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The mean acinar volume shows an unproportional growth compared to the total lung volume

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The pulmonary acinus represents the functional unit of the lung. Due to a restricted availability of high resolution imaging methods the knowledge about the development of the pulmonary acini is limited. Using synchrotron radiation based tomographic microscopy we developed a method to estimate the volume of single acini throughout postnatal lung development.

More than 1000 functional units of the lung, the so-called acini were isolated from tomographic datasets of rat lungs acquired at the TOMCAT beamline by closing the transition between conducting and gas-exchanging airways bronchioles semi-automatically with three-dimensional discs acting as segmentation breakpoints. The volume of each acinus was determined by subsequent voxel counting.

While the volume of the right lower lung lobe increases approximately 10x during postnatal lung development from day 4 to 60, we detected a smaller increase in the volumes of the single acini (approximately 5.5x) for the same time-span.

We hypothesize that at days 10 and 60 a larger number of acini is present or that the growth of the acini is unproportional in regard to its location in the lung lobe (central or peripheral parts of the lobe).

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Talk

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