ERNDIM QUANTITATIVE ORGANIC ACIDS IN URINE: HIGHLIGHTS AND RECOMMENDATIONS

Martens G.A. [1,5], Weykamp C. [2,5] , Scott C. [4] and Duran M. [3,5]

[1] Universitair Ziekenhuis Brussel, Brussels, Belgium; [2] Stichtig Kwaliteitsbewaking Ziekenhuis Laboratoria, Winterswijk, the Netherlands, [3] Academic Medical Center, Amsterdam, The Netherlands; [4] Sheffield Children's Hospital, Sheffield, UK [5] All on behalf of the ERNDIM Scientific Advisory Board

ERNDIM
QUALITY ASSURANCE IN LABORATORY TESTING FOR IEM

Introduction

Can you use your organic acids profiling results for therapeutic monitoring? ***Can they be used in multi-centre studies?***

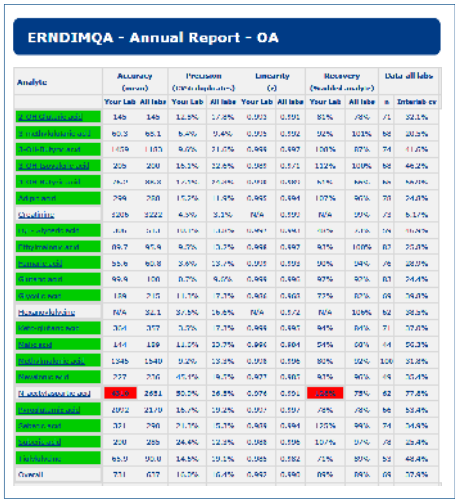
The ERNDIM *Quantitative Organic Acids in Urine* EQA scheme assesses accuracy, recovery, precision, linearity and inter-laboratory variance (CV%) of quantitative measurements for 20 common and selected organic acids relevant to IEMs

Scheme Details

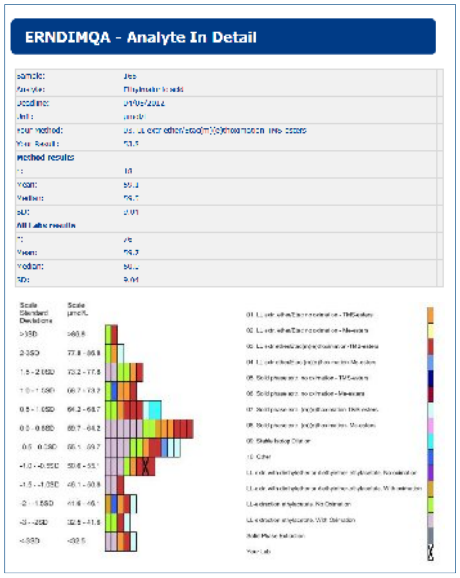
- 8 samples of lyophilised human urine spiked with physiologically relevant levels of 20 organic acids
- Results submitted via ERNDIM interactive website
- Scheme operated since 1993
- 107 participants from 33 Countries worldwide (2013)
- Cost (2013): 270 EURO

Participants' Annual Report

- Performance based on 4 parameters:
  ♦ Accuracy ♦ Precision ♦ Linearity ♦ Recovery
- The parameters are scored for each analyte; those falling outside the 95th percentile for all laboratories are indicated with red shading
- Two or more parameters with red shading or insufficient submissions are equated to unsatisfactory performance for that particular analyte
- Green shading indicates satisfactory performance for that analyte



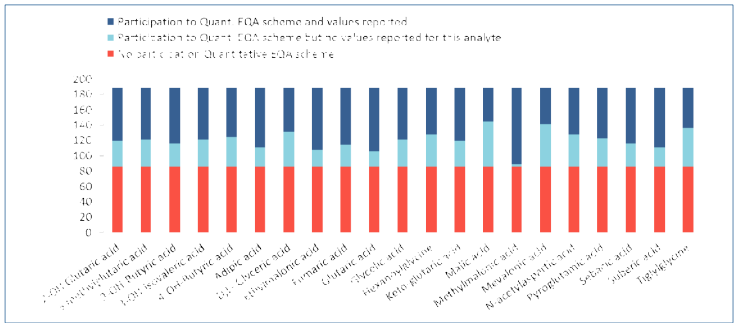
Example of Detailed Report



Ethylmalonic acid

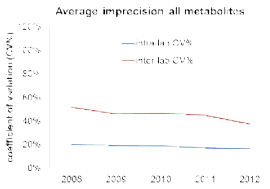
- Consensus concentration = median = 59 µmol/L (20 mmol/mol creatinine)
- Close to diagnostic threshold for EPEMA (ETH1 mutation ~ 35-45 mmol/mol creatinine)
- 5 labs (7%) reported values more than 3SD below consensus value: risk of missing ETH1
- 2 labs (3%) reported more than 3SD above consensus: risk of false positive ETH1 diagnosis

Scheme participation

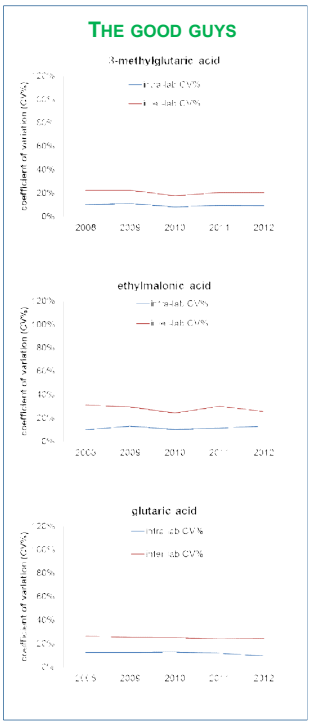


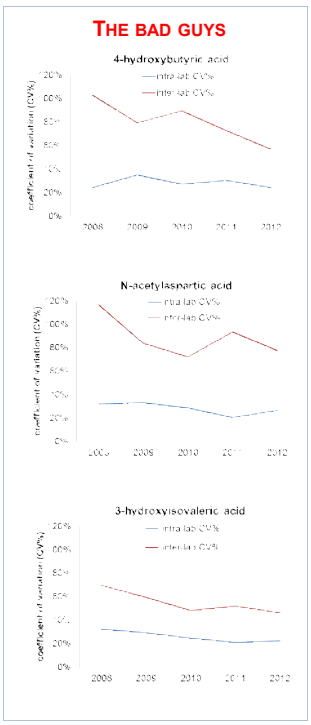
Only 50% of the labs that participate in the Diagnostic Proficiency Scheme (ERNDIM Qualitative Organic Acids Schemes) participate in the Qualitative schemes. Does this mean that half of the labs does not care about accurate and precise quantification?

Variation within and between labs



- Large analyte-dependent differences in intra-lab CV% (precision): <10% to > 25%
- Inter-lab CV% discrepantly high as compared to intra-lab CV%: lack of method standardization
- A positive trend is seen for inter-lab CV% in the period 2008-2012





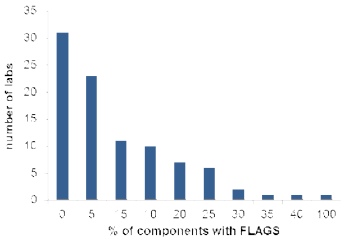
Feedback

General:

- 8 Monthly reports plus annual report
- Certificate issued once a year by ERNDIM Board

Personalized:

- Letters of support to poor-performers
- Offer training



Conclusions

- Accurate and precise quantification is important for therapeutic monitoring but also for diagnosis, e.g. subtle rises of ethylmalonic acid in SCAD or EPEMA, and 3-hydroxisovaleric acid in biotinidase deficiency
- Surprisingly, only half of labs that use organic acids for clinical diagnosis feel the need to (quality-control if they can) report quantitative results
- From 2008-2012, the analytical performance in the Quantitative Organic Acids in Urine EQA scheme steadily improved, indicating the educational value of participation to such quantitative scheme.
- Inter-lab imprecisions remain, disproportionately high, calling for further standardization.

Ask your lab how they perform in ERNDIM EQA schemes!

For further information please contact: admin@erndim.org
www.erndim.org