Lung Function: It's Not Just Breathing

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There are a variety of techniques available for assessment of the effect of toxicants upon the lung. One of the most powerful techniques available is the measurement of lung function. There have been a number of both conceptual and technical advances made in recent years in the assessment of lung function, particularly with respect to airway dynamics. However, for many toxicologists, lung function assessment is unclear and the possibilities for its use remain underutilized. The purpose of this Continuing Education course is to examine the fundamentals that underlie lung function testing and consider in what ways they can be measured and how these data can be related to toxicological outcomes. The first presentation will introduce the concept of lung function and how it has developed with newer technologies, in particular relating structure with function and how modeling can play a part in assessing this relationship. The second presentation will present an overview of lung mechanics. The physiological elements that make up the measurable units of lung function and how pressure and flow data can be used to generate models of lung function to assess toxicological outcomes will be discussed. The third presenter will describe the challenges of measuring lung function and the various approaches that are available to the investigator. The presentation will concentrate on parameters that can be extracted from different measurement techniques and how they can be utilized to gain information about the physiological elements of the lung. This information will be of critical importance to the practicing toxicologist. The fourth presenter will present on feed forward modeling of lung function and how both pathological and physiological data can be combined. He will focus on how animal scale function data can be used to understand the consequences of toxicant exposure to humans. The final presenter will provide a detailed example of how imaging data can be used to predict lung function. The focus of the presentation will be the longitudinal analysis of whole animal *in vivo* imaging data following toxicant exposure and its relationship to outcome. This technique provides a novel paradigm for assessing the continuous effect of toxicological exposure in the lung. Overall, these presentations will provide the audience with a practical understanding of lung functional data within the context of disease models as well as an understanding of how lung functional data can be used to further their own research.