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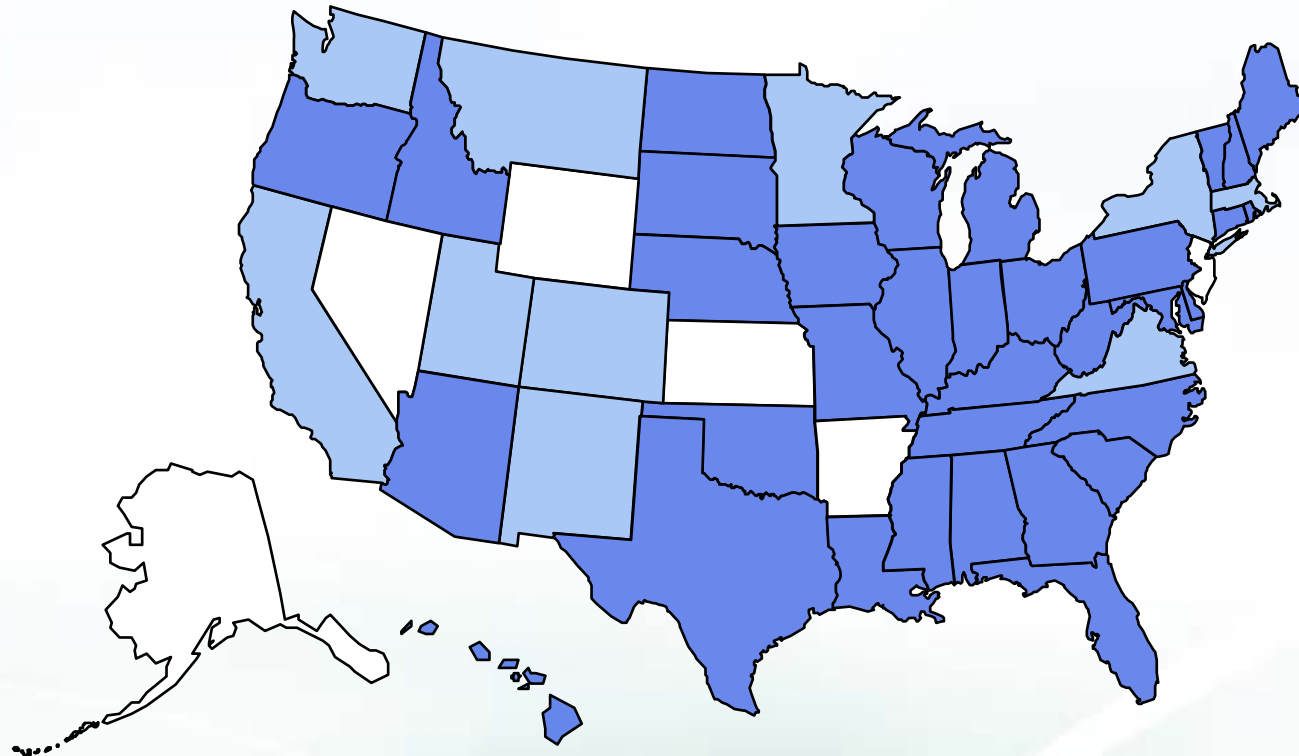


# **Gly-Sea-Max™**

## **Proprietary Brown Seaweed and Slendesta™ Potato Protein Extracts**

# Obesity Trends\* Among U.S. Adults BRFSS, 1990

(\*BMI  $\geq 30$ , or ~ 30 lbs overweight for 5' 4" woman)



□ No Data    ■ <10%    ■ 10%–14%

Source: Behavioral Risk Factor Surveillance System, CDC

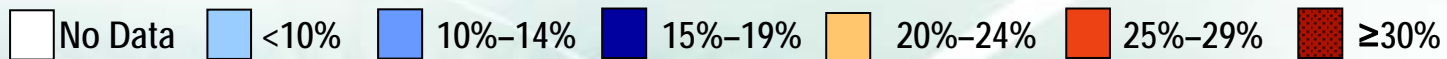
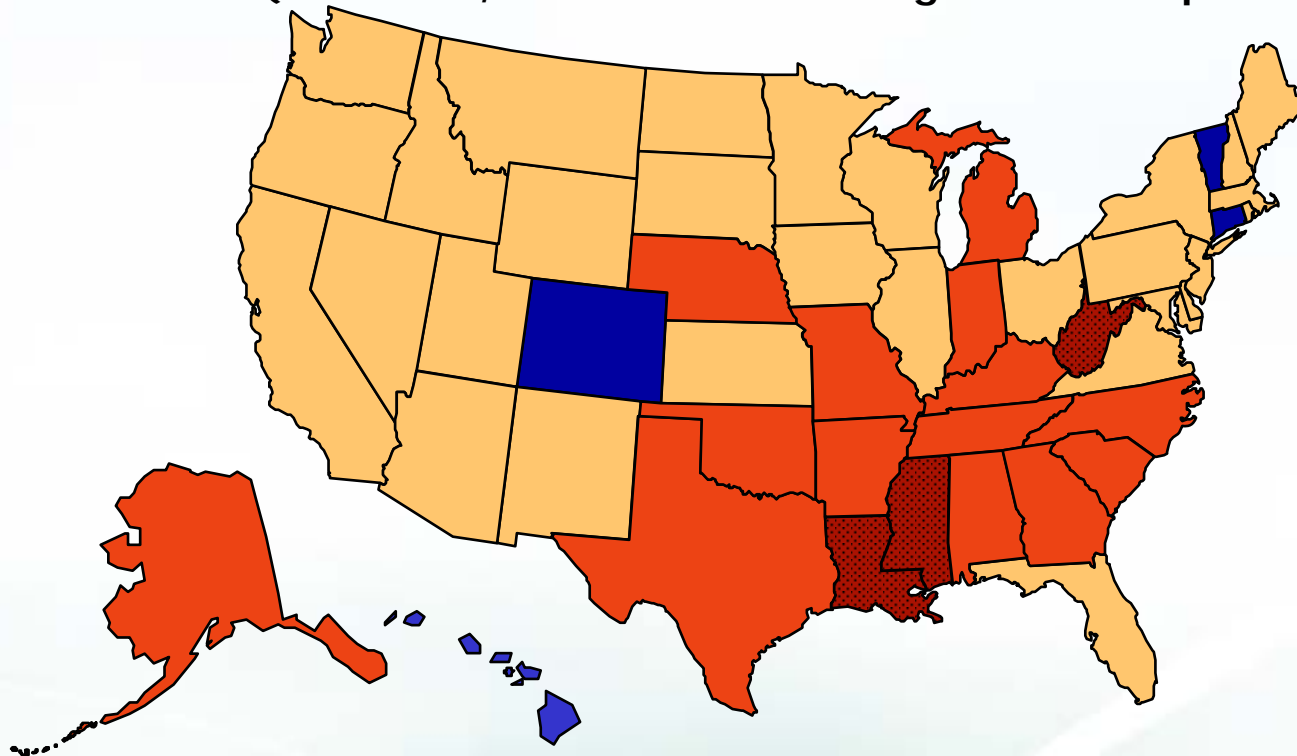
  
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# Obesity Trends\* Among U.S. Adults BRFSS, 2005

(\*BMI  $\geq 30$ , or ~ 30 lbs overweight for 5' 4" person)



Source: Behavioral Risk Factor Surveillance System, CDC



# Importance of Lower Glucose

- Chronic hyperglycemia can increase fat production
- Lowering glycemic load important in reducing or maintaining weight
- Subjects consuming lower glycemic index foods lose more weight
- Reducing glucose spikes limits time to onset of hunger

**Brand-miller et al. 2002. *Am J Clin Nutr.* 76; 281s-285s**

**Wolever et al. 1992. *Diabetes Care.* 15; 562-564**

**Green et al. 2006. KHBB-017-041**



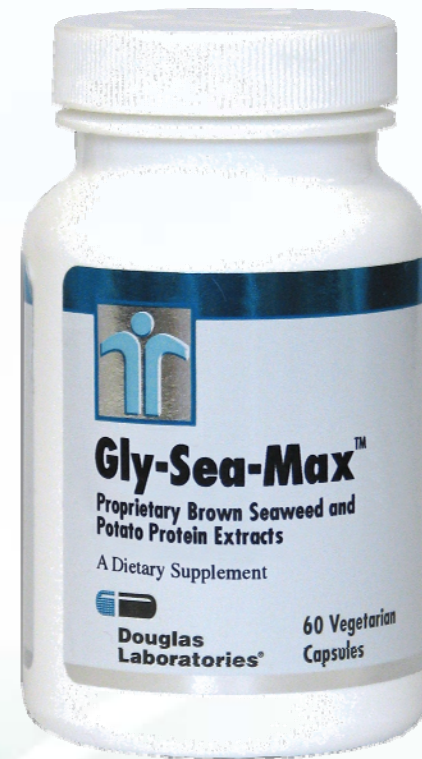
# Gly-Sea-Max™

- Combination of two unique ingredients
  - ▶ Slendesta™ potato protein extract from Kemin Health
  - ▶ Proprietary blend of *Ascophyllum nodosum* and *Fucus vesiculosus* extracts from Oceanova Biotechnologies



# Gly-Sea-Max™

- Helps Moderate Normal Glycemic Response After Meals
- Supports Satiety and Fullness
- Non-stimulating
- Vegetarian



# Slendesta™ Potato Protein Extract 5% Powder: A Natural Satiety Ingredient



# Slendesta™ Active Ingredient

- Standardized to 5% Proteinase Inhibitors (PI2)
- Protein from potatoes
  - ▶ Russet, baking potatoes
- Patented process
  - US 6,414,124 (Licensed);  
6,767,566; 6,686,456;  
6,872,544
  - Australia 2005/ 779377

✓ **300 mg Slendesta™ Potato Protein Extract 5% Powder supplies as much active as four potatoes**



# Proteinase Inhibitors

- Present in most plants
- Natural defense mechanism
- Protect tissues from degradation



Plunkett *et al.* 1982. *Arch Biochem Biophys.* 213 (2): 463-471.

  
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# Potato Proteinase Inhibitor II

1960's: Discovery of PI2



1970's-1980's:  
Amino acid & gene  
sequences identified



1980's: PI2 stimulates  
CCK release in rodents



1985: Patent issued on  
the use of PI's to induce  
satiety in mammals

1987: PI2 stimulates CCK  
release in humans



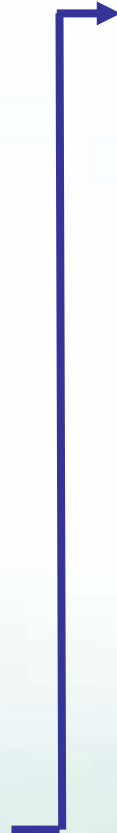
1990's: PI2 decreased  
hunger in humans



2000: Proprietary process  
for PI2 extraction from  
potatoes developed

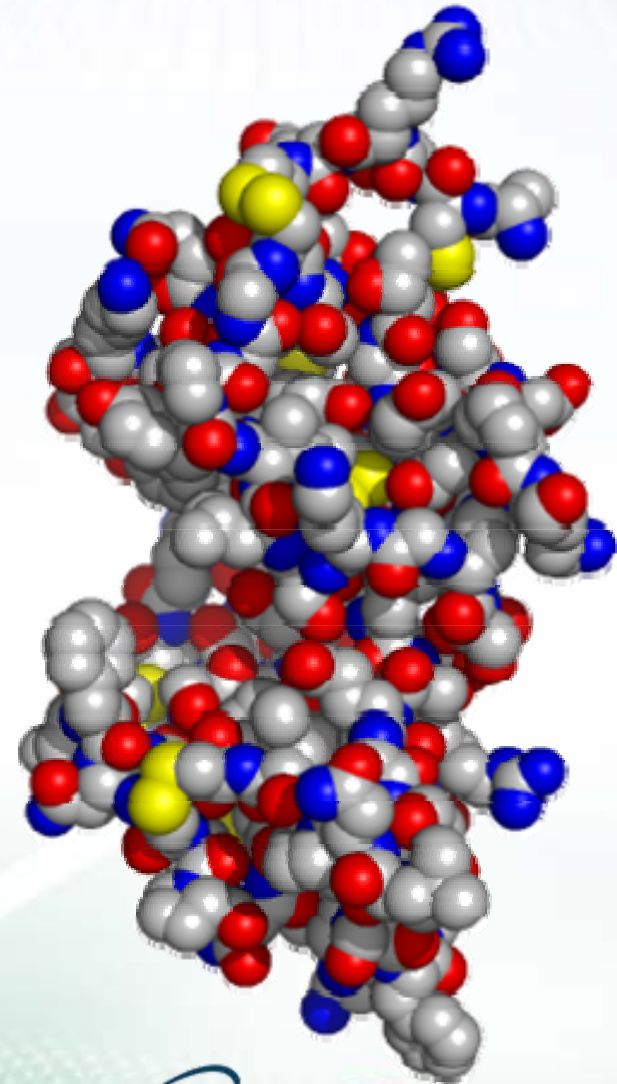


**2006: PI2 becomes  
commercially available  
in the ingredient  
Slendesta™**



# PI2 at the Molecular Level

- Inhibits trypsin and chymotrypsin
- Orally stable; resistant to:
  - ▶ Heat
  - ▶ pH
  - ▶ Salt



Ryan, 1974. *J Biol Chem* 249: 5495-9.

Bryant, 1976. *J Biochem* 15: 3418-24.

Barett-Ng, *et al.* 2003. *J. Biol. Chem.* 278: 31391-400.

Graphics generated with PyMOL.

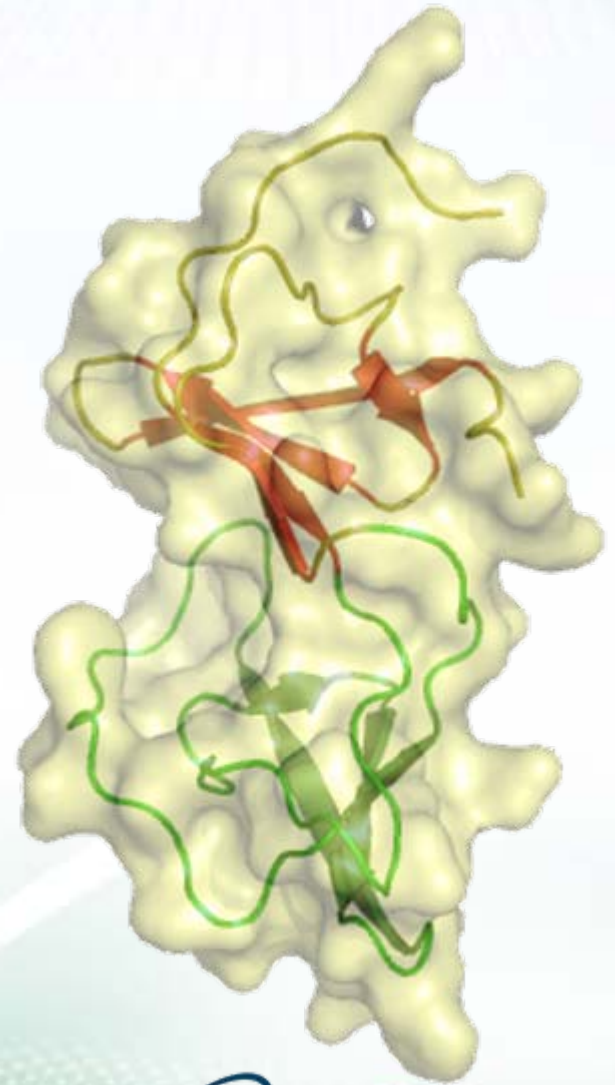
  
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# PI2 at the Molecular Level

- Enhances CCK release
- Results in natural satiety response
  - ▶ Feeling of fullness



Peikin *et al.* 1987. (Abstract) *Gastroenterology* 92(5): A1570.H

Hill 1990 *Physiol Behav* 48: 241-6.

Schwartz 1994 *Diabetes Care* 17: 255-62.

Spiegel 1999 (Abstract) *NAASO Annual Meeting*.

Vasselli JR 1999 (Abstract) *NAASO Annual Meeting*.

Barett-Ng, *et al.* 2003. *J. Biol. Chem.* 278: 31391-400.

Graphics generated with PyMOL.

  
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# PI2 Proposed Mechanism of Action

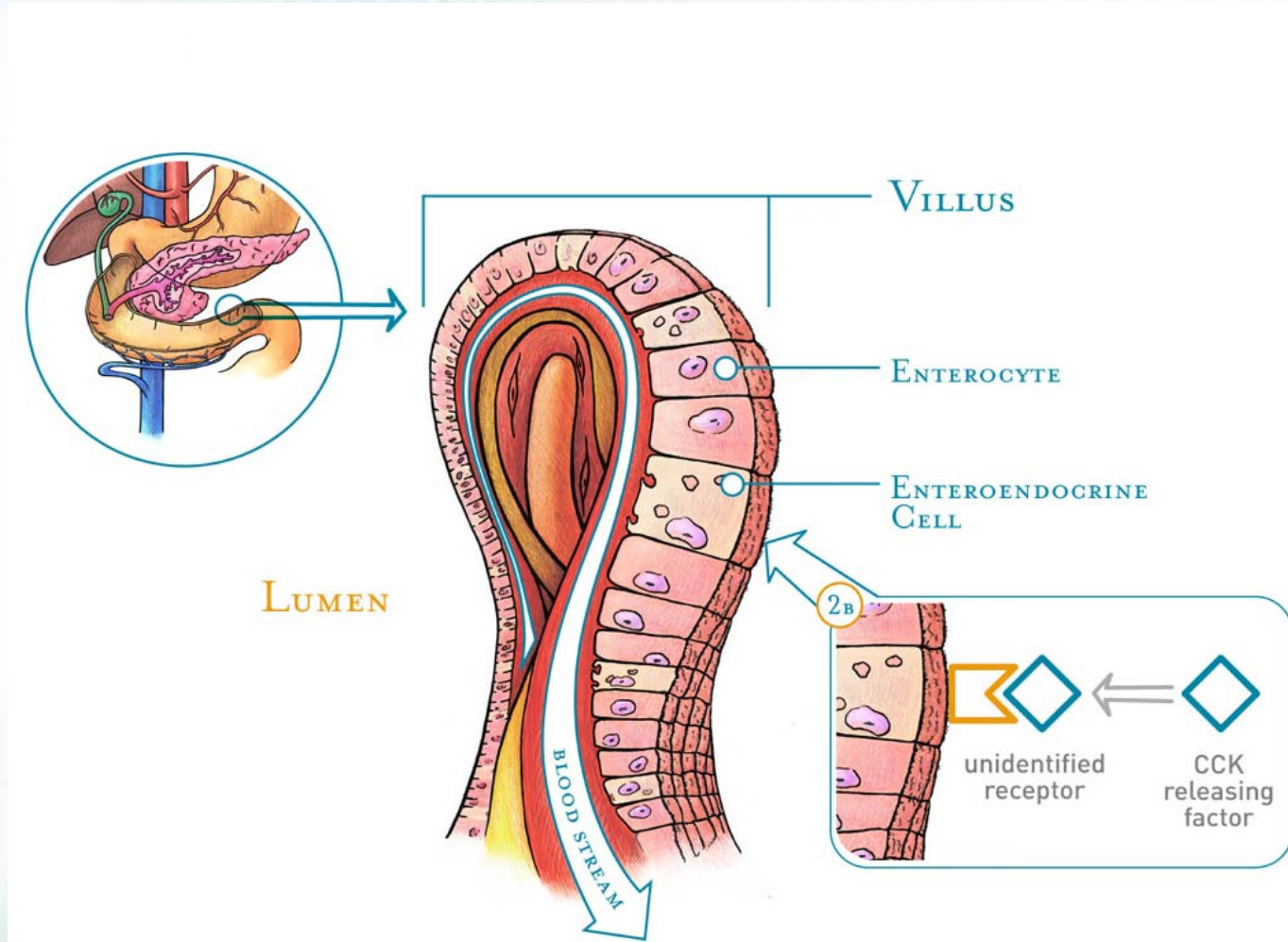


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# In the State of Fullness

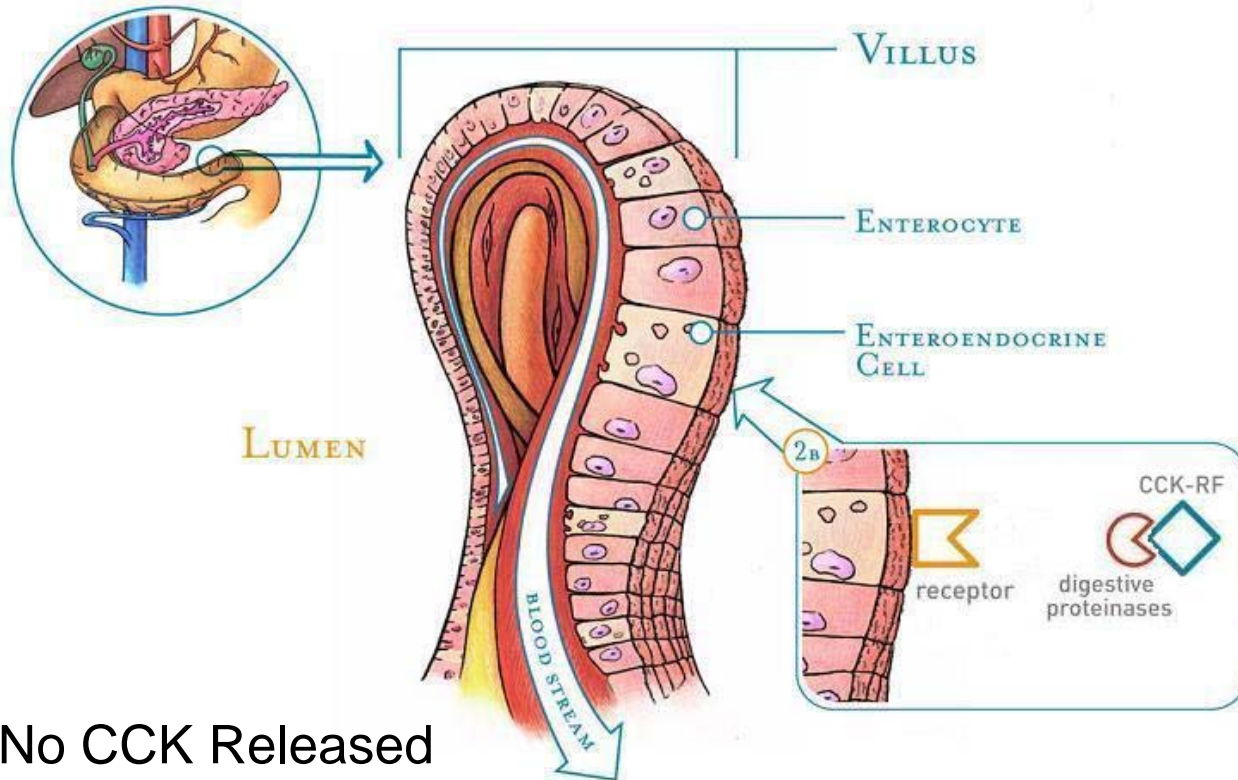


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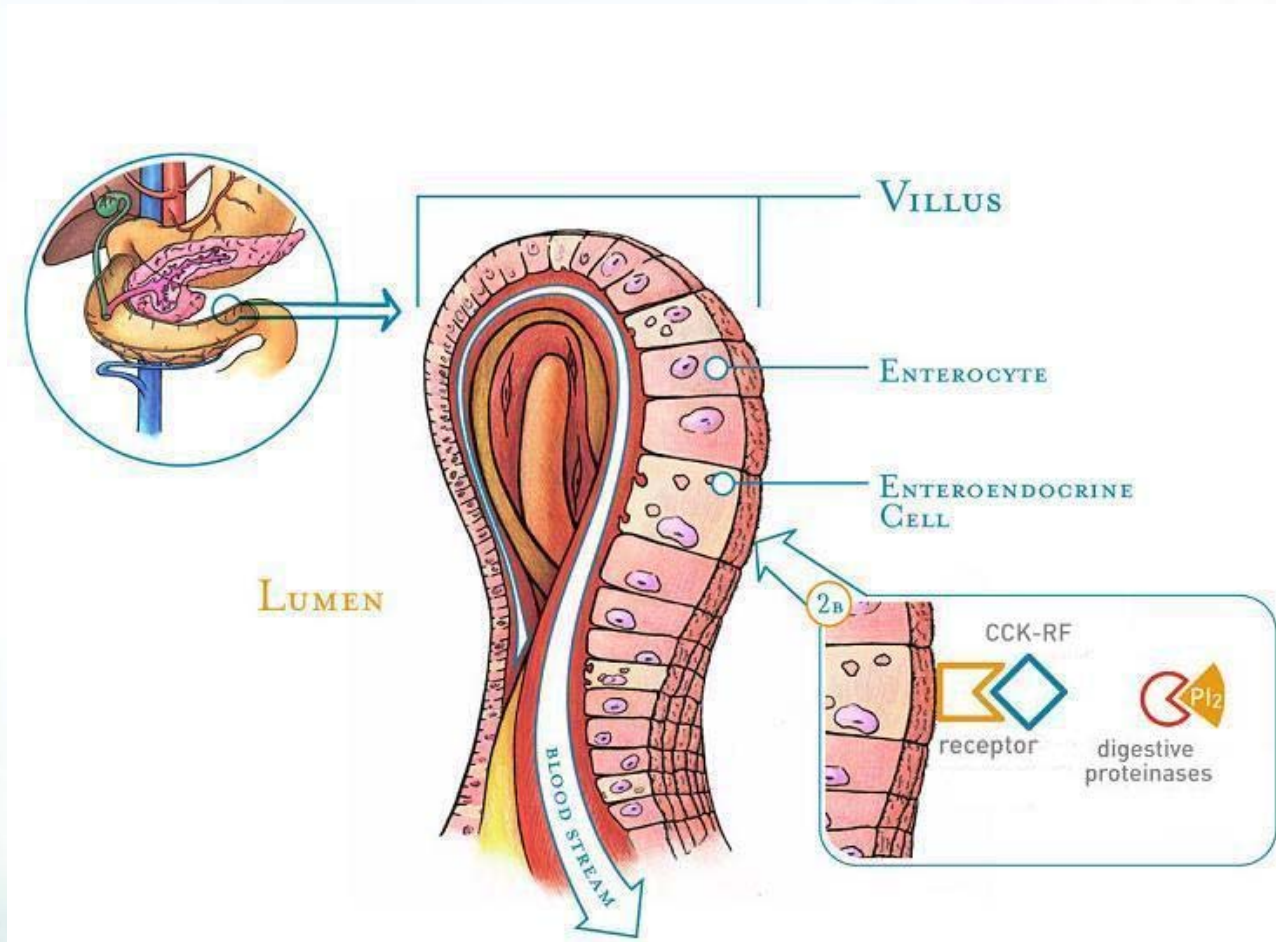


# In the Fasting State (no food present)



No CCK Released

# When PI2 is Taken (no food present)



  
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# Relevance of the PI2 Mechanism

- Fullness sooner and longer
- Portion control
- Curb snacking
- Fewer calories consumed
- Weight management
  - ▶ Loss
  - ▶ Maintenance



# Slendesta™ Potato Protein Extract Research

- Efficacy
- 11 Clinical studies
  - ▶ CCK
  - ▶ Hunger
  - ▶ Satiety
  - ▶ Glucose
  - ▶ Weight loss



Dana. 2006. KHBB-017-036

  
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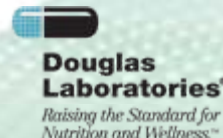
  
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# Spreadbury Blood Glucose Study

- Randomized, double-blind, cross-over design
- Conducted at Des Moines University of Osteopathic Medicine
- 39 healthy adult men and women
- Placebo and two different active doses
  - ▶ 7.5, 15, or 30 mg PI2 (150, 300, or 600 mg Slendesta™ Potato Protein Extract 5% Powder)
- 30 min before a lunch meal

Spreadbury *et al.* 2003. *JANA*. 6(1): 29-38.



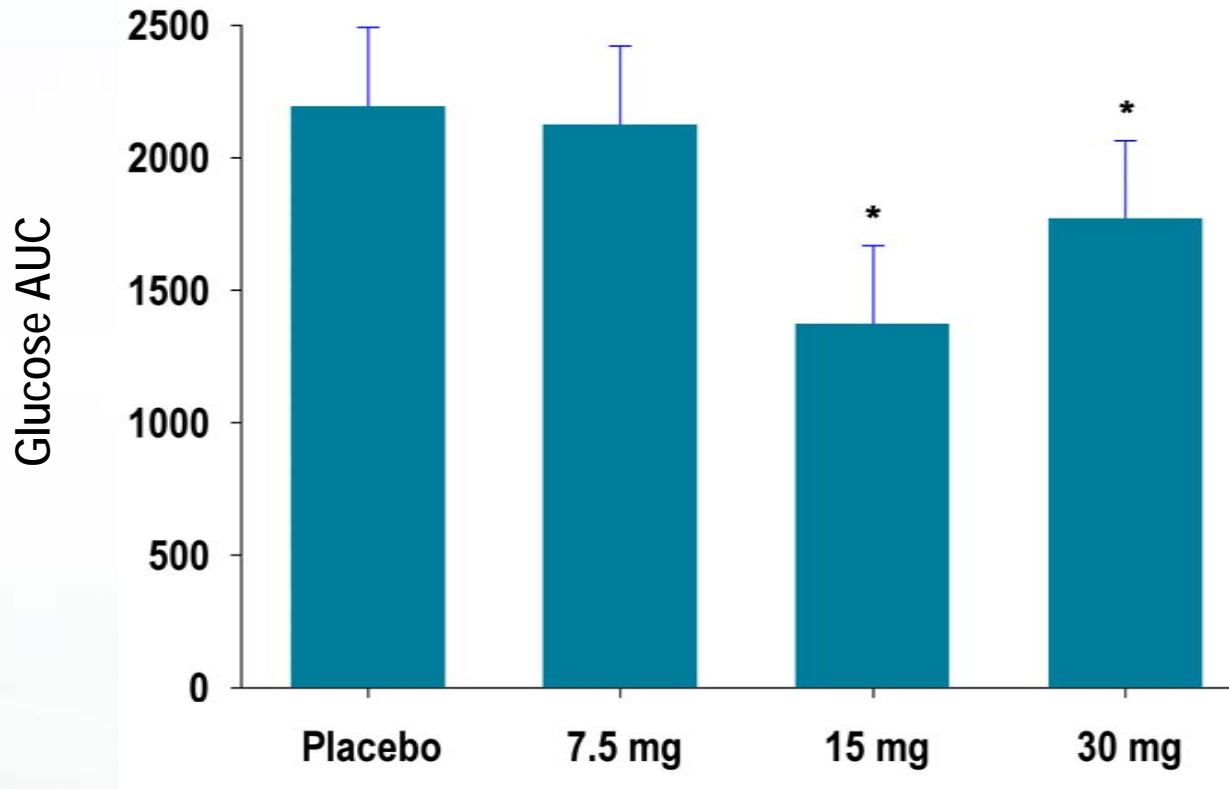
# Spreadbury Study

- Measured
  - ▶ Peripheral blood glucose levels
    - Every 30 minutes for two hours after meal
  - ▶ Adverse events
    - At 15 minute intervals for 200 minutes

Spreadbury *et al.* 2003. *JANA*. 6(1): 29-38.



# Spreadbury Study - Decreased Post-meal Blood Sugar



\*  $p < 0.05$  vs. placebo

Spreadbury *et al.* 2003. *JANA*. 6(1): 29-38.

  
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# Conclusions Supported by the Spreadbury Study

- 100-fold lower doses than previous tests
- First administration in capsule form
- Suggested possibility of lowering glycemic load with Slendesta™ Potato Protein Extract before a meal
- Lowest effective dose tested was 15 mg PI2
- No serious side effects; no significant difference by treatment

Spreadbury *et al.* 2003. *JANA*. 6(1): 29-38.



# ISU Study - Iowa State University

- Randomized, double-blind, cross-over design
- 45 healthy adult women
- Three clinic visits
- 0, 15 or 30 mg PI2 (0, 300, or 600 mg Slendesta™ Potato Protein Extract 5% Powder) 60 min before breakfast

# ISU Study

- Measured
  - ▶ Fullness, hunger, desire to eat
  - ▶ Prospective food consumption
  - ▶ Glucose
  - ▶ CCK
  - ▶ Adverse events



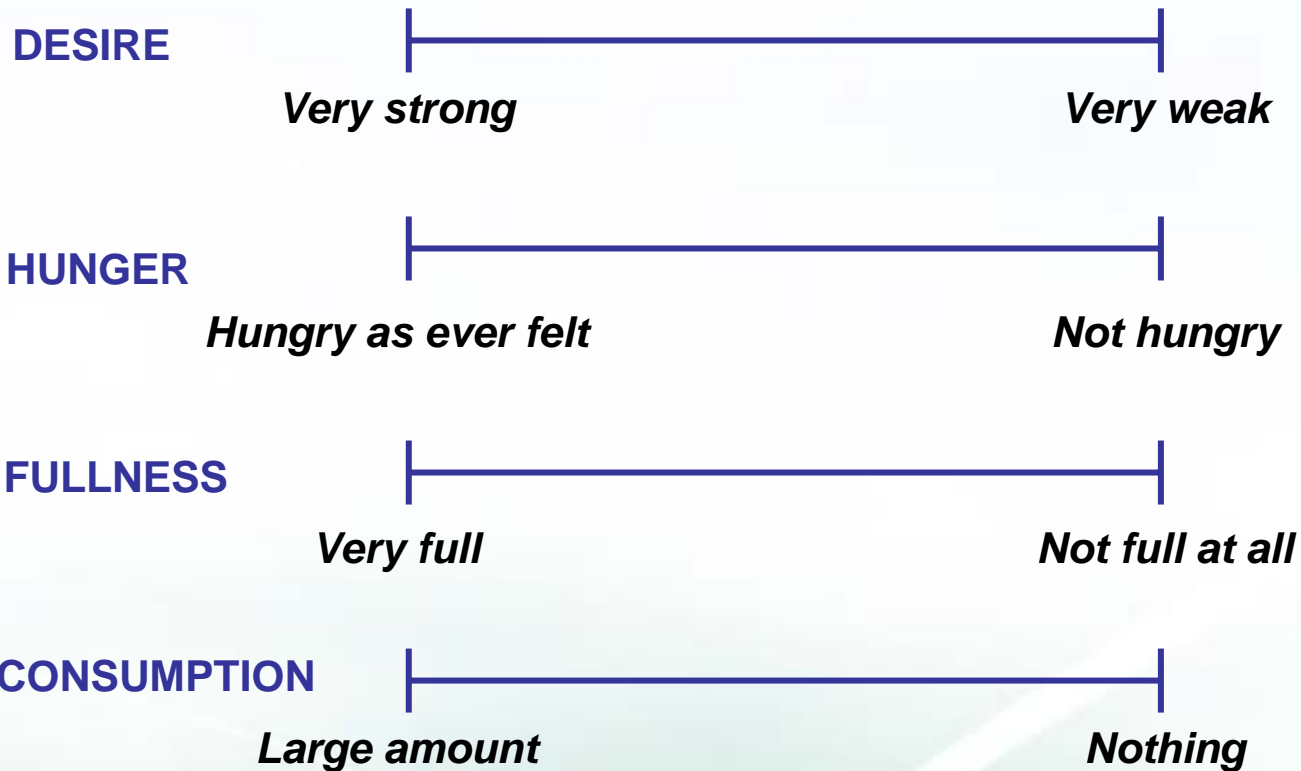
Dana *et al.* 2006. KHBB-017-040

  
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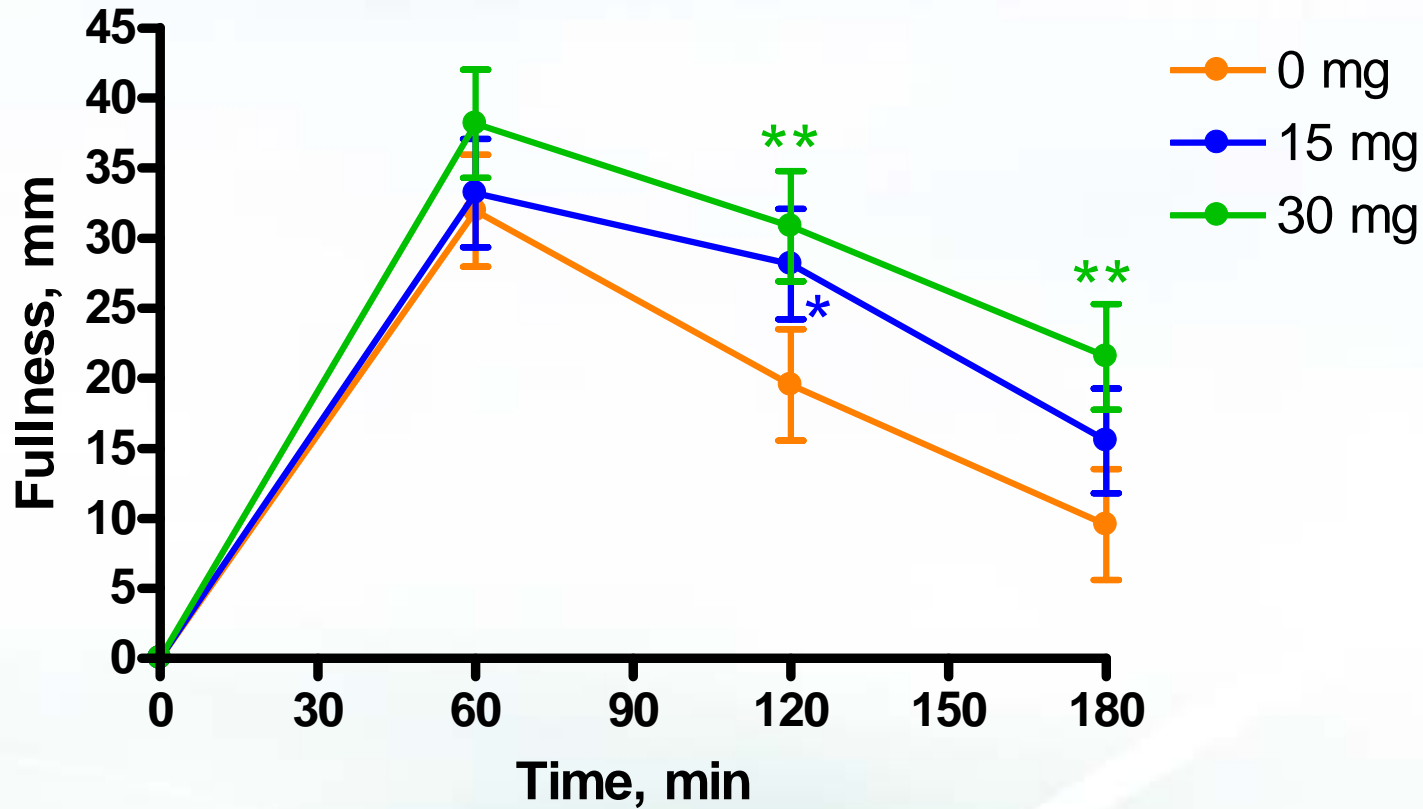
# Visual Analog Scale (VAS)



Hill et al. 1990 *Physiol. Behav.* 48: 241-6



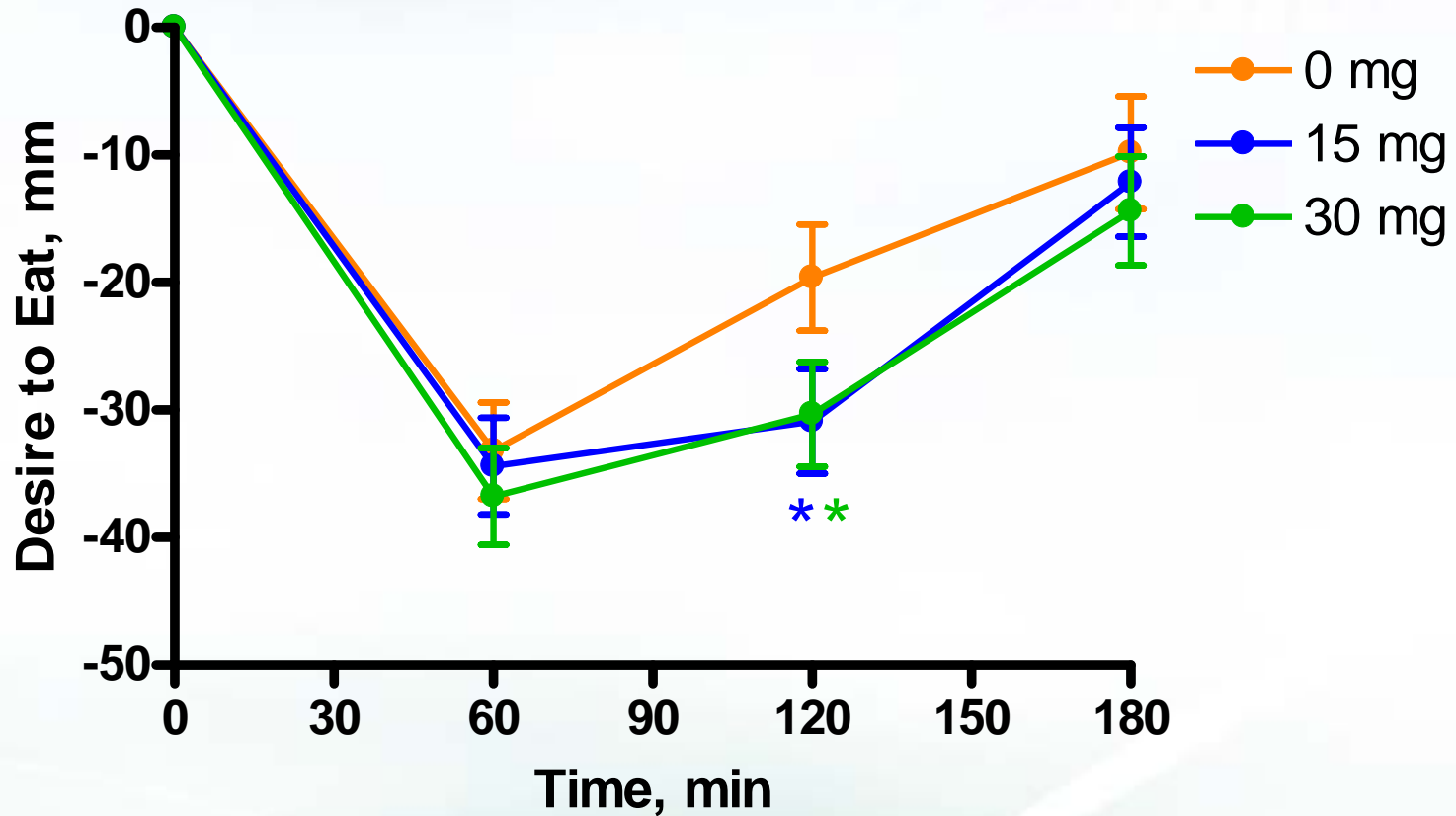
# ISU Study - Increased Fullness



0 = not at all full, 100 = very full;

\*  $p < 0.05$  15 mg vs. placebo; \*\*  $p < 0.01$  30 mg vs. placebo

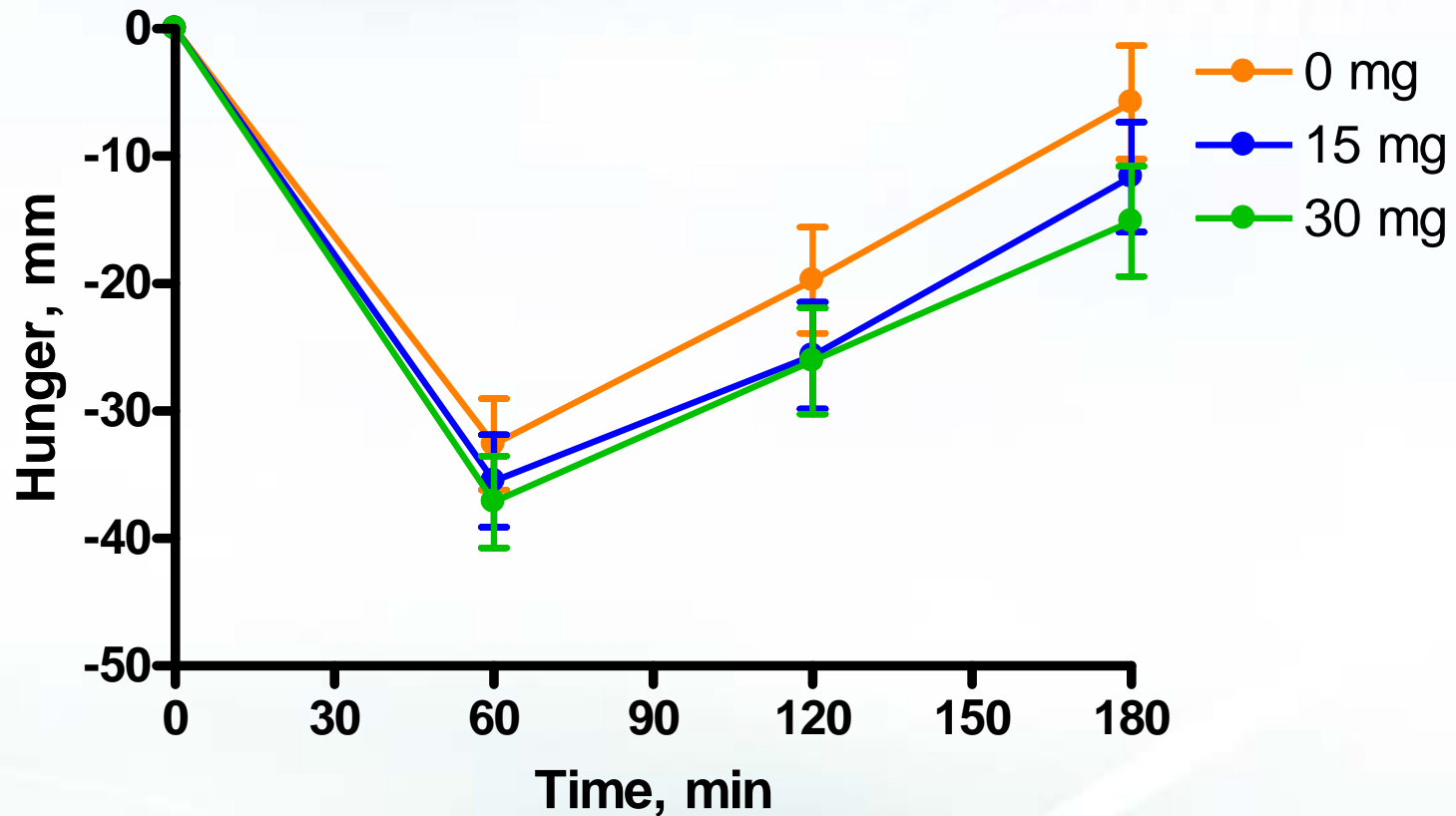
# ISU Study - Decreased Desire To Eat



0 = very strong, -100 = very weak;

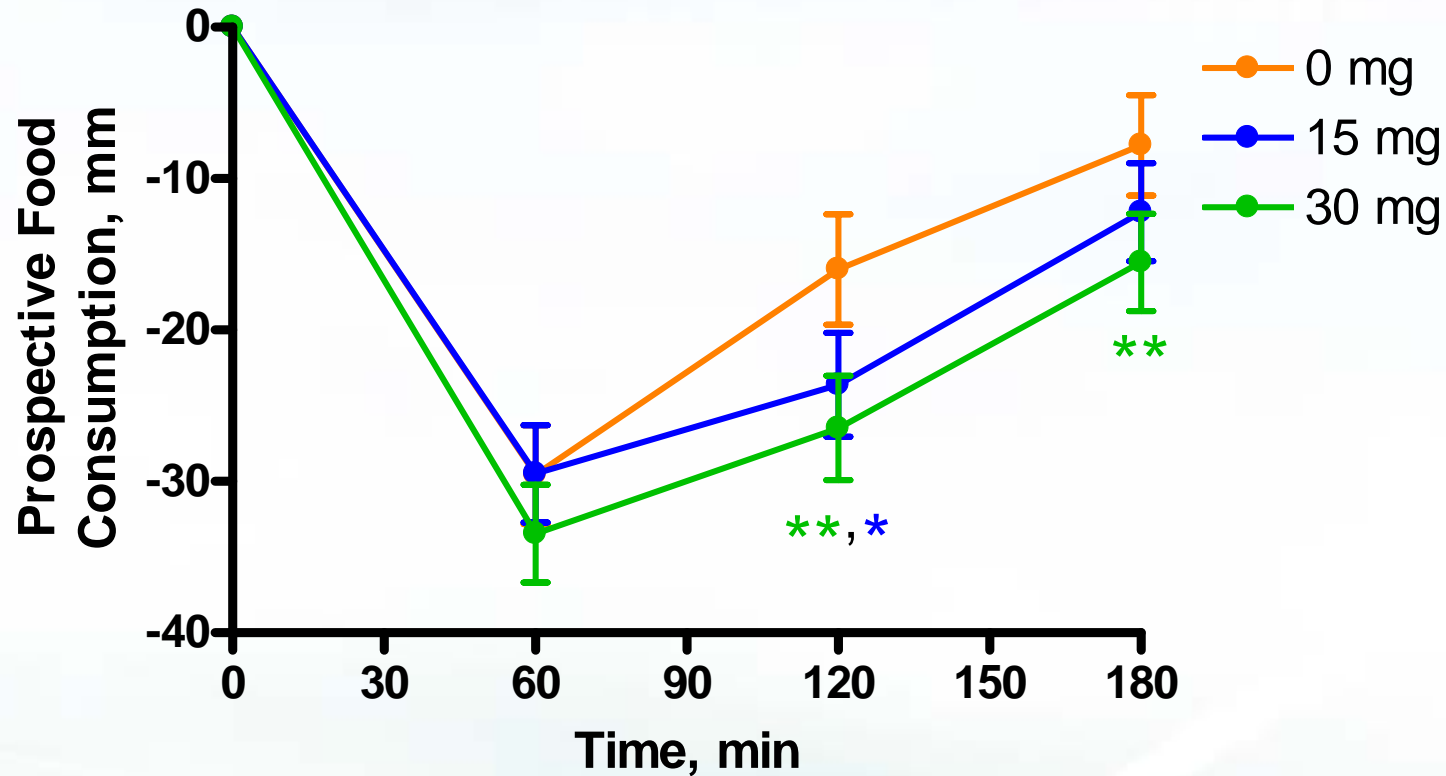
\*  $p < 0.05$  vs. placebo

# ISU Study - Decreased Hunger



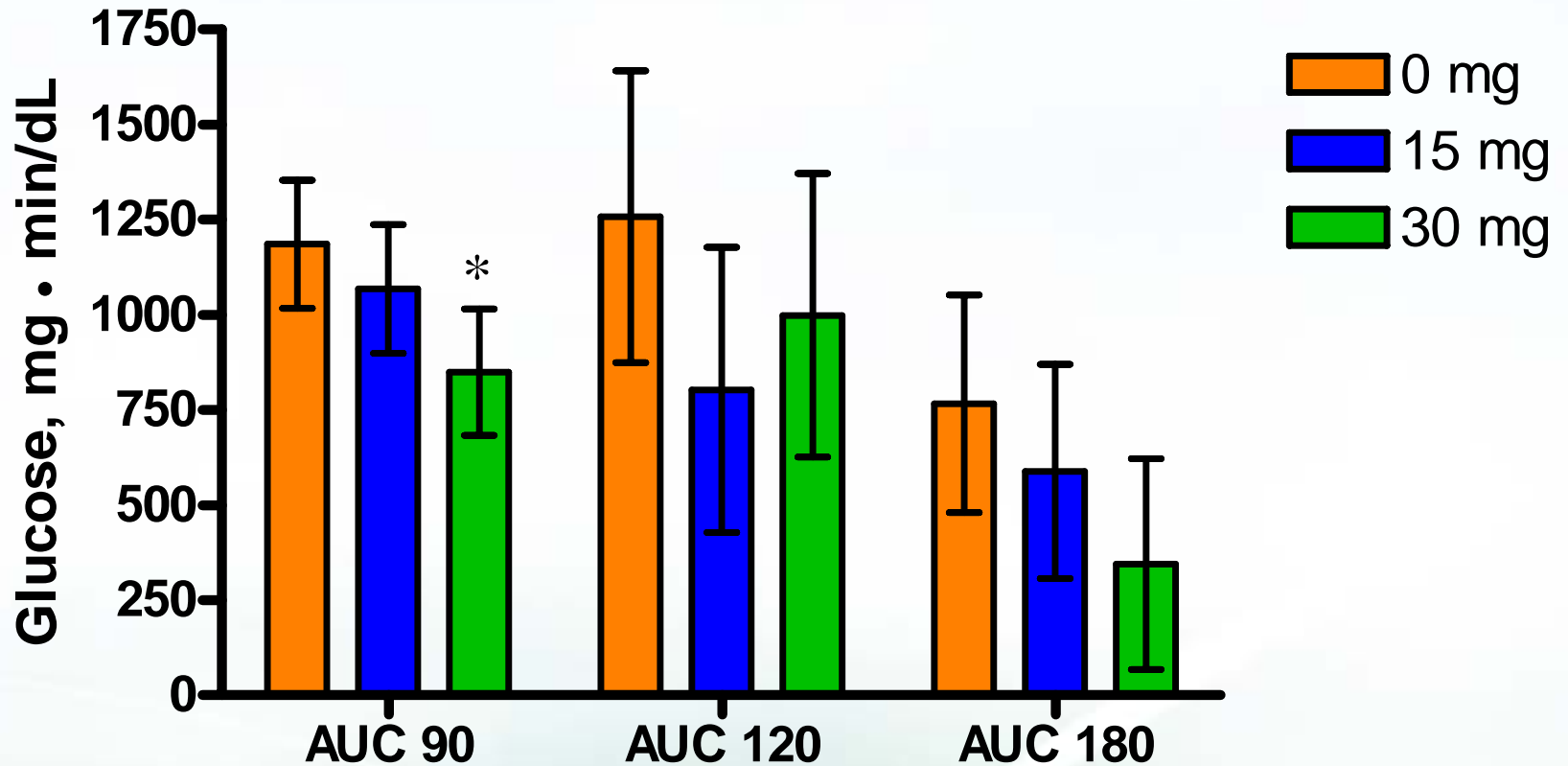
0 = as hungry as I have ever felt; -100 = not hungry at all

# ISU Study - Lower Food Consumption



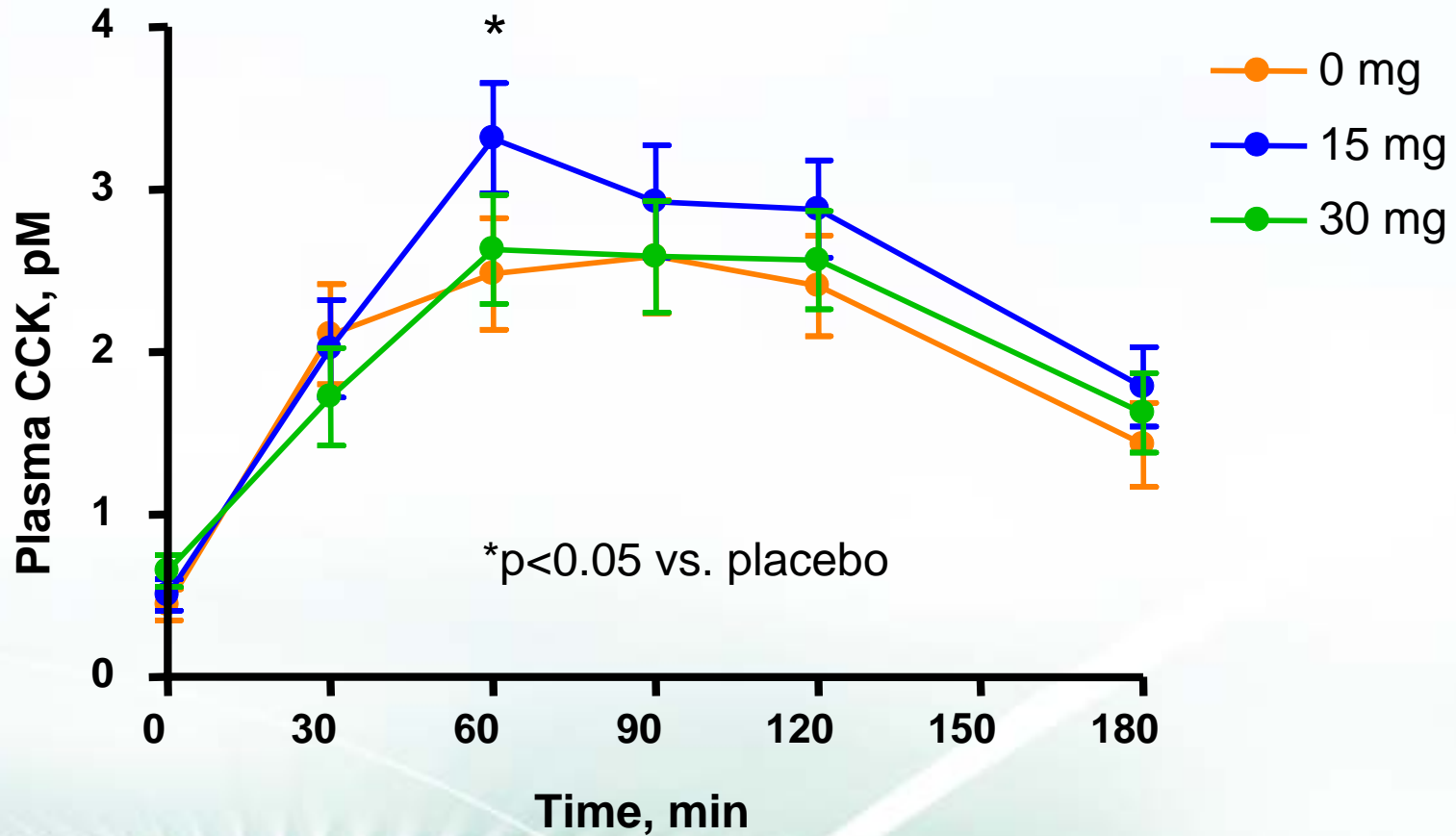
Prospective Food Consumption 0 = large urge, -100 = no urge  
\*p<0.05 mg vs. placebo; \*\*p<0.01 30 mg vs. placebo

# ISU Study - Decreased Glucose Spikes



\* p < 0.05 vs. placebo

# ISU Study - Increased CCK Release



Dana et al. 2006. KHBB-017-040

  
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# Slendesta™ Potato Protein Extract Advantages

- Clinical research = A Competitive Advantage
  - ▶ An Effective Product with Claims Substantiation
  - ▶ Safe
  - ▶ Natural
  - ▶ No side effects
    - No stimulants, no jitters
    - Won't keep you up nights
    - No bloating



# ASCO/FUCUS Blend

***In vitro efficacy results***  
***In vivo safety and efficacy results***



# ***In vitro* efficacy:**

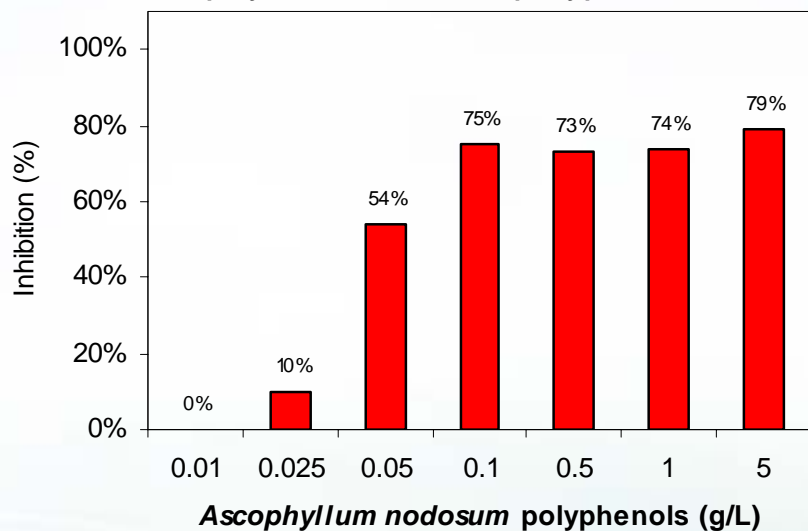
**The *in vitro* efficacy study was aimed at confirming the efficacy of the inhibitor at doses that are commercially viable.**

**This protocol was also aimed at providing guidelines for the elaboration of the animal protocols.**

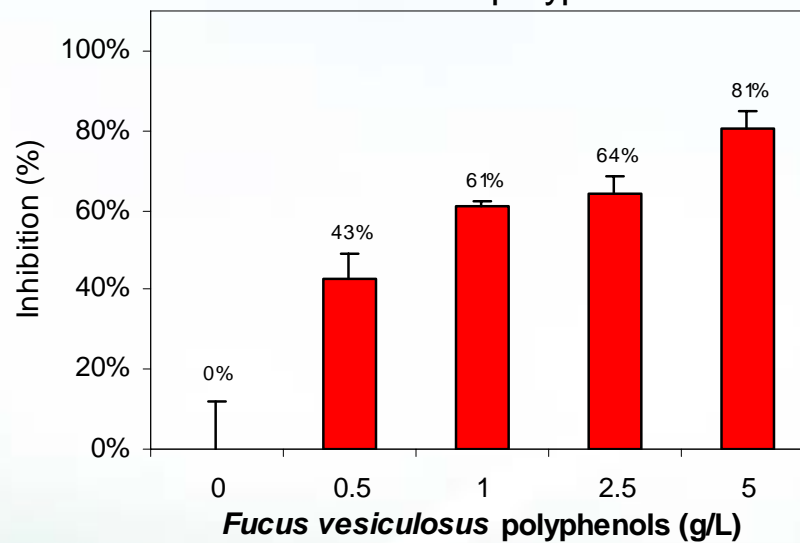


# *In vitro* efficacy:

Inhibition of alpha-amylase by *Ascophyllum nodosum* polyphenols

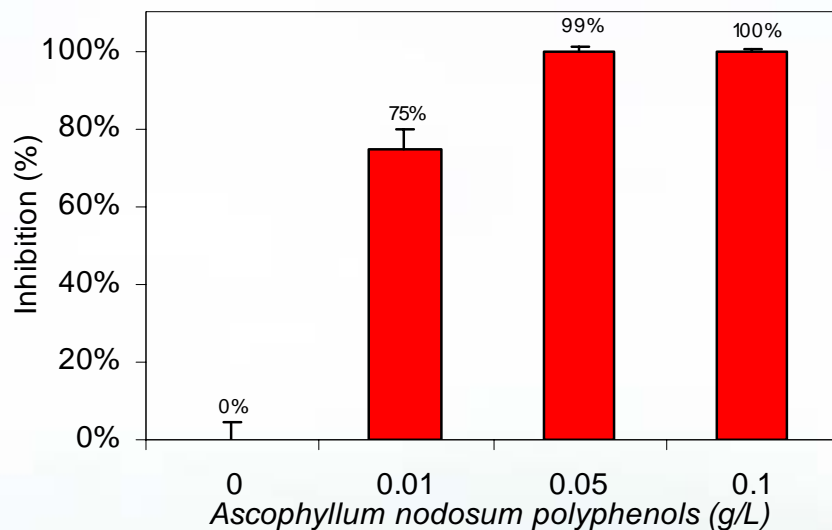


Inhibition of alpha-amylase by *Fucus vesiculosus* polyphenols

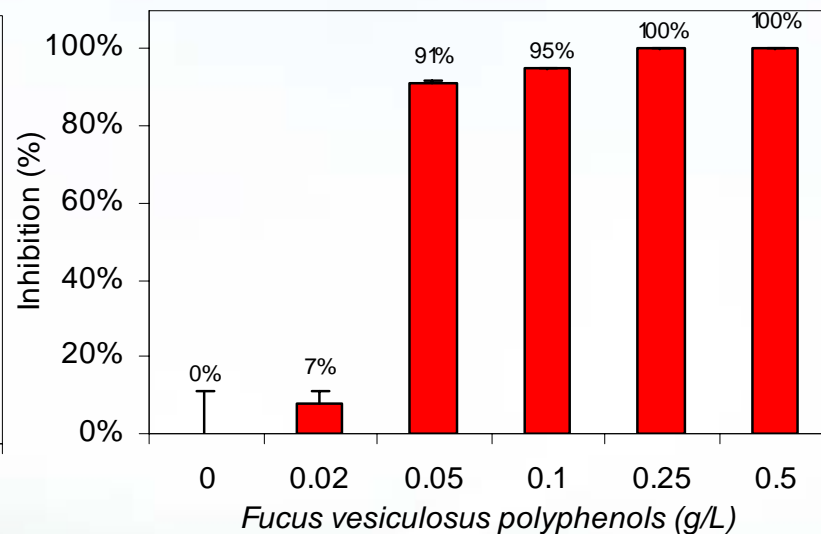


# *In vitro* efficacy:

**Inhibition of alpha-glucosidase by *Ascophyllum nodosum* polyphenols**



**Inhibition of alpha-glucosidase by *Fucus vesiculosus* polyphenols**



# ***In vivo* efficacy:**

**The following parameters were measured:**

- 1) Blood glucose;**
- 2) Blood insulin.**

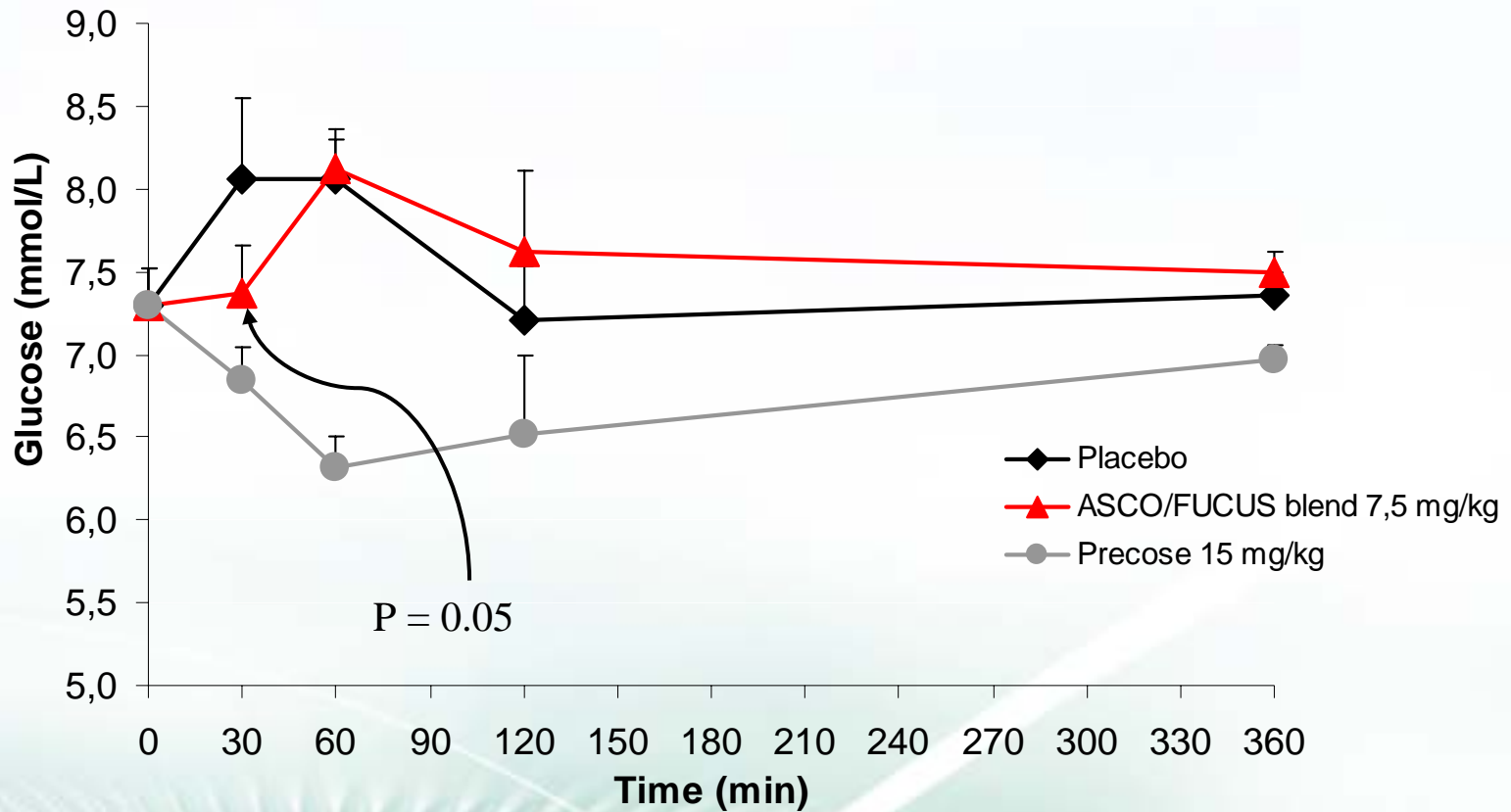
**The animals were divided and gavaged with a diet containing corn starch and sunflower oil at a dose of 2 g/kg body weight.**

**The efficacy of the product was compared to the pharmaceutical control Precose from Bayer (inhibitor of alpha-amylase and alpha-glucosidase).**



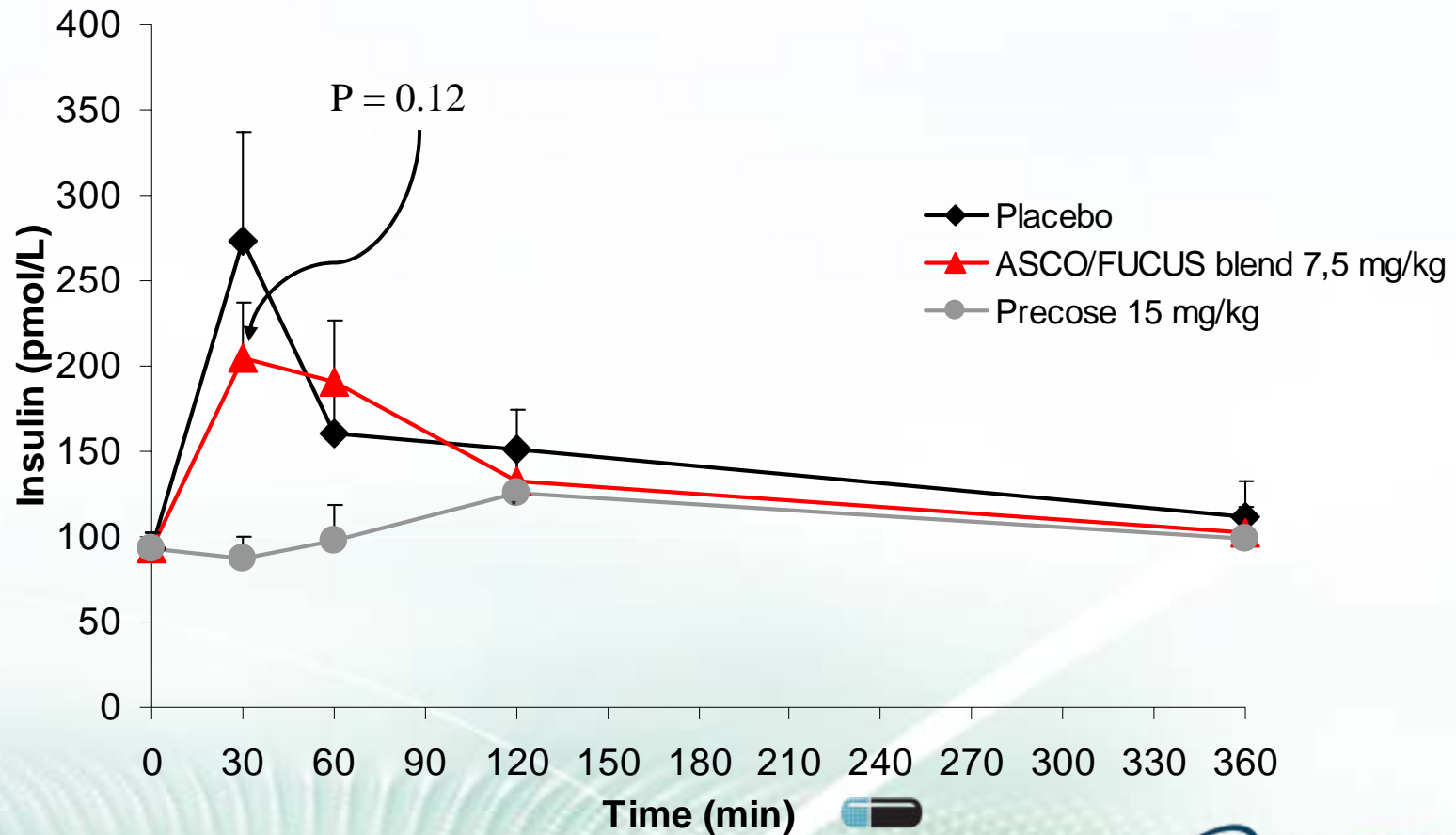
# *In vivo* efficacy:

Blood glucose following gavage with starch and oil



# *In vivo* efficacy:

**Blood insulin following a gavage with starch and oil**



# *In vivo* safety:

The ASCO/FUCUS blend's effects were compared on three different diets:

- 1) Chow (ratio CLP 67%/11.8%/21.2%)
- 2) High carb (ratio CLP 64.9%/14.5%/20.6%)
- 3) High fat (ratio CLP 14.5%/65.0%/20.5%)

Study parameters included blood glucose, insulin, triglycerides, cholesterol, organ weight, body weight, food intake, stool analysis (residual energy and nitrogen) and blood clotting.



# *In vivo* safety:

**The ASCO/FUCUS blend is well tolerated at a dose up to 750 mg/kg body weight (equivalent to a daily dose of 52.5 g in humans).**

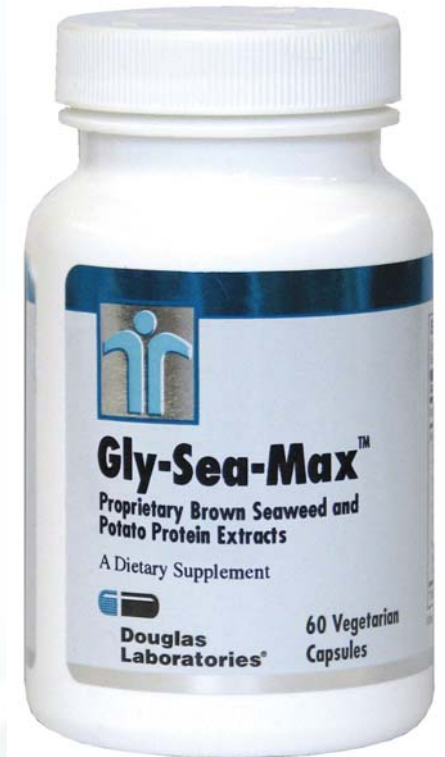
**No signs of toxicity were seen based on organ weight, stool analysis or blood parameters.**

**The ASCO/FUCUS blend, at the highest dose tested (750 mg/kg) induced a statistically significant reduction in blood insulin in rats fed the high carb diet.**



# Gly-Sea-Max™

- Combination of Natural Proprietary Ingredients
- Complementary Modes of Action
  - ▶ Satiety, Fullness
  - ▶ Enhancement of CCK release
  - ▶ Inhibition of carbohydrate absorption
- Safe
  - ▶ Derived from typically consumed foods
  - ▶ Stimulant-Free
- Vegetarian, Non-GMO



# Gly-Sea-Max™

- Decrease in the normal blood glucose response to a meal
- Increase in satiety

