

Abstract

Aerosol Delivery Devices

Jim Fink, Ph.D.

References to inhaling medicaments date back at least 5000 years, however, much of what we know of medical aerosol science has evolved in the last century. Early aerosol devices were used with a variety of available medications and delivered aerosols and vapors. From the 1900s-inhaled medication were developed for use with open cup aerosol devices, ranging from hand bulb atomizers to pneumatic nebulizers. Compressed air jet nebulizers appeared shortly after the turn of the 20th century. Over the next 100 years, newer technologies such as pressurized metered dose inhalers (pMDIs) and dry powder inhalers (DPIs) emerged, many with the medicament integral to the device.

This talk introduces some of the basic concepts of aerosol drug delivery including relevant lung anatomy and descriptors for aerosol particles. The 4 basic types of aerosol devices are introduced (pMDIs, DPIs, MDLIs, nebulizers). Operational principles are introduced, and advantages and disadvantages of each type are discussed. pMDIs are the least expensive, yet have a very limited dose range and the delivered dose is highly dependent on patient technique. DPIs can deliver higher loads (up to a few mg per breath), but are more expensive than pMDIs. Multi Dose Liquid Inhalers (MDLI) uses a nozzle to create the aerosol, and the Respimat is the only current example. Nebulizers is a large field, with highly varying performance. Performance differences between nebulizers is discussed.