NEWSLETTER

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Enhancing Research and Innovation Capacity of TUBITAK MRC Food Institute on Dietary Polyphenols and Bioavailability/Bioefficiency

Grant Agreement No: 951994

PhenolAcTwin

Bioavailability and Bioefficacy of Polyphenols

What is PhenolAcTwin?

PhenolAcTwin is an EU granted project under H2020-WIDESPREAD-2018-2020 call. The main objective of PhenolAcTwin is to enhance the research and innovation capacity of TUBITAK MRC Food Institute on dietary polyphenols focusing on their bioavailability and bioefficacy via networking with CSIC, QIB, and INRAE. Key scientific aspects of PhenolAcTwin are: molecular identification of dietary polyphenols, bioavailability and biological activity evaluation of dietary polyphenols, in vivo-in vitro analysis, metabolomics and cardiovascular protective effects of dietary polyphenols.

Defined activities of PhenolAcTwin such as; exchange of young researchers, summer schools, expert visits, trainings, conferences, and seminars will help young researchers to enhance the research and innovation capacity, as well as the research profile. PhenolAcTwin will provide mutual benefit to collaborators in the areas of polyphenols, bioavailability and bioefficacy through project activities. This will maximize the impact by enabling the stakeholders (scientist, industry, including SMEs) to be better able to innovate with the availability of new tools, technologies and knowledge. By participating the project activities, food industry will benefit in all aspects of the development and production of innovative healthy food products.

WHAT'S INSIDE THIS ISSUE?

WELCOME TO THE FIRST RELEASE OF PHENOLACTWIN NEWSLETTER!

PhenolAcTwin

Enhancing Research and Innovation Capacity of TUBITAK MRC Food Institute on Dietary Polyphenols and Bioavailability/Bioefficiency

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TÜBİTAK MAM · CSIC · INRAE · Quadram Institute

As PhenolAcTwin Team members we would like to welcome you to the first issue of PhenolAcTwin newsletter. The aim of this publication is to keep you informed of all events, outcomes and updates of PhenolAcTwin. Newsletters of PhenolAcTwin will be published annualy in the project webpage.

We are pleased to share the first PhenolAcTwin newsletter with you, and look forward to sharing more news with you soon. Enjoy!

*In this newsletter some pictures were obtained from Freepik.

WEB PAGE

If you like to learn more about PhenolAcTwin project you can visit our web page **https://phenolactwin.eu/**

SOCIAL MEDIA

The PhenolAcTwin communication channels are open, join us!

PhenolAcTwin is also on LinkedIn and Twitter. **FOLLOW US!**

HORIZON 2020

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 951994.

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PROJECT PARTNERS

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CEBAS-CSIC

Agencia Estatal Consejo Superior De Investigaciones Científicas / Spain

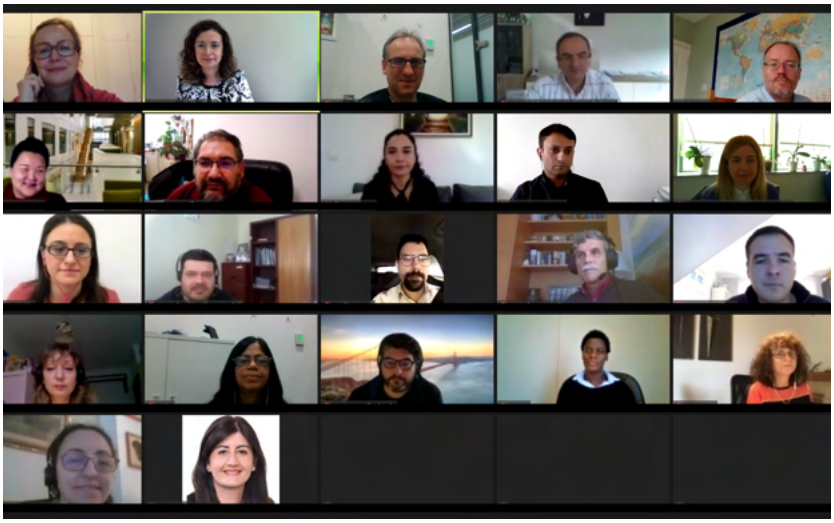
QUADRAM INSTITUTE

Quadram Institute Bioscience/United Kingdom

INRAE

Institut National De Recherche Pour L'agriculture, L'alimentation Et L'environnement / France

ACTIVITIES



Kick-off Meeting

December 3, 2020

The Kick- off Meeting of the PhenolAcTwin project was held on December 3, 2020. Project partners from TUBITAK, CSIC, QIB, and INRAE and Project Officer from the AB Research Executive Agency (REA) Office were attended to the meeting. At the meeting project activities and targets were planned for the first year of the project.

Advisory Board Meeting 2021

January 28, 2021

First Advisory Board Meeting of the PhenolAcTwin project was held on January 28, 2021. Project partners from TUBITAK, CSIC, QIB, and INRAE and Advisory Board members were attended to the meeting. At the meeting, project activities and targets were planned for the first year of the project.

Internal-Twinning Research Project Group Meetings

April 12 and June 28, 2021

The First Internal-Twinning Research Project Group Meeting was held on April 12 and June 28, 2021. At the meeting a presentation of TUBITAK MAM Food Institute was made. With the participation of project partners, roadmap for future research and new project proposals were discussed.

ACTIVITIES

SUCCESS STORIES WITHIN THE PARTNERS

SOLARTWINS

First Success Story Meeting of PhenolAcTwin was held on August 25, 2021. The coordinator of SolarTwins Project Professor Derek Baker from METU shared the success story of project with us.

POLYBIOTA

Second Success Story Meeting of PhenolAcTwin was held on September 9, 2021. The coordinator of Polybiota Project Dr. Juan Antonio Giménez Bastida from CEBAS-CSIC shared the success story of the project with us.

POSITIVE

Third Success Story Meeting of PhenolAcTwin was held on September 24, 2021. The coordinator of COST POSITIVe Project Dr. Christine Morand from INRAE shared the success story of the project with us.

BACCHUS

Fourth Success Story Meeting of PhenolAcTwin was held on September 30, 2021. The coordinator of BACCHUS Project Dr. Paul Kroon from QIB shared the success story of the project with us.

"We are happy to announce that we will have our first Seminar on 3rd November 2021, Wednesday together with Open-day as an online activity. The seminar will be on “Recent Advances in Polyphenols and Health Research"

➤ Seminar and Open-Day (Online) - November 3rd 2021

Invited speakers are;

*** Dr. Antonio González-Sarrías from CEBAS-CSIC, Spain,**

*** Dr. Paul Kroon from QIB, United Kingdom,**

*** Dr. Laurent-Emmanuel Monfoulet from INRAE, France and**

*** Prof. Dr. ir. John Van Camp from Ghent University, Belgium.**

Open-day:

* PhenolAcTwin Project Presentation by Dr. Ebru Pelvan Pelitli

* TUBITAK MAM Food Institute Presentation by Assoc. Prof. Cesarettin Alaşalvar

145 participants from 15 countries

UP-COMING EVENTS

2022-2023 ACTIVITIES

WHAT'S INSIDE

➤ **Short Term Staff Exchanges**
Young researchers from TUBITAK will be visiting partnering organizations to develop their skill and career, improve networking, and prepare joint publication, and future collaborative research projects. In total three young researchers from TUBITAK will be visiting project partners on specific topİcs.

➤ **Trainings & Technical Visits**
Trainings from experts will be taken to improve the skills of PhenolAcTwin personnel on research management and proposal preparation. Researchers from TUBITAK will visit the well-established centers/institutions and leading SMEs/food processors in Europe and Turkey to collect and share information about latest development, laboratory systems, ongoing projects, and exchange ideas for mutually beneficial collaborative projects.

➤ **Conferences**
Within PhenolAcTwin Project, 14th International Conference and Exhibition on Nutraceuticals and Functional Foods will be organized in 2022 in Turkey. PhenolAcTwin personnel will attend the conferences to present their work.

WORKSHOPS

UP-COMING EVENTS

INRAE
2022

WORKSHOP-1

Will be organized by INRAE on Nutrigenomics for a better understanding of health effects of phytochemicals and foods.

CSIC
2022

WORKSHOP-2

Will be organized by CSIC on Polyphenol metabotypes and personalized nutrition.

QIB
2023

WORKSHOP-3

Will be organized by QIB on Approaches and challenges to determining the effects of consuming food components such as polyphenols on health outcomes including estimating habitual nutrient intakes, control foods in intervention studies, inter-individual variation in bioavailability and responses to food components, and the role of the gut microbiome.

SUMMER SCHOOLS

FOUR SUMMER SCHOOLS WILL BE ORGANIZED IN SPAIN, GREECE, UNITED KINGDOM, AND TURKEY IN 2022 AND 2023.

In total four summers schools will be organized on the subject of polyphenols, bioavailability and bioefficacy for young researchers .

Summer school 1: First summer school will be organized by QIB on the topic of “the impact of polyphenols and other dietary components on food digestion, host metabolism and cardiometabolic health including sessions focused on the use of next generation sequencing, metabolomics and bioinformatics”

Summer school 2: Second summer school will be organized by CSIC on the topic of “Gut microbiota metabolism of dietary polyphenols”

Summer school 3: Third summer school will be organized by INRAE together with the Medical School of Democritus University of Thrace (Alexandroupolis, Greece) and it will be held in Greece in 2022. This co-organized summer schools will be on the topic “Assessment of health effects of plant food bioactives: from bioavailability, health to mechanisms of action using nutrigenomics”

Summer school 4: Identification of dietary polyphenols and their bioavailability and bioefficacy: Final summer school will be organized by TUBITAK on the topic of “Identification of polyphenols in foods and their bioavailability” in the third year of the project. Especially, medicinal and aromatic plants, Turkish traditional foods and effects of industrial processing and home cooking, on composition and bioavailability will be the main focus of this summer school.

The International Society for Nutraceuticals and Functional Foods

14th International Conference and Exhibition on Nutraceuticals and Functional Foods (ISNFF 2022)

International Conference

TOGETHER WITH ISNFF IN 2022

14th International Conference and Exhibition on Nutraceuticals and Functional Foods- ISNFF" will be organized by TUBITAK together with ISNFF. The thematic areas of conference will be on dietary polyphenols, functional foods, nutraceuticals, and bioavailability, which are the targeted specific research fields of PhenolAcTwin.

Details of the conference will be shared soon from the web page of PhenolAcTwin and ISNFF.

METABOLIC PROFILING AND BIOACTIVITY OF DIETARY POLYPHENOLS IN MAMMARY TISSUES FROM BREAST CANCER PATIENTS (THE POLYSEN STUDY)

A. González-Sarrías, M.A. Ávila-Gálvez, R. García-Villalba, , J.A. Giménez-Bastida, J.C. Espín

During decades, many preclinical (cellular and animal) studies have suggested a potential protective effect of dietary polyphenols against breast cancer (BC). However, it is unknown whether they reach human malignant breast tumours in molecular forms and/or at concentrations likely to exert anticancer effect. POLYSEN study explored for the first time the metabolic profiling of dietary polyphenols in normal (NT) and malignant (MT) glandular breast tissues from BC patients, and evaluated the anticancer activity of the metabolites at physiological conditions (in terms of concentration and metabolic form) that could reach breast tissues in human BC cell models. Firstly, a clinical trial was conducted with BC patients who consumed (n=19) or not (control, n=9) three capsules daily containing resveratrol (RSV) plus plant extracts (pomegranate, orange, lemon, olive, cocoa and grape) from biopsy-confirmed diagnosis to surgery (6±2 days). NT and MT were analysed with UPLC-ESI-QTOF-MS using a targeted metabolomics approach. Analyses showed that mainly phenolic-derived phase-II metabolites (glucuronidates and/or sulphates) were detected in both breast tissues, being the most abundant phenolic metabolites such as urolithin-A-3-O-glucuronide, RSV-3-O-sulfate, dihydroresveratrol-3-O-glucuronide, etc. Next, these data were confirmed in a pharmacokinetic study using Sprague-Dawley rats fed with same plant extracts consumed by the patients with breast cancer. Besides, it was confirmed that fasting before surgery (10-12 hours) prevented the quantification of higher concentrations of phenolic metabolites in the mammary tissues that detected in clinical study.

Secondly, the antiproliferative effect of representative mixtures of phenolic phase-II metabolites that reach MT were evaluated on BC cell lines (MDA-MB-231 and MCF-7). Results showed that conjugation of phenolic metabolites prevented in vitro antiproliferative activity against cancer cells. However, we identified that the physiological relevant RSV conjugated metabolites exerted antiproliferative activity, at longer time exposures, showing a reduction of the clonogenic capacity via induction of cellular senescence dependent of p53/p21 overexpression, suggesting that may exert long-term tumour-senescent chemoprevention.

Overall, Polysen study suggests that these phenolic-derived phase-II metabolites that reach systemic tissues such as human breast could exert certain activity upon chronic (years) consumption of plant foods. Overall, this study provides a step forward for future clinical trials to unravel the role of polyphenols against BC.

Laboratory of Food and Health, Research Group on Quality, Safety and Bioactivity of Plant Foods, Dept. Food Science and Technology, CEBAS-CSIC, 30100 Campus de Espinardo, Murcia, Spain.

IMPACT OF CELLULAR STRESS ON FLAVONOID ACCUMULATION AND BIOACTVIITY ASSESSED BY IN VITRO MODELS

H. Vissenaekens 1-2, C. Grootaert 2, G. Smagghe 1, K. Raes 2, J. Van Camp 2

Quercetin was used as a model compound to study the impact of cellular stress on flavonoid accumulation and bioactivity as assessed by in vitro models. Stress was induced by LPS, valinomycin and FCCP. The following research questions were discussed: (1) Can cellular stress modulate quercetin accumulation ?, and (2) Can quercetin counteract cellular stress ? Both LPS and valinomycin were able to induce quercetin accumulation in Caco-2 cells. Quercetin and its metabolites were associated to the mitochondrial fraction. Under stress conditions, ATP production was stabilized and ROS production significantly reduced. We speculate that local quercetin accumulation as influenced by stress could add in our understanding of the need for personalized nutrition. Further information can be found in:

VISSENAEKENS, H., GROOTAERT, C., RAJKOVIC, A., DE SCHUTTER, K., RAES, K., SMAGGHE, G., VAN DE WIELE, T. & VAN CAMP, J. (2019). Cell line-dependent increase in cellular quercetin accumulation upon stress induced by valinomycin and lipopolysaccharide, but not by TNF-α. Food Research International, Nov;125:108596.

VISSENAEKENS, H., SMAGGHE, G., CRIEL, H., GROOTAERT, C., RAES, K., RAJKOVIC, A., GOEMINNE, G., BOONE, N., DE SCHUTTER, K. & VAN CAMP, J. (2021). Intracellular quercetin accumulation and its impact on mitochondrial dysfunction in intestinal Caco-2 cells. Food Research International, Jul; 145:110430.

VISSENAEKENS, H., CRIEL, H., GROOTAERT, C., RAES, K., SMAGGHE, G., & VAN CAMP, J. (2021). Flavonoids and Cellular Stress: a Complex Interplay affecting Human Health. Critical Reviews in Food Science and Nutrition, pp 1-32. DOI: 10.1080/10408398.2021.1929822.

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