# SHORT-TERM GLUCOSE VARIABILITY CHANGE IN TYPE 2 DIABETES ASSESSED BY CONTINUOUS GLUCOSE MONITORING

## Andreea Morosanu[1,2], Magdalena Morosanu[1,2]

[1]"Lower Danube" University Galați, [2]Diamed Obesity SRL, Galați, Romania

*Email: andreeamorosanu17@gmail.com*

## ABSTRACT

Glucose status is the main determinant factor for diabetes evolution on short-term and long-term periods. Glucose fluctuations are related to oxidative stress in a higher extent than sustained hyperglycemia in type 2 diabetes. This study evaluated prospectively the relation between **glucose variability (GV), mean amplitude of glucose excursions (MAGE)** and glycated haemoglobin (A1c), anthropometric parameters, gender, in persons with **type 2 diabetes** assessed by **continuous glucose monitoring (CGM).**

## METHODS

**Study group**: **30 persons with type 2 diabetes**
- 8 women/22 men, - median age 64 (39-69) years,
- mean diabetes duration 14 (0-17) years,
- insulin therapy-14 persons/oral therapy-16 persons performed **blinded CGM for 3 days**.
**10 persons of the insulin treated subjects performed a second blinded CGM after 3 months**.

**Assessed parameters**:
- haemoglobin A1c (A1C)
- body weight
- body mass index (BMI)
- waist circumference
- glucose variability (GV)
  (standard deviation of glucose values)
- mean amplitude of glucose excursions (MAGE)
- number of glucose values (time)
- area under the curve (AUC, glucose exposure),
- mean glucose values on CGM (glucose amplitude)
  **on domains**:
  hypoglycemic (<70mg/dl)
  optimal (90-130mg/dl)
  intermediate (70-180mg/dl)
  hyperglycemic (>180 mg/dl)

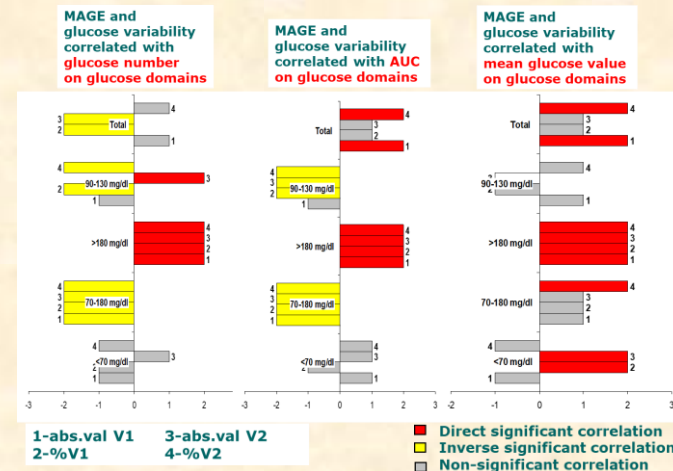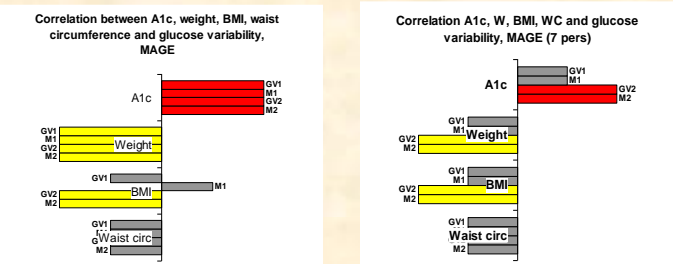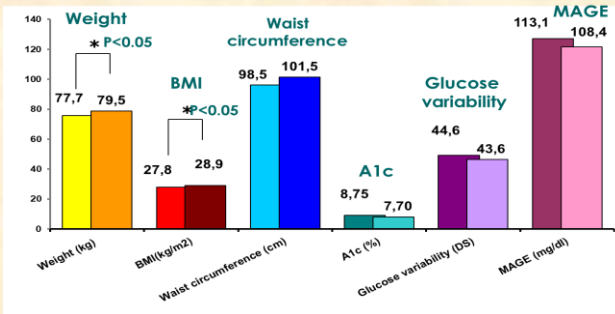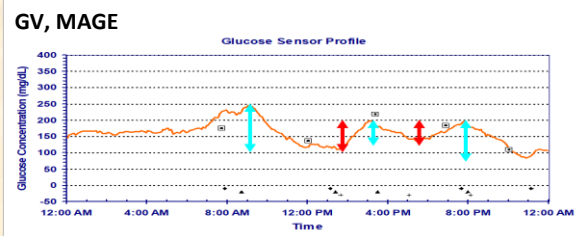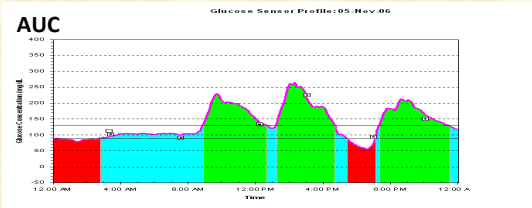| STUDY GROUP | Visit 1 (N=30) (0 months) | Visit 1 (N=10) (0 months) | Visit 2 (N=10) (3 months) |
|---|---|---|---|
| **Weight(kg)** | 86.91±11.01 | 77.71±4.77 | 79.50±5.30 |
| **BMI(kg/m²)** | 30.10±4.00 | 27.85±1.39 | 28.97±1.41 |
| **Waist circ(cm)** | 107.17±10.44 | 98.50±5.52 | 101.50±3.21 |
| **A1c(%)** | 8.21(5.3–12) | 8.75(7.30–9.60) | 7.70(6.00–9.4) |
| **Hours of CGM** | 69.87 ± 0.61 | 69.87±0.61 | 70.27±0.56 |
| **Mean glucose CGM** | 154.86 ± 11.79 | 154.86±11.79 | 149.30±12.21 |
| **GV(mg/dl)** | 37.94 ± 2.90 | 44.64±5.11 | 43.66±5.29 |
| **MAGE(mg/dl)** | 98.28 ± 7.06 | 113.18±15.1 | 108.48±17.36 |

N=number of subjects

## RESULTS

**A1C, GV and MAGE were significantly higher in insulin treated persons and women at the first visit (p<0.05).**

**A1C (p<0.05), GV (p>0.05) and MAGE (p>0.05) decreased after three months.**

**GV and MAGE were directly correlated with A1C initially and after 3 months (p<0.05).**
**GV and MAGE were inversely correlated with body weight (not BMI, nor waist) initially and with body weight and BMI (not waist) after 3 months (p<0.05).**

**GV and MAGE were directly related to hyperglycemic exposure (time, AUC > 180), and inversely related to normoglycemic exposure (time, AUC 90-130, 70-180) (p<0.05).**


AUC


GV, MAGE




Correlation between A1c, weight, BMI, waist circumference and glucose variability, MAGE


Correlation A1c, W, BMI, WC and glucose variability, MAGE (7 pers)


MAGE and glucose variability correlated with glucose number on glucose domains


MAGE and glucose variability correlated with AUC on glucose domains


MAGE and glucose variability correlated with mean glucose value on glucose domains

1-abs.val V1   3-abs.val V2
2-%V1          4-%V2

- **Direct significant correlation** (Red)
- **Inverse significant correlation** (Yellow)
- **Non-significant correlation** (Grey)

## CONCLUSIONS

**Short-term glucose fluctuations were directly related to long-term glucose status (A1C), and hyperglycemic exposure, while inversely related to parameters of normoglycemia, and body weight.**
**A1C, GV and MAGE decreased after three months, possibly due to specific treatment adjustments based on continuous glucose monitoring.**

## REFERENCES

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