

# ATS, ERS issue official standards for the quantitative assessment of lung structure

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The ATS and the European Respiratory Society have issued official standards for the quantitative assessment of lung structure.

"This is the first concise state-of-the-art review of stereological methods for [lung](#) morphometry that formulates practical guidelines for the use of advanced imaging techniques," said ATS past president, John Heffner, M.D. "The proposed standards ensure that the three dimensional window into the lung offered by advanced imaging techniques will provide the sharp and clear view necessary for the discovery of new respiratory cures."

The research policy statement was published in the February 15, 2010, issue of the [American Journal of Respiratory and Critical Care Medicine](#)

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Lung morphometry—the study of the structure of the lung on the whole-organ level—is of growing importance as new advanced imaging techniques provide investigators glimpses of previously inaccessible areas of lung architecture. The lung is composed of networks of increasingly tiny airways which, if laid out end-to-end, would extend for 1,500 miles, as well as tiny air sacs called alveoli which, if flattened, would have the surface area of a tennis court. However, these tremendously complex and intricate structures comprise only 10 to 15 percent of the volume of an inflated lung. The rest is air.

"When I look into a microscope at about 200 times magnification and

observe a histological section of human lung tissue, I see kind of a network of thin bands that I suspect to represent the walls between airspaces, the empty-looking areas; and some of the network bands mysteriously have free ends," explained Ewald R. Weibel, M.D., D.Sc., who is senior author of the standards and professor emeritus at the Institute for Anatomy at the University of Berne in Switzerland.

New advanced lung imaging techniques offer genuine three-dimensional views of the lung, and because of their ready availability, these techniques provide investigators with tremendous opportunities to look into previously inaccessible crevasses of the whole lung and examine spatial displays of the relationship between tissues, cells, organelles, alveoli, airways and blood vessels. But if these imaging techniques are misapplied they can promote misinterpretations of findings and confuse investigators in the field. Correctly interpreting these images is of critical importance to understanding the exact structures of airways and alveoli.

"Stereology now tells us that the length of this two-dimensional contour of air spaces images (per unit area of section) is proportional to the surface area of the three-dimensional airspaces (per unit volume of lung tissue)," said Dr. Weibel. "This allows the alveolar surface, functionally the gas exchange surface, to be measured on thin sections with great precision. But because the relationship is a statistical one, there are strict rules that must be observed if such an indirect estimate of a three-dimensional surface area is to be accurate. These standards explain these rules."

"The standards also promote the quality of basic and translational lung research, particularly because the potential use of the methodological standards in the modern imaging modalities—such as high-resolution CT, MRI and PET—are outlined," Dr. Weibel continued. "If adopted by the research community, the standards should also improve the

efficiency and accuracy of studies and, most importantly, make results obtained by different groups comparable, thus facilitating interdisciplinary and international collaboration."

Provided by American Thoracic Society

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