



# Annual Report 2021

## NuGO Association

NuGO is an Association of universities, research institutes and SMEs focusing on the development of molecular nutrition, personalised nutrition, nutrigenomics and nutritional systems biology

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## NuGO Association 2021

It is my privilege to introduce the NuGO Association Annual Report for 2021 and summarise some of our recent activities. We were all very happy to move out of the pandemic public health restrictions and return to face-to-face working, but we should not forget that Covid-19 is still a major challenge for all of us and our organizations including NuGO.

Due to travel restrictions, NuGO decided -early in 2021- to organise the first and hopefully only virtual NUGOweek. The topic was "Immuno-nutrigenomics: How to feed the immune system".

NuGO views training as a key asset of the association, and we are keen to support such activities, awarding grants to support this whenever possible. Supported by NuGO, two early career NuGO scientists attended the online seminar "16S rRNA gene amplicon analysis", organised by the Technical University of Munich (DE) in April 2021. Similarly, seven grants were given to NuGO researchers to attend the online 4<sup>th</sup> European Summer School on Nutrigenomics in June 2021.

During 2021, we continued with online activities including NuGO webinars, which address specific research topics, such as metabolism, precision nutrition, microbiota, exposome research or nutriepigenomics. These webinars are open to all NuGO members, and are intended to strengthen networking and collaboration between NuGO members.

In March 2021 we started a series of webinars around the "Role of the gut microbiota-brain axis for human health", organised by me (Prof. Michael Müller - UEA, UK) and was attended by 238 researchers. The webinar "Role of gut and gut microbiota in health and wellbeing" was organized after eNuGOweek in September, hosted by Professors. Stine Marie Ulven and Marjukka Kolehmainen (FI), and attracted 138 attendees. The last 2021 webinar on "Mapping the exposome: Linking exposure and effect" was organised by Professors Lynn Vanhaecke and Sarah De Saeger, both from Ghent University (BE), and was attended by 120 participants. We will continue with NuGO webinars in the future, as they give NuGO scientists an opportunity to keep others informed about the exciting research that takes place within NuGO.

I would like to thank Meike Bünger and Lydia Afman from the NuGO Secretariat for their enthusiastic and tireless support, all NuGO Board Members for their commitment, and -finally- I would like to thank all members over the past year for your engagement and the enthusiasm you bring to the Association!

Prof. Michael Müller, CEO of NuGO

# NuGO Management Board



Prof. Michael Müller  
University of East Anglia (UK)  
NuGO Director



Dr Lydia Afman  
Wageningen University (NL)  
NuGO Executive Secretary



Dr Guy Vergères  
Agroscope (CH)  
NuGO Management Board (Chair)

## As of September 2021, the NuGO Management Board is composed of:

- Guy Vergères (Agroscope, CH) - Chair
- Marjukka Kolehmainen (University of Eastern Finland, FI)
- Chris Evelo (Maastricht University, NL)
- Diana Ivanova (Medical University of Varna, BG)
- Chiara Murgia (Monash University, AU)
- Lynn Vanhaecke (Ghent University, BE)
- Fiona Malcomson (Newcastle University, UK - ECN Representative)
- Lorraine Brennan (University College Dublin, IE)
- Baukje de Roos (University of Aberdeen, UK)

**NuGO General Assembly** chair and vice-chair are Dr Guy Vergères (Agroscope, CH) and Dr Marjukka Kolehmainen (University of Eastern Finland, FI), respectively.

# NuGO General Assembly

The NuGO General Assembly is the highest authority within NuGO and meets at least once a year. Of the 31 Members, 26 Members attended the 14<sup>th</sup> General Assembly on 6<sup>th</sup> September 2021 (online).

The General Assembly welcomed Ben van Ommen (TNO, NL) and invited him to give a brief update on his research in the area of lifestyle medicine reducing, for example, risks of diabetes and Alzheimer through nutrition.

The General Assembly accepted the University of Melbourne (AU), represented by Chiara Murgia, as a new member, and Dr Murgia presented her work at the university, where nutrition research is being developed. In general, NuGO continued to offer a reduced fee for new Members during their first year (50%) but, because

of the pandemic, the General Assembly also reduced 2022 fees to €1200. Membership is open to organisations only, but individuals are welcome to participate in events organised or supported by NuGO. At the end of 2021, 30 organisations were Members of NuGO including the University of Melbourne (AU).

The NuGO Secretariat is based at Wageningen University & Research (NL) and, in April 2021, Meike Büniger replaced Ingeborg van Leeuwen-Bol. Ingeborg had been with for NuGO for more than 18 years, having started in 2004 when NuGO was an FP6 Network of Excellence. NuGO thanks Ingeborg for her dedication and hard work, and wishes her every success in the future.



NuGO General Assembly 2021



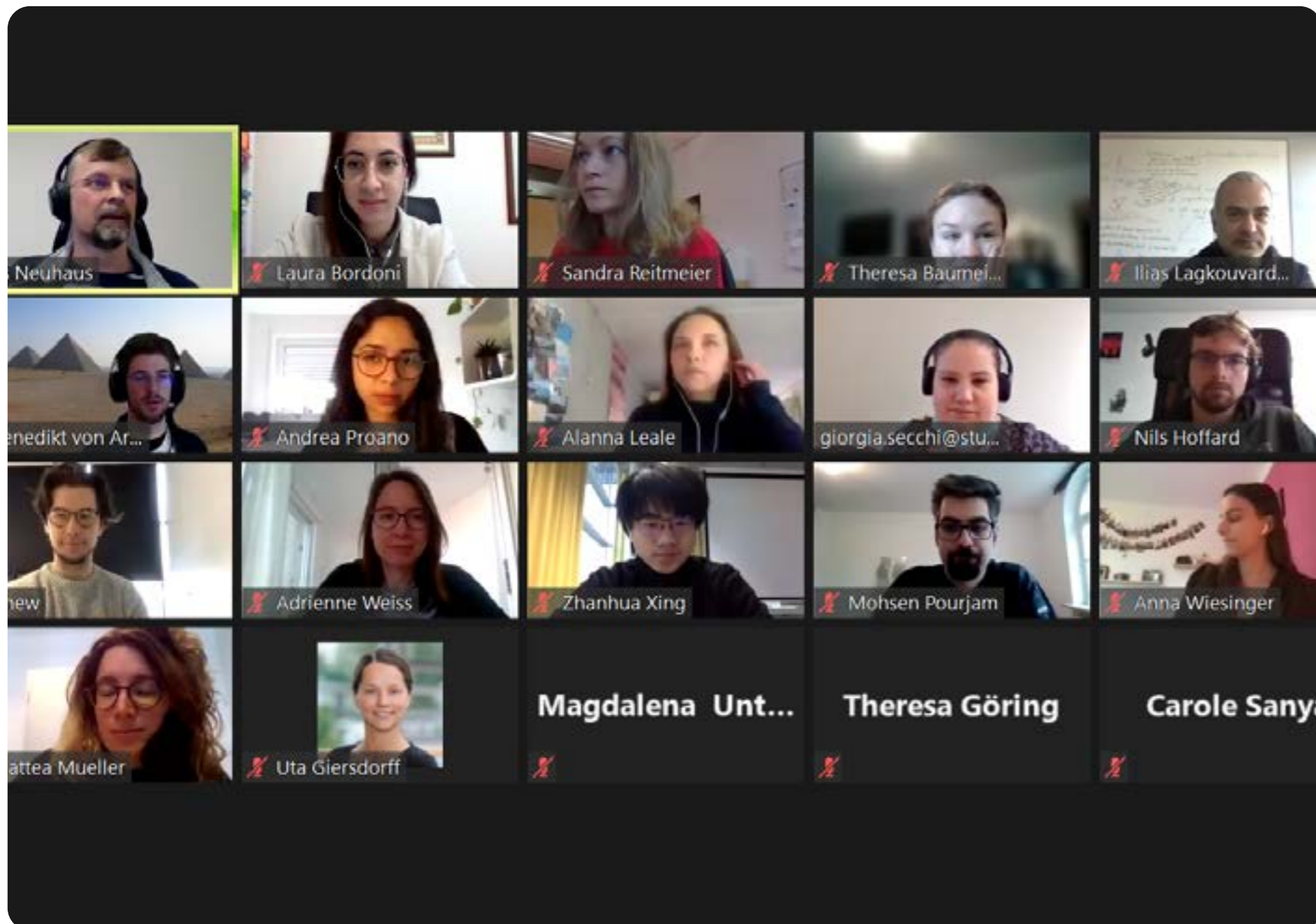
Dr Meike Büniger  
Wageningen University (NL)  
NuGO Secretariat



Ingeborg van Leeuwen-Bol  
Wageningen University (NL)  
Formerly of the NuGO Secretariat



# NuGO Courses 2021



## Hands-on 16S rRNA gene amplicon analysis

Supported by the NuGO association, two NuGO member affiliates, Giorgia Secchi (Fondazione Edmund Mach, IT) and Laura Bordoni (University of Camerino, IT), attended the online seminar 16S rRNA gene amplicon analysis, which was organised by the Technische Universität München (12-14<sup>th</sup> April 2021).

The seminar started with an introduction about amplicon-based next generation sequences, focusing on 16S rRNA for microbiome analysis. Critical points to be considered from the initial steps of the study design were described as well as an exhaustive description of how to measure richness, alpha- and beta-diversities, and different indexes associated with these parameters. These general concepts are necessary to fully understand and handle properly the IMNGS (integrated microbial next generation sequencing) and Rhea scripts proposed for analysis of microbial profiles.

Giorgia and Laura learnt how to process raw sequencing data (FASTQ files) from quality check (using FASTQC) to production of remultiplex from dimultiplex files (using Perplexor scripts). They also learnt how to produce OTU

(operational taxonomic unit) tables with IMNGS and analyse them using Rhea scripts.

These scripts represent an easy tool for normalization and production of rarefaction curves, analysis of alpha- and beta-diversities, taxonomic binning, serial group comparisons, and correlation analysis.

The seminar provided both theoretical background (with daily morning lectures) and opportunities to practice using the data analysis pipeline (with separated hands-on sessions in the afternoon). These practical sessions included an overview of advanced analysis (Namco) and how to produce figures for papers, depending on numbers of samples, confounders, and longitudinal data, for effective communication and interpretation.

Despite public restrictions due to the COVID-19 pandemic, this online seminar represented a wonderful learning opportunity to keep educating NuGO early career researchers.



# NuGO Webinars 2021

NuGO webinars address a range of topics, such as metabolism, precision nutrition, microbiota, exposomics, and nutriepigenetics. They are open to all NuGO members and are intended to strengthen networking and collaboration. NuGO webinars were well received during 2021 with around 140 attendees and will be part of the 2022 programme.



## Role of the gut microbiota-brain axis for human health - 4<sup>th</sup> March 2021

Amy Loughman (Deakin, AU), *The role of the gut microbiota for mental and brain health*; Aimee Parker (QIB, UK), *Gut microbiota regulate hallmarks of inflamm-ageing in the gut and brain*; and David Vauzour (UEA, UK), *Novel strategies to delay brain ageing: Role of the gut microbiota*

Considerable attention has focused on gut microbiota-brain axis for mutual interplay and involvement of immune and endocrine system crosstalk. Studies conducted on experimental animal models, such as germ-free or transgenic mice, have shown the influence of gut microbiota in progression of diseases affecting the central nervous system. The few studies available on patient groups have established that patients affected by a specific disease share prevalence of the same families of microorganisms in their microbiota and their microbiota differs from that of healthy controls. New technical perspectives are aimed at shaping an individual's microbiota to ensure the presence of microbiota capable of counteracting onset and progression of diseases.



## The role of gut and gut microbiota in health and well-being - 23<sup>rd</sup> September 2021

Vibeke Telle-Hansen (OsloMet, NO), *Gut & metabolism: Role of diet on gut microbiota & metabolic regulation*; Gianni Panagiotou (UniHK, CN), *Shaping the disease microbiome with dietary and lifestyle interventions*; and Rikard Landberg (Chalmers, SE), *Metotypes based on microbiota & metabolites for studying individual responses*

The importance of gut function and microbiota composition to overall wellbeing and healthy metabolism are evident. Food and dietary components are mediating many of effects via interactions with gut microbiota and mechanisms that are activated or prevented by these interactions, such as production of food metabolites as well as gut barrier function. The liver is key in regulating balanced metabolism as well as delivering and modifying diet related metabolites for the body. Thus, its contribution to health and wellbeing is obvious and, today, it is known that compositions of microbiota have important impacts liver function. It is also known that individual differences in responses to diet- and microbiota-produced metabolites might determine outcomes in health and risk of diseases.

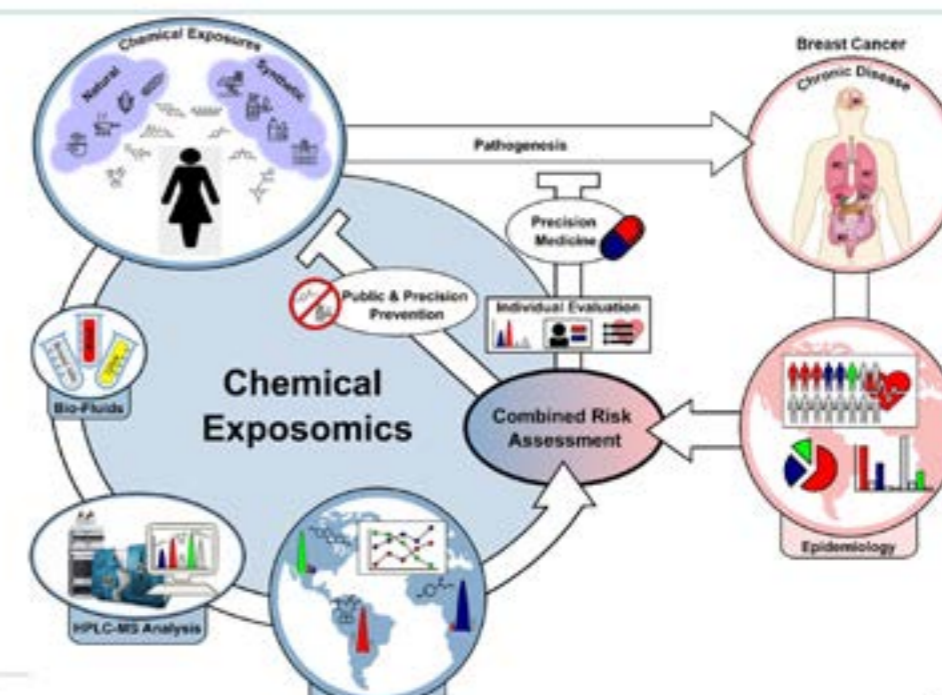


## Mapping the exposome: Linking exposure and effect - 22<sup>nd</sup> November 2021

Sarah De Saeger (Ghent University, BE) *Introduction to FLEXiGUT: exposomics to study chronic low-grade inflammation*; Benedikt Warth (University of Vienna, AT) *Exposure and Effect of Environmental and Food Toxicants: An Omics' Perspective*; Martine Vrijheid (Institute of Global Health, ES) *Studying the Exposome during Early Life*; and Gary Miller (Columbia University, US) *The Exposome in the Future: Obstacles and Opportunities*

Exposure to environmental hazards, such as unhealthy diet and lifestyle, air pollution, legacy and emerging contaminants, toxins, etc., exert a negative impact on human health, leading to the onset and/or progression of chronic diseases as well as accelerated biological ageing. Improved understanding of drivers of human health and disease, therefore, requires in-depth investigation of not only the genome, but also the exposome, defined as "cumulative measure of environmental influences and associated biological responses throughout the lifespan, including exposures from the environment, diet, behaviour and endogenous processes" (Wild 2005; Miller and Jones 2014).

### Vision





# NuGO Early Career Network



2021 was a real challenge for the committee to keep connected with ECN members given the continued pandemic and the high-turnover of the ECN, with new PhD students arriving and early career post-docs moving on. With these continued challenges most ECN activities were online during 2021 such as regular 'meet-ups', scientific webinars (e.g., Tips for succeeding your PhD, The role of gut and gut microbiota in health and wellbeing), and listen-in webinars considering a variety of communication strategies and opportunities. The same approach will be followed in 2022 including research presentations by ECN members and experts, a new journal Club - giving ECN members to critically-appraise nutrigenomics-related publications, and skills & training workshops, developing skills, such as science communication and the use of specific platforms for data analysis, will be given by experts. During the second half of the year, NuGO ECN asked members what they would like to see from the network. The responses have helped to guide topics for webinars and training as well as our aims and mission.

One of the highlights for the ECN this year was our virtual ECN breakfast, during eNuGOweek, which attracted 20 members using GatherTown, a user-friendly platform that supports interaction amongst participants. We assigned participants to groups and held a Pub Quiz, including a round with 'NuGO questions'. Overall, feedback for this event was very positive.

This year also saw one of our long-standing committee members and chair, Kathryn Pimentel, step down from the ECN Committee after five years. We thank Kathryn for all of her fantastic work and continued support, and wish her and her family all the best in the future! Fiona Malcomson (University of Newcastle, UK) and Aimee Dordevic (Monash University) remain on the committee with Fiona representing ECN on the NuGO Management Board and Aimee on the Bioinformatics Working Group. Eva Rath (TUM, DE) and Charlotte Michielsen (WUR, NL) have joined the ECN Committee, and we look forward to working with them.

Another success during 2021 was publication of the nutrigenomics collection for 'Frontiers for Young Minds', an open-access journal for articles written by scientists, reviewed by children and adolescents, and published by Frontiers. The collection is entitled 'New ways to understand how foods affect me and my health'. This collection has provided an opportunity for NuGO researchers to engage with their early career researchers to present the cutting-edge of nutrigenomic research to the next generation of scientists. We also look forward to launch of this publication of this as an e-book around the time of NuGO Week 2022!

As ever, the NuGO ECN Committee members would like to give their sincere thanks to the NuGO Association for their continued support and for sponsoring our activities.



Kathryn Pimentel, Agroscope (CH)

# NuGO Summer School 2021

**The NuGO summer school offers insights from studies examining health, nutrition, epigenetics, nutrigenomics, and complex diseases, presented by experts globally.**



The presentations were all appreciated by the delegates, but some of the most important ideas were effects of polymorphisms on individual differences in response to certain diets and the potential benefits from tailoring diets for individuals, application of personalised dietary strategies and the interplay between microbiome and nutrition, i.e., that diet influences directly composition of gut microbiota and gut microbiomes influence responses to certain food components and potential health benefits. Despite being online, participants enjoyed meeting people who work in the same field but offered different perspectives.

Both the round table discussions and 1:1 sessions with speakers allowed more than 100 attendees to explore aspects of the different presentations more deeply.

NuGO Scholarships were awarded to Alexandra King (St Mary's University, UK), Laura Alessandrini (University di Camerino, IT), Federico Bernuzzi (QIB, UK), Alba Miguéns Gómez (URV, ES), Giulia Gaudio (La Fondazione Edmund Mach, IT), Duygu Dede Sener (Maastricht University, NL), Ayshe Salim (Medical University Varna, BG).

# eNuGOweek

## Immuno-nutrigenomics: How to feed the immune system

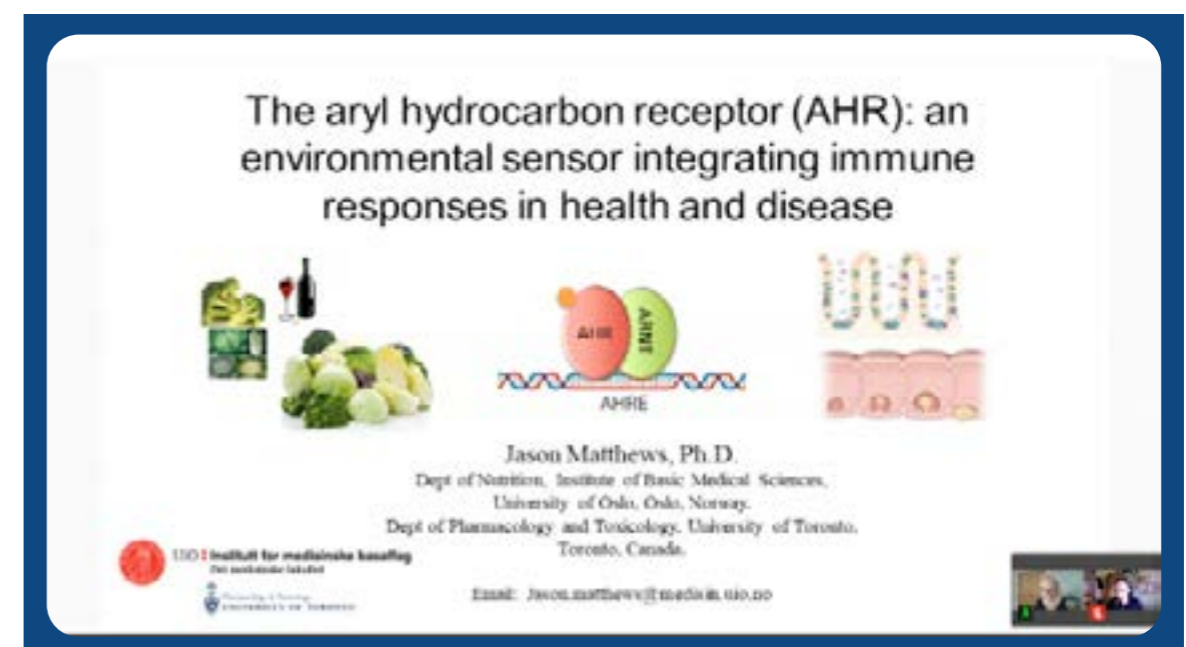
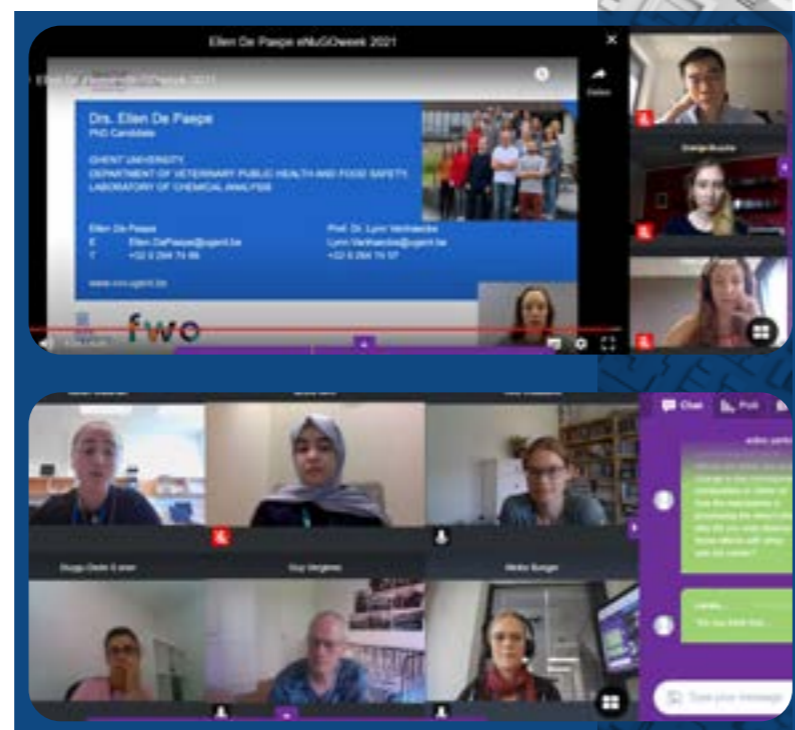
Immunometabolism is an emerging branch of biology that examines the interplay between metabolism and immunology. Because of the long-lasting effects COVID-19 has on metabolic health the eNuGO week 2021 was well-timed and attracted 154 delegates from 25 countries.

Participants listened to a range of lectures by leading scientists on topics including Fibre-poor Western diets fuel inflammation (Quirijn de Mast - Radboudumc, NL), Environmental signals influencing immuno-metabolism in diabetes" (Rinke Stienstra - WUR, NL), Global pandemics interconnected: Obesity, impaired metabolic health, and COVID-19 (Matthias Schulze - DIFE, DE), Immuno-metabolism around the clock (Annie Curtis - Royal College of Surgeons in Ireland, IE), Role of lipid mediators in resolving inflammation: COVID-19 and beyond (Bente Halvorsen - UiO/Oslo University Hospital, NO), Regulating metabolic inflammation by nutritional modulation (Helen Roche - UCD, IE), Microbiome composition as a mediator of the link between diet and systemic inflammation: PREDICT studies (Ana Valdes - University of Nottingham, UK) and shorter presentations given by selected early career scientists from NuGO organisations.

An interactive poster presentation gave young scientists the opportunity to present their research results in groups of 5-8, and resulted in lively online discussions.

The NuGO networking event was a 'speed dating' event, pairing participants randomly every eight minutes. And, surprisingly,

a funny, interesting, informative, and absolutely great experience, as an alternative for more usual networking at face-to-face events.





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