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Title: Reduction of particles by using a particle separator in pig barn environment reduces inflammatory response in healthy volunteers

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Body: The pig farming environment is a well-known inducer of upper and lower airway inflammation and it is unknown what causes the strong inflammatory response. The objective was to investigate if the number or size distributions of particles in the barn dust affect the airway inflammatory reaction in healthy volunteers. Two identical barns were cleaned and a particle separator (CentriClean System AB) was installed in one stable before the pigs were housed for ten weeks. Twelve non-smoking volunteers were exposed while weighing pigs for 3 hours to normal pig house environment and particle separated pig house environment (6 in each group, cross-over design) with 2-4 weeks between the two exposures. Initial particle (0.3µm-25µm) analyses showed e.g. 2-4 fold higher particle numbers in an ordinary pig barn than in particle separated barn. There were increase in body temperature, exhaled NO and almost all perceived symptoms while FEV_1, $PD_{20}FEV_1$ (methacholine), VC and PEF were reduced in all subjects after exposure to pig barn in comparison to filtered milieu. No significant changes were seen between the exposures except for body temperature (p=0.034). IL-8 and IL-6 in nasal lavage fluid and CD14-expressing monocytes in blood increased more after exposure to swine barn in comparison to the air filtered swine barn (p=0.040, p=0.021 and p=0.034 respectively). The results indicate that reduction in particles exposure of pig barns affect both local and systemic inflammatory responses in healthy persons after acute exposure to swine barn environment.