Clinical Chemistry

October 2015 Audio Summary

This is the October 2015 issue of *Clinical Chemistry*, Volume 61, Issue 10.

On the cover this month: *Linda Thienpont.* When Thienpont first entered the field, routine assays for estradiol, progesterone, testosterone, thyroxine, and other thyroid hormones varied widely depending on who developed them and where they were performed. Wanting to hold the field to a higher standard, she has dedicated her career to the development of reference materials and reference methods to help bring "harmonization" and "trueness" to laboratory measurements. Yet, when asked to describe herself and her career, she emphasizes the importance of simple rewards: "I am a person who is always happy. I am happy with my work, happy in my family. I'm happy with my normal life." But her story has more to it than that, as you will see when you read more about her in this month's Inspiring Minds feature.

Cannabinoid Concentrations Detected in Fatal Road Traffic Collision Victims Compared with a Population of Other Postmortem Cases
By Rebecca Andrews, et al.

This study describes the comparison of concentrations of the primary psychoactive cannabinoid, Δ^9-tetrahydrocannabinol, or THC, detected in postmortem blood samples from fatal road traffic collision victims to those detected in a non-road traffic collision postmortem control group. The results highlight the importance of measuring THC concentrations in fatal road traffic collision victims rather than simply reporting the presence of cannabinoids. This study adds to the current knowledge surrounding interpretation of postmortem blood THC concentrations by specifically comparing the blood concentrations of THC in deaths where cannabis may be implicated to those where the finding of cannabis is thought to be incidental.

Performance of Cystatin C– and Creatinine-Based Estimated Glomerular Filtration Rate Equations Depends on Patient Characteristics
By Jeffrey W. Meeusen, et al.

This study set out to evaluate the performance of cystatin C and creatinine estimated GFR equations compared to measured GFR across different clinical presentations. Over 1,600 patients were evaluated, including transplant recipients, chronic kidney disease patients, and potential donors. Performance of estimated GFR equations varied considerably across patient categories and estimated GFR values. The combined cystatin C and creatinine estimated GFR was the most consistent with measured GFR. No significant difference in estimated GFR performance was observed in any patient group with a GFR between 45-59 milliliters per minute per 1.73 meters squared. The authors conclude that creatinine- estimated GFR is not advised in kidney donor evaluations and cystatin C estimated GFR is not advised in transplant recipients.

Temporal Release Pattern of Copeptin and Troponin T in Patients with Suspected Acute Coronary Syndrome and Spontaneous Acute Myocardial Infarction
By Anna Slagman, et al.

The release pattern of copeptin during the initial 36 hours of spontaneous acute myocardial infarction (AMI) has received relatively little investigation but may provide important information on optimal timing of diagnostic measurements. The authors of this study analyzed copeptin in patients with suspected acute coronary syndrome at 6 time points up to 12-36 hours after presentation. In patients with AMI, copeptin values peaked early and decreased significantly over time while they remained stable in patients with other diagnoses. In early presenters, no patient with AMI was found to be initially copeptin negative indicating excellent diagnostic performance. This analysis is the first to show a consistent early increase in copeptin at first medical contact in the ambulance and a decrease to normal values within 12-36 hours in patients presenting early with spontaneous AMI.

Fully Automated Ultrasensitive Digital Immunoassay for Cardiac Troponin I Based on Single Molecule Array Technology
By Petr Jarolim, et al.

The paper introduces a new troponin assay as the first example of fully automated single molecule array technology, which enables digitization of rapid immunoassays with single molecule sensitivity. The authors demonstrated analytical and clinical efficacy by subjecting the test to analytical characterization and measurement of troponin in cohorts of healthy and diseased individuals. The data established a new sensitivity benchmark, easily measuring troponin in the healthy cohort and discriminating between healthy and heart failure cohorts. The analytical performance makes the test suitable for routine troponin monitoring and applications where small changes in troponin are of clinical interest.

Detecting Long-term Drift in Reagent Lots
By Jiakai Liu, et al.

The current between-reagent lot verification procedure based upon weighted Deming regression does not detect long-term analytical drifts. The authors of this paper describe an alternate procedure based on Student t-test examination of cumulative regression slopes and intercepts across multiple reagent lots. Numerical simulations showed that the proposed approach can detect long-term cumulative drifts in regression slopes and intercepts. This alternative method detected a mild downward drift in the serum sodium assay in the authors' hospital, which was missed by routine between-reagent lot verification. However, the statistical power of this procedure remains unsatisfactory when smaller numbers of samples are used for comparison. Pooling of laboratory data between laboratories may overcome this limitation.

Circulating Tumor DNA Outperforms Circulating Tumor Cells for *KRAS* Mutation Detection in Thoracic Malignancies
By Maxim B. Freidin, et al.

The liquid biopsy concept suggests the detection of "druggable" mutations in tumors through the use of circulating biomarkers instead of invasive and traumatic approaches for obtaining cancerous tissues. This study compares the performance of circulating tumor cells and circulating tumor DNA as a proxy to *KRAS* gene mutation detection in thoracic malignancies. The authors show that circulating tumor DNA reveals more mutations than circulating tumor cells and primary tumors themselves. Therefore, genotyping of circulating tumor DNA may have higher predictive potential for the choice of personalized treatment in cancer as compared with DNA from limited amounts of tumor tissues, which do not fully reflect genetically heterogeneous cancer tissues.