MedicalXpress

# Hormone that signals fullness also curbs fast food consumption and tendency to binge eat

June 7 2007

The synthetic form of a hormone previously found to produce a feeling of fullness when eating and reduce body weight, also may help curb binge eating and the desire to eat high-fat foods and sweets. The findings on fast food consumption and binge eating tendencies are based on a 6-week research study of 88 obese individuals.

The research, entitled “Pramlintide treatment reduces 24-hour caloric intake and meal sizes and improves control of eating in obese subjects,” appears in the online edition of the American Journal of Physiology-Endocrinology and Metabolism. Pramlintide is the synthetic form of amylin, a satiety hormone produced by the beta cells of the pancreas, which also produce insulin.

“Satiety hormones are commonly thought to control food intake by signaling to the brain when we are full,” said Christian Weyer, M.D., the study’s senior author and executive director of clinical research at Amylin Pharmaceuticals, Inc., in San Diego, Calif. “The findings of our clinical study further suggest that satiety hormones such as amylin can exert multiple effects on human eating behavior, such as reduced intake of highly-palatable foods and reduced binge eating tendency.”

Pramlintide is marketed in the U.S. by Amylin Pharmaceuticals, under the brand name Symlin, to treat diabetes and control blood sugar. Amylin is one of several hormones secreted when eating and is known to work in partnership with insulin to regulate blood sugar. Pramlintide is also under development as a potential drug for obesity.

The study was carried out in 10 U.S. research sites and was reported by Steven R. Smith of the Pennington Biomedical Research Center in Baton Rouge, La.; John E. Blundell of the University of Leeds, United Kingdom; and Colleen Burns, Cinzia Ellero, Brock E. Schroeder, Nicole C. Kesty, Kim Chen, Amy E. Halseth, Cameron W. Lush and Christian Weyer, all of Amylin Pharmaceuticals.

## Multi-center, double-blind study

Eighty eight volunteers, comprised of obese men and obese post-menopausal women, 25-60 years old, took part in the 6-week study. (Pre-menopausal females were excluded because estrogen affects hunger and eating.) Participants were divided into treatment and placebo groups at a 2:1 ratio. Neither participants nor investigators knew which subjects were receiving placebo and which pramlintide.

Participants began with a four-day inpatient stay. All subjects received placebo during the first two days. The treatment period began on day three. The subjects received pramlintide or placebo via subcutaneous injection 15 minutes prior to each meal: breakfast, lunch and dinner. They continued their assigned regimen during a 5-week outpatient period (days 5-41) but reported for brief visits to the research unit on days 17 and 31. They returned for a final three days as inpatients, ending the experiment at day 44.

Participants maintained their typical exercise habits and made no lifestyle changes that could account for weight loss. During the inpatient stays, food intake was measured throughout the day under carefully controlled conditions. Participants were allowed to eat as much as they wanted but were told to eat until they were comfortably full.

On inpatient days 1, 3, and 43, offerings included such foods as bagels and cream cheese, muffins, cereal, fruit, sandwiches, casseroles, salads,

tortilla chips, potato chips, cookies and soft drinks. They were also offered an evening snack that included peanut butter sandwiches and a cookie.

On inpatient days 2, 4, and 44, participants received a high-fat, high-sugar lunch that included deep-dish pizzas, ice cream and high fructose corn syrup-sweetened soft drinks. These three meals were the “fast-food challenge.”

The participants’ 24-hour food intake was measured on the first day of the experiment, when all were given a placebo, the first treatment day, (day 3) and on day 43. The participants rated their feelings of hunger, fullness and nausea throughout these days using a hand-held electronic device. Participants also completed a 16-item questionnaire on days 1 and 42 that was designed to measure binge eating tendencies.

The researchers looked at weight, portion size, 24-hour caloric intake and consumption at a “fast food” challenge.

Weight: Participants who received pramlintide lost significantly more weight than those who received placebo. This finding fits with earlier research with rodents and some human studies. The pramlintide group lost an average of 4.5 pounds, about 2% of total body weight, while the placebo group remained about the same weight. The weight loss was in line with a 3.7% weight loss during an earlier 16-week study, the authors said.

Calories: The pramlintide group ate significantly fewer calories compared to the first two days of the experiment, before treatment started. On day 3, the first day of treatment, the pramlintide group decreased their food intake by 990 calories while the placebo group decreased caloric intake by a more modest 243 calories. On day 43, the pramlintide group was still ingesting significantly fewer calories (680

less) compared to what they consumed before treatment began. By comparison, the placebo group ate only 191 fewer calories on day 43.

Portion control: Within the inpatient setting, the overall reduction in 24-hour caloric intake with pramlintide was attributable to subjects eating smaller portions at each major meal. What is more, the researchers found that the pramlintide group felt just as full and satiated as the placebo group, even though the pramlintide group was eating considerably less. This suggests that pramlintide participants did not experience the increased feeling of hunger and food craving that often occurs when food intake is reduced with dieting, Weyer said

Fast food intake and binge eating: The researchers also examined how the hormone affected certain “hedonic” aspects of eating. Hedonic eating includes, for instance, the consumption of “fast foods,” that are high in fat or sugar (such as pizza, chocolate and ice cream), often leading to a sense of reward. The pramlintide group reduced fast food intake by 385 calories on day 44 during the “fast-food challenge,” compared to the placebo group, which decreased their intake by 109 calories. Those taking pramlintide also reduced their scores on a questionnaire designed to measure binge eating tendencies: On day 42, 83% of participants on pramlintide were categorized as having “mild-to-none” binge eating severity, compared to 58% in the placebo group.

These new results are interesting in light of previous observations in rodents. Rats typically crave high-sugar foods when placed under stress. When they receive amylin, their stress-induced sugar consumption significantly decreases. On chronic amylin treatment, obese rats also exhibit a long-term switch to eating more healthy chow and less high-fat, high sugar food.

“Our findings illustrate that comprehensive, carefully conducted clinical studies can provide important new insights into how hormones help

regulate human eating behavior," Weyer said. Often times, the food intake effect of hormones in humans is studied only acutely, using a single meal test.

## More natural weight control?

Unlike many diet pills, which typically block individual brain chemicals, hormone-based therapies such as pramlintide work by enhancing existing physiological pathways involved in food intake control. By developing therapies based on naturally occurring hormones, it may be possible to help people control how much they eat, reduce binge eating and resist the drive to overeat even while living in today's environment where access to high-caloric food is abundant every day.

While this research is promising, it appears pramlintide will produce only modest weight loss, probably around 8%, before reaching a plateau. Amylin Pharmaceutical's clinical research program in obesity includes several ongoing studies that test pramlintide in combination with other hormones involved in weight control, such as peptide YY and leptin, Weyer said. Research in obese rats suggests that amylin may restore the response to leptin, which is often lost in obesity. The hope is that this combination approach will help achieve even greater appetite control and weight loss.

Source: American Physiological Society