Meal anticipation potentiates postprandial ghrelin suppression in humans

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Circulating concentrations of the orexigenic hormone ghrelin show a postprandial decrease in dependence on meal size and composition. Cognitive determinants of postprandial ghrelin suppression in humans are largely unexplored. We assessed the effects of cued meal anticipation on pre- and postprandial concentrations of total plasma ghrelin, pancreatic polypeptide and leptin as well as on markers of glucose metabolism in healthy men. In a between-subject comparison, meal anticipation was induced in 14 fasted men at 08:00 h by the announcement and subsequent presentation of a breakfast buffet. Fifteen fasted control subjects were informed that they would remain fasted until noon. At 10:00 h, both groups were served a rich free-choice breakfast. At 12:00 h, all subjects underwent a snack test assessing casual cookie intake. Circulating concentrations of ghrelin, pancreatic polypeptide, glucose, insulin and leptin were frequently assessed. Preprandial endocrine parameters as well as breakfast intake (all p>0.23) and subsequent snack consumption (p>0.83) were comparable between groups. The postprandial suppression of ghrelin levels observed in both groups was markedly stronger in subjects who had anticipated breakfast intake (p<0.03) while pancreatic polypeptide concentrations did not differ between groups (p>0.56). Results indicate that meal anticipation is a critical determinant of postprandial ghrelin suppression that, as suggested by unaltered pancreatic polypeptide levels, appears to be mediated independent of vagal activation. Our findings highlight the role of subtle cognitive factors in the postprandial regulation of ghrelin secretion, suggesting that neurobehavioral approaches to improved food intake control should take into account meal anticipatory mechanisms.