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Nutritional & Health-Related Environmental Studies Newsletter

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Contents

To our readers

Sunny greetings from Vienna!

It has been an exceptional hot summer here in Vienna! In our air-conditioned offices we have kept ourselves busy with lots of activities. A major focus was on the follow-up of the DBM symposium! The report is finally ready and uploaded! The 13 papers of the symposium proceedings have been finalized and were just submitted to the journal *Annals of Nutrition and Metabolism*! We will let you know once the special issue with the proceedings is published – hopefully before December 2019!

Other activities included the development of an exciting new research project on measuring added sugar intake and meetings to train on protocols and to finalize projects. We are also sharing our latest outreach material and publications with you. I am happy to report that we now have an introductory e-learning course on the eNutrition Academy! Check out the stories from Malawi and from one of our experts! Thanks to the UNSCN Secretariat for another special contribution!

Physical activity with my daughter (Austrian Women's Run)!

We were sad to let Theodora return to Greece in June. She was a tremendous support on all the symposium-related tasks. Check out where she is now, and you will understand why she wanted to go back! We also had to say good-bye to Vera, who is now enjoying herself in the Swiss mountains taking care of a herd of sheep for a few months! We wish both of them all the best for their future activities! We welcome Daniela, who joined us in February and was instrumental in putting this newsletter together!

Best wishes,
Cornelia

Meetings

Scientists converge in Kingston, Jamaica to learn how to assess gut dysfunction using a stable isotope technique

Kingston is the city of music, blue mountain coffee and is also the place where the fastest man the world has known so far calls home. The Tropical Metabolism Research Unit at the University of the West Indies in Kingston is known for its major contribution to the understanding of the pathophysiology of severe acute malnutrition in children and how to treat it. It is here where a workshop to train participants in an IAEA-funded Coordinated Research Project (CRP) on the assessment of gut dysfunction related to environmental enteric dysfunction (EED) using a stable isotope-based breath test was held from 21-25 January 2019.

Scientists from Australia, Bangladesh, India, Jamaica, United Kingdom of Great Britain and Northern Ireland, United States of America, Zambia, and the IAEA learned about the field procedures for a novel non-invasive breath test based on the use of highly enriched 13-Carbon Sucrose (13C-SBT) to diagnose EED. Participants from the low- and middle-income countries (LMICs) in the group will use the 13C-SBT to assess EED and link it to growth patterns among children aged 12-15 months. The 13C-SBT protocol is currently being validated.

Results of the workshop were shared with the PATH-based Diarrhea Innovations EED Working Group (DIG) during their meeting on 6 March 2019.

Participants at the training workshop on 13C-Sucrose breath test in Kingston. (Photo courtesy of D. Gordon)

DIG is part of a broader effort to find innovative ways for measuring EED under the "The Strategies Targeting Environmental Enteric Dysfunction Platform" (STEED). The IAEA CRP aims to optimize an existing 13C-SBT by validating it against biopsy, the gold standard for EED, and other techniques such as the dual sugar test for intestinal permeability – the lactulose: ramnose ratio.

Check out our article to learn more about EED and growth failure in children.

Project meetings on assessing vitamin A body pools

Two projects had their final meetings in the first half of 2019. One is the IAEA Technical Cooperation (TC) regional project "Using stable isotope techniques to monitor and assess the vitamin A status of children susceptible to infection" (RAF/6/047). The final coordination meeting was held in Tunisia in February 2019. The eleven studies were reviewed, lessons learned documented, and a dissemination strategy for new information on vitamin A status and the effect of high-dose vitamin A supplementation developed.

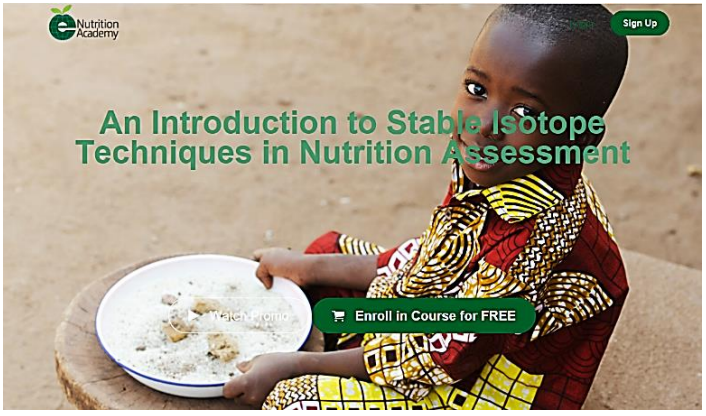
In July 2019, the final Research Coordination Meeting of the CRP "Optimizing nuclear techniques to assess vitamin A status" was held at the IAEA in Vienna. This CRP is complementary to the above TC project and four research groups are part of the two projects. Results generated during the CRP were reviewed, the completion of outstanding activities was planned, common challenges and lessons learned were highlighted, a guidance document in form of a new Human Health Series on assessment of vitamin A status and evaluation of intervention programmes was outlined and dissemination of the results through publications was discussed. The Human Health Series will hopefully come out next year. In the meantime, we will develop a factsheet on accurate approaches to assess vitamin A status to evaluate programmes. We will announce it when it is out! First published results are available from South Africa, check out the full article here.

News

Bringing stable isotope techniques closer to the people through e-learning platforms

The IAEA has over the years developed several resource materials and e-learning modules on the application of stable isotope techniques in nutrition. These resource materials can be easily accessed on the IAEA's Human Health Campus (HHC). In the past two years NAHRES has also deliberately made efforts to make its educational materials available on external platforms with wider coverage and with a link back to the HHC for more extensive e-learning courses. One such example is the e-taster course 'An introduction to stable isotope techniques in nutrition assessment' which is a joint effort between the IAEA and the eNutrition Academy, an associate of the Nutrition Society. The eNutrition Academy has a global reach being a collaborative initiative of the Nutrition Society, African Nutrition Society, American Nutrition Society and the International Union of Nutritional Sciences (IUNS). Over 50 participants have enrolled into the e-taster course on stable isotope techniques since its launch in late June 2019. The e-taster course focuses on three thematic areas: breastfeeding practices, body composition and energy expenditure. Check out the course description, get to know the instructor and enroll for free by clicking on the button below!

An introduction to stable isotope techniques in nutrition assessment



Nuclear Techniques for Better Nutrition

Malnutrition is a major global health problem, and poor diet has been linked to a range of chronic diseases. Obesity has nearly tripled around the world in recent decades, while undernutrition remains a serious concern. Do you want to understand how the use of stable isotopes can help governments improve the nutrition and health of their people? Check out our new short animated video!

NEW Coordinated Research Project on Biomarkers of Added Sugar Intake!

The IAEA is launching a new five-year CRP that will optimize biomarkers to assess added sugar intake in different populations based on natural abundance stable isotope ratios of carbon. Such a biomarker is relevant because of the emerging evidence for the role of carbohydrates and free sugar intake in chronic diseases, and the recent guidelines issued by the World Health Organization (WHO) which recommend restricting free sugar in the diet to less than 10%, or even 5% of total energy intake for additional health benefits. The overall objective is to provide new knowledge and evidence on the application of nuclear methods to define accurate biomarkers of added sugar intake in adults.

Click here for more details on this CRP and for information on how to apply. **Remember**: the deadline for receiving proposals is **15 September 2019**!

News

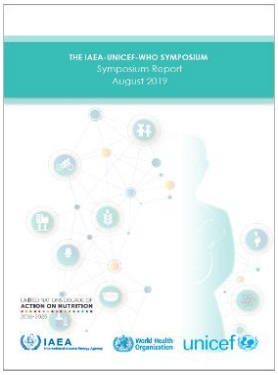
Student's visit from Wageningen University and University of Vienna

Group of students from Wageningen University during their visit to the IAEA. (Photo courtesy of IAEA)

On 15 February and 16 April, we welcomed two groups of students, from Wageningen University and from the University of Vienna. On both occasions, NAHRES activities were presented and our interns talked about their experiences at the IAEA. The aim of the visits was for the students to understand what we do and what stable isotope techniques can be used for in nutrition assessments. We highlighted that the IAEA is an interesting place for an internship after finishing their studies. The students also had the opportunity to join a tour at the Vienna International Center (VIC) to get to know more about the other UN organizations established here. The visits ended with a common lunch at the cafeteria.

Double Burden of Malnutrition - Symposium Follow-Up

We are more than six months post the symposium and the first outputs are being finalized! The report highlighting the key messages from each session during the symposium is available for download on our Human Health Campus.



The symposium proceedings will hopefully be published in November 2019. We have just submitted 13 papers to the *Annals of Nutrition and Metabolism*. They will be included in a Special Issue of the journal!

Results of FTIR use and ownership survey 2018

The IAEA supports its Member States through the TC Programme in building capacity in the use of stable isotope techniques in nutrition assessments. There is high demand for two techniques that are based on deuterium – the deuterium dilution technique to assess body composition and the deuterium oxide dose-to-mother technique to assess breast milk intake and exclusivity of breastfeeding. In both techniques, deuterium enrichment is measured in saliva samples and the IAEA has supplied in the past Fourier transform Infrared Spectrometers (FTIRs) for this purpose. This survey was meant to better understand how these FTIRs are being used in the Member States. We received a total of 28 completed survey forms and want to highlight here a few interesting results:

- Most of the participating groups (25) use their FTIR for the assessment of body composition or to assess breastfeeding practices (13).
- Training of technicians on the use of the FTIR was conducted mainly through IAEA in-country expert visits, own internal trainings, and IAEA fellowships.
- More than half of the groups have already participated in FTIR proficiency tests to ensure the quality of their analysis.
- Survey participants think that having available an FTIR in their institutions has:

  ✓ Increased the scope of training capacity;
  ✓ Increased collaboration with other sections in the institute;
  ✓ Increased dialogue with policy makers and programme planners;
  ✓ Increased ability to obtain additional funding.

Have a look at this blog post that shows the excitement of our current FTIR supplier, Agilent, about FTIRs being used in nutrition assessments such as the measurement of breastfeeding practices or body composition!

Publications

Greater household food insecurity is associated with lower breast milk intake among infants in Western Kenya

Miller JD, Young SL, Boateng GO, Oiye S, Owino V

Scientists in Kenya studied the role of food security in breastfeeding practices and infant breast milk intake by using the deuterium oxide dose-to-mother technique. This IAEA research project found that infants in households with insecure food access consume less breast milk. The study also found no correlation between household food insecurity status and exclusive breastfeeding rates in the first six months of life. "This implies that food insecurity may undermine breast milk output, but not the mother's choice to give her infant breast milk only, which could be the result of inadequate energy and nutrient intake by the mother", said Victor Owino, nutrition specialist at the IAEA's Division of Human Health.

"Before this study, the role of food insecurity in breastfeeding hadn't been evaluated using an objective measurement of exclusive breastfeeding or quantity of breast milk ingested", said Sera Young, a food security expert leading the IAEA-supported study and Assistant Professor of Anthropology and Global Health at North-western University in the United States. "This is an important missing piece of information, because of the high prevalence of food insecurity worldwide and the many pathways by which food insecurity may negatively impact exclusive breastfeeding."

Approximately 2 billion people are exposed to food insecurity, meaning they have no access to safe and affordable food for a day or more, according to the new United Nations system report on the 'State of Food Security and Nutrition in the World' (SOFI 2019).

Have a look at the complete story posted by the IAEA with a link to the published article here. This article was also featured on the UN's home page and highlighted by the Organization for World Peace.

Protocol for validating simple measures of body fatness and physical activity of children in twelve African countries: The ROUND-IT Africa Study

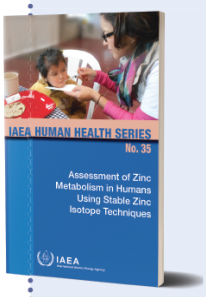
The consortium on "Reducing Obesity Using Nuclear Techniques to Design Interventions in Africa (ROUND-IT)" Study is a cross-sectional study conducted in 12 countries, to which the IAEA provided technical support and funding under a regional TC project (RAF/6/042). The primary aims of the ROUND-IT Africa Study were: (1) to validate the diagnostic accuracy of the WHO body mass index (BMI)-for-age as a means of assessing excessive body fatness; (2) to validate the Physical Activity Questionnaire for Children (PAQ-C) as a measure of physical activity; and (3) to describe accelerometer-measured physical activity in children 8-11 years old in a large African sample. Data collection began in April 2014 and was completed at the end of 2018.

The protocol for this study has now been published! First findings were already highlighted in the previous newsletter. The WHO BMI-for-age definition of obesity was compared against measured body fatness using deuterium dilution. It showed that excessive fatness was over three times more common than the prevalence of BMI-defined obesity. Excessive fatness was present in nearly a third of children, suggesting that urban African environments are now highly obesogenic even for children. Read more in the article of the Bulletin of the World Health Organization! We are currently working on getting the paper on physical activity written!

Check out our other new publications:

1. Measuring growth and medium- and longer-term outcomes in malnourished children
2. Challenges and opportunities to tackle the rising prevalence of diet-related non-communicable diseases in Africa

Publications – Full compilation of our Human Health Series



Assessment of Zinc Metabolism in Humans Using Stable Zinc Isotope Techniques

IAEA Human Health Series No. 35

This publication is part of the IAEA's continuing efforts to transfer technology and to contribute to capacity building by providing information on the theoretical background and practical application of state of the art methodologies for assessing human zinc metabolism to better understand absorption, dietary bioavailability and nutritional requirements. It reviews the role of zinc in human nutrition and the application of stable isotope techniques to evaluate nutritional interventions. Advice is given on planning a study, administering isotopes, preparing and analysing samples, and calculating physiological end points. The publication was developed with input from international experts and is intended for nutritionists, analytical chemists and other professionals interested in the application of stable isotope techniques to evaluate human zinc nutrition and metabolism.

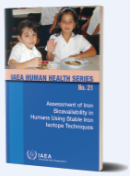
(115 pp., 14 figs; 2018) • ISBN 978-92-0-108418-7 • STI/PUB/1835 • €51.00

Also available

Body Composition Assessment from Birth to Two Years of Age

IAEA Human Health Series No. 22

(62 pp., 21 figs; 2013) • ISBN 978-92-0-127710-7 • STI/PUB/1550 • €36.00



Assessment of Iron Bioavailability in Humans Using Stable Iron Isotope Techniques

IAEA Human Health Series No. 21

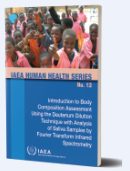
(78 pp., 14 figs; 2012) • ISBN 978-92-0-126510-4 • STI/PUB/1544 • €26.00

Dual Energy X Ray Absorptiometry for Bone Mineral Density and Body Composition Assessment

IAEA Human Health Series No. 15

Arabic Edition (132 pp., 30 figs; 2013) • ISBN 978-92-0-643210-5 • STI/PUB/1479• €50.00

English Edition (118 pp., 30 figs; 2011) • ISBN 978-92-0-110610-0 • STI/PUB/1479 • €50.00



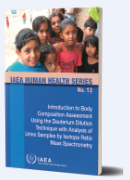
Introduction to Body Composition Assessment Using the Deuterium Dilution Technique with Analysis of Saliva Samples by Fourier Transform Infrared Spectrometry

IAEA Human Health Series No. 12

English Edition (77 pp., 30 figs; 2011) • ISBN 978-92-0-103210-2 • STI/PUB/1450 • €37.00

French Edition (84 pp., 30 figs; 2013) • ISBN 978-92-0-214513-9 • STI/PUB/1450 • €37.00

Spanish Edition (81 pp., 30 figs; 2013) • ISBN 978-92-0-314013-3 • STI/PUB/1450 • €37.00



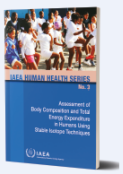
Introduction to Body Composition Assessment Using the Deuterium Dilution Technique with Analysis of Urine Samples by Isotope Ratio Mass Spectrometry

IAEA Human Health Series No. 13

English Edition (65 pp., 18 figs; 2011) • ISBN 978-92-0-103310-9 • STI/PUB/1451 • €36.00

French Edition (71 pp., 18 figs; 2013) • ISBN 978-92-0-214113-1 • STI/PUB/1451 • €36.00

Spanish Edition (69 pp., 18 figs; 2013) • ISBN 978-92-0-313913-7 • STI/PUB/1451 • €36.00



Assessment of Body Composition and Total Energy Expenditure in Humans Using Stable Isotope Techniques

IAEA Human Health Series No. 3

(133 pp., 20 figs; 2009) • ISBN 978-92-0-111708-3 • STI/PUB/1370• €38.00

Stable Isotope Technique to Assess Intake of Human Milk in Breastfed Infants

IAEA Human Health Series No. 7

English Edition (67 pp., 39 figs; 2010) • ISBN 978-92-0-114009-8 • STI/PUB/1429 • €32.00

French Edition (71 pp., 39 figs; 2015) • ISBN 978-92-0-207914-4 • STI/PUB/1429 • €32.00

Spanish Edition (71 pp., 39 figs; 2014) • ISBN 978-92-0-308114-6 • STI/PUB/1429 • €32.00

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Success stories

Dispatch from the warm heart of Africa: How nuclear techniques are contributing to understanding the double burden of malnutrition in Malawi

With special thanks to K. Maleta, College of Medicine, University of Malawi, Blantyre

Malawi has made major strides in the recent past to reduce the scourge of undernutrition that has plagued the country for a long time. This has been achieved through concerted efforts to support good infant and young child feeding practices and community-based management of acute malnutrition based on early screening and detection of children at risk. However, micronutrient deficiencies remain a challenge. Additionally, there is a rise in the number of overweight individuals, including children.

Malawi is a Member State of the IAEA since 2006. The Malawi government, with support from the IAEA is using stable isotope techniques since 2016 to understand how previous exposure to acute malnutrition determines later risk for metabolic problems including obesity. The related regional TC project (RAF/6/052) involves other 8 African countries; preliminary results including those from Malawi will be presented at the 4th Federation of Nutrition Societies Conference to be held in Kigali, Rwanda from 26-29 August 2019. Another on-going collaboration is under a national TC project in the context of a multiple micronutrient powder supplementation programme targeting children from 6-23 months of age (MLW/6/007), implemented by the Ministry of Health and supported by UNICEF via World Bank funding. The College of Medicine is responsible for evaluating how effective the programme is in terms of meeting the desired health and nutrition outcomes: reduced stunting rates and improved iron status. A baseline survey to collect relevant data including body composition measured using the deuterium dilution technique was completed in 2018; a follow-up survey will be implemented by the end of 2019.

Under the on-going projects, the IAEA has supported in-country training by international experts. For example, in early June 2019, a Moroccan expert, Mr Khalid El Khari, guided the local team in analysing and interpreting body composition results. Apart from this, the IAEA supplied a FTIR for deuterium enrichment analysis, deuterium oxide and laboratory reagents to assess iron status, immune function, metabolic indicators and physical activity levels. The technical officer from IAEA, Mr Victor Owino, visited Malawi in June 2019 to assess the progress of the projects and set dialogue for upcoming TC projects for the years 2022-23. He met with the local team from the College of Medicine, Ministry of Health and Lilongwe University of Agriculture and Natural Resources. The team was composed of directors for nutrition from the Ministry of Health, project counterparts and technical counterparts from the different nutritional projects. The projects have also attracted a request for support in capacity building to measure body composition by local institutions and a need for a larger national training workshop has been identified. Further, international institutions have also benefited. For example, the Pediatrics Department in Blantyre collaborating with the Sick Children's Hospital in Toronto, Canada, is being supported with the measurement of breast milk intake and body composition in a project in Blantyre.

This model is exemplary of how different sectors can collaborate to address a pressing national problem.

Data collection in progress in a study village. (Photo courtesy of Q. Mwakhwawa).

Success stories

A day in the life of an IAEA nutrition expert

With special thanks to G. Munthali, National Institute for Scientific and Industrial Research, Zambia

Ms Munthali demonstrates analysis of saliva with FTIR in Vienna. (Photo courtesy of IAEA)

Since 2010, I have been privileged to travel to several countries as an IAEA expert providing specific training to local research and project teams on field and laboratory procedures for body composition and breast milk intake assessments using deuterium dilution and FTIRs. My first assignment was in March 2010 to Zimbabwe where I trained the local team on breast milk intake and body composition assessments. It was a scary but gratifying experience as I realized how passionate I was about the use of stable isotopes in nutrition studies. Working as an IAEA nutrition expert has had its own challenges and merits. Challenges range from the need to constantly adapt to different cultures and environments to inadvertent inability to deliver effective training due to lack of adequate laboratory apparatus in some instances. Rough terrain to reach study participants is a problem in some cases where ingenious ways such as riding on motorbikes become handy.

Positively, I get satisfied when I help people to achieve their goals and inspire them to take control of their work to completion. For me, working as an IAEA expert in nutrition sometimes goes beyond a one-off expert mission assignment as I continue to render my expertise at no cost to some counterparts after completion of the mission. Additionally, I am consistently upgrading my skills and knowledge in the field of nutrition which positively imparts my personal growth.

In the words of some counterparts:

> *"We had the honour of benefiting from the training on breast milk intake and body composition by Grace Munthali, whose know-how is of exceptional quality."* - Mr Ghislain Bisimwa Balaluka – Centre de Recherche en Sciences Naturelles de Lwiro, Department of Health and Nutrition, Bukavu, Democratic Republic of Congo.
>
> *"Thanks to Grace. Her expertise in deuterium analysis in saliva using the FTIR has helped our entire team so much*." – Ms Hilde Liisa Nashandi – former Senior Programme Officer, Ministry of Health and Social Services, Windhoek, Namibia.
>
> *"Grace Munthali is an awesome, knowledgeable and diligent teacher in the area of body composition using the FTIR."* – Mr Andries Monyeki – North-West University Potchefstroom, South Africa.

NAHRES Special - UNSCN

LAUNCHED: UNSCN Nutrition 44 – Food environments: Where people meet the food system

With special thanks to A. Mora and S. Oenema, UNSCN Secretariat

The world faces enormous challenges in nourishing its growing population while assuring the health and sustainability of the planet. Highly processed foods and meat-based diets are becoming more available everywhere, displacing healthier plant based traditional diets and disrupting food systems. Current industrial food production practices are unsustainable and major contributors to the decline of biodiversity, land degradation, water extraction, pollution and climate change. This needs to change urgently. Food environments can serve as useful entry points to transform food systems. This year's edition of UNSCN Nutrition (previously UNSCN News) – the flagship publication of the United Nations System Standing Committee on Nutrition (UNSCN) – explores the contexts in which consumers engage with the food system when making decisions on acquiring, preparing and consuming food, as well as the impact of the food environment on their dietary choices. The "food environment" is a new concept and its relevance to our understanding of food systems is still a matter of debate. Researchers have not yet agreed on a universal definition of the food environment, but current thinking converges towards a combination of external and personal domains influencing people's food choices, attitudes and habits, and thus their nutritional and health status. UNSCN Nutrition 44 – Food environments: Where people meet the food system provides diverse perspectives on several food environment related issues from all stakeholder groups: government, academics, civil society, and the private sector.

A consultant's perspective

With special thanks to Theodora Mouratidou

Back in February 2018 I joined the nutrition section at the IAEA to support the organisation of the International Symposium on Understanding the Double Burden of Malnutrition for Effective Interventions.

Reflecting about my time at the IAEA I can say that it was one of the best working experiences I have had! I was part of a small, but dynamic team of nutritionists with expertise in nuclear techniques and its applications to human nutrition. I was lucky to gain a first-hand insight of the techniques and their important contribution to policy support and development by providing accurate measures of body composition, energy expenditure and breastfeeding practices amongst others. As part of my duties, I provided scientific and technical support to the preparation and organization of the symposium. I was involved in the conceptualization and formulation of the scientific agenda and worked closely with the 23 members of the scientific committee and with the symposium speakers.

It was such a positive experience to get to know and work with experts from various settings like the academia, UN agencies, NGOs, Ministries of Health, scientific institutes, national health institutes, etc., which helped me to better appreciate the power of multi sectoral cooperation when dealing with the double burden of malnutrition. A few months ago, I returned to my home country, Greece, where I spent my summer in Nafpaktos (known in Venetian as Lepanto), a historic small seaside town. I was lucky to wake up every morning to the view in the photo below where you can see the old Venetian port of Nafpaktos.

The Venetian port of Nafpaktos. (Photo courtesy of T. Mouratidou)

Puzzle corner

Below, 10 nine-letter words have been broken into chunks of three letters. These chunks have been mixed up, no chunk is used twice and all chunks are used. Can you determine what the 10 words are?

lle	pra	que	hou	ium	ion
ood	rit	bio	sum	ces	ter
ker	pos	cha	nut	old	chi
tec	seh	ldh	mar	deu	con
ium	nge	cti	hni	sym	ers

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Do you want to know the answer? Write us an e-mail to nahres@iaea.org and we will send you the list with the 10 words!

The NAHRES Team

Cornelia Loechl	Section Head
Alexia Alford (Murphy)	Nutrition Specialist
Victor Ochieng Owino	Nutrition Specialist
Pernille Kaestel	Nutrition Specialist
Monica Atac-Bauer	Team Assistant
Inka Schaepe	Team Assistant
Daniela Gomez	Intern

Feedback

The NAHRES Team appreciates your feedback! If you have any questions or comments, please send them to:
nahres@iaea.org

Impressum

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