



N°8, MAY 2018

NEWSLETTER



EUROCAROTEN

EUROPEAN NETWORK TO ADVANCE CAROTENOID RESEARCH
AND APPLICATIONS IN AGRO-FOOD AND HEALTH

WELCOME

We are pleased to welcome you to the eighth issue of the EUROCAROTEN Newsletter.

In this issue, we present a summary of the EUROCAROTEN Training School on Bioavailability of Carotenoids, which was held March, 2018 at the University of Newcastle.

You may check the News from the Action rubric to find finished STSMs during last period, followed by their "STSM experience report" at pages 4 and 5.

Also, we would like to introduce Emmanuelle Reboul, a Senior Researcher, Head of the Research Axis "Bioavailability of lipid micronutrients" within the Centre for CardioVascular and Nutrition research of Marseille.

In page 7, α -carotene is presented in "Carotenoid of the month" rubric; and you can read more about the Functional cereals enriched with carotenoids and PUFAs.

Lastly, we would like to introduce you the next Think Tank Representatives for the 3rd Grant Period.

You can find more information about EUROCAROTEN COST Action on COST website http://www.cost.eu/COST_Actions/ca/CA15136 and on our website www.eurocaroten.eu.

*Yours sincerely,
Ludmiła Bogacz-Radomska
Mohammed Iddir
Kristina Kljak*



Subscription to the newsletter e-mailing is available via the EUROCAROTEN website (www.eurocaroten.eu). For further information, please contact us via our e-mail info@eurocaroten.eu. You can also send us your comments and proposals.

PAST EVENTS

19th to 23rd March 2018

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"My work contributed to show that the transport of vitamin D, E, K and carotenoids was actually not driven by passive diffusion only, but could be facilitated by membrane proteins."

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CAROTENOIDS IN OUR DAILY LIFE

Carotenoid of the Month: α -Carotene

" α -carotene was inversely associated with cancer death, cardiovascular disease [...] correlation between high levels of α -carotene and a lower risk of death from diabetes disease were especially high"

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Functional cereals enriched with carotenoids and PUFAs – scientific fiction or commercial reality?

"[...] biotechnologically prepared carotenoid/PUFA-enriched cereals may open novel prospects for the market of functional cereal-based food and feed industry."

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SUMMARY FROM PAST EVENTS

TRAINING SCHOOL BIOAVAILABILITY OF CAROTENOIDS

19TH – 23RD March 2018

NEWCASTLE | UNITED KINGDOM



Organizers:

- Dr. Georg Lietz (Newcastle University, United Kingdom)
- Dr. Antonio J. Meléndez Martínez (Universidad de Sevilla, Spain)

Training School: Availability of Carotenoids was held on 19-23 March 2018, where more than **20 young researchers** from **13 countries** participated. The training school was organized by Eurocaroten together with Human Nutrition Research Centre at Newcastle University.

The ECIs (Early Career Investigators) and PhD students highly appreciated given the opportunity to attend this event, **thanks to the grants provided by EUROCAROTEN**.

The young researchers had **very much benefited from the insights and skills** obtained from the five-day talks and practice, covering the main aspects of **carotenoid bioavailability**. It was also perceived as an occasion to familiarize even more with **good laboratory practices** as a channel for their personal development.

As a special added value of this training school, all participants found **the opportunity to network** with both other young researchers and the invited experts in the field of carotenoids from inside and outside Europe.

The participants were invited to share breaks together

between talks, where tea & coffee were provided as well as the daily lunch, but the participants were also invited to share the organized diner at the Great North Museum, in the Living Planet Gallery. It was an exceptional **opportunity for horizontal exchange** of experiences.





NEWS FROM THE ACTION & FINISHED STSMs

EUROCAROTEN AT 3rd COMMEMORATION OF THE INTERNATIONAL DAY OF WOMEN AND GIRLS IN SCIENCE



EUROCAROTEN AT 3rd COMMEMORATION OF THE INTERNATIONAL DAY OF WOMEN AND GIRLS IN SCIENCE

On the occasion of the 3rd commemoration of the International Day of Women and Girls in Science (11th February 2018), member of EUROCAROTEN organized activities for primary schools to motivate children into scientific careers, especially girls, and to show them that women and men are equally prepared and have the same skills and capacities to work in science.

Maria J. Rodrigo (Institute of Agrochemistry and food Technology, IATA-CSIC, Valencia, Spain; WG1 within EUROCAROTEN) prepared two afternoon sessions for 80 children between 7 and 9 years old where they performed and easy experiment to separate carotenoid pigments from citrus fruits.

The experiment was accompanied by a short talk to explain what are carotenoids and the potential health benefits of these colourful compounds.

To end the afternoon sessions, a recommendation of regular intake of fruits and vegetables rich in carotenoids was made, especially citrus!!

FINISHED STSMs

THE EFFECT OF GREEN EXTRACTION ON THE CAROTENOID CONTENT OF 7 MEDITERRANEAN PLANTS

Grant Holder

Radhia Abdelkebir

Institute of Arid Regions of Medenine, Tunisia

Period

1st February – 31st March 2018

Host Institution

University of Valencia and IATA-CSIC, Spain

BIOACCESSIBILITY AND CELLULAR UPTAKE OF CAROTENOIDS FROM TWO VARIETIES OF SEA BUCKTHORN BERRIES USING IN VITRO PROTOCOL AND CACO-2 CELLULAR MODELS

Grant Holder

Cristina Tudor

University of Agricultural Sciences and Veterinary Medicine,
Cluj-Napoca, Romania

Period

8th January – 9th March 2018

Host Institution

Department of Population Health, Luxembourg Institute of
Health, Luxembourg

TESTING OF NOVEL STATIONARY PHASES FOR THE SEPARATION OF CAROTENOIDS AND LEARNING OF CAROTENOID EXTRACTION METHODS FOR OIL

Grant Holder

Antonio J. Meléndez Martínez

Universidad de Sevilla, Spain

Period

30th March – 5th April 2018

Host Institution

Institute of Horticulture, Latvia University of Agriculture,
Latvia

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ACCOMPLISHED STSM'S EXPERIENCE REPORT

Radhia ABDELKEBIR

THE EFFECT OF GREEN EXTRACTION ON THE CAROTENOID CONTENT OF 7 MEDITERRANEAN PLANTS

Affiliation Range Ecology Laboratory, Arid Lands Institute, Tunisia
Position PhD Student
Host Institution Preventive Medicine and Public Health Department, Faculty
of Pharmacy, University of Valencia, Spain
E-mail abdelkebirradhia@yahoo.fr



I spent two months as part of a STSM action. The activity was developed in Valencia. The work consisted of a collaborative study between three top academic and research institutions in Spain: Universitat de València (UVEG), Universitat Politècnica de València (UPV) and Instituto de Agroquímica y Tecnología De Alimentos (IATA-CSIC). I would like to acknowledge all the team, Dr Jose V. Garcia-Perez, as Prof. Titular at the Department of Food Technology at the UPV, Dr. Maria Carmen Collado, as Researcher at IATA-CSIC, and their respective teams for the excellent work developed, their help and support. They have helped me in the laboratory and outside of it, making this stay an unforgettable experience. They made me feel like a part of the group. Dr. Francisco J. Barba was also an excellent instructor with a beautiful human character.

Thankfully to this, during my STSM, I have had the opportunity to learn about new techniques of plants extraction and to improve my research skills. We are working now in the publication of the results obtained for the analysis developed about carotenoid in top journals in the area of Food Science and Technology (Thomson Reuters®). My stay in Valencia also allowed me to meet new friends from Spain, Italy, USA and Croatia, among other countries.

I had the great luck to visit Valencia (Spain). Valencia has a mix of old and new buildings, giving it a real special feel of its own. There is a lot to see in Valencia. You could spend a day just at the City of Arts and Sciences, and there are some great museums. Without forgetting the famous local party "Fallas". The five days and nights of "Fallas" might be described as a

continuous street party. There are a multitude of processions: historical, religious, and comedic.

Finally, I am thankful to EUROCAROTEN committee for providing this great chance to widen my scientific horizons, improve my expertise and financially support all these efforts. I would like to thank personally Prof. Lourdes Gomez for her valuable assistance during all stages of my STSM application. Special thanks are given to the STSM Coordinator, the STSM Committee, the Chair and the Grant Holder of the Action, and to all these people that make possible the STSM experiences.

Thanks COST Action **CA15136 EUROCAROTEN** !!



ACCOMPLISHED STSM'S EXPERIENCE REPORT

Cristina TUDOR

BIOACCESSIBILITY AND CELLULAR UPTAKE OF CAROTENOIDS FROM
TWO VARIETIES OF SEA BUCKTHORN BERRIES USING IN VITRO
DIGESTION PROTOCOL AND CACO-2 CELLULAR MODELS

Affiliation University of Agricultural Sciences and Veterinary Medicine,
Cluj-Napoca, Romania

Position PhD Student

Host Institution Epidemiology and Public Health Research Unit ,Department
of Population Health, Luxembourg Institute of Health,
Luxembourg

E-mail cristina.tudor@usamvcluj.ro



My short-term scientific mission took place in Luxembourg, at the Luxembourg Institute of Health, under the supervision of Dr. Torsten Bohn. The two major objectives of my STSM were to **determine the bioaccessibility and the cellular uptake of carotenoids** from two Romanian varieties of sea buckthorn berries. The ultimate goal of my visit was **to learn and apply the in vitro digestion and cellular uptake protocols** so that I can further implement them in my home laboratory.

I had the chance to work for 9 weeks in a very well-equipped laboratory, together with Dr. Torsten Bohn and his team. While working in the lab' **I certainly improved my laboratory skills and also acquired new ones**, I became more independent and I learned how to work in a different environment than the one I was used to, all of these during the process of learning the protocols. I was lucky enough to work with people that had a vast experience in the field of carotenoid bioavailability and could properly guide me in the lab during these 9 weeks. **The experience in Luxembourg will significantly contribute to my PhD thesis**, in which I aim to compare the bioaccessibility of carotenoids and tocopherols from food and food supplements, and to evaluate the effect of food matrix and processing.

The Grand Duchy of Luxembourg's capital is a small city, in which I found many cultures, languages and mentalities that seem to coexist in a harmonious way. During my stay in Luxembourg **I worked in a pleasant multicultural environment, together with very nice colleagues from different parts of the world**, and I was able to experience the beauty of this diversity. Because of the country's central location, I took the advantage

and spent some of the weekends exploring neighboring Belgium, France and Germany, making very pleasant memories with wonderful people.

First of all, **I have to thank Dr. Torsten Bohn and his team for their willingness to receive me**, for the valuable advice and more important, for the guidance and unconditional help in the lab. This exchange visit was possible through the EUROCAROTEN network, and I want to take this opportunity and also thank all the people involved because without their support, both financial and moral, I couldn't have been able to accomplish the proposed work. **I highly recommend this experience abroad with an STSM not only for the professional gain, but also for the personal development.**





EUROCAROTEN'S INTERVIEW

TALKING WITH:

Emmanuelle Reboul

Affiliation	"Human Micronutrition Team" of the Centre for CardioVascular and Nutrition research of Marseille (INSERM/ INRA/ Aix-Marseille University Joint Unit)
Position	Senior Researcher, Head of the Research Axis "Bioavailability of lipid micronutrients"
Country	France
Area of Interest	Fat-soluble micronutrient bioaccessibility and bioavailability, digestion, membranes transporters, uptake and efflux pathways, enterocytes



Please tell us a bit about your lab and what you work on?

The Centre for CardioVascular and Nutrition research (C2VN) clusters expertise in the fields of **nutrition, metabolic syndrome and cardiovascular pathologies** at the faculty of Medicine Timone (Marseille). I belong to the "Human Micronutrition" team, which is one of the 5 teams of the C2VN. **The objectives of the team are to identify both host and environmental factors modulating fat-soluble micronutrient bioavailability**, as well as to better understand their health effects.

My work is mainly dedicated to i) understanding how some dietary factors (including lipids, polyphenols, etc.) can modulate the bioaccessibility and/ or the intestinal absorption of fat-soluble micronutrients, and ii) deciphering fat-soluble micronutrient uptake and efflux processes through cellular membranes.

Which area of carotenoids research do you find most interesting?

My work contributed to show that the transport of vitamin D, E, K and carotenoids was actually not driven by passive diffusion only, but could be facilitated by membrane proteins. The proteins identified so far are known to be involved in lipid and/or cholesterol transport, but some other transporters remain to be identified. There is still a lot to do to fully understand the molecular mechanisms of these complex pathways, and this is a very exciting objective.

As a STSM hosting lab, what type of collaborative projects would you envision?

My group **can share skills to study carotenoid digestion and bioaccessibility** using different in vitro models, as well as expertise to understand **carotenoid uptake and efflux in several cellular and animal models**. We mainly work on intestinal cells, but we also study fat-soluble micronutrient transport in other organs such as liver or brain. **We would be happy to collaborate with other teams to study carotenoid bioavailability, from the intestinal lumen to target tissues.**

In your eyes, how can the EUROCAROTEN Cost Action contribute to carotenoid research?

EUROCAROTEN Cost Action constitutes an amazing **networking opportunity** for both researchers and students. Besides, the different workgroups are working on the **harmonisation of the protocols** and the **constitution of data banks** that will be very useful for the whole carotenoid community. I am sure that this Cost Action will strongly help researchers to propose ambitious EU projects in the future.

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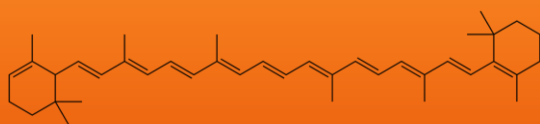
CAROTENOIDS IN OUR DAILY LIFE

CAROTENOID OF THE MONTH

Name: α -Carotene

Chemical Formula: $C_{40}H_{56}$

Molecular Weight: 536.88 g/mol



CAROTENOID OF THE MONTH: α -CAROTENE

α -carotene is a member of carotenoid family, to which belongs together with β -carotene, β -cryptoxanthin, lutein, lycopene, and zeaxanthin. Human body can convert α -carotene into vitamin A to sustain of healthy skin, bones, good vision, and a great immune system. α -carotene can act as antioxidant and remove destructive free radicals from the body before they cause the tissue damage, which can lead to chronic diseases. Many foods are rich in α -carotene including orange, cabbage, swiss chard, collards, green beans, tangerines, and sweet bell peppers.

α -carotene is a fat-soluble substance, which requires the presence of dietary fat for proper absorption. A study investigated that humans with the highest blood levels of α -carotene were less likely to die from heart disease. Another study found a correlation between α -carotene intake and longevity. Overlook at the investigation of researchers found that high blood levels of α -carotene were inversely associated with cancer death, cardiovascular disease and all other illnesses. The correlation between high levels of α -carotene and a lower risk of death from diabetes disease were especially high[...].

Text by Alma Bockuviene, Post-Doc at the Vilnius Gediminas Technical University, Lithuania.
E-mail: buvytealma@gmail.com

FUNCTIONAL CEREALS ENRICHED WITH CAROTENOIDS AND PUFA_s – SCIENTIFIC FICTION OR COMMERCIAL REALITY?

Carotenoid pigments and polyunsaturated fatty acids (PUFAs) are indispensable for human well-being due to their healthy, dietary and functional properties. The insufficiency of naturally sources of carotenoids and PUFAs resulted in “hunting” for an appropriate technology that could be able to either enrich common food- and feed-stuffs with these metabolites or directly produce them in high enough quantities. The Čertík’s team has developed the solid state fermentation (SSF) process where oleaginous fungi belonging to *Zygomycetes* efficiently utilized cereals and simultaneously accumulated dietetic valuable carotenoids and PUFAs. The SSF process has been optimized for natural construction of functional cereal-based food/feed products. Such SSF-based cereals have been successfully employed for making cereal goods (e.g. rolls, bread and pasta) as well as they have been tested as a feed additive for animal diet. Thus, biotechnologically prepared carotenoid/PUFA-enriched cereals may open novel prospects for the market of functional cereal-based food and feed industry.

Text by Milan Čertík, Assoc. Prof. at the Institute of Biotechnology, Slovak University of Technology, Slovak Republic
E-mail: milan.certik@stuba.sk

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THINK TANK INFORMATION

THINK TANK REPRESENTATIVES FOR THE NEXT 3rd GRANT PERIOD – WELCOME LETTER

As this second Grant Period of EUROCAROTEN COST Action comes to the end, it is time to pass on the responsibilities of being a Think Tank Representative to two new candidates.

The selection process for the new Representatives of the Think Tank Group (TTR), taking place during the month of April it is now closed and we have found our **new representatives for the next Grant Period**:



- **Sanja Vlasisavljević Krstić**, Research Associate at University of Novi Sad, Serbia
E-mail: sanja.vlasisavljevic@dh.uns.ac.rs



- **Marina Green**, PhD Student in the Nutrition Research Centre Ireland, Ireland,
E-mail: mgreen@wit.ie

On behalf of our network, we would like to extend a most cordial welcome to them.

According to their professional profiles and their enthusiasm, we know that the chosen candidates are capable to carry out the tasks of this group, and we know that their contribution will be of value within EUROCAROTEN.

Ludmila Bogacz-Radomska and **Mohammed Iddir** use this opportunity to sincerely thank the invitation to be the 2nd Grant Period Representatives of the Think Tank Group, and bid farewell. This work has led us to a personal and professional development and also given us a sense of contributing to a common goal.

Lastly, we would like to thank everyone who has shown interest and applied to our call, and we wish all the luck to the new representatives and offer our support for any guidance or counselling.



Representatives for 2nd grant period:

- * **Mohammed Iddir**
mohammed.iddir@lih.lu
- * **Ludmila Bogacz-Radomska**
Ludmila.bogacz-radomska@ue.wroc.pl

ECl spokesperson:

- * **Kristina Kljak**
kkljak@agr.hr



Kristina

Mohammed

Ludmila



WORK GROUP NEWS

WORKING GROUP 2 QUESTIONNAIRE

As carotenoids are important bioactive compounds in human nutrition affecting health and well-being, it is necessary to widen knowledge about them among general population. Within EUROCAROTEN, one of the goals of WG2: Quality along food chain, is to promote carotenoids and their health benefits. WG2 participants discussed this topic and decided to introduce a short questionnaires as one of the tools. As a targeted group, children from 9 to 15 years of age were selected. The prepared questionnaire contains 9 multi-choice questions, and is prepared in several languages: English (<https://goo.gl/forms/0v4CZoE7yL6P62tz1>), Spanish (<https://goo.gl/forms/ZaZMT6iYFfQSsZQt2>), Dutch-NL (<https://goo.gl/forms/PqSMG00VPbTUrsAy1>), Slovak (<https://goo.gl/forms/pNT5qfGshWhvY9w72>), Dutch-BE (<https://goo.gl/forms/40ONfI3hUAF6bJJi2>), Albanian (<https://goo.gl/forms/gxsJTF6b38YpCWCi1>),

French (<https://goo.gl/forms/b82EMh9ZLqvRY8eG3>), Lithuanian (<https://goo.gl/forms/q3rdTMvCAkg26XJz2>), Romanian (<https://goo.gl/forms/JoZU3ZvdOJscgLDN2>), Croatian (<https://goo.gl/forms/TmA8sJRL3z8Ihm572>), Serbian (<https://goo.gl/forms/0wPPLPqD1bnuG5aq2>), Norwegian (<https://goo.gl/forms/xwO7FURnDkvAfLr42>) and Macedonian (<https://goo.gl/forms/nikFvAI87orUfsKk1>).

For more information contact:

Nora O'Brien (nob@ucc.ie),
Anamarija Mandić (anamarija.mandic@fins.uns.ac.rs)
and Irena Vovk (irena.vovk@gmail.com), activity coordinators.

ACKNOWLEDGEMENTS

We would like to thank everyone who has so kindly contributed with the content present in this newsletter:

Antonio J. Meléndez Martínez and Cristina L.M. Silva for their guidance and supervision during the making of the EUROCAROTEN Newsletter.

Radhia Abdelkebir and Cristina Tudor who have kindly given their testimonies.

Emmanuelle Reboul for her contribution to our EUROCAROTEN Interview.

Alma Bockuviene and Milan čertík for contribution to our "Carotenoids In Our Daily Life" rubric.

Nora O'Brien and Anamarija Mandić in WG News.

This newsletter is part of dissemination strategy of COST Action EUROCAROTEN, supported by COST (European Cooperation in Science and Technology).

COST (European Cooperation in Science and Technology) is a pan-European intergovernmental framework. Its mission is to enable break-through scientific and technological developments leading to new concepts and products and thereby contribute to strengthening Europe's research and innovation capacities.

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NEWSLETTER CONTRIBUTORS

Editors:

Antonio J. Meléndez-Martínez (ajmelendez@us.es)
Kristina Kljak (kkkljak@agr.hr)
Mohammed Iddir (mohammed.iddir@lih.lu)
Ludmiła Bogacz-Radowska (ludmila.bogacz-radowska@ue.wroc.pl)

Dissemination:

Anneli Ritala (anneli.ritala@vtt.fi)
George Manganaris (george.manganaris@cut.ac.cy)
Cristina Luisa Silva (clsilva@porto.ucp.pt)
Mladen Brncic (mbrncic@pbf.hr)

Design and Layout:

Miguel Braga (miguel.braga@brag.pt)