



**NuGO Association
2017 Annual Report**

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

NuGO Management Board (01.01.2017)

John Mathers, University of Newcastle (UK)
Marjukka Kolehmainen, University of Eastern Finland (FI)
Chris Evelo, Maastricht University (NL)
Guy Vergères, Agroscope, Institute of Food Science (CH)
Diana Ivanova, Medical University of Varna (BG)
Lynn Vanhaecke, Ghent University (BE)
Cristina Andres-Lacueva, University of Barcelona (ES)

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» 01. Management

» More than 15 years of NuGO

2018 marked the 15th official anniversary of NuGO and, on such occasions, it is an opportunity to reflect on our history. NuGO grew from an Accompanying Measures ‘Molecular approaches to human nutrition research’ (Acronym: Nutrigenomics). This was followed by a meeting in Schiphol (NL) during the summer of 2002 where the concept of a Nutrigenomics Network of Excellence (NoE) emerged. Following this, work commenced on preparing a draft proposal, which developed further in January 2003 in during a meeting in Florence (IT). The proposal was approved in April 2003 with negotiations commencing in July 2003. In January 2004, NuGO NoE was launched with 23 partners and an impressive budget of €17.3M with Wageningen University (NL) acting as coordinator. In September 2004, the first NuGOweek 2004 took place and, following its success, these meetings are now an annual fixture and NuGOweek is the leading Nutrigenomics Conference in Europe. In 2018, we will celebrate NuGO week 2017, the 15th annual event and a significant accomplishment.

From 2004 until 2010, NuGO was at the forefront in delivering nutrigenomics training to researchers around Europe. Many group leaders globally have attended these courses and are now still sending their students to NuGOweek or the associated training courses. Access to a worldwide network of experts has been key in the success of NuGO and enabled development of subsequent projects, such as Food4me, NutriTech, ENPADASI, QUALIFY and FOOTBALL. NuGO can say proudly that, during this funded period, it helped shaped the nutrition research landscape with the emergence of sophisticated omics technologies now used routinely in most labs and the development of concepts associated with personalised nutrition. Following 2010, it was clear that the network needed to continue, and work commenced to establish the NuGO Association, which grown into its current form with 27 members, three of which are from outside of Europe. In the eight years following cessation of EU funding, it is a major achievement that a vibrant, active and influential network still thrives and continues to grow.



*Prof. Baukje de Roos
(University of Aberdeen, UK)*

» ... And 2017 in a nutshell

NuGO continues to have a role in the training of future generation of nutrition scientists and the development of new and key concepts pertinent to nutrition. We could not do this without the support and input of a growing number of NuGO members. In 2017, we welcomed four new members to our NuGO community - the Liggins Institute at the University of Auckland (NZ), St Mary's University London (UK), the Max Rubner-Institut, Karlsruhe (DE) and the Faculty of Veterinary Science at University of Ghent (BE). We are looking forward to working with them to extend and broaden our activities for an increasingly global audience interested in advancing the field of nutrigenomics.

NuGOweek 2017 took place in the beautiful Black Sea port town of Varna (BG). The scientific programme, led by experts in the field of nutrigenomics, personalised medicine and systems biology, and the NuGOweek PhD course on new technologies in nutrigenomics research, were well received and attracted an even greater number of member organisations than before. This meeting also offered an opportunity to reconsider several existing activities, such as exchange grants and shared software licences. We also organised a second very successful PhD course on Metabolomics in Copenhagen (DK).

We are very pleased to see growing participation of younger researchers within our NuGO community in the shaping and running NuGO activities. The NuGO Early Career Network is working hard to create a sense of community and engagement amongst early-career researchers and provide a forum for nutrigenomics researchers at the start of their career. One of their most important outputs in 2017 was the organisation of webinars on communication skills, dissemination, scientific concepts and software analysis tools. These webinars have proven very popular and we are looking forward to enhancing further the opportunities webinars offer for education and dissemination within NuGO.



*Prof. Lorraine Brennan
(University College Dublin, IE)*

>> 02. Administration

In 2017, there were no major changes to the management structure or the staffing.

NuGO co-directors, who completed their third year in office during 2017 were:

- Prof. Lorraine Brennan
University College Dublin (IE)
- Prof. Baukje de Roos
University of Aberdeen (UK)

The Management Board, which has a maximum of seven members, supports the NuGO co-Directors in decision-making and, in 2017, was composed of:

- John Mathers (UK)
- Marjukka Kolehmainen (FI)
- Chris Evelo (NL)
- Guy Vergeres (CH)
- Diana Ivanova (BG)
- Lynn Vanhaecke (BE)
- Cristina Andres-Lacueva (ES)

Chair and vice-chair of the NuGO Annual General Meeting (AGM) were:

- Prof. John Mathers
University of Newcastle (chair, UK)
- Dr Marjukka Kolehmainen
University of Eastern Finland (vice-chair, FI)

The NuGO AGM is the highest authority within NuGO and at least one meeting is held each year.

The NuGO secretariat is based at Wageningen University & Research (NL) with Dr Fré Pepping Ingeborg van Leeuwen-Bol (right).

> Software licence

During the NuGO NoE (2004-2010), we offered shared software licences to the project partners. For several years since we have offered two options, and this was reduced to one in 2015. At the NuGO AGMs in Copenhagen (DK) and Varna (BG), we discussed how NuGO might proceed with software licences and it was decided the Association would:

- Focus on open source options and provide training opportunities accordingly
- Exclude the costs of the software licence from the annual fee

As a result, seven NuGO members decided to continue with a shared software licence for METACORE as of January 2018, which was purchased from Clarivate Analytics, formerly the IP & Science business of Thomson Reuters and the costs among them.

Other members are welcome to sign-up and join.



Dr Fré Pepping
Wageningen University & Research (NL)



Mrs Ingeborg van Leeuwen-Bol
Wageningen University & Research (NL)

> Finance

The NuGO AGM on 31st August 2017 in Varna (BG) approved the auditor's report for 2016 with negative balance of €4015.

Due to the relatively low number of exchange grants awarded in 2016 and executed in 2017, and the generous contribution of the Rectorate of the Medical University of Varna for NuGOweek 2017, the Association ended the year with a surplus.

The annual fee for 2018 has been set at €1600. For new members, we apply a reduced fee (50%) for 12 months.

» 03. NuGO week 2017, Molecular nutrition: Understanding how food influences health

The Medical University of Varna (BG, 28th-31st August 2017) started its activities within NuGO as an Associate Member in 2007. Under the leadership of Professor Diana Ivanova, now Dean of the Faculty of Pharmacy, the Varna group has always been present at the NuGOweek and an active member.



Diana Ivanova chaired the Organising and Scientific Committee.

NuGOweek 2017 included sessions on:

- Precision medicine
- Adipose and related tissues
- Application of phenotypic flexibility
- Diet and cancer prevention
- New development in nutritional genetics
- Early career investigators

Venue: The Palace Hotel, Varna, Bulgaria

Participants: 135 participants from 15 countries; 27 oral presentations and 52 poster presentations



» Poster prizes:

As in previous years, prizes were provided by one of our sponsors, Amway, and were won by:

- 1st Prize: Kathryn Burton (Agroscope, CH)
- 2nd Prize: Iris de Hoogh (TNO, NL) & Kamalita Pertiwi (WUR, NL)
- 3rd Prize: Mariya Markova (DIfE, DE) and Teresa Grohman (University of Aberdeen, UK)

>> 04. NuGO PhD Course Varna (BG, 26-28th August 2017)

Venue: Faculty of Pharmacy, Medical Univ. Varna

Participants: 21 PhDs and post-doctoral researchers from 15 organisations (11 VLAG, 10 external)

Programme: Seven lectures, group assignment, practical exercise (below) and a laboratory visit

Lecturers:

- Thomas Gundersen (VITAS AS, NO)
- Yoana Kiselova (MUV, BG)
- Andre Boorsma & Iris de Hoogh (TNO, NL)
- Christian Drevon & Sindre Lee (Univ. of Oslo, NO)
- Hannelore Daniel (Technical Univ. Munich, DE)



> 05. Introduction to nutritional metabolomics (Copenhagen, DK - 13-17 February 2017)



Course coordinators:

Prof. Lars O. Dragsted and Gözde Gürdeniz

NuGO grants awarded to: Sunniva Veen Larsen & Jacob Juel Christensen (University of Oslo, NO)

The aim of this course was to give an introduction untargeted nutritional metabolomics including the use of software for data handling and analysis. It combined theory and practical learning and is very intense.

More specifically, participants are taught to evaluate how study design affects sample and data handling, how to use the most common freely-available software, and how to apply

common strategies for marker identification. There is an introduction to the different mass spectrometers, focusing on mechanisms of action, and data pre-processing and analysis using MZmine, including peak detection, deisotoping, alignment and gap filling.

Hands-on exercises used a dataset from a coffee intervention study, and there are lectures introducing univariate analyses (R) as well as multivariate approaches (PCA), and MATLAB, PLS-toolbox and PLS-DA. Following a lecture on metabolite identification, participants tried various web-based tools and MZmine to identify coffee metabolites of importance for projection in PLS-DA analyses.

On the last day, groups give a presentation summarising their workflow and results.

» 06. NuGO Early Career Network (ECN)

The ECN was established in 2016 and commenced activities during NuGOweek 2016 in Copenhagen (DK). A survey among the young scientists of NuGO identified the actions most wanted by the ECN were more training and support for career development, and more information about metabolomics and metabolic diseases were the top-ranked areas of interest. Subsequently, ECN organised a series of webinars that have served as training opportunities, covering basic aspects of the areas of interest.

The topics and facilitators of the webinars were:

- MetaboAnalyst web-based tool (Dr Vazquez-Fresno, University of Alberta, CA)
- Using Metacore (Dr Olivia Adler, University of Leeds, UK)
- Poster presentation: Harder than you think to get it right (Dr Siân Astley, BE)
- Phenotypic flexibility and personalised nutrition (Dr Suzan Wopereis, TNO, The Netherlands)

The ECN is represented on the NuGO Management Board and at the AGM to ensure the voice of young scientists is heard within the Association. As off end of 2017, the ECN representatives were:

- Kathryn Burton (Agroscope - CH)
- Jarlei Fiamoncini (TUM - DE, INRA - FR and, currently, University of São Paulo - BR)
- Sara Tulipani (University of Barcelona - ES, now Consultant - ES)
- Valentini Konstantinidou (University of Barcelona – ES, Consultant - ES)

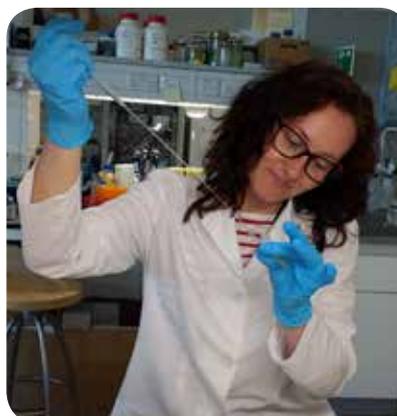
» 07. NuGO Exchange grants

In 2017, two exchange grants were implemented as a result of the December 2016 call:

- **Oscar Daniel Rangel-Huerta** from the University of Oslo (NO) visited the laboratory of Prof. Lars Dragsted at Københavns Universitet (DK)
- **Neshe Nazifova-Tasino** from the Medical University of Varna (BG) visited the group of Prof. Lorraine Brennan at University College Dublin (IE).

The future of the exchanges within NuGO was discussed during the NuGO AGM in Varna (BG). The ECN pleaded for these exchanges to continue and to make this opportunity more widely known amongst NuGO community. In December 2017, a new approach for 2018 was announced:

- Increased funding per exchange (€3500)
- Minimum duration of 10 working days
- Advertising of host on www.nugo.org
- Deadline for applications 26th March 2018 with the potential for a second round later in 2018



>> o8. New members since 2016



> Laboratory of Chemical Analysis (Ghent University, BE)

To characterize my research group (Prof. Lynn Vanhaecke), remarkably different research questions are tackled across convergent domains. However, within this context of diversity, and as a recurring element, comprehensive mass spectrometry-based analysis constitutes the key strategy to gain new insights and realise essential breakthroughs.

Historically, analytical methods have been established to measure residues and contaminants in food matrices of animal origin to ensure food safety and quality. Now, a new analytical avenue is being explored focusing on multi-compound approaches, and the simultaneous measurement of a wide range of analytes. As such, for about a decade, the Laboratory of Chemical Analysis has been exploiting fully the potential of so-called metabolomics using high-end technologies, such as Q-Exactive™ Orbitrap mass spectrometry and ambient ionisation. This metabolomics approach is, amongst other things, used to map:

- Residues and contaminants in food and environmental matrices (e.g. marine toxins in seafood, antibiotics and pesticides in edible insects, boar taint in pig meat, carotenoids in tomato, endocrine disrupting compounds in seawater)
- Metabolites in biofluids and tissue

The latter in particular has become a primary focus, searching for metabolite markers that are descriptive for certain metabolic disorders, dietary patterns, microbial perturbations, etc. It is often selected for multi-matrix approaches, assessing the metabolome of matrices including blood, urine and faeces. Faecal metabolomics has become our key expertise, putting our research group in a unique position in the human metabolomics field. Our pioneering role in this regard is reflected in three recent research papers, published in *Analytical Chemistry* and introducing faecal polar metabolomics, faecal lipidomics, and DNA-adductomics. Indeed, the faecal metabolome is widely acknowledged to integrate information about the host as well as exposomal factors, such as diet and the microbiome. As an example, using faecal metabolomics, we were able to reveal metabolome discrepancies following consumption of red and white meats that could be linked to diverse pathologies, including (colon) cancer, diabetes mellitus, and cardiovascular diseases. Our research group aim to improve knowledge about human metabolism, gaining insights on host metabolism, together with microbial and nutritional impacts, which may lead to advanced management strategies in health and disease. Moreover, the discovery of stratifying health and disease markers may serve a valuable basis for preventive or intervening nutritional strategies. As these objectives align with those of NuGO, we are very enthusiastic to have become part of the NuGO community.



St Mary's
University
Twickenham
London

> Nutrition and Genetics Group, St Mary's University, Twickenham (UK)

The Nutrition and Genetics Research Group at St Mary's University in London was created in 2015. Research interests are predominantly in the areas of genetic variations and their relationship with nutrition and chronic disease. We

endeavour to conduct research that has direct and measurable impact on human health. The group has been developing steadily since its creation and now includes lecturers and senior lecturers, PhD students and postgraduate students from the MSc Nutrition and Genetics programme, which is the first (and to date only) university degree of its kind in Europe. We are planning to expand further, increasing our research output and continuing to be pioneers in educating future scientists in nutritional genomics.



UNIVERSITAT
ROVIRA I VIRGILI

› Nutrigenomics Research Group, Universitat Rovira I Virgili (ES)

Description and general aim. The Nutrigenomics Research Group from the Universitat Rovira I Virgili (URV, ES) aims to generate general knowledge about the design of functional foods that can prevent, delay or alleviate metabolic diseases, such as obesity, diabetes, hypertension and metabolic syndrome. In addition, the group aims to obtain functional ingredients from natural sources to increase the value of food by-products.

Main techniques/ expertise: The group has wide experience of working as a team. It is an interdisciplinary group formed with experts in the fields of nutrition and related aspects of metabolism (lipids, glucose, etc.). The group works using techniques both in vitro and in vivo. In vitro techniques allow us changes caused by naturally occurring molecules in major metabolic pathways to be described and analysed. Moreover, these techniques also allow gene expression patterns in tissues involved in human diseases to be analysed. On the other hand, in vivo experimentation enables evaluation of the effectiveness of selected natural molecules in animal models. To achieve these aims, the research group works with the leading omics techniques.

Research lines: The group has several research lines that are supported by grants from national and international public and private entities, and always has at least one competitive national or internal project on-going.



› **NIM Genetics (ES)** is a Spanish biomedical company that specialises in the design and commercialisation of products and services for clinical genetic diagnosis, joined NuGO to help in the international efforts to improve

knowledge about personalised nutrition, nutrigenomics and nutrigenetics.

NIMGenetics has a multidisciplinary team of 85 people with a proven track-record in applying new genomic technologies to medicine and research and solid experience in analysis and interpretation of genomic data. Creation of a Personal Genomics Division, with Dr David de Lorenzo as its technical Director, is the result of interest in the field of nutrigenomics. The Personal Genomics Division is the origin of a new business model within the organisation, named GoGood Genetics. GoGood Genetics is focused on direct-to-consumer nutrigenetic testing services. In GoGood, our mission is to transfer state-of-the-art nutrigenomics and nutrigenetics research into efficient tools to improve quality-of-life, helping to reduce risks associated with inadequate nutrition. With this aim, we are building the most scientifically advanced nutrigenetic tests, like GoGood Vital and GoGood Intolerances.

- GoGood Vital analyses 83 genetic variants to determine individuals' requirements for vitamins and omega-3 fatty acids, and their effects in the individuals' health. This test allows the daily intake of these essential nutrients to be adjusted, meeting the real needs of each individual, improving wellbeing and helping to prevent diseases associated with inadequate nutrient intake amongst specific genotypes.
- GoGood Intolerance analyses 14 variants to determine the genetic risk of intolerances to lactose, fructose and gluten.

NIMGenetics and GoGood Genetics can contribute to NuGO by providing the latest genetic technology and the expertise in nutrigenomics and nutrigenetics services.



› The Graduate School LiFT (SE)

Future Technologies for Food Production (LiFT) is a national PhD programme and research network in food sciences. The overall goal of the graduate school is to strengthen competitiveness of the Swedish food industry by providing highly trained post-graduates with scientific competence in areas of importance to Swedish society and industry. The graduate school started in 1997 and is a joint initiative amongst SLU, Chalmers, LTH, RISE and University of Örebro.

LiFT is unique because of its:

- Active interactions with industry
- Synergies across and interactions between existing Swedish research environments
- Experience of an international network through educational travel
- PhD programmes with industrial connections and strong networking relationships

For more information: <http://foodsciencesweden.se/forskarskola-lift/lift/>

Directors of studies:

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› Liggins Institute, The University of Auckland (NZ)

Martin Kussman is Professor of “Systems Biology in Nutrition and Health” at the Liggins Institute (University of Auckland, NZ) and his team focuses on infant micro- and mycobiome and health; maternal nutrition, breast milk and infant health; and nutritional effects on early-life epigenetics. Martin is also the Scientific Director of New Zealand’s “National Science Challenge” on “High-Value Nutrition”, the third largest NZ National Research Programme, which focuses on infant, immune, metabolic and gut health and nutritional innovation for Asian consumers.

› 09. Scientific collaborations

From 2017, NuGO is no longer involved in the delivery of EU-funded projects.

As in 2016, the JPI HDHL project FoodBALL (the Food Biomarker Alliance) held their progress meeting immediately following NuGOweek2017 on 31st August and 1st September in Varna (BG), which was attended 35 people. 14 NuGO member organisations participate in FoodBALL.

In 2016 and 2017, we collaborated with the Asia Pacific Nutrigenomics and Nutrigenetics Organisation (APPNO) and facilitated visits to one another's annual meetings. As a result, we welcomed Prof. Young-Joon Surh (Seoul National University, KR) to NuGOweek 2017.

During NuGOweek 2015 (Barcelona, ES), we joined forces with the Micronutrient Genomics Project (MGP), with Prof. Michael Fenech from CSIRO (AU) and Prof. Chris Evelo (Maastricht University, NL) hosting a one-day satellite symposium. This collaboration will be extended at NuGOweek 2018, where one day will be devoted to '*Epigenetic effects of micronutrients and their impact on cellular and mitochondrial metabolism*'.

During 2018, travel grants will be made available for junior staff affiliated with NuGO Mmembers to participate in the third European Summer School on Nutrigenomics (University of Camerino, IT - 25-29th June 2018).

› 10. Members as of the end of 2017

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