Clinical Chemistry

February 2013 Audio Summary

This is the February 2013 issue of *Clinical Chemistry*: Volume 59, Issue 2.

External Quality Assessment of Point-of-Care Methods: Model for Combined Assessment of Method Bias and Single-Participant Performance by the Use of Native Patient Samples and Noncommutable Control Materials
By Anne Stavelin, et al.

An important objective in external quality assessment is to evaluate systematic deviations between methods. However, this is not possible when non-commutable control materials are used. This report proposes a model where a method bias evaluation using native patient samples is incorporated into external quality assessment schemes where non-commutable samples are used, in order to assess both the methods and each single participant performance. The model is specifically aimed at point-of-care methods and should be easy to carry out on a regular basis.

Isotope-Dilution Liquid Chromatography-Tandem Mass Spectrometry Candidate Reference Method for Total Testosterone in Human Serum
By Julianne Cook Botelho, et al.

In this article the authors describe the validation of a highly accurate and precise candidate isotope dilution liquid chromatrography tandem mass spectrometry reference measurement procedure for total testosterone value assignment in male and female serum samples. This method has similar performance characteristics to established reference method procedures. Traceability to SI units was established by using the primary reference material Testosterone NMI M914 from the National Measurement Institute for calibration. This measurement procedure can serve as a higher order standard for measurement traceability, and can be used to provide an accuracy base to which routine methods can be compared in the CDC Hormone Standardization Program.

Low 25-Hydroxyvitamin D and Risk of Type 2 Diabetes: A Prospective Cohort Study and Metaanalysis
By Shoaib Afzal, et al.

Several studies have shown that vitamin D regulates insulin sensitivity and insulin secretion, two of the principal mechanisms disturbed in the development of diabetes. This study was conducted as a prospective cohort study with about 10,000 participants to test the hypothesis that vitamin D deficiency is associated with increased risk of type 2 diabetes. Furthermore, a metaanalysis of previously published prospective studies was performed.

An association of low plasma 25-hydroxyvitamin D with increased risk of type 2 diabetes was observed. This finding was substantiated in a metaanalysis. The present study and the metaanalysis suggest that randomized intervention studies are highly warranted.

Data Submission and Quality in Microarray-Based MicroRNA Profiling
By Kenneth W. Witwer

As a matter of scientific integrity and transparency, most journals require submission of microarray datasets to public databases prior to publication. This study reviewed 127 microRNA articles published by several leading journals during a ten-month period in 2011/2012. The results indicate that, despite journal mandates, data were unavailable at publication for most microRNA profiling studies. Furthermore, lack of data deposition appeared to correlate with low study quality as assessed by a multiparameter metric. The study concludes with the recommendation that journals enforce existing data submission policies to promote data quality and integrity in microRNA microarray studies.

Short- and Long-Term Individual Variation in Cardiac Troponin in Patients with Stable Coronary Artery Disease
By Anna Nordenskjöld, et al.

Knowledge about the biological and analytical variation in cardiac troponin is of importance for the diagnosis of myocardial infarction. Blood samples from twenty-four patients with suspected stable coronary heart disease scheduled for elective coronary angiography were analyzed with two different high-sensitivity assays. The short-term individual variation in concentrations measured by high sensitivity assays was 14% for cardiac troponin I and 7% for cardiac troponin T. The short-term individual variation of cardiac troponin concentrations in patients with symptoms of stable coronary artery disease seems to be quite similar to the biological variation previously demonstrated in healthy individuals. These results suggest that a change in cardiac troponin concentrations of greater than 50% is highly indicative of an acute myocardial injury.

Refining Diagnostic MicroRNA Signatures by Whole-miRNome Kinetic Analysis in Acute Myocardial Infarction
By Britta Vogel, et al.

MicroRNAs are important contributors of cardiovascular diseases and represent novel biomarker candidates with great potential. The present study relied on serial whole-genome microRNA expression profiling of whole blood samples of patients with acute myocardial infarction. The study identified microRNAs that predict acute myocardial infarction with high statistical power at the initial presentation to the hospital. This is presumably due to the fact that these microRNAs reflect early pathogenic alterations in acute myocardial infarction, such as plaque rupture, endothelial dysfunction and thrombosis. Information from microRNAs has the potential to complement that derived from existing diagnostic tools in the near future.

MNAzyme qPCR with Superior Multiplexing Capacity
By Elisa Mokany, et al.

MNAzymes are novel nucleic acid enzymes that can be used to provide a flexible and highly specific readout for qPCR, allowing the easy design of multiplex assays. This report demonstrates several applications of multiplex MNAzyme qPCR and RT-qPCR assays using a set of universal probes. The universal nature of the MNAzyme reporter probe removes the need for design of target specific probes. In addition to being highly sensitive and robust, the assays proved to be highly specific owing to the requirement of four target-specific binding events for signal production. The ease of multiplexing qPCR assays with MNAzymes offers advantages over other real-time chemistries.

Noninvasive Prenatal Determination of Twin Zygosity by Maternal Plasma DNA Analysis
By James Z.Z. Qu, et al.

This study explored the noninvasive prenatal determination of the zygosity of twin pregnancies by targeted sequencing of maternal plasma. Monozygotic and dizygotic twins would be expected to exhibit, respectively, identical and nonidentical fractional fetal DNA concentrations across different genomic regions. Sequencing data on 4 monozygotic and 4 dizygotic twins demonstrated complete distinction of the two groups. For the latter group, the investigators were also able to deduce the relative fractional fetal DNA concentration for each fetus in maternal plasma. These developments have multiple applications for prenatal monitoring and research and will improve noninvasive prenatal diagnosis for twin pregnancies.