Dose requirements of phase contrast CT for in-vivo mouse studies in comparison to classical small animal CTs

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Mouse disease models are the working horse in preclinical research. They are used to unravel the underlying patho-mechanism of diseases and they are mandatory in drug testing. Only few years ago histology was the main readout and therefore in order to follow the course of a disease or to evaluate treatment response a large quantity of mice needed to be sacrificed. *In-vivo* imaging techniques such as small animal CT, allowing for longitudinal studies by repeatedly imaging the same animal, have dramatically changed the game. However, the smallness of mice as model organisms enforces imaging at much greater resolution than in human patients. This renders small animal CT much more challenging and usually results in the application of higher radiation doses. Like in human high x-ray dose causes blindness, radiation burns and the production of free radicals to only name a few effects and therefore ethics demands us to restrain the dose. However, even in application which may justify impairments of the mice, a high x-ray dose may interfere with the experiment and falsify the results.
The benefits of phase contrast CT in comparison to classical in-vivo microCT will be discussed by showing for instance results of *in-situ* lung imaging in asthma research and the measurement of osteogenesis in scaffold implanted mice. It will be demonstrated that even the use of an in-vivo small animal CT applying only a moderate x-ray dose has altered the tumor development in a longitudinal tumor therapy study. Finally, based on own working experience some dose considerations will be presented.