Unstandardized meal does not affect plasma concentrations of leptin, acylated and unacylated ghrelin in humans

Hanna Wosik¹, Jolanta Fryczak², Gabriela Meleni-Mucha²
¹Mikolaj Pirogow District Hospital, Lodz, Poland
²Department of Immunoendocrinology, Medical University of Lodz, Poland

Introduction
Leptin and both forms of ghrelin (acylated and unacylated) are peptide hormones involved in appetite control and food intake regulation in humans. Ghrelin is known as the only fast-acting orexigenic hormone, playing a substantial role in meal initiation, while leptin is a mediator of long-term regulation of energy balance, suppressing food intake and thereby protecting against pathological weight gain. It has been thought that circulating ghrelin concentrations are elevated by fasting and suppressed following a meal, whereas leptin concentrations change in the opposite direction[1]. Most human clinical studies only examined these changes after a standardized meal and in carefully selected probes. Assessing total ghrelin without separate measurement of acylated and unacylated hormone together with using different assay methods may also contribute to discrepancies between the studies’ results [2,3].

The aim of the present study was to investigate whether unstandardized meal influences short-term response of leptin and both biological forms of ghrelin in the group of age- and BMI-differentiated healthy volunteers.

Results
- Plasma concentrations of leptin were higher in females compared to male subjects (Me=11,8 ng/ml; U=82,5; p<0,01); the analysis was performed for the whole results.
- Plasma concentrations of unacylated ghrelin were higher in females compared to male subjects (Me=777,50 vs 455,00 pg/ml; U=126,0; p<0,05); as before.
- Leptin concentrations were also higher in overweight/obese than in normal weight individuals (t±SD: 15,4±12,5 vs 4,03±3,78 ng/ml; p<0,001); as before.
- No significant difference has been found between fasting and short-time postprandial plasma concentrations of leptin, acylated and unacylated ghrelin, nor acylated to unacylated ghrelin ratio (Table 1, Fig. 1).

Table 1. Plasma concentrations of leptin, acylated and unacylated ghrelin and acylated/unacylated ghrelin ratio.

<table>
<thead>
<tr>
<th></th>
<th>Women</th>
<th></th>
<th></th>
<th>Men</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Me fasting</td>
<td>Me postprandial</td>
<td>U</td>
<td>Me fasting</td>
<td>Me postprandial</td>
<td>U</td>
</tr>
<tr>
<td>Leptin [ng/ml]</td>
<td>15,55</td>
<td>10,45</td>
<td>40,00*</td>
<td>4,50</td>
<td>3,80</td>
<td>39,50*</td>
</tr>
<tr>
<td>Acylated ghrelin [pg/ml]</td>
<td>59,75</td>
<td>68,75</td>
<td>47,50*</td>
<td>42,50</td>
<td>57,50</td>
<td>44,00*</td>
</tr>
<tr>
<td>Unacylated ghrelin [pg/ml]</td>
<td>782,50</td>
<td>765,00</td>
<td>45,00*</td>
<td>582,50</td>
<td>347,00</td>
<td>38,00*</td>
</tr>
<tr>
<td>Acylated/unacylated ghrelin ratio</td>
<td>0,0375</td>
<td>0,0967</td>
<td>47,50*</td>
<td>0,0805</td>
<td>0,1175</td>
<td>40,00</td>
</tr>
</tbody>
</table>

* p<0,05; the U Mann Whitney test showed no significant differences between fasting and postprandial concentrations measured separately for each sex.

Conclusions
- No significant short-term changes were observed in plasma concentrations of appetite hormones before and after the meal.
- It seems that the short-term regulation of postprandial satiety is only partially dependent on ghrelin and leptin response.
- The meal composition may affect leptin and ghrelin plasma concentrations to the greater degree than just food ingestion [4,5].

References

The study was supported by Medical University of Lodz grant No 502/03/1-153/03/502-14-137.