Summary

Our objective was to evaluate plasma levels of gut hormones and hormones associated with glucose metabolism in children with type 1 diabetes mellitus (T1DM), and to correlate plasma concentrations of gut hormones with blood biochemistry, markers of metabolic control and anthropometric parameters. A multiplex assay kit (LINCOplex®) was used for the determination of postprandial plasma levels of specific gut peptide hormones. Amylin, glucose-dependent insulinotropic polypeptide (GIP), active glucagon-like peptide 1 (GLP-1), active ghrelin, insulin, leptin, pancreatic polypeptide (PP), and polypeptide YY (PYY) were assessed prospectively in 55 subjects including 19 T1DM children (mean age: 13.4 years) and 21 healthy reference controls (mean age: 13. 4 years) and 15 patients with functional abdominal pain (FAP) (mean age: 10.5 years). In total, 440 plasma hormones samples were assessed in 55 patients. Entered data were examined using a non-parametric Wilcoxon's test. Furthermore, statistically significant correlations were assessed by stepwise regression analysis. Our study demonstrated that the determination of specific postprandial gut hormones with the multiplex assay kit (LINCOplex®) was highly efficient. Not only was a small amount of plasma sample (25µl) required for analysis, but also a vast number of gut hormones could be assessed simultaneously. This is particularly useful in paediatrics.

T1DM subjects demonstrated significantly reduced amylin ($p<0.001$) and ghrelin ($p<0.05$) levels, whereas GIP ($p<0.05$) was elevated when compared to healthy controls. Hormone levels may impact on daily insulin dosages as well as metabolic control. Differences in gut hormones levels in T1DM with worse metabolic control tended to be more significant in comparison to healthy controls. Plasma levels of ghrelin ($p<0.001$) and GIP ($p<0.01$) were more significantly different in T1DM with worse metabolic control. Plasma levels of other assessed hormones did not differ significantly.

The FAP group of patients was considered as a second reference group. No statistically sig-

nificant differences were found in hormone plasma levels between FAP patients and healthy controls. This implies an important role of gut peptides in T1DM children.

Based on our results, gut hormones may have an impact on T1DM metabolic control. A significant correlation between $HbA_{1c,}$ daily insulin dosage and ghrelin was found in T1DM. This supports a significant correlation between $HbA_{1c,}$ daily insulin dosage and ghrelin in T1DM with worse metabolic control. Step-wise regression analysis confirmed HbA_{1c} and daily insulin dosage as a predictive factor for ghrelin plasma levels. Based on our findings we could further speculate that postprandial ghrelin values might serve as a measurable parameter of metabolic control. Our study demonstrated altered secretion patterns of GIT hormones in T1DM children. This supports the theory that insulin is not the only hormone which is lost after β-cells destruction or its secretion altered. A potential use of amylin to reduce postprandial hyperglycaemia can be envisioned as its deficit in T1DM and significant correlation with HbA_{1c} were demon-strated. Studies utilising GIT hormones are a promising future prospect for a deeper under-standing of diabetic metabolism. Given our final data one might speculate that better meta-bolic control and lower morbidity could be achieved using pharmacological intervention in GIT hormone pathways.