# Annual Report ERNDIM-EQAS
# Cystine in White Blood Cells 2005

## 1. *Purpose*

The purpose of the ERNDIM External Quality Assurance Scheme for Cystine in White Blood Cells is the monitoring of the analytical quality of the quantitative assay of cystine in white blood cells in the management and diagnosis of patients with cystinosis. For details see www.erndimqa.nl

## 2. *Participants*

27 Laboratories from 13 countries participate in the scheme.

## 3. *Design*

The Scheme has been designed, planned and co-ordinated by Dr. Mick Henderson as scientific advisor and Dr. Cas Weykamp as scheme organiser, both appointed by the ERNDIM Board. The design includes special attention to sample composition and to the layout of the reports.

### *Samples*

The scheme consisted of 2 series of lyophilised samples: one series containing protein pellets and the other supernatants of lysed white blood cells spiked with cystine. As can be seen from table 1 the weighed amounts of protein and cystine were identical in pairs of samples. The nature, source and added amounts of the analytes are summarised in table 1.

Table 1. Pair identification, source and amount of added analytes.

| Analyte | Source | Added Quantities Protein (mg/vial)+Cystine (nmol/vial) | | | |
|---|---|---|---|---|---|
| | | Sample Pair 21-26 | Sample Pair 23-27 | Sample Pair 22-25 | Sample Pair 24-28 |
| Protein | Serva 11930 | 0.75 | 1.00 | 1.25 | 1.55 |
| Cystine | Sigma C8755 | 2.20 | 0.00 | 0.50 | 0.20 |

### *Reports*

All data-transfer, the submission of data as well as request and viewing of reports proceeded via the interactive website www.erndimqa.nl

An important characteristic of the website is that it supplies short-term and long-term reports.
**Short-term reports** on the eight individual specimens are available two weeks after the submission deadline and provide up-to-date information on analytical performance. Although technically reports could be immediately available a delay time of 14 days has been introduced to enable the scientific advisor to inspect the results and add his comment to the report.
The **annual long-term report** summarises the results of the whole year.

A second important characteristic of the ERNDIM website is the different levels of detail of results which allows individual laboratories the choice of fully detailed and/or summarised reports.

The “Analyte in Detail” is the most detailed report and shows results of a specific analyte in a specific sample.
A more condensed report is the “Current Report” which summarises the performance of all analytes in a specific sample.
The Annual Report summarizes all results giving an indication of overall performance for all analytes in all 8 samples.
Depending on the responsibilities within the laboratory participants can choose to inspect the annual report (QC managers) or all (or part of) detailed reports (scientific staff).

## *4. Discussion of Results in the Annual Report 2005*

In this part the results as seen in the annual report 2005 will be discussed. Please print out your annual report from the website when you follow the various aspects below and keep in mind that we only discuss the results of “all labs”. It is up to you to inspect and interpret the results of your own laboratory.

### *4.1 Accuracy*

A first approach to evaluating your performance in terms of accuracy is comparison of your mean values in the eight samples with those of all labs. This is shown in the columns "your lab" and "all labs" under the heading "Accuracy”. For example for protein the mean of all labs is 1.09 mg/vial. with which you can compare the mean of your lab.

### *4.2 Recovery*

A second approach to describe accuracy is the percentage recovery of added analyte. In this approach the amounts of weighed quantities added to the samples are the assumed target values after adjustment for blank values. The correlation between weighed amounts (on the x-axis) and your measured quantities (on the y-axis) has been calculated. The slope of the resulting relationship ( a in $y = ax + b$) in this formula multiplied by 100% is your recovery of the added amounts. The outcome for your lab in comparison to the median outcome of all labs is shown in the column “Recovery”.
It can be seen that the mean recovery of cystine is 100% and of protein 94% which is excellent and very reassuring. We are all measuring the same thing.

### *4.3 Precision*

Reproducibility is an important parameter for the analytical performance of a laboratory and is addressed in the schemes’ design. Samples provided in pairs can be regarded as duplicates from which CV’s can be calculated. The column “Precision” in the annual report shows your CV’s in comparison to median values for all labs. The best median CV is observed for protein (6.9%). 11.5% and 14.8% are seen for cystine (nmol/aliquot) and cystine (nmol ½ cys/mg protein), respectively.

### *4.4 Linearity*

Linearity over the whole relevant analytical range is another important parameter for analytical quality and is also examined within the schemes. A comparison of the weighed quantities on the x-axis and your measured quantities on the y-axis allows calculation of the coefficient of regression (**r**). The column “Linearity” in the annual report shows your **r** values in comparison to the median **r** values for all labs. Ideally

the **r** value is close to 1.000 and this is indeed observed with values of 0.9746 for protein and 0.9911 for cystine.

### *4.5 Interlab CV*

For comparison for diagnosis and monitoring of treatment for one patient in different hospitals and for use of shared reference values it is essential to have a high degree of harmonization between results of laboratories. Part of the schemes' design is to monitor this by calculating the Interlaboratory CV. This, along with the number of laboratories who submitted results is shown in the column "Data all labs" in the annual report. We see an interlab CV of 11.8% for protein and of 104.1% for cystine (nmol ½ cys/mg protein). The interlab CV for cystine is disappointing and is caused by some labs with extreme results.

### *4.6 Number of participating labs and submitting results*

In total 27 labs received samples and 26 submitted results.

### *4.7 Interrelationships between results*

Cystine (nmol ½ cys/mg protein) is a ratio of the assays of cystine (nmol/aliquot) and protein. The precision will be the cumulated precision of both assays.

### *4.8 Report in correct numbers*

As we have indicated in previous reports it is important to report in the correct units. Although we feel that nearly all labs do that now, some strange results of individual labs might be traced back to "clerical errors". So if you have a deviating result, please check if you reported your result in the correct units.

## 5. *Summary*

We feel that, after some pilots, the scheme is well-established now. The mean performance of the labs, especially the recovery of added cystine and protein, is fine. Of course the performance of some individual labs require improvement. The Interlab CV demonstrates lack of standardisation which requires improvement.

## 6. *Preview of the Scheme in 2006*

The design of the 2006-scheme is the same as in 2005.

## *7. Questions, Comments and Suggestions*

If you have any questions, comments or suggestions please address to the scientific advisor of the Scheme, Dr. Mick Henderson (mick.henderson@leedsth.nhs.uk) and/or the scheme organiser Dr. Cas Weykamp (c.w.weykamp@skbwinterswijk.nl).