was derived from studies on extremophile organisms. These organisms can survive extreme environmental conditions. SampleMatrix™ consists of protective agents developed from combining small molecule chemistry with advanced polymer chemistry. This product has multiple components: 1) the dissolvable polymer in a stabilization buffer adjusted for the different biological samples; 2) a stabilizing solution containing small synthetic molecules. We have conducted research on the effectiveness of SampleMatrix™ to stabilize biological evidence as compared to conventional storage methods. The study tests the hypothesis that the storage of biological samples, swabs and liquid DNA extracts, in the SampleMatrix™ polymer at room temperature reduces the exogenous degradation of DNA by minimizing the adverse effects of hydrolysis and freeze-thawing. Blood, semen, and saliva stains of different concentrations were initially deposited on five different substrates. Each stain was sampled by swabbing with water or Sample Matrix™ as the wetting agent and then exposed to room temperature v. freezer storage for longitudinal study. In addition, we have conducted parallel studies whereby blood, semen, and saliva were directly applied to swabs and subsequently stored for longitudinal study. This presentation will discuss the results of the experimental conditions that were evaluated by Real-Time and STR analysis following standard forensic protocols.

Development of the Powerplex® 16 HS System

Lotte Downey
Promega Corporation

Short tandem repeat (STR) analysis remains the primary method for human identification. Forensic Typing, criminal databasing and relationship testing laboratories in the US and many other regions of the world use a standard set of 13 STR markers selected by the US Federal Bureau of Investigation for the Combined DNA Indexing System (CODIS). The PowerPlex® 16 HS System co-amplifies these 13 loci (D18S51, D21S11, TH01, D3S1358, FGA, TPOX, D8S1179, vWA, CSF1PO, D16S539, D7S820, D13S317, and D5S818) plus the low-stutter Penta E and Penta D markers and the gender-determining Amelogenin locus. One primer for each of these loci is labeled with fluorsecein, carboxy-tetramethylrhodamine (TMR) or 6-carboxy-4′, 5′-dichloro-2′,7′-dimethoxy-fluorescein (JOE). Amplicon size is determined by comparison with the Internal Lane Standard 600 (ILS) labeled with carboxy-X-rhodamine (CXR). This four-color chemistry can be analyzed on the ABI Prism® 310, 3100 and 3100-Avant genetic Analyzers and Applied Biosystems 3130 and 3130xl Genetic Analyzers using existing dye matrix standards. The PowerPlex® 16 HS System provides a hot-start Taq DNA polymerase in a modified master mix to provide increased ease-of-use and performance over previous PowerPlex® systems. This assay has increased tolerance to common forensic sample inhibitors known to reduce genotyping success rates. The presentation will share results from sensitivity and inhibitor studies along with developmental validation results.

GC-C-IRMS: It's Use/Misuse in the Floyd Landis Sports Doping Case

Bob Blackledge
Forensic Chemist Consultant

Gas chromatography combustion stable isotope ratio mass spectrometry, GC-C-IRMS, is the analytical method used as a confirmatory test for the presence of exogenous anabolic steroids in urine. This analytical technique should especially be of interest to CAC members because it has many potential applications to questions addressed in forensic science. This presentation will explain the scientific basis for GC-C- IRMS and use the data from the Floyd Landis sports doping case to illustrate possible pitfalls.

An Investigation Into PCR Inhibition Issues Encountered Using Microcon® for DNA Extraction, and Subsequent Validation of the Vivacon 2 for Casework DNA Extraction

Mehul B. Anjaria, Kellie A. Fenesan, Chantel M. Giamanco
Human Identification Technologies, Inc.

In November 2007 Human Identification Technologies, Inc. (HIT) was forced to abandon use of CENTRICON(r) Centrifugal Filter Devices for organic DNA extraction clean up due to their unavailability in the marketplace. The MICROCON(r) Centrifugal Filter Device was assessed and found to be a suitable replacement, and in fact produced slightly better DNA yields than did the Centricon. Initially, the Microcon appeared to perform well with casework samples. However, over time an increase in apparent PCR inhibition was observed. This was generally overcome by amplifying a reduced amount of DNA extract. The practice of exposing Microcons to ultraviolet light prior to use in casework was investigated as a possible aggravating factor, but experiments showed that the ultraviolet treatment did not have a detrimental effect. As the inhibition reached unacceptable levels, HIT began validating the VIVACON 2 as a replacement for the Microcon. The Vivacon performed well during the validation for both extraction and the concentration of extracts, and therefore HIT has abandoned the Microcon device in favor of the Vivacon.The troubleshooting approach used to deal with the inhibition encountered will be described and data from the Vivacon validation will be presented. Results of a literature search on ultraviolet treatment of consumables prior to PCR will also be described.