DNA ANALYSIS FROM FORENSIC EVIDENTIARY MATERIAL IN LESS THAN TWO HOURS

Amy Jeangeunat, Jonathan Davoren, Kristen Hancock, Sandra Gault, Mike Cariola
The Bode Technology Group, 10430 Furnace Road, Suite 107, Lorton, VA 22079, USA

DNA is one of the most unique identifiers of individuals, but the time from collection to results being produced has historically been slow. Several manufacturers are on the forefront of creating microfluidic devices to differentiate known individuals in 1 to 3 hours. However, there have been several advances in direct amplification and rapid thermal cycling technologies that have significantly decreased standard processing times and have allowed faster turnaround times to be achieved with commercial off-the-shelf (COTS) equipment.

With modifications to PCR polymerases and buffering components, unpurified samples can now be directly amplified following sampling. Reagent component enhancements also allow for changes to thermal cycling conditions. The three step PCR process “denature, anneal, extend” can now be performed in two steps in conjunction with a decreased activation and final extension. Thermal cycling instrumentation is also improving with faster ramp rates between cycling temperatures, and having less requirements for voltage and weight. This allows for some models to be extremely portable. Bode has capitalized on these advancements and developed a procedure to achieve DNA results from known standards and evidentiary items in less than 2 hours.

Focusing on novel sampling techniques, along with direct and rapid amplification, full profiles have been obtained from known samples as well as touch items, wearer DNA, blood swabs, cigarette butts, and mixture samples. This presentation will discuss the historical advancements that make this testing possible, validation results, the compatibility of a wide range of samples with a COTS rapid system, and future considerations. Using equipment and resources already common in the crime laboratory, a rapid process can provide immediate response to critical investigations for law enforcement and can offer fast turnaround for pressing identifications, including persons of interest or detainees at critical screening functions. ⌘