The use of mass spectrometry (MS) in forensic science has had a profound impact on the investigation of crimes, especially in the areas of drug analysis and toxicology. In 1970, Althaus et al. reported on the use of a gas chromatography-MS (GC-MS) system at Massachusetts Institute of Technology (MIT) to detect several hallucinogenic drugs using MS. This marked the beginning of a shift towards the use of MS in forensic laboratories, which had not been widely adopted in the past due to issues such as cost, complexity, and lack of standardization.

In 1973, a Swedish team developed a GC-MS assay for Δ⁹-THC, which was sensitive enough to detect if someone had smoked "one half-billionth of a gram". This was a significant advancement in the field of drug detection, as it allowed for more sensitive and accurate identification of drug use.

In 1977, MS data from the Environmental Protection Agency (EPA) was admitted as evidence in a case involving the detection of trace levels of 2,4-dichlorophenol. This was a pivotal moment in the acceptance of MS as a reliable and valid forensic tool.

Although MS techniques were commercially available in the early 1970s, they were not widely used in forensic laboratories due to issues such as cost, complexity, and the lack of standardized procedures. In 1980, the National Academy of Sciences published a report titled "The Scientific Foundation of Forensic Science", which recommended the use of MS in forensic laboratories.

In the 1990s, the use of MS in forensic science continued to grow, particularly in the areas of drug analysis and toxicology. In 1997, the United States Department of Justice initiated the National Institute of Justice (NIJ)-funded "Crime Scene Identification Project" (CSIP), which aimed to develop and implement standardized identification procedures for crime scene evidence.

In 2003, forensic scientists used MS to analyze the composition of gunshot residue (GSR), also known as cartridge discharge residue, in a case related to a murder investigation. The GSR analysis was used to establish the presence of a firearm at the scene of the crime, which was critical evidence in the case.

In the 21st century, MS has continued to play a critical role in forensic science, with the development of new techniques such as liquid chromatography-mass spectrometry (LC-MS/MS) and direct analysis in real time (DART). These advances have improved the sensitivity and specificity of MS in forensic applications, making it an even more powerful tool for forensic investigators.

In conclusion, the use of mass spectrometry in forensic science has had a significant impact on the investigation and resolution of crimes. As technology continues to evolve, MS will likely play an even larger role in forensic science, providing investigators with even more powerful tools to solve crimes and bring justice to victims.
History of Forensic Mass Spectrometry

1950
- B. Biemann's use of EI-MS to distinguish the stereochemistry of cyclic alcohols in natural products, including steroids.

1964
- Kaiser and Ghiselin publish diffusion chambers describing the mass spectrometer (GC-MS) providing the first real-time, in-vivo analysis of natural products.

1966
- R. G. Gillis et al. and J. Yinon publish separations of volatile metabolites in rat urine using a GC-MS and automated peak tracking system.

1968
- R. T. Coutts and R. Purdon conduct first comprehensive determinations of articles describing the mass spectrometry of hydrocarbons, "alkanes, alkenes, cycloalkanes and mechanisms for aromatics, including common fragments and mechanisms for aromatics, including common fragments.

1969
- J. Locke et al. demonstrate SSMS for forensic analysis of casework with an elevated background of weathered fuel oil.

1970
- A. Blum et al. use GC-MS/MS to detect trace gasoline residues in forensic casework.

1971
- R. W. Kondrat and R. G. Cooks introduce mass spectrometry (MS) to forensic analysis.

1972
- D. E. Green describes the use of MS "cracking patterns" to identify LSD, DMT and other hallucinogenic drugs.

1974
- J. A. Zoro and K. Hadley publish a review of the use of MS in forensic toxicology and the detection of drugs and explosives in ignitable liquids.

1976
- J. A. Zoro and K. Hadley publish a review of the use of MS in forensic toxicology and the detection of drugs and explosives in ignitable liquids.

1978
- A. Blum et al. use ICP-MS to detect trace elements in human hair; technique found to be unspecific, but the test remains in casework.

1981
- W. Meier-Augenstein and I. Fraser use isotope ratio mass spectrometry (IRMS) to help identify herbicide TCDD in beef fat to the level of ~5 ppt.

1988
- J. A. Zoro and K. Hadley publish a review of the use of MS in forensic toxicology and the detection of drugs and explosives in ignitable liquids.

1990
- W. Meier-Augenstein and I. Fraser use isotope ratio mass spectrometry (IRMS) to help identify herbicide TCDD in beef fat to the level of ~5 ppt.

1994
- A. Blum et al. use GC-IRMS to determine the geographic origins and production batches of diazepam.

1997
- J. B. Shead et al. use LC-MS/MS to detect trace gasoline residues in forensic casework with an elevated background of weathered fuel oil.

2000
- R. G. Gillis et al. use GC-IRMS to determine the geographic origins and production batches of diazepam.

2003
- R. G. Gillis et al. use GC-IRMS to determine the geographic origins and production batches of diazepam.

2008
- R. Saferstein et al. and J. C. Hughes et al. publish separate accounts of Py-GC-MS of explosives.

2010
- R. Saferstein et al. and J. C. Hughes et al. publish separate accounts of Py-GC-MS of explosives.
References for: History of Forensic Mass Spectrometry

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73. Commonwealth v. Westwood, Appellant. Supreme Court of Pennsylvania: **1936**.


