



THE PRODUCT MAKERS

Could foods that inhibit digestive enzymes help fight type 2 diabetes?

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Introduction

- Diabetes mellitus is a major public health problem worldwide. Hyperglycemia in diabetes can be very dangerous for the patients. Inhibiting α -glucosidase is an effective way to control blood glucose levels.
- The Product Makers Bioactive lab use Phytolin™ and Polynol™ to inhibit mammalian α -glucosidase to achieve better blood glucose control.

Project Aims

- Plant extracts Phytolin™ and Polynol™ are used to compare the potency of α -glucosidase inhibition with acarbose.
- Measure glucose uptake using different concentrations of Polynol™ to study the effect of Polynol™ on glucose transporters.

Phytolin™ and Polynol™

- Phytolin™ and Polynol™ are natural sugarcane extracts containing high levels of polyphenols, bioactive properties including antioxidant, anti-inflammatory and anti-microbial properties, lending the material attractive potentials of physiological functions in a number of health concern areas.

Results

α -Glucosidase Inhibition by Acarbose

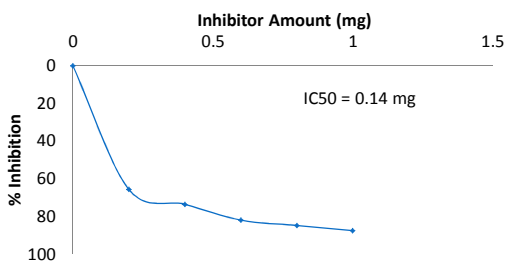


Figure 1. α -Glucosidase Inhibition by Acarbose

■ Interpretation: Acarbose was used as a standard for α -glucosidase inhibition. The half maximal inhibitory concentration (IC50) is 0.14 mg acarbose.

α -Glucosidase Inhibition by Phytolin™

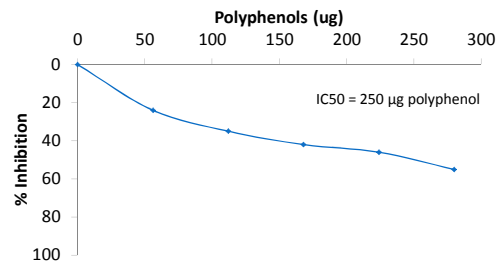


Figure 2. α -Glucosidase Inhibition by Phytolin™

■ Interpretation: Phytolin™ inhibited α -glucosidase significantly. IC50 is equivalent to polyphenols 250 μ g.

α -Glucosidase Inhibition by Polynol™

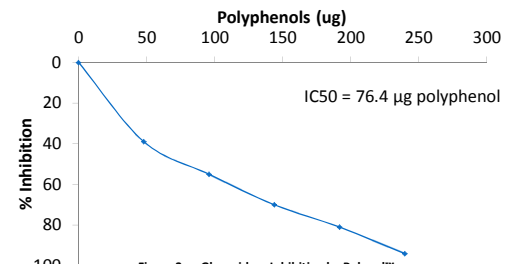


Figure 3. α -Glucosidase Inhibition by Polynol™

■ Interpretation: Polynol™ showed a strong inhibition on α -glucosidase. IC50 is equivalent to polyphenols 76.4 μ g.

Effects of Polynol™ on Glucose Uptake Under Sodium-Dependent Conditions

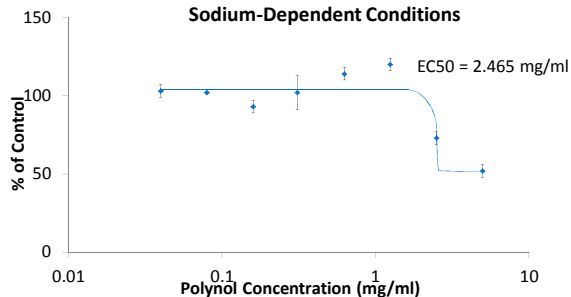


Figure 4. Inhibition of glucose uptake by Polynol™ under sodium-dependent conditions

■ Interpretation: Glucose transporters 2 (GLUT2) and sodium glucose transporter 1 (SGLT1) are two major transporters responsible for glucose uptake. Glucose uptake inhibition was observed in Caco-2 cell with presence of different concentration of Polynol™ under sodium-dependent and sodium-free conditions. Polynol™ reduced glucose uptake significantly at a dose dependent manner with IC50 under sodium-dependent 2.465 mg/ml, IC50 under sodium-free condition 1.272 mg/ml, respectively.^{1,2}

Effects of Polynol™ on Glucose Uptake Under Sodium-Free Conditions

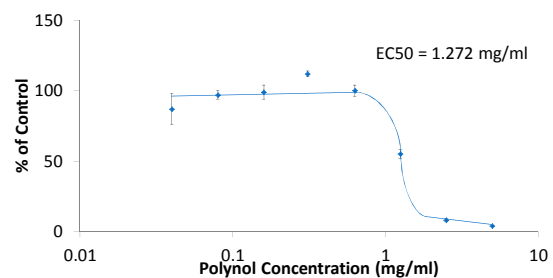


Figure 5. Inhibition of glucose uptake by Polynol™ under sodium-free conditions

Method

- α -glucosidase was extracted from rat intestines. Acarbose, Phytolin™ and Polynol™ were incubated with α -glucosidase. IC50 was compared for different inhibitors.
- Glucose uptake in Caco-2 cells was tested by Brunswick Laboratories method.²

Conclusion

- In previous studies, yeast enzyme (*saccharomyces cerevisiae*) has been widely used for α -glucosidase inhibition. In our study, mammalian rat intestinal enzyme has been used. Phytolin™ and Polynol™ inhibit mammalian α -glucosidase effectively.
- Polynol™ may inhibit glucose uptake by modulating glucose transporters GLUT2 and SGLT1.
- Phytolin™ and Polynol™ can be blended with other strong α -glucosidase inhibitors to make highly potent supplement to assist in diabetes.

For more information, please join us at stand 22 of AIFST for Phytolin™ products tasting. Embrace healthy living!

References:

- Zou, CH, Wang, YJ and Shen, ZF. "2-NBDG as a fluorescent indicator for direct glucose uptake measurement." *Journal of biochemical and biophysical methods* 64.3 (2005): 207-215.
- Ji, J, Wang, D, et al. "Effect of Polynol™ on glucose transporter 2 (GLUT2) and sodium glucose transporter 1 (SGLT1) in the intestinal cells, Brunswick Laboratories, MA, USA, 2017