

# Gluco-Insight

## the influence of life style on blood glucose levels in type 2 diabetics

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### BACKGROUND

Type 2 diabetes is not a homogenous disease. Individuals with type 2 diabetes might benefit from different types of lifestyle interventions, depending on their underlying physiology. By measuring life style factors and continuous glucose levels at the same time, we can gain insight in these processes and possibly give personalized advice.

### OBJECTIVE

To study continuous blood glucose patterns in type 2 diabetics in relation to sleep, physical activity, nutrition, wellbeing and health status (BMI, blood pressure, biomarkers in blood).

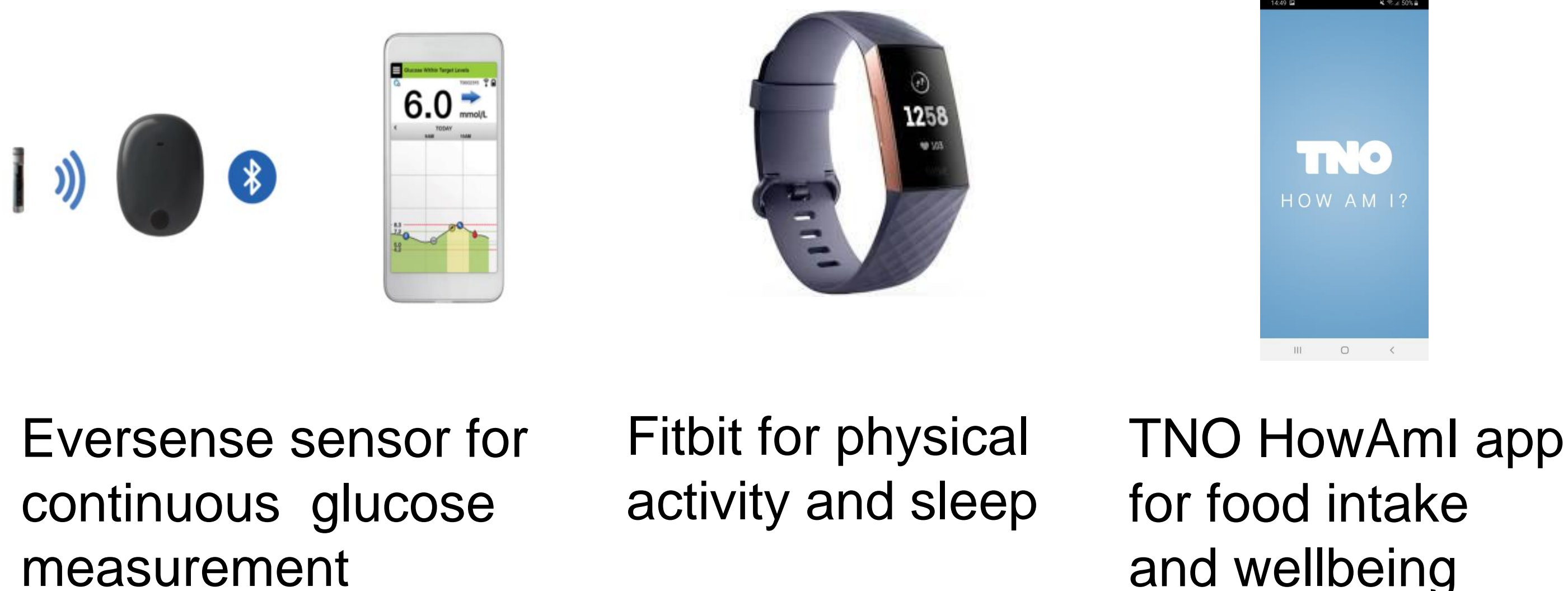
To study the effects of two types of physical activity and two types of dietary interventions on blood glucose.

### STUDY POPULATION

40 individuals with type 2 diabetes treated with life style advice and/or Metformin.

### STUDY DESIGN

During half a year, participants will undergo 11 monitoring periods of four days. During these periods participants will monitor:



Eversense sensor for continuous glucose measurement

Fitbit for physical activity and sleep

TNO HowAmI app for food intake and wellbeing

Participants either follow their usual routine (observation period) and perform an oral glucose tolerance test or they follow a physical activity or dietary intervention.

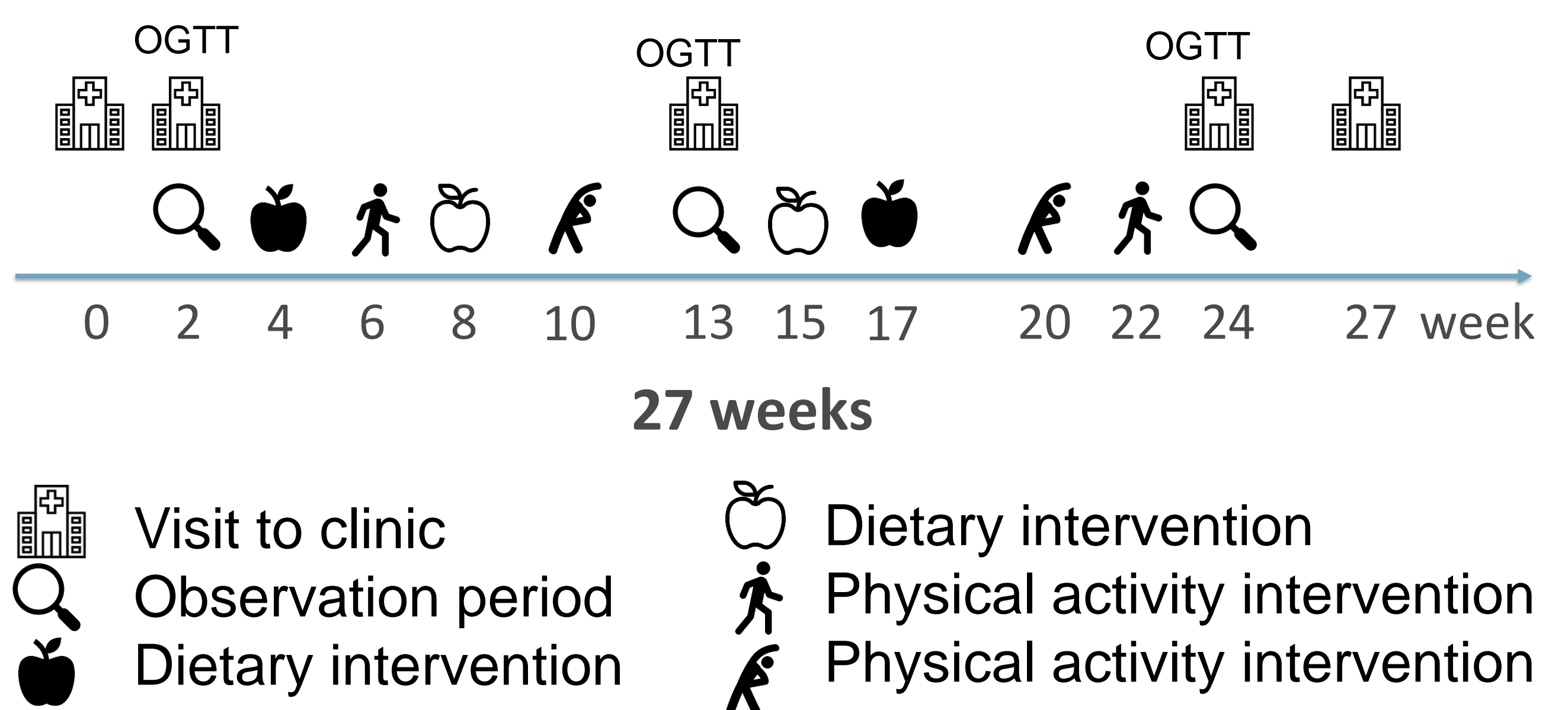


Figure 1: Study design. The order of interventions will be randomly assigned.

Table 1: Interventions.

Interventions	
<b>Low-carbohydrate diet</b>	<b>Mediterranean diet</b>
Less than 20 grams of carbohydrates per meal. Less than 100 grams of carbohydrates per day. Ekomenuevening meal: maximum of 20 grams of carbohydrates per meal.	Main difference: larger amount of carbohydrates. Ekomenuevening meal: minimum of 70 grams of carbohydrates per meal.
<b>Walking after meal</b>	<b>Active day</b>
15 minutes of walking after breakfast, lunch and dinner.	Being physically active for five minutes every hour.

PHASE 1

PHASE 2

### MODELLING OF BLOOD GLUCOSE

We will compare different models which can simulate the effects of life style on blood glucose:

1. KADIS® model: physiological expert knowledge about which factors influence blood glucose translated to mathematical equations to form a model for an individual.

2. Statistical multi-level n=1 model: physiological expert knowledge combined with statistical methodology which form a model for an individual.

3. Machine learning: the computer learns the factors influencing blood glucose itself. Model constantly trains on collected blood glucose levels and predicts based on the (most recent) former blood glucose levels. Model can run scenario simulations when provided with additional contextual factors.

Goals:

- Insight in the influence of life style factors on blood glucose.
- Optimization protocol: gaining a model that is as accurate as possible while minimizing the burden for participants.
- Future goal: personalized life style advice.

#### Acknowledgements

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