Conclusions
DissolvIt could be used for dissolution testing of nanoparticles.

Introduction
The increased production and use of nanoparticles lead to a need for performing risk assessment of different materials. The most common exposure route for nanoparticles is inhalation. One critical aspect of understanding the risk is knowledge about the dissolution kinetics in the lungs.

Aim
The aim of this study was to test a recently developed in vitro dissolution system called DissolvIt, that mimics the air-blood barrier in the upper airways, and furthermore, to generate dissolution/absorption profiles of CuO and Cu nanoparticles.

Methods
The PreciselInhale® aerosol generator was used to generate dry powder aerosols of CuO and Cu nanoparticles and deposit the aerosols on glass cover slips (2.1 µg CuO and 4.7 µg Cu respectively) (figure 1).

DissolvIt consists of (from bottom to top) a glass cover slip with well distributed particles (facing upwards), a mucus simulant in which the particles are dissolved. The mucus simulant is distributed over a polycarbonate membrane (representing the basal membrane in the airways). On the other side of the membrane a phosphate buffer containing 4 % albumin (pH 7.4) is pumped (simulating the blood) absorbing dissolved constituents of the particles.

Results
We found CuO easier to aerosolize than Cu. The CuO particles were more easily de-agglomerated and tended to re-agglomerate less in the aerosol (figure 1). Both types of nanoparticles dissolved rather rapidly in the simulated air-blood barrier (figure 2). Analysis of the perfusate samples indicated that the absorption of CuO was faster than for Cu (table 1).

Further investigations will reveal the full potential of using DissolvIt as a tool in toxicology research.