

Title: Effects of a Sorghum Starch on Blood Glucose and Insulin Responses in People with Pre-diabetes

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Status: Reporting on year 2 of 2

Introduction: 79 million people in the U.S have pre-diabetes. About 35% of U.S. adults aged 20 years or older (50% of those aged 65 years or older) had pre-diabetes. Without lifestyle changes, 15% to 30% of people with pre-diabetes developed type 2 diabetes within five years. Therefore, it is necessary to develop functional foods to improve blood glucose and insulin levels.

Objectives:

1. Characterized the functional starch contents of grain sorghum and prepare the sorghum muffin for a human feeding study
2. Assess the functionality of consuming grain sorghum muffins to ameliorating blood glucose and insulin levels in people with pre-diabetes

2nd Year Results:

A control muffin was compared with the grain sorghum muffin (treatment) with both muffins containing 50 g of total starch. Using a randomized-crossover design, men with pre-diabetes consumed treatment within a one-week washout period, and blood glucose and insulin levels were observed at 15 minutes before and 0, 15, 30,, 45, 60, 75, 90, 120, 180 minutes after consumption. Blood glucose concentrations were measured with an ACE Alera™ Clinical Analyzer (Fig.1 A). Blood insulin levels were analyzed using a multi-mode microplate reader and an insulin ELISA (enzyme-linked immunosorbent assay) kit from Mercodia (Fig.1 B and C).

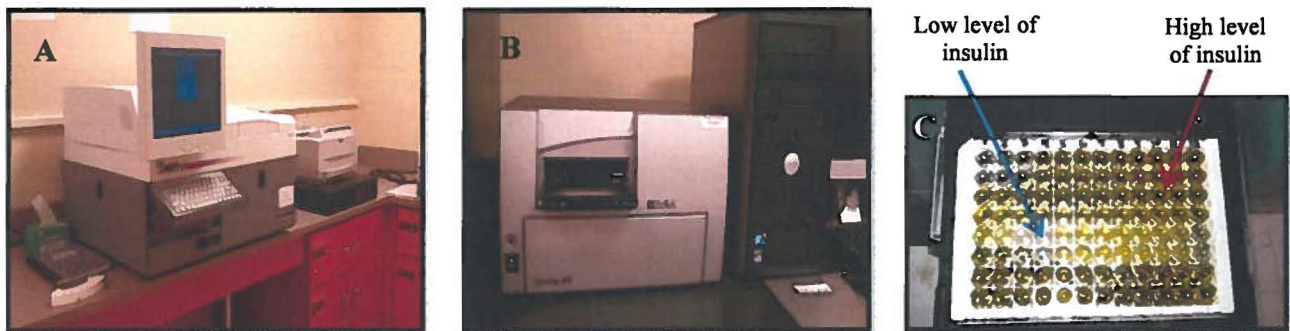
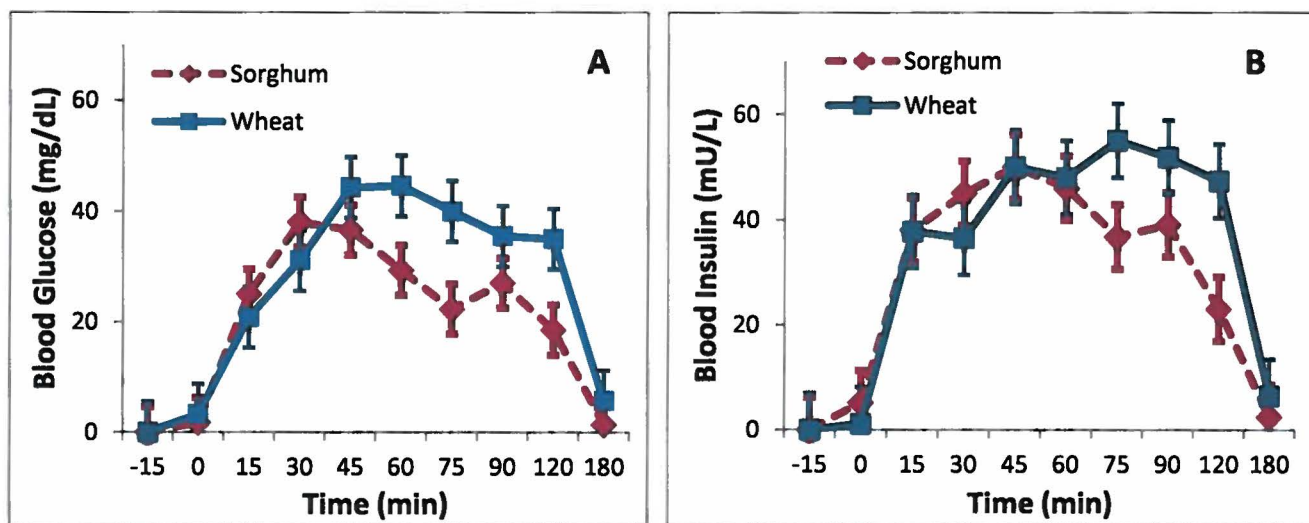


Fig.1. ACE Alera Clinical Analyzer (A), Microplate reader (B) and ELISA plate after stop solution(C).

The incremental blood glucose and insulin responses are in Figure 2. Consumption of grain sorghum muffins lowered blood glucose and insulin concentrations in men with pre-diabetes. With the grain sorghum muffin treatment, the glucose responses from participants were lower at 45-75 minute intervals and at 120 minutes. The mean blood insulin responses reduced at 75-120 minute intervals compared to control.

Fig.2. Mean incremental change of blood glucose (A) and insulin (B) in men with pre-diabetes with standard error of mean bars (SEM).



The mean incremental area under the curve (iAUC) were lowered for blood glucose responses an average of 24% and mean iAUC responses of insulin were also reduced about 13%.

The clinical trials are ongoing right now. We are current conducting the fifth cohort with pre-diabetic subjects (fasting blood glucose level: 100-125mg/dL).