

# CLINICAL MASS SPECTROMETRY MILESTONES

Fritzsche Anton develops the first mass spectrometer that is able to accurately determine the masses of individual atoms. The measurements supported the existence of isotopes in chemical free elements and led the pathway toward modern-day mass spectrometry techniques.



The **Wendt** accident, a military jet crash, kills 34 service members. Mass spectrometry enabled the recovery of thousands of members of the crew. At a time when procedures had a high level of risk, Wendt's team showed the way for mass spectrometry studies in clinical forensic science.



Gas chromatography-mass spectrometry (GC-MS) becomes the gold standard for confirming drug screens across federal and state agencies, workplaces, and other institutions.

Millington et al.<sup>1</sup> proposes tandem MS of dried blood spots for newborn screening.

The authors envision screening for multiple organic acid and amino acid metabolic disorders within a hour and comparing the technology with established newborn blood screens for the detection of even more disorders with a dried blood

introduction of a multiple electrode source that interfaces with MS leads to higher sample throughput and cost savings. This is combined with a large flow rate from ion-multiplexed electrospray ionization (ESI-MS), the technology made rapid and accurate determination of pharmaceuticals present in plasma achievable, with throughput reaching 100 samples per hour.

The Nobel Prize in chemistry goes to John B. Fenn and Klaus T. Tanabe for the development of ESI and "soft" ionization techniques (shared with Kurt Wüthrich for development of NMR).

The research publication of the first ion-trap based ion-multiplexed tandem mass spectrometry (IM-MS/MS) for sample MS optimized by separating the ions for accurate analysis and preliminary sample preparation and other clinical laboratory body fluids for MS.

A nonprofit organization committed to the advancement of MS in the clinical laboratory called Mass Spectrometry Applications to the Clinical Laboratory is incorporated.

The organization began holding an annual conference to provide education and training on MS in the laboratory setting to doctors and practitioners in the field.



MS is increasingly used in metabolomics—the analysis of cellular metabolites during gene alterations at physiological stimuli. An example of the power of what a team of targeted research scientists, a team of clinicians, and an integrated approach, MS can contribute to patient care is shown in patients' personal and clinical data integration.

The intelligent knife (IKnife) is used in cancer surgery.

Rapid postoperative clinical on-line spectrometry (OPMS) combined with intraoperative visualization real-time evaluation of surgical tissue using handheld devices that rapidly interface with handheld knife or scalpel.



Matrix-assisted laser desorption/ionization (MALDI) MS is successfully cleared by the FDA for microorganism identification.

Researchers demonstrated the use of a handheld rapid and robust, ready-to-deploy mass spectrometer and software platform, built on standard culture techniques and commercializing testing.

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# Clinical Applications Mass Spectrometry Analysis

**Lingjun Ying**



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