Evaluation of β-cell function in young MODY patients using a Mixed Meal Tolerance Test

Ingrida Stankute1, Ausra Morkunaitė1, Rimante Dobrovolskiene1, Evalda Danyte1, Dovile Razanskaite-Virbickiene2, Edita Jasinskienė1, Giedre Mockeviciene3, Valerie M. Schwitzgebel2,4, Rasa Verkauskienė1,4

1Medical Academy, Lithuanian University of Health Sciences, Kaunas, Lithuania
2Diabetes Center of the Faculty of Medicine, University of Geneva, 1211 Geneva, Switzerland
3Pediatric Endocrine and Diabetes Unit, Department of Pediatrics, Gynecology and Obstetrics, University Hospitals of Geneva, 1211 Geneva, Switzerland
4Institute of Endocrinology, Lithuanian University of Health Sciences, Kaunas, Lithuania

Background
Mixed meal tolerance test (MMTT) is a gold standard for evaluating β-cell function. There is limited data on MMTT and β-cell function in MODY patients.

Objective
The aim was to analyze plasma C-peptide (CP) levels during MMTT in MODY patients as a biomarker of β-cell function.

Methods
The cohort consisted of 39 patients with MODY genes mutations:

- 20 - GCK
- 8 - HNF1A
- 3 - HNF4A
- 4 - KCNJ11
- 2 – ABCC8
- 1 – INS
- 1 - KLF11

59% were children (n=23), and 41% - adults (18-27 years, n=16). MMTT was performed following standardized technique: overnight fast → ingestion of 6 mL/kg (max 360 mL) of standard liquid meal (1 kcal/mL).

Blood samples for CP and glyceremia levels were taken 10 min prior to the meal (t0), at the meal time (t1), and time points: t2, t3, t4, t5, t6. The results of CP were available at each time point for all subjects.

AUC_CP, CP_min, CP_max concentrations were evaluated for all subjects and compared between MODY groups.

The cutoff of stimulated CP>0.2 nmol/L was used in our study and described by other authors as a predictor of poor β-cell response and absolute insulin deficiency. Kruskal-Wallis test used to compare data in Fig. 1.

Results
The median of participants’ age was 190 months [142;269]. The median of diabetes duration was 44 months [25;136]. The youngest patient with performed MMTT was 2.5 years old (KCNJ11).

Conclusions
As expected GCK diabetes patients preserved the best β-cell function. For other than GCK related monogenic diabetes, a pretreatment challenge with MMTT might be a useful indicator to predict therapeutic success with oral sulfonylurea treatment after genetic diagnosis.

Financial Support
The study was supported by a grant from Lithuanian Research Council Lithuanian-Swiss program “Research and development” (CH-3-ŠMM-01/09) and the Federal Department of Foreign Affairs of Switzerland.
Swiss National Science Foundation Grant No. CR33I3_140655 and CR33I3_1166591 to Schwitzgebel VM.
Merck sponsored educational program “ESPE Clinical Fellowship” to IS.