Evolution of Medical Plasma Devices: From Laboratory Curiosity to Life-Saving Technology

Mehran Shahmansouri

Department of Atomic and Molecular Physics, Faculty of Physics, Alzahra University, Tehran, Iran

OPEN ACCESS

Citation:
Shahmansouri M. Evolution of Medical Plasma Devices: From Laboratory Curiosity to Life-Saving Technology. *Iran Biomed J.* Supplementary (2-2026): 75.

ABSTRACT

Introduction: Medical plasma technology exhibits one of the most fascinating journeys in healthcare innovation, evolving from an obscure laboratory phenomenon to a cornerstone of fantastic medical treatment. The present presentation will explore the remarkable evolution of the plasma devices-spanning nearly a century of scientific advances, engineering innovations, and clinical applications that have transformed patient care across a variety of medical disciplines.

Materials and Methods: The present study is based on a concise narrative review and comparative technological investigations of medical plasma devices, focusing on their biomedical functionality and historical evolution. Peer-reviewed publications were surveyed from major scientific databases including Scopus, Web of Science, PubMed, and, covering the period from early electrosurgical systems to modern cold atmospheric plasma (CAP) technologies. A qualitative comparison was done based on the device thermal safety, miniaturization, therapeutic scope, and plasma controllability, enabling identification of key technological milestones and emerging trends in plasma medicine.

Results and Discussion: The visual evolution of medical plasma technology tells a fascinating story of miniaturization, improved safety, and expanded capabilities. From space consuming laboratory devices to precision handheld instruments, the physical transformation reflects a conceptual revolution in plasma medicine. Today's plasma devices offer a wide range of medical functions that go far beyond traditional surgical applications. The technology has become an advanced therapeutic platform with applications in various medical specialties, each taking advantages of the unique physical and biochemical properties of plasma.

Conclusion: The development of plasma technology is creating new opportunities in the field of health, treatment, and wellness, which makes it possible to treat some incurable diseases as well as reduce the cost and duration of treatment for other diseases. Despite many investigations, the exact pathways through which plasma affects cells and tissues are not fully understood and need further investigation.

Keywords: Cold Atmospheric Plasma, Tumor Microenvironment

Corresponding Author: Mehran Shahmansouri
Department of Atomic and Molecular Physics, Faculty of Physics, Alzahra University, Tehran, Iran