Using the Legacy Effect to Improve Patient Outcomes

Written by Maria Vinall

Among individuals with diabetes, early intensive glycemic control is associated with long-term benefits 10 or more years later (ie, the legacy effect) [Holman RR et al. *N Engl J Med* 2008]. Despite this knowledge, in the United States, 1 in 5 adults with diabetes has an HbA1C >8% [Ali MK et al. *N Engl J Med* 2013], and for 2 in 5, this HbA1C level persists for ≥90 days [Lafata JE et al. *Diabetes Care* 2009]. In the United Kingdom, it can take between 2 and 7 years for these patients to start additional glucose control medications [Khunti K et al. *Diabetes Care* 2013]. Neda Laiteerapong, MD, MS, University of Chicago, Chicago, Illinois, USA, discussed the clinical implications of the legacy effect and the lag time before additional antihyperglycemic agents are added.

The legacy effect and lag time represent opportunities to attain benefits that accrue in the future. It is an equation that raises the question of how to convince patients to undertake intensive glycemic treatments now for benefits they may not see for 10 years. A major challenge is that the immediate effects are certain, whereas the long-term benefits are not.

Dr. Laiteerapong presented preliminary results from interviews with 43 adult patients she conducted to assess whether information about the legacy effect and lag time would change their willingness to intensify their treatment for diabetes and hypertension. Their mean age was 59.2 years, 63% were women, and 74% were African American. The duration of their type 2 diabetes mellitus (T2DM) was 3.3 years, they were not treated with insulin, and they had hypertension for a mean 10.6 years.

After establishing a baseline likelihood (scale of 1 to 10) of taking one additional medicine (pill or insulin) for their diabetes or hypertension, patients were provided information on the legacy effect (for diabetes, benefits last an additional 10 years; whereas for hypertension, benefits last only while on medication) and lag time (for diabetes, 10 years; and for hypertension, 3 years) and asked if their likelihood of taking additional medicine would increase, decrease, or remain the same. Other covariates included demographics, time-related variables (eg, perceived life expectancy, degree to which they consider the future, and future expectations about diabetes, hypertension, and medication in general), self-efficacy, outcome expectancy, interest in lag time and the legacy effect, and clinical variables (HbA1C, blood pressure, and medication history).

At baseline, 65% of interviewees had a high likelihood (≥7 of 10) of taking an additional pill, and 44% had a high likelihood of taking insulin for their diabetes. After receiving the lag time information, 42% said their likelihood of taking one additional pill decreased. After receiving the legacy effect information, 37% said their likelihood of taking one additional pill increased. The change in likelihood of taking insulin was in the same direction but smaller for the legacy effect and lag time (Table 1). With respect to hypertension, 63% of patients had a high likelihood of taking one additional pill at baseline, but a similar number increased or decreased their likelihood after receiving the information (Table 2).

Table 1. Likelihood of Adjusting Treatment After Lag Time and Legacy Effect Information: Diabetes

	Pill			Insulin		
	Increase	Decrease	Maintain	Increase	Decrease	Maintain
Lag time, n (%)	1 (2)	18 (42)	24 (56)	2 (5)	10 (23)	31 (72)
Legacy effect, n (%)	16 (37)	1 (3)	26 (60)	14 (33)	2 (4)	27 (63)

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Table 2. Likelihood of Adjusting Treatment After Lag Time and Legacy Effect Information: Hypertension

	Increase	Decrease	Maintain
Lag time, n (%)	5 (12)	8 (19)	30 (70)
Legacy effect, n (%)	7 (16)	7 (16)	29 (67)

Based on these preliminary results, Dr. Laiteerapong concluded that the long lag time before the benefits from intensive glucose control is achieved may decrease the willingness of patients to start additional medications; however, the legacy effect may increase this willingness. Preventive health and chronic health behaviors are affected by the way patients consider the future. Thus, legacy effect information could be a simple and effective strategy to motivate patients to intensify their treatment to improve glycemic control earlier in the disease course. Further research is needed to understand how to optimally discuss the legacy effect with patients.

Updated Diabetes Nutrition Therapy Recommendations From the ADA

Written by Nicola Parry

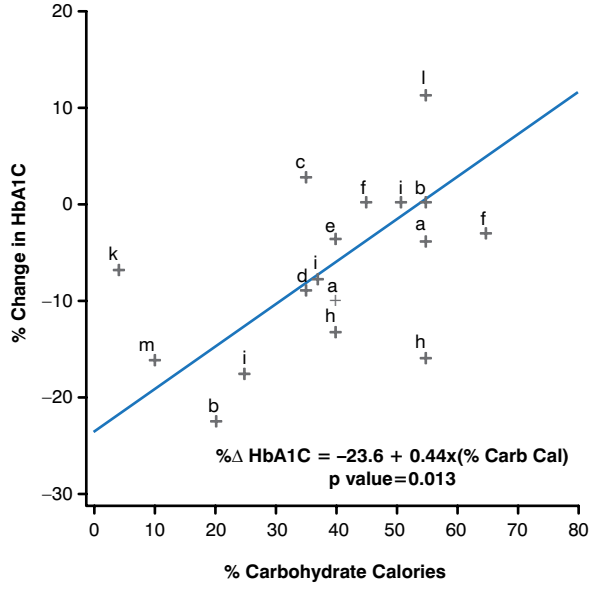
In a symposium on the new "Nutrition Therapy Recommendations for the Management of Adults With Diabetes," William S. Yancy Jr, MD, VA Medical Center and Duke University School of Medicine, Durham, North Carolina, USA, discussed the importance of individualizing carbohydrate intake in treating diabetes and shared some of the evidence that was considered when updating the American Diabetes Association (ADA) recommendations [Evert AB et al. *Diabetes Care* 2014].

For many people with diabetes, their biggest challenge is determining what to eat, particularly with respect to carbohydrates. And while the ADA does not recommend any specific eating plan for people with diabetes, it does emphasize that lifestyle and metabolic needs should be considered when choosing one eating pattern over another.

When considering the evidence for patients with diabetes following a low-carbohydrate diet, Dr. Yancy referred to a landmark study involving a strict low-carbohydrate diet in 10 adults with obesity and type 2 diabetes mellitus (T2DM). After following their normal diet for 7 days, participants switched to a low-carbohydrate diet (~21 g/day carbohydrate) for 14 days. The low-carbohydrate diet significantly lowered their levels of plasma glucose ($p<.05$) and HbA1C (from 7.3% to 6.8%; $p<.006$) [Boden G et al. *Ann Intern Med* 2005].

The results of a subsequent meta-analysis of trials evaluating the effects of carbohydrate-restricted diets (<45% of calories) in patients with T2DM also showed improvements in HbA1C levels as the percentage of calories from carbohydrate was decreased (Figure 1) [Kirk JK et al. *J Am Diet Assoc* 2008].

Figure 1. Effect of Decreasing Dietary Carbohydrate on HbA1C Levels



Carb cal = carbohydrate calories.

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However, Dr. Yancy emphasized that not all studies involving low-carbohydrate diets have shown improvement in glycemic control [Daly ME et al. *Diabet Med* 2006; Davis NJ et al. *Diabetes Care* 2009; Iqbal N et al. *Obesity* 2010]. He also noted that retention levels were low in some studies involving low-carbohydrate diets, and he stressed that this may be one reason why, at this point, such diets have not been endorsed as the superior option for patients with diabetes. Still, the greater glycemic improvement seen in the majority of randomized controlled trials and the potential for reduction in diabetes medications make low-carbohydrate diets a viable treatment option and one worthy of further research.

In contrast, Dr. Yancy remarked that some studies have shown high-carbohydrate diets to be helpful in patients with diabetes. In one study, glycemic and lipid control was improved in participants with T2DM who followed a high-carbohydrate, very-low-fat diet (vegan group), as well as those who followed