

SIG-Micronutrients (MN)

11SEP23

Agenda:

- Objectives of the SIG-MN – presentation of the actual WG
- Achievements of the SIG-MN group:
 - MN-guideline shortening
 - Report of the symposium 7-8 Nov 2022
 - Creation of a LLL module: 4 courses dedicated to MN
 - Proposal of a questionnaire to identify practical cost problems
- Recent publications – problems despite guidelines
- MN Analytical point of care development
 - vitamins? Biomarkers?
 - colorimetric methods Cu, Fe, Se, Zn
- Funding and sponsoring
- Varia



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ESPEN
 European Society for Clinical Nutrition and Metabolism

Special Interest Groups

Acute Intestinal Failure

Nutrition in Geriatrics

Cachexia-Anorexia in chronic diseases

Tracer Methodology

Home Artificial Nutrition & Chronic Intestinal Failure

Nutrition in Obesity

Micronutrients
new 2023

Perioperative Nutrition, ERAS

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SIG-MN – who?

Officers: Initial (22 JAN 23) officers are:

Secretary: Mette M Berger (CH)

Members: Alan Shenkin (UK)
 Angélique de Man (NL)
 Karin Amrein (AU)
 Michael Casaer (BE)
 Oguzhan Dizdar (TU)
 Kursat Gundogan (TU)
 Hanna-Lis Lepp (ES)
 Serge Rezzi (CH) (+ Arthur van Zanten (NL))



Criteria for being a SIG member:

- Members of ESPEN.
- Expertise in the field of micronutrients
- Enthusiasm for and affinity with the work of the group.
- Must be approved by their national society for Clin.Nutr.
- A list of the members is submitted to ESPEN Executive committee each year
- Members can only be part of one SIG

Composition of the group:

- The ESPEN-MN Special Interest Group has a maximum of 12 members.
- The group is multidisciplinary: members are recruited from physicians, pharmacists, biologists, nurses, and dieticians.
- Membership of the group is normally limited to 4 years (?) but can be extended to assure continuity if the member vigorously participates in the SIG's activities

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Aim of the SIG-MN



- To promote education in the domain of MNs
 - LLL courses
 - Ensure that the recommendations of GL are met regarding wording and interpretation of analytical methods
 - Education includes identifying papers with poor peer review ... writing to editors
- To coordinate/perform scientific and epidemiological studies in the field of MNs
- To become a reference group for international questions transmitted over the ESPEN central website
- To create a network in the field of MN
- To promote collaborative research in the field
- To help adapt national policies regarding MNs
- To stimulate the industry to produce adapted MN product

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2023 SIG-MN Achievements

- MN-guideline shortening
 - Close to submission
- Report of the MN symposium 7-8 Nov 2022
 - Close to submission
- Creation of a LLL module: 4 courses dedicated to MN
 - ❖ Trace elements
 - ❖ Vitamins
 - ❖ Chronic diseases / conditions
 - ❖ Acute diseases / ICU
- Proposal of a web-questionnaire to identify practical MN prescription and cost problems

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Education – ex. 2023 Swiss MN publications



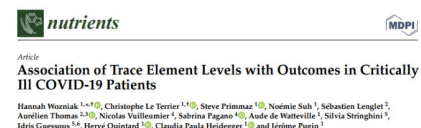
Prevalence of Micronutrient Deficiencies in Patients Hospitalized with COVID-19: An Observational Cohort Study

Manyela Voelkle^{1,2}, Claudia Gregoriano¹, Peter Neyer^{1,2}, Daniel Koch^{1,2}, Alexander Kutz^{1,2}, Luca Bernasconi¹, Anna Cosen^{1,2,3}, Beat Mueller^{1,2} and Philipp Schürli^{1,2,3,4}

Not adequately revised

Reviewers do not know about the concepts published in the MN guidelines, the vocabulary regarding depletion/deficiency, the impact of inflammation

The journal(s) cannot assist authors in improving their important publications – some of the conclusions are incorrect



Association of Trace Element Levels with Outcomes in Critically Ill COVID-19 Patients

Hannah Wroniak^{1,2,3}, Christophe Le Tertier^{1,2,3}, Steve Primnaz^{1,2}, Noémie Sah¹, Sébastien Lenglet², Amélie Thomas^{1,2,3}, Nicolas Vuillemin¹, Sabrina Pagano^{1,2}, Aude de Watterville¹, Silvia Stringhini¹, Idris Guessous^{1,2}, Hervé Quintard^{1,2}, Claudia Paula Heidegger^{1,2} and Jérôme Pugin¹

Revision process integrates recent recommendations

Results are interpreted reliably – clinical application becomes possible



Nutritional and metabolic characteristics of critically ill patients admitted for severe toxidermia

Matthieu Karakus¹, Olivier Panzet¹, Mélanie Charrière^{1,2}, Doris Favre^{1,2}, Olivier Galde¹, Mette M. Berger¹

Association of plasma zinc levels with anti-SARS-CoV-2 IgG and IgA seropositivity in the general population: A case-control study

Antoine Equey^{1,2}, Mette M. Berger^{1,2,3}, Sémira Gonsse-Neuville¹, Marc Augsburger¹, Serge Reza¹, Andrew C.C. Hodgson¹, Sandrine Ensseny¹, Giuseppe Pantano¹, Céline Pellaton¹, Malvern Perrais¹, Sébastien Lenglet¹, Valentin Rousson¹, Valérie D'Arenmont^{1,2}, Murielle Bochud^{1,2,3}

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Analytical methods – ESPEN monitoring guidelines

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|--|---|
| <p>Recommendation 3 Inflammation</p> <p>C-reactive protein should be determined at the same time as any micronutrient analysis.</p> <p>Grade of recommendation B – Consensus 87%</p> <p>Recommendation 6.2 Copper</p> <p>Copper status shall be determined by measurement of plasma copper simultaneously with CRP determination.</p> <p>Grade of recommendation A - Consensus 89%</p> <p>Recommendation 8.1 Iodine</p> <p>In populations with high prevalence of thyroid disorders, iodine status should be assessed.</p> <p>Grade of recommendation B – Strong consensus 94%</p> <p>Recommendation 8.2</p> <p>In patients presenting with thyroid disorders in countries with high incidence of iodine deficiency, iodine status shall be assessed.</p> <p>Grade of recommendation A – Strong consensus 97%</p> <p>Recommendation 14.2 B1 Thiamine</p> <p>Thiamine status shall be determined by measuring RBC or whole blood thiamine diphosphate (ThDP).</p> <p>Grade of recommendation A – Consensus 90%</p> | <p>Recommendation 9.1 Iron</p> <p>Full investigation of iron status shall be performed in case of anemia, and in case of persistent major fatigue.</p> <p>Grade of recommendation A – Strong consensus 94%</p> <p>Recommendation 9.2</p> <p>Investigation of both suspected deficiency and overload shall include a combination of tests: plasma iron, transferrin, transferrin saturation, ferritin, CRP, hepcidin, and evaluation of red blood cell morphology.</p> <p>Grade of recommendation A – Strong consensus 97%</p> <p>Recommendation 12.1 Selenium</p> <p>All patients likely to receive parenteral nutrition for more than two weeks or about to commence home parenteral nutrition should have plasma selenium and CRP measured on commencing parenteral nutrition. Tests should be repeated as required depending on the results, and at least once every 3–6 months.</p> <p>Grade of recommendation B – Strong consensus 92%</p> <p>Recommendation 17.1 B5 pantothenic acid</p> <p>Pantothenic acid blood determination should be performed in the context of neurological symptom investigations.</p> <p>Grade of recommendation GPP – Consensus 86%</p> <p>Recommendation 17.2</p> <p>Pantothenic acid shall be determined in blood.</p> <p>Grade of recommendation A – Strong consensus 93%</p> |
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Analytical methods. What about having a reliable screening POC

Monitoring-GL aim at pushing institutions to include MN analysis

But monitoring-GL are difficult to apply in numerous settings worldwide

- Analysis is not available in the setting
- Analytical results not timely available (coming back weeks later)
- Analysis considered too costly in local health system

Development is needed

- colorimetric methods Cu, Fe, Se, Zn
- Infrared methods? For some vitamins, biomarkers

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USE OF NEAR-INFRARED REFLECTANCE SPECTROSCOPY TO ANALYZE VITAMIN CONTENT¹

F. F. PIRES,² M. C. LEMOS, J. C. PETERSEN, and A. M. KESSLER
Departamento de Zootecnia, Universidade Federal do Rio Grande do Sul, Cx. P. 776,
Porto Alegre, 91540-000, RS, Brazil

SUMMARY

Near-infrared reflectance spectroscopy (NIRS) has been used to determine the composition of many products used in animal nutrition. This study sought to determine how best to apply NIRS to analyze the concentration of 11 vitamins in a standard premix. Two methods of regression, stepwise and modified partial least-squares, were used to analyze the results. Stepwise regression showed a confounding effect among various wavelengths and was problematic for use at extreme wavelengths. Modified partial least-squares regression gave more accurate results, as indicated by values of the coefficient of determination in calibration (1.0 for all vitamins) and the coefficient of determination in validation (0.96 to 1.0). Application of NIRS in conjunction with modified partial least-squares regression shows promise as a quick and inexpensive procedure for analysis of vitamin content.

Key words: Analyze, near-infrared reflectance spectroscopy, prediction, premix, vitamin
2001 J. Appl. Poult. Res. 10:412–418

VITAMIN	N ^a
Niacin (%)	40
E (%)	40
Pantothenic acid (%)	40
A (%)	37
Cyanocobalamin (mg/kg)	40
Riboflavin (%)	40
K (%)	40
Pyridoxine (%)	40
Thiamin (%)	40
Folic acid (%)	40
D (%)	40

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A new approach

- > Near Infrared Spectrometer: MicroNIR
 - > 950 – 1650 nm
 - > Signal to Noise 25000:1
- > Portable
 - > On-time response
 - > No sample preparation
 - > No specific knowledge

Identify narcotic substances anywhere in 5 seconds



Courtesy Pierre Esseiva, EPFL, 2023



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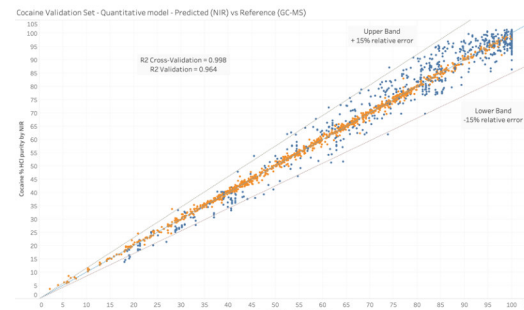
Substances

Illicit drugs	Qualification	Quantification
Cannabis	CBD-type vs THC-Type vs Mixte	Yes
Haschisch	Yes	Yes
Marijuana	Yes	Yes
Cocaine	Yes	Yes
Heroin	Yes	Yes
MDMA / XTC	Yes	Yes
Methamphetamine	Yes	Yes
Amphetamine	Yes	Yes
Ketamine	Yes	Yes
NPS – a selection	Yes (more than 50)	No
Identification of more than 60 substances used s cutting agents or precursors		

Courtesy Pierre Esseiva, EPFL, 2023

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Quantification model for cocaine specimens



Method NIR certified under ISO 17025 in the forensic laboratory



Cocaine MicroNIR method (ISO 17025)		Cocaine ISO 17025 validated GC-MS method	
Concentration (%)	Relative Expanded Uncertainty (%)	Concentration (%)	Relative Expanded Uncertainty (%)
21.2 ≤ C < 40.5	15.5	1.15 ≤ C < 5.5	17.0
40.5 ≤ C < 81.6	12.5	5.5 ≤ C < 69.8	10.0
81.6 ≤ C ≤ 98.5	7.7	69.8 ≤ C < 87.3	13.0

Courtesy Pierre Esseiva, EPFL, 2023

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Future developments - MN

To promote good clinical practice

We need

- Education and high-quality research
- Make hospital administrations aware about the importance of MN for clinical practice

Promotion & funding are required

- Sponsoring needed for:
 - Creation one/more research prizes
 - Development of a practical App
 - Development of analytical methods

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2023 SIG-MN actions



- Publications of the practical MN-guideline with flow-charts
- Creations of a MN-app
- First LLL module live: Milano
- Diffusion of the web-questionnaire to identify practical problems
- Become a reference group for nutrition journals
- Become a reference groups for our industry partners
- Interact with other SIG (as for the shortage issue with IF)



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2023 SIG-MN – Q & discussion



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