

# **Format rapportage projectinformatie PPS-en Landbouw, water, voedsel**

Datum versie: 7 december 2020

## **Uit projectplan (svp zoveel mogelijk invullen)**

### **1. Projectinformatie**

<b>1.1 Organisatie/financiering</b> (keuze maken)	TKI A&F
<b>1.2 Projectnummer</b>	AF-16505
<b>1.3 Project titel</b>	The biology behind perceivable consumer benefits; Glucose (M)apping
<b>1.4 Projectleider</b> (naam en emailadres)	Prof Ellen Blaak <a href="mailto:e.blaak@maastrichtuniversity.nl">e.blaak@maastrichtuniversity.nl</a>
<b>1.5 Startdatum</b> (dd-mm-jjjj)	1 mei 2017
<b>1.6 Einddatum</b> (dd-mm-jjjj)	1 oktober 2022
<b>1.7 MMIP primair</b> (nummer en naam van het MMIP, zie overzicht bijlage 1)	Missie D: gewaardeerd, gezond en veilig voedsel
<b>1.8 MMIP secundair</b> (deze alleen invullen als er een 2 <sup>e</sup> MMIP is waar het project aan bijdraagt)	

### **2. Projectomschrijving**

<b>2.1 Samenvatting</b> Geef een korte samenvatting van wat het project inhoudt en beoogt. Het gaat om een publiek beschikbare samenvatting (doel, bijdrage aan de missie, op te leveren resultaten in termen van kennis voor doelgroep x en de partners in het project).
A healthy lifestyle is an essential element to release the physical and mental potential of every individual and is able to prevent the epidemic development of overweight, and cardio- metabolic diseases. Unfortunately, most people do not manage to incorporate or to maintain the recommended changes in their daily lifestyle. The aim of this project is to obtain insight into the variability in response to dietary and lifestyle intervention with respect to blood glucose homeostasis and mental and physical performance and well-being. This information may be used to develop more successful personalized lifestyle interventions or the development of personalized food products. When people feel better, fitter and/or otherwise motivated to follow a dietary advice, for instance by personalized feedback on physiological measures of glucose control or other indicators of health status, the implementation of a healthy lifestyle is expected to be more successful.
<b>2.2 Doel van het project</b> Wat gaat het project bijdragen aan de doelen van de KIA, de missies en de MMIP's?
<b>The aims of the project are:</b>  1. Obtain insight into the metabolic and lifestyle determinants of blood glucose responses and glycemic variability and relate the latter responses to mental and physical performance and well-being

2. Study how acute and chronic dietary and/or physical activity interventions affect blood glucose homeostasis in metabolically different subgroups and how this consequently alters the related mental and physical performance, well-being and food preferences.
3. Develop multi-scale tissue dynamic and mathematical models on diet and lifestyle (physical activity) in relation to blood glucose homeostasis (including microbiota and host metabolism) and mental and physical performance and well-being.
4. Test whether tailored dietary interventions/physical activity programs based on these models may improve blood glucose homeostasis and physical and mental performance and well-being
5. Evaluate the application of wearables and other tools to quantify the biological and mental biomarkers

### **2.3 Motivatie** *Licht toe waarom dit project passend en nodig is binnen het MMIP*

This project may give leads for more successful lifestyle interventions and healthy food choices by providing more information on (1) determinants of successful dietary interventions as well as (2) the relationship between biological factors including blood glucose homeostasis, on mental health, cognitive function, mood and well-being

**2.4 Resultaat** *Zo SMART mogelijke beschrijving van de beoogde resultaten van het project. Het gaat om zowel de inhoudelijke resultaten (in relatie tot vraag 2.2) als resultaten zoals bijeenkomsten en rapporten. Geef zoveel mogelijk ook de planning per jaar.*

#### **The main deliverables of the current project are:**

1. Establishment of (cause-effect) relationships between blood glucose homeostasis, the underlying tissue related physiology and the perceivable benefits<sup>1</sup> connected to mental and physical performance and well-being
2. Demonstration that subgroup-based dietary/lifestyle intervention may optimize the beneficial effect on blood glucose homeostasis and metabolic health and related perceivable benefits
3. Generation of multi-tissue dynamic and mathematical models that can determine the ranges at which diet/lifestyle intervention can modulate the blood glucose homeostasis and underlying physiology and in turn the related perceivable benefits
4. Proof of the concept and more detailed knowledge on more personalised and effective lifestyle-related strategies to improve blood glucose management and related perceivable benefits

## Jaarrapportage (svp ook laatste jaar invullen)

### 3. Status project

<b>3.1 Status project</b> (keuze maken)	project loopt achter
<b>3.2 Toelichting</b> incl. voorziene wijzigingen t.o.v. het oorspronkelijke werkplan	During the time course of the personalized nutrition intervention study (the PERSON study) project participants are continuously included (Maastricht University) or are included in groups (Wageningen University). The execution of this multicenter study was originally planned from June 2018 until December 2020, In total, 240 participants have to participate in this research to finalize the intervention study. During a period of 4 month the study had to be stopped since research facilities at UM and at WU were closed (March-July 2020). The expectation is that the PERSON study will be finalized with a 8 month delay in July-October 2021. Extra funding is obtained from TKI-agrifood as well as the companies and universities for the extension of the PhD-students from the core study by 5-8 months.

### 4. Behaalde resultaten

<b>4.1 Korte beschrijving van de inhoudelijke resultaten</b> en hun bijdrage aan het MMIP (zoals beschreven in 2.2)
For the personalized nutrition intervention, based on computational modelling of 4 large previous European intervention studies a classifier has been developed to divide individuals in two metabolically different groups with either more pronounced liver or muscle insulin resistant. For these two distinct subgroups, an optimal and suboptimal diets to improve glucose homeostasis and mental health and well-being have been defined. The personalized nutrition intervention is ongoing and will be finalized in October 2021. Mathematical and computational modelling will be used in order to predict intervention response.
<b>4.2 Deliverables</b> (bijeenkomsten en andere output, die niet benoemd wordt in 4.3 en 4.4)
<b>4.3 Communicatie</b> (lijsten)
<b>4.3.1 Wetenschappelijke artikelen en hun doi</b> ( <i>Digital Object Identifiers</i> )
<b>Scientific papers in peer-reviewed journals</b>  <u>Project-related</u> <ul style="list-style-type: none"><li>• Sloun Bv, Goossens GH, Erdos B, Lenz M, Riel Nv, Arts ICW. The Impact of Amino Acids on Postprandial Glucose and Insulin Kinetics in Humans: A Quantitative Overview. <i>Nutrients</i>. 2020; 12(10):3211.</li></ul> <b>Submitted papers in peer-reviewed journals</b>

- Erdos B, Sloun Bv, Adriaens ME, O'Donovan SD, Langin D, Astrup A, Blaak EE, Arts ICW, Riel Nv. Individualized computational model quantifies heterogeneity in postprandial responses to oral glucose challenge. In review.
- Diet and the gut microbiome: a personalized nutrition approach to improve body weight control and insulin sensitivity (review, in revision Gut)
- 12-week combined polyphenol supplementation: indications for sex-specific differences in gut microbiome-host metabolism interaction in individuals with overweight/obesity (in preparation for submission)

#### 4.3.2 Rapporten/artikelen in vakbladen

Visiedocument koolhydraten en insulinegevoeligheid; prof. dr. ir. Edith Feskens, Iris van Damme MSc., ir. Arine de Ridder, dr. Kirsten Berk, prof. dr. ir. Ellen Blaak, prof. dr. Fred Brouns, drs. Karel Bos, Ellen Govers, dr. Peter Voshol, drs. Hans van Wijland, 10 maart 2020

#### 4.3.3 Overige communicatie-uitingen (inleidingen/posters/radio-tv/social media/workshops/beurzen)

- ByteMAL: Bioinformatics for young international researchers Expo: Maastricht-Aachen- Liege, Maastricht, Netherlands 14 October 2020.  
Title: Exploring the insulin-mediated glucose homeostasis using a computational model
- Presentation E. Blaak at congres' Koolhydraten en Insulinegevoeligheid' Jaarbeurs, voeding NL Congres, 10 March 2020 (with focus on role of tissuespecific insulin sensitivity)
- Abstract and poster. 12-week combined polyphenol supplementation: indications for sex-specific differences in gut microbiome-host metabolism interaction in individuals with overweight/obesity. European and international congress on obesity, 1-4 September 2020
- Abstract and presentation. 12-week combined polyphenol supplementation: indications for sex-specific differences in gut microbiome-host metabolism interaction in individuals with overweight/obesity. Annual Dutch Diabetes Research Meeting, 26 November 2020.
- Abstract and selected presentation. 12-week combined polyphenol supplementation: sex-specific differences in gut microbiome-host metabolism interaction. Annual NUTRIM Symposium, 18 November 2020.

#### 4.4 Overige resultaten: technieken, apparaten, methodes

Method development in the field of computational modelling:

- Sloun Bv, Goossens GH, Erdos B, Lenz M, Riel Nv, Arts ICW. The Impact of Amino Acids on Postprandial Glucose and Insulin Kinetics in Humans: A Quantitative Overview. *Nutrients*. 2020; 12(10):3211.

- Erdos B, Sloun Bv, Adriaens ME, O'Donovan SD, Langin D, Astrup A, Blaak EE, Arts ICW, Riel Nv. Individualized computational model quantifies heterogeneity in postprandial responses to oral glucose challenge. In review.

**4.5 Projectwebsite:** geef het adres van de projectwebsite (indien beschikbaar)

Site available for participants to the PERSON study: <https://www.person-studie.nl/wie-zijn-wij/universiteit-maastricht.html>