



General information	
PPP number	AF-17048
Title	<i>Positieve gezondheidseffecten van GABA in aardappel en tomaat</i>
Theme	Voeding en Gezondheid
Executive knowledge institution(s)	Wageningen UR
Research project leader (name + e-mail address)	Maarten Jongsma, maarten.jongsma@wur.nl
Coordinator (on behalf of private parties)	Sjefke Allefs, Agrico BV, s.allefs@agrico.nl
Address projectwebsite	n.a.
Start date	1/2/2018
End date	1/2/2022

Approval coordinator/consortium	
<i>The annual report should be discussed with the coordinator/the consortium. The TKIs appreciate being informed of possible feedback on the annual report.</i>	
The coordinator has assessed the annual report on behalf of the consortium:	<input checked="" type="checkbox"/> approved <input type="checkbox"/> rejected
Possible feedback on the annual report:	

Summary of the project	
Problem description	<p>Background: Gamma-amino butyric acid (GABA) is a derivative of the amino acid glutamate and a neurotransmitter involved in a multitude of biological processes in the human body. Oral intake according to the literature appears to lead to lowered blood pressure and improved glucose metabolism. This is relevant for people with symptoms of "metabolic syndrome" but also for people that are (still) healthy. Tomato and potato are in the western diet by far the most important sources of oral GABA but the contents differ by more than a factor 20 between different varieties. The effects of existing food sources with high GABA has not yet been investigated in a human intervention study but are promising based on animal models.</p>
Aims of the project	<p>Aim: The aim is to examine whether the high GABA content of some potato and tomato cultivars and potato extracts will have positive effects on human glucose metabolism and blood pressure with high risk groups for prediabetes and/or mild hypertension that are not yet using drug prescriptions.</p> <p>Innovation: In this research project intervention studies are planned that can demonstrate the expected positive impact on health of natural GABA in potato and tomato. Specific tomato and potato varieties with high content and proven health effects may pass the EFSA evaluation and obtain a health claim.</p> <p>Expected impact: For the food sector this project sets an example of what is potentially possible and needed to establish health claims for food products derived from vegetables and staple crops. Currently there is a lot of scepticism whether such claims can be obtained and deliver a profitable market share despite the fact that diet and health are known to be intimately connected. Scientifically the topic is also in a hotspot because it concerns a compound that is known to have a central role in regulating many physiological and neurological</p>

	processes, so that the interaction between oral and endogenous GABA deserves profound attention.
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Results	
Anticipated results 2019	<ol style="list-style-type: none"> 1. An METC protocol for testing GABA bioavailability from potato and tomato 2. A human trial to test the GABA bioavailability 3. A method paper to analyze GABA and glutamate in blood plasma
Results obtained 2019	<ol style="list-style-type: none"> 1. An LC-MS method to measure GABA in human plasma was optimized and validated 2. An METC protocol for testing GABA bioavailability from potato and tomato 3. A human trial to test the GABA and glutamate bioavailability demonstrated that ca 900 mg GABA and 2500 mg glutamate in both pure solutions and as part of tomato juice are rapidly taken up and peaking 15-30 min after intake. Glutamate is not visibly converted into GABA. GABA and glutamate appear to be rapidly distributed from the blood to other tissues. Peak levels are on average ~10-20x higher than base levels for GABA and ~4x higher for glutamate. Individuals had baseline levels that varied up to 60%. These differences were stable and significant across a period of 4 weeks. 4. Contents for GABA and glutamate of a number of new and previously tested cultivars of tomato and potato were determined 5. In the case of tomato the effect of ripening stages of the Madara variety was determined 6. A tomato line was selected with GABA levels of 1600 mg/kg. Such a tomato line would be interesting for a human trial
Planned results 2020	<ul style="list-style-type: none"> • Two papers will be written and published <ul style="list-style-type: none"> ◦ Optimization and validation of an UPLC-MS/MS method for simultaneous determination of GABA and glutamic acid in human plasma. Planned journal: Journal of Chromatography B ◦ Bioavailability and plasmakinetics of GABA are comparable after consumption of tomato juice or a GABA supplement • A second METC protocol for long term testing of GABA on glucose metabolism and blood pressure will be submitted • A second human trial will be executed to test the effect of longterm GABA supplements.

Products delivered products in 2019
Academic papers
External reports
Popular press
Presentations/posters during workshops, congresses and symposia <ol style="list-style-type: none"> 1. Study set-up was presented at the Young NVDO Meeting https://addrm.nl/jonge-nvdo-bijeenkomst/ 2. The project and study set-up was presented at the Quebec Heart and Lung Institute and the University of Guelph in Canada as part of the 2019 PhD tour http://2019.phdtour.nl/participants.html
TV/Radio/Social Media/Newspaper
Other (techniques, machines, methods, etc.) <ol style="list-style-type: none"> 1. An LC-MS method to measure GABA in human plasma was optimized and validated 2. METC-passed human trial 7808: https://www.trialregister.nl/trial/7808 ; https://clinicaltrials.gov/ct2/history/NCT04086108?V_3=View