

The 40-page glycemic index is a daunting document that lists raw data from studies conducted around the world. We've boiled down this information to a few general patterns you can use to guide your eating choices. (The glycemic index and glycemic load of 100 foods is available on our Web site, <http://health.harvard.edu/heart>)

■ **Switch from refined to whole grains.** White bread, white rice, and

many breakfast cereals sit high on the glycemic index. As alternatives, try eating more whole grains and whole-grain foods. These generally have lower glycemic index values, and other health benefits to boot (*Harvard Heart Letter*, November 2002).

■ **Don't be afraid of pasta.** Plain pasta isn't the villain it's often made out to be. Most types have modest glycemic index values. So they're a good alternative to mashed potatoes or white rice.

■ **Bank on beans.** There are many good reasons to eat beans. They're an excellent source of protein. They're rich in fiber, vitamins, minerals, and other micronutrients. And they generally have a small effect on blood sugar and insulin.

■ **Eat plenty of fruits and vegetables.** This advice crops up everywhere. We're repeating it here because fruits and vegetables have a low to modest effect on blood sugar and insulin. Like beans, they also deliver plenty of healthful nutrients. When it comes to meals and snacks, you might want to think of potatoes as a starch, not a vegetable.

■ **Other foods influence how your body digests carbohydrates.** Fats tend to slow the passage of food from the stomach to the intestine. So eating good fats with a carbohydrate, like olive oil with bread, can curb increases in blood sugar.

■ **Don't sweat the small stuff.** Small differences in the glycemic index value and glycemic load don't matter much. Instead, try to choose foods with glycemic index values under 55 (compared with glucose) and those with glycemic loads in the low teens or below. Foods with glycemic index values above 70 are better for the occasional snack or meal, not all the time.

Keep in mind that no matter how "good" a carbohydrate is, eating too much of it isn't. Quantity matters just as much as quality, especially if you are trying to lose weight or keep it stable. In fact, in an upcoming issue we'll take a look at how effective low-carbohydrate diets are for weight loss. ♥

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