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INTER- AND INTRA-LABORATORY VARIABILITY OF GLYCEMIC AND INSULINEMIC INDEXES

Topic 2 Advances in dietary studies, methodology and design

Alexandra Meynier[1], Thomas Wolever[2], Jennie Brand-Miller[3], Muriel Cazaubiel[5], Alexandra Jenkins[4], Fiona Atkinson[3], David Gendre[5] and Sophie Vinoy[1]

[1] : Mondelez France R&D, Saclay, France ; [2] : University of Toronto, Toronto, Canada. ; [3] : University of Sydney, Sydney, Austrialia ; [4] : GI Labs Inc., Toronto, Canada ; [5] : Biofortis, Nantes, France

INTRODUCTION

- Glycemic Index concept has been defined by Jenkins et al in 1981 to rank products according to the glycemic response they induce;
- A standard method exists for GI evaluation Brouns et al, 2005, FAO/WHO standards, ISO 26642:2010
- Two interlab studies have been done in the past : inter-laboratory SD was 9.0 in both studies
- Several publications have shown and discussed the high variability in Insulin measurements (results depend on the method/kits used) ➔ some work started to homogenize these methods but nothing finalized yet

OBJECTIVES

The aims of the present study were:

– To harmonize the protocols and methodologies used in 3 different labs, except for glucose measurements to reduce interlab GI variability

– To evaluate GI, II and several parameters of glycemic and insulinemic responses

– To evaluate the Inter- and Intra-laboratory variabilities → evaluate the level of comparability of these parameters between labs

METHODS / DESIGN

- Multicenter (3 labs), randomized, open study performed on at least 15 subjects per lab
- several criteria added to recruit healthy normal-weight subjects with very low risk of metabolic alterations
  - –18 to 45 years old (mean age of the population = 25,7 ± 0,6 y)
  - –BMI between 19 and 25 kg/m² (mean BMI of the population = 22,8 ± 0,2 kg/m²)
  - –Normal glucose tolerance and insulin sensitivity (HOMA-IR < 1.7) (mean HOMA-IR of the population = 0,90 ± 0,03)
- 3 reference glucose sessions + 6 cereal products to cover the whole range of GI

Fig. 1: Products chosen for the study

RESULTS

Fig. 2: Glycemic Index (GI) results

	Lab 3	Lab 1	Lab 2
Corn Flakes	69 ± 20	77 ± 23	77 ± 22
Gingerbread	92 ± 29	81 ± 21	88 ± 18
Cracker	60 ± 17	51 ± 17	61 ± 19
White bread	67 ± 27	75 ± 22	65 ± 15
Rotary-moulded biscuit	45 ± 23	48 ± 17	47 ± 14
Sandwiched rotary-moulded biscuit	52 ± 23	44 ± 15	55 ± 16

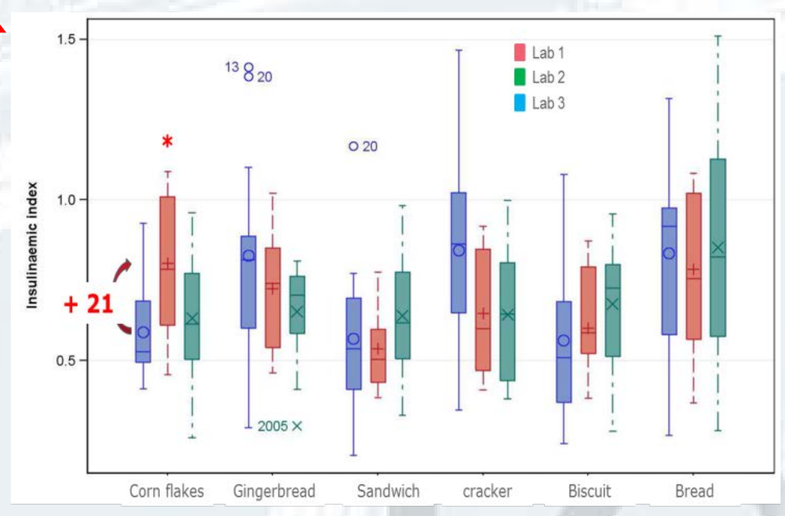
+11 +11 High GI Medium GI Low GI

Products are globally **in the expected range**.

Significant **differences between products** but **no lab effect**.

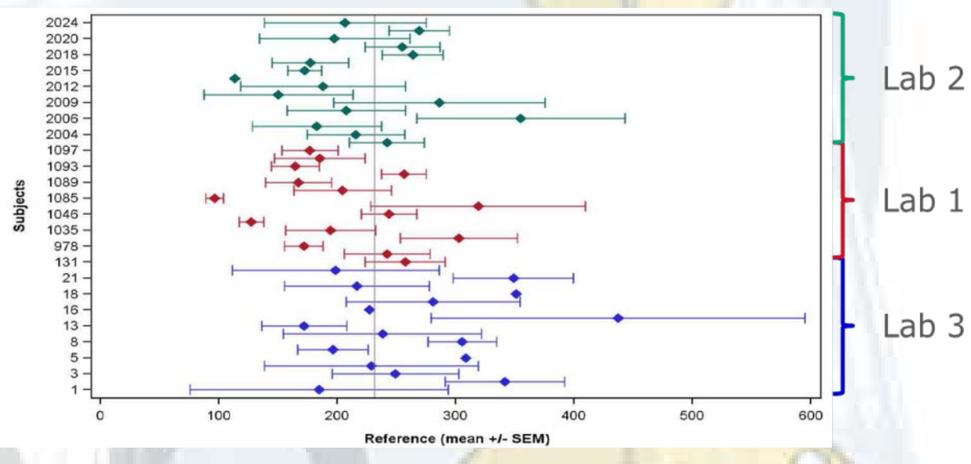
Until 11 points of difference for some products.

Fig. 3 : Insulin Index (II) results



Significant product effect on the II. Great variability with until 21 points of difference between 2 labs. A significant product * lab effect was observed.

Fig. 4 : Intra-laboratory variability of glycaemia



Both **Inter- and Intra-laboratory Coefficient of Variability** were **< 30 %** in the 3 labs for glycemia. These latter were greater for insulinemia.

CONCLUSIONS

- **Glycemic Index :** Based on harmonized GI method between lab, we can discriminate products based on the glycemic responses they induce
- **Insulin Index : significant lab * product effect** on insulin index ➔ difficult to compare; Moreover, **high intra-laboratory variability** (both intra- and inter-individual) was observed.

➔Glycemic Index appears as having a good reproducibility and comparability between labs

➔Need to investigate further and to standardize insulin methodologies

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