HOLMES: A NEW FORENSIC TOOL FOR SIMULTANEOUS DNA TESTING AND BIOLOGICAL MATRIX IDENTIFICATION

Adolfo Gregori[1], Fabiano Gentile[1], Cristina Canton[2], Simone Cristoni[2], Giampietro Lago[1]
[1]R.I.S. di Parma
[2]ISB – Ion Source & Biotechnologies srl, Via Lepetit 34, Gerenzano (VA)

Biological Matrix (blood, sperm etc) identification is a key factor in forensic investigation. In fact, the characterization of matrix together with subjects identification through DNA test are often essential to understand the crime dynamics. However, perform this two analysis can be very challenging, especially when the amount of sample found on the crime scene is low. Commercial kits used for DNA analysis involves different step in order to eliminate the fabric on which the evidence is located and to purify DNA from PCR inhibitors . In this paper an innovative platform named Human Oriented Low concentration Matrix Expressed compounds Search (HOLMES) has been performed in order to identify biological matrix through matrix biomarker monitored in the DNA wash discard fluids. HOLMES has been used to identify blood samples with respect to other matrixes (saliva, urine, vaginal fluids). Plexor® HY System and PowerPlex® ESI 17 from Promega (Madison – WI) are also performed in order to obtain DNA quantitation and DNA profile. The complex matrix biomarker profile has been monitored by means of high resolution liquid chromatography ORBITRAP mass spectrometry. The matrix identification probability has been obtained using a Bayesian learning filter.
100% of blood samples were correctly classified.