Chapter 9
Glycemic Monitoring and Prediction With Response Improvement via Psyllium

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ABSTRACT
Fibers are proven to provide health benefits in preventing metabolic diseases. This chapter first presents the existing blood glucose monitoring sensors and a prediction model for blood glucose concentration. It also aims at analyzing the efficacy of a functional fiber, psyllium on the glycemic control function. Three studies included suggesting psyllium supplementation would significantly improve glycemic response while two studies included showed no effects. Advantages and limitations of each study were evaluated. Overall, it is generally believed that psyllium might give glycemic response improvement effect, especially in Type II Diabetes Mellitus patients.

INTRODUCTION
It has been well documented that fibers have beneficial effects on human health, with its action on preventing and acting as treatment of chronic diseases (Anderson et al., 2009). According to the Institute of Medicine, fiber can be categorized into 2
groups (Trumbo et al., 2002) (i) Dietary fiber, refers to non-digestible carbohydrates and lignin that are intrinsic and intact in plants; and (ii) Functional fiber, refers to isolated non-digestible carbohydrates which have beneficial physiological effects in humans. This chapter focuses on a commonly known functional fiber, psyllium.

Psyllium is one of the popular used functional fiber supplements in the world which has shown to have positive effects on weight management, constipation, diarrhea (McRorie Jr, 2015; Mcrorie and Fahey, 2013) and irritable bowel syndrome (Eswaran et al., 2013; Luther and Chey, 2010). It contains approximately 67% natural concentrated soluble fiber (Gelissen et al., 1994) and is derived from the husks of ripe seeds from Plantago ovate (Singh, 2007).

In addition, psyllium, with its viscous and gel-forming property of a soluble fiber, has long been believed to improve hypercholesterolemia (Dennison and Levine, 1993; Glassman et al., 1990; Taneja et al., 1989). Similarly, it has been suggested that these properties allow psyllium to act as a potential therapeutic treatment in lowering blood glucose level since the 1970s (Fagerberg, 1982; Gupta et al., 1994; Kenkins et al., 1978; Pastors et al., 1991).

However, some researchers (De Bock et al., 2012; Frost et al., 2003; Pal et al., 2011) doubted on the effectiveness of psyllium on prevention and treatment of diabetes mellitus and this topic is still controversial. Recent studies have been carried out on psyllium and blood glucose level among different population in different situations for further investigation (Abutair et al., 2016; De Bock et al., 2012; Feinglos et al., 2013; Karhunen et al., 2010; Pal et al., 2011).

Diabetes is one of the series epidemic diseases in the world. Over 400 million people in the world are living with diabetes (World Health Organization, 2016). Prevalence of diabetes among adults increases globally. It is expected that by 2035, the total number of adults with diabetes in the world would increase to 592 million (Guariguata et al., 2014). Its subsequent microvascular and macrovascular complications could be fatal. Enormous financial burden are putting on diabetes related area. Many patients have to rely on medication in their lifetimes to control diabetes. Therefore, interventions that help glycemic control are worth discussing and investigating. In this review, the effect of psyllium supplement on glycemic control will be evaluated.

**BLOOD GLUCOSE MONITORING**

Patients with diabetes are always being reminded to maintain their blood glucose level to an acceptable euglycemic range and try their best to minimize the fluctuation in blood glucose. The tools for blood glucose monitoring thus become crucial
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