

THE HISTORY OF SPIROMETRY

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Abstract

The value of objective quantitative assessment of lung ventilation parameters is extremely important in clinical practice. Among pulmonary function tests, spirometry is an accessible, simple technique that allows obtaining valuable useful information.

The aim was to study the history of spirometry by the literature data.

Attempts to measure quantitative characteristics of breathing have been known since the 17th century. In 1681, Giovanni Alfonso Borelli developed a method for measuring tidal volume by sucking liquid into a cylindrical glass tube. The volume of air displaced by the water was calculated from the diameter of the tube and the height of the meniscus. In the early 18th century, in 1727, Stephen Hales collected the air that could be exhaled into a bladder and measured its volume by further displacing water according to Archimedes' principle. The classic water-filled spirometer was developed based on the gas holder or "gasometer" in 1798. An alternative approach to measuring tidal volumes, and a precursor to bodyplethysmography, was the Boerhaave approach, in which a person immersed in a large bath with water took a forceful inspiration and then measured the rise in fluid level after the "expansion of the chest." In 1846, John Hutchinson published his *magnus opus* on the newly invented "spirometer." Over 50 variations of spirometers were introduced in the second half of the 19th century. Only after approximately 100 years, in 1960, in addition to the water-based devices, a second type of spirometer was developed, which was "dry." A significant advance in spirometry occurred in 1947, when two French physicians, Robert Tiffeneau and André Pinelli, proposed the introduction of forced expiratory volume in one second and the Tiffeneau-Pinelli index. This index was independently described by Edward Gensler in the United States. Peak flow-volume curves were first described in 1960. Currently, we use modern, convenient portable spirometers with software with very broad capabilities, and the methodology itself is standardized. The history of spirometry from its inception to the present provides valuable information about the overall development of our understanding of the respiratory system and helps to recognize the problems that prevent the optimal use of this powerful tool today.

Key words: spirometry, pulmonary function testing, lung volumes, John Hutchinson, history of pulmonology.

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