



Hair Today Con Tomorrow

The same technology that brings you decaffeinated coffee after your evening meal may soon help investigators identify criminals from hair left behind at crime scenes. A study under way at the National Institute of Standards and Technology (NIST) uses an adaptation of supercritical fluid extraction (SFE)—a procedure like that used to decaffeinate coffee—to create chemical profiles of hair samples.

The technique, developed by NIST research chemist Bruce Benner in 1993, uses SFE connected to gas chromatography and mass spectrometry equipment similar to that already in place in crime labs to identify the chemical components of hair samples. The resulting chemical profile includes applied substances like shampoo and conditioners, as well as naturally occurring substances such as cholesterol.

“Our main goal in the development of this method has been to provide additional data from trace evidence hair analysis that could help guide a criminal investigation,” Benner says. “For example, the method could possibly distinguish hair of the victim from that of the alleged perpetrator and help reduce the number of suspects from comparisons of the trace evidence obtained at the crime scene with that obtained from suspects.”

Using this technique, researchers can derive a chemical profile from samples as small as one to two segments of hair about 1.5 centimeters (less than 5/8 of an inch) in length. In the first portion of the study, conducted in 1999, hair samples were collected from 20 people and consistent chemical profiles developed for each individual. Information on this study can be found in *Trace Evidence Analysis of Human Hair by On-Line Supercritical Fluid Extraction—Gas Chromatography/Mass Spectrometry: A Feasibility Study*, NIJ Report 600-99. (The National Institute of Justice provided funding for the study.)

John Goodpaster, a National Research Council post-doctoral research associate, is currently working full-time on the second stage of the project. In this stage, which

will run through 2002, hair samples from an additional 60 to 100 persons will be analyzed to determine the extent to which the chemical profile resembles a fingerprint in its uniqueness. Sometime thereafter, the researchers hope to publish a peer-reviewed journal article on the technique.

“Depending on the results and the utility of the method for human identification, we would like to transfer the method to the FBI and other forensic research laboratories for them to apply it to known hair samples in their archives,” Benner says, cautioning that this process could take several years. “We are encouraged from the preliminary study. Our method for characterizing the surface components of small hair samples may provide complementary information to that obtained through traditional microscopic examination of samples collected at a crime scene.”

For more information about trace evidence hair analysis, contact Michael Newman, National Institute of Standards and Technology Public Affairs and Business Division, 301-975-3025, or e-mail michael.newman@nist.gov. To order the publication *Trace Evidence Analysis of Human Hair by On-Line Supercritical Fluid Extraction—Gas Chromatography/Mass Spectrometry: A Feasibility Study*, NIJ Report 600-99, contact the National Criminal Justice Reference Service at 800-851-3420.

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