Assessment of impaired glucose tolerance and diabetes in an obese paediatric population

E. Elowe-Gruau[1], T. Bouthors[1], E. Pivin[2], M. Buzduga[1], D. Laufer[1, 3], S. Borloz[1], J.J. Puder[1,4], S. Stoppa-Vaucher[1], F. Phan-Hug[1], A. Dwyer[4],M. Hauschild[1], N. Pitteloud[1,4]

1. Division of Pediatric Endocrinology, Diabetology and Obesity, Department of Pediatric Medicine & Surgery, Centre Hospitalier Universitaire Vaudois (CHUV), Lausanne, Switzerland 2.Institute of Social and Preventive Medicine (IUMSP), Centre Hospitalier Universitaire Vaudois (CHUV), Lausanne, Switzerland 3. Pediatric Unit, Department of Pediatric Medicine & Surgery, Centre Hospitalier Universitaire Vaudois (CHUV), Lausanne, Switzerland. 4. Endocrinology, Diabetes & Metabolism Service, Centre Hospitalier Universitaire Vaudois (CHUV), Lausanne, Switzerland

Disclosure statement: the authors report no conflict of interest

Background & Aims

- Screening for prediabetes or type 2 diabetes (T2D) is recommended for obese children >10 yrs (or onset of puberty) in the presence of two or more of the following risk factors[3]
  - ✓ family history of T2D in a 1° or 2° relative,
  - ✓ High-risk ethnicity,
  - ✓ signs of insulin resistance (IR) or associated conditions,
  - ✓ maternal gestational diabetes.
- Diagnostic utility of HbA1C remains controversial in this population.

AIMS

- To evaluate the prevalence of prediabetes and T2D among a cohort of obese children using oral glucose tolerance test (OGTT)
- To assess the utility of alternative tests: fasting plasma glucose (FPG), and HbA1C as compared to the OGTT.

Patients & Methods

- 148 obese children/adolescents recruited from an ambulatory pediatric endocrine service (BMI Z-Score ≥ 2.0 SDS per WHO[1]).
- Evaluation at 08:00 a.m. following 8-hour, overnight fast.
- Baseline measurement of plasma glucose, insulin, lipids, HbA1C, and leptin levels followed by a standard OGTT [2].
- Patients with acute or chronic inflammatory process, known diabetes, medication that alters glucose/lipid metabolism were excluded.

DEFINITIONS

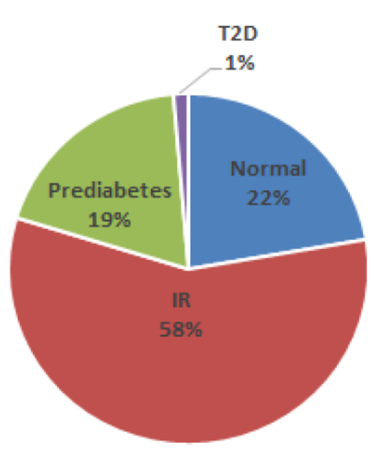
- **Insulin resistance (IR):** HOMA-IR ≥ 2.7 in the absence of prediabetes or T2D,
- **Prediabetes:** impaired fasting glucose (IFG) and/or impaired glucose tolerance (IGT) on standard OGTT[3].
  - IFG = FPG between 5.6 - 6.9 mM
  - IGT = T120-glucose 7.8 - 11.0 mM (OGTT)
- **T2D:** FPG level ≥ 7.0 mM or a T120-glucose ≥ 11.1mM

Results

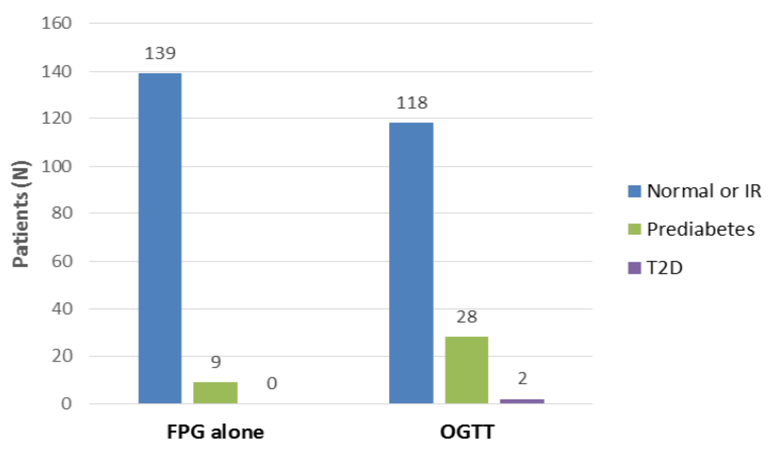
Patient characteristics

	n=148
Median age (range), years	11.9 (3.2-18.7)
Female / male (%)	53/47
Tanner 1 / Tanner 2-5 (%)	37/63
Median BMI Z-Score, (range), SDS	2.92 (2.0-12.9)
High-risk ethnicity (%)	24
T2D in 1° / 2° relative (%)	26
High-risk group per ADA (%)	34
Blood pressure> P95 (%)	8
Dyslipidemia (%)	24
Median HbA1C (range) ,%	5.3 (5.0-5.9)
Median HOMA-IR (range)	4.87 (19.9-0.9)
Median T0-glucose (range), mM	4.9 (3.1-5.8)
Median T120-glucose (range), mM	6.55 (3.6-12.4)

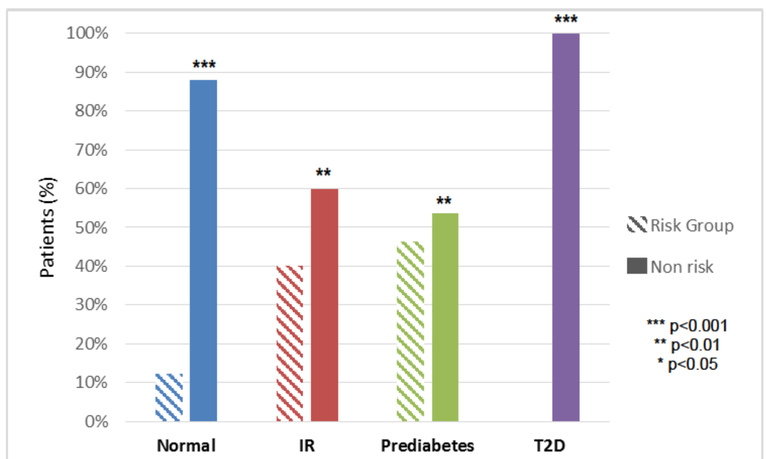
Diagnosis according to OGTT results



FPG vs. OGTT for diagnosing prediabetes & T2D



OGTT results by risk group (per ADA)



Risk factors for prediabetes or T2D

Patients with prediabetes / T2D vs. normal OGTT /IR

- Age was associated with ↑ disease risk (p=0.048)
- Belonging to ADA-defined risk group was associated with ↑ disease risk (p<0.01)
- No association with ↑ risk: (all p>0.05)
  - Tanner stage
  - HbA1C
  - leptin levels

Discussion & Conclusions

- In total, 20% of this cohort of obese Swiss children had either prediabetes or T2D based on OGTT results.
- Remarkably, more than half would have been missed using fasting glucose measurement alone.
- HbA1C levels do not correlate well with OGTT results in children and adolescents.
- These data raise questions concerning the ADA identified limits for screening prediabetes and T2D in such at-risk paediatric patients.

References

1. Obesity: preventing and managing the global epidemic. Report of a WHO consultation. *World Health Organization technical report series*. 2000;894:i-xii, 1-253.
2. Sinha R, Fisch G, Teague B, et al. Prevalence of impaired glucose tolerance among children and adolescents with marked obesity. *The New England journal of medicine*. Mar 14 2002;346(11):802-810
3. American Diabetes A. (2) Classification and diagnosis of diabetes. *Diabetes care*. Jan 2015;38 Suppl:S8-S16.

ESPE 2015, Eglantinie.Elowe-Gruau@chuv.ch

ESPE 2015 872--P3
Fat 1
Elowe-Gruau Eglantine
DOI: 10.3252/pso.eu.54espe.2015
Poster presented at: ESPE 2015 BARCELONA European Society for Paediatric Endocrinology
PosterSessionOnline.com