

# ORAL DISPOSITION INDEX AS A PREDICTOR OF CHANGES IN GLUCOSE TOLERANCE STATUS OVER TIME

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## OBJECTIVES

Type 2 diabetes (DM) is characterized by both insulin resistance and  $\beta$ -cell dysfunction. The oral disposition index (Dio), a measurement of  $\beta$ -cell function and insulin sensitivity, is considered the best predictor of progression to a worse glucose tolerance status (GTS), although it was not well tested for regression to a better GTS.

Therefore, the objective is to assess the validity of Dio in our population and to determine whether Dio predicts regression to a better GTS.

## METHODS

- Longitudinal study
- At first evaluation, 179 patients from an outpatient clinic were submitted to a 75g- OGTT and classified according to different degrees of glucose tolerance based on ADA criteria.
- Patients with prediabetes (PDM) and DM had their data recollected, and patients were classified as regressors and non-regressors to a better GTS.
- Insulin sensitivity was estimated as  $1/\text{fasting insulin}$  and  $\beta$ -cell function as the ratio of the change in insulin to the change in glucose from 0 to 30 ( $\Delta I_{0-30}/\Delta G_{0-30}$ ). The Dio was calculated as  $(\Delta I_{0-30}/\Delta G_{0-30} \times 1/\text{fasting insulin})$ .
- Data are presented as mean  $\pm$  standard deviation (SD), median (P25-P75), unless otherwise specified. A two-sided P value  $<0.05$  was considered significant.

## SUBJECTS' CHARACTERISTICS AT FIRST EVALUATION

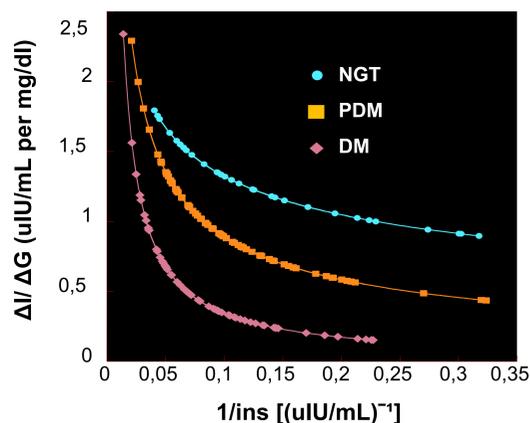
|  | NGT<br>(n = 32)      | PDM<br>(n = 76)     | DM<br>(n = 71)     | P            |
|--|----------------------|---------------------|--------------------|--------------|
| Age (years)                            | 46.7 $\pm$ 12.9      | 54.8 $\pm$ 11.5     | 53.2 $\pm$ 11.2    | <b>0.005</b> |
| Female - n (%)                         | 23 (71.9)            | 57 (75)             | 44 (62)            | 0.850        |
| DM family history - n (%)              | 12 (41.4)            | 32 (43.2)           | 33 (61.1)          | 0.220        |
| Years of education                     | 10 (6.3 – 13.7)      | 7 (4.2 – 11)        | 7 (4 – 11)         | 0.263        |
| Sedentarism - n (%)                    | 13 (50)              | 31 (48.4)           | 35 (66)            | 0.138        |
| BMI (kg/m <sup>2</sup> )               | 29.8 (25.5 – 32.5)   | 30.5 (27.4 – 35.8)  | 32 (27.6 – 36.2)   | 0.072        |
| Waist circumference (cm)               | 96 $\pm$ 14.8        | 103.6 $\pm$ 12.7    | 105.4 $\pm$ 13.2   | <b>0.005</b> |
| A1c (%)                                | 5.3 (5 – 5.5)        | 5.9 (5.5 – 6.2)     | 6.7 (6 – 7.4)      | -            |
| Fasting glucose (mg/dL)                | 87 (82 – 92)         | 101 (90 – 107)      | 110 (99 – 124.5)   | -            |
| 2-hour glucose (mg/dL)                 | 110 (96 – 121)       | 152.5 (118.7 – 171) | 211 (172.5 – 266)  | -            |
| $\Delta I/\Delta G$ (uIU/mL per mg/dl) | 1.4 (0.8 – 1.8)      | 1 (0.6 – 1.6)       | 0.5 (0.3 – 1)      | -            |
| HOMA-S (%)                             | 105.4 (63.8 – 196.6) | 80.6 (55.1 – 120.5) | 68.4 (45.5 – 91.9) | -            |
| HOMA-IR (%)                            | 1.9 (1 – 3.1)        | 2.5 (1.7 – 3.9)     | 3.5 (2.6 – 5.4)    | -            |

## BASAL AND FINAL CHARACTERISTICS OF THE RE-EVALUATED SUBJECTS

|                                | Regressors<br>(n = 45) | Non-regressors<br>(n = 56) | P                |
|--------------------------------|------------------------|----------------------------|------------------|
| Age (years)                    | 57.1 $\pm$ 11.6        | 53.1 $\pm$ 11.2            | 0.084            |
| Female - n (%)                 | 32 (71.1)              | 39 (69.9)                  | 0.874            |
| BMI (kg/m <sup>2</sup> )       | 33 $\pm$ 6.1           | 36.5 $\pm$ 6.8             | 0.725            |
| Waist circumference (cm)       | 105.9 $\pm$ 13.9       | 108.3 $\pm$ 12.7           | 0.369            |
| Fasting glucose (mg/dL)        | 106 (100 – 118.5)      | 108 (97.5 – 115.5)         | 0.128            |
| 2-hour glucose (mg/dL)         | 202 (161.5 – 240.5)    | 170 (157 – 219.5)          | 0.184            |
| A1c (%)                        | 6.1 (5.7 – 6.6)        | 6.1 (5.7 – 6.9)            | 0.862            |
| Time of follow-up (months)     | 26 (16 – 43.5)         | 29 (19 – 37)               | 0.751            |
| Final A1c (%)                  | 5.6 (5.4 – 5.9)        | 6 (5.4 – 6.6)              | <b>&lt;0.001</b> |
| Final fasting glucose (mg/dL)  | 95 (90 – 108.5)        | 115 (103 – 128)            | <b>&lt;0.001</b> |
| Final BMI (kg/m <sup>2</sup> ) | 31.4 $\pm$ 5.8         | 33.1 $\pm$ 7.5             | 0.265            |
| Final waist circumference (cm) | 103 (90 – 112)         | 106 (94.5 – 110.5)         | 0.429            |
| Disposition index (Z score)    | -0.8 (-0.9 – -0.1)     | 0.7 (-0.9 – 1)             | <b>&lt;0.001</b> |

## RESULTS

Is the Oral Disposition Index valid in our population?

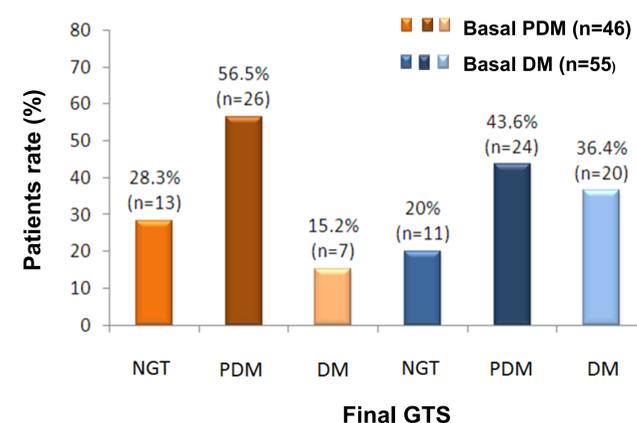


Is the  $\beta$ -cell function able to predict the regression to a better glucose tolerance status?

| Independent variables | Beta   | Hazard ratio | IC (95%)      | P            |
|-----------------------|--------|--------------|---------------|--------------|
| Sex                   | -0.055 | 0.945        | 0.448 – 2.003 | 0.886        |
| Age                   | 0.036  | 1.037        | 1.003 – 1.072 | <b>0.032</b> |
| Waist circumference   | -0.015 | 0.985        | 0.961 – 1.009 | 0.225        |
| DM family history     | -0.842 | 0.431        | 0.134 – 1.382 | 0.157        |
| SD Dio *              | -0.428 | 0.652        | 0.451 – 0.943 | <b>0.023</b> |

\* SD Dio: Dio adjusted by Z score

Which were the regression and progression rates?



## CONCLUSIONS

A total of 47.5% of patients regressed to a better glucose tolerance status while participating in a program with multiple interventions for the treatment of hyperglycemia. The Oral Disposition Index in our population was able to predict the regression to a better glucose tolerance status. It was proved to be reproducible and could be applied for DM research in the Brazilian population. Our outpatient clinic presents regression and progression rates of the glucose tolerance status compatible with epidemiologic studies.

## References

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