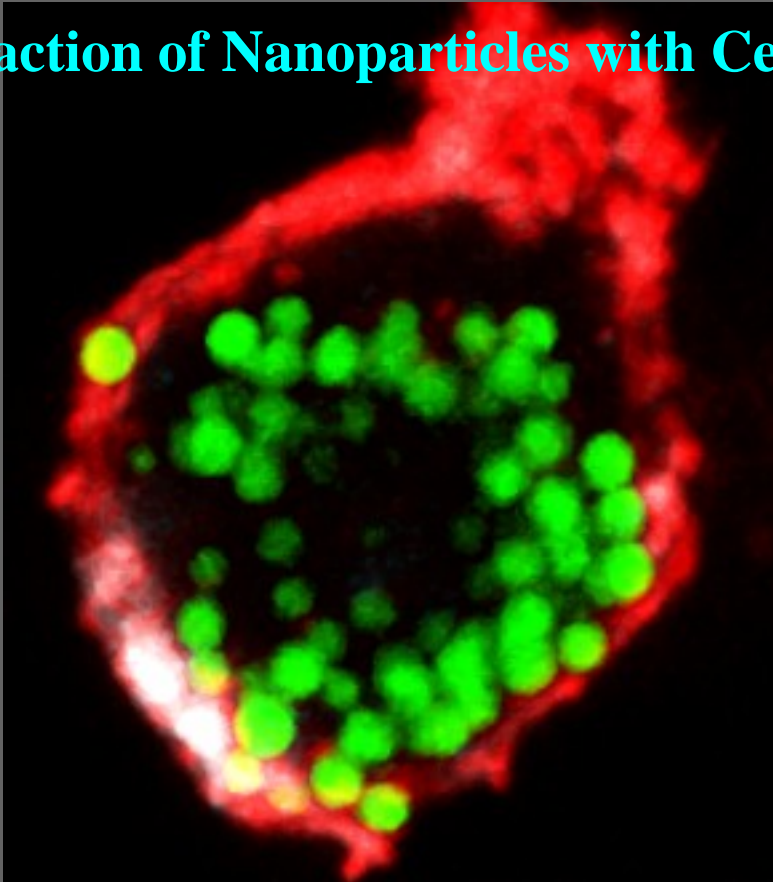


# Interaction of Nanoparticles with Cells of the Airway Epithelial Barrier: A Study with Cell Culture Models

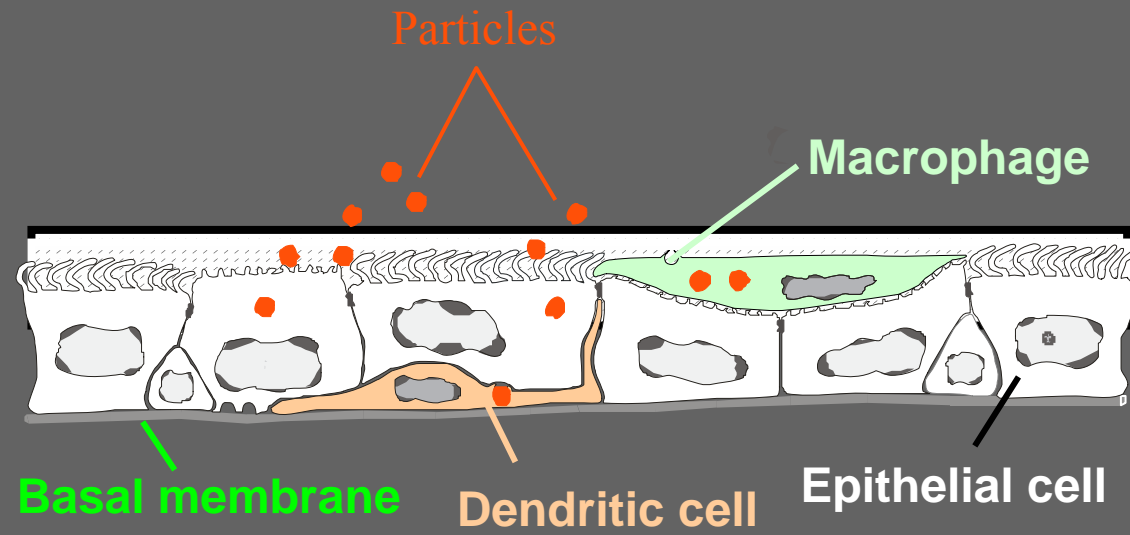


Barbara Rothen-Rutishauser

Institute of Anatomy, University Bern

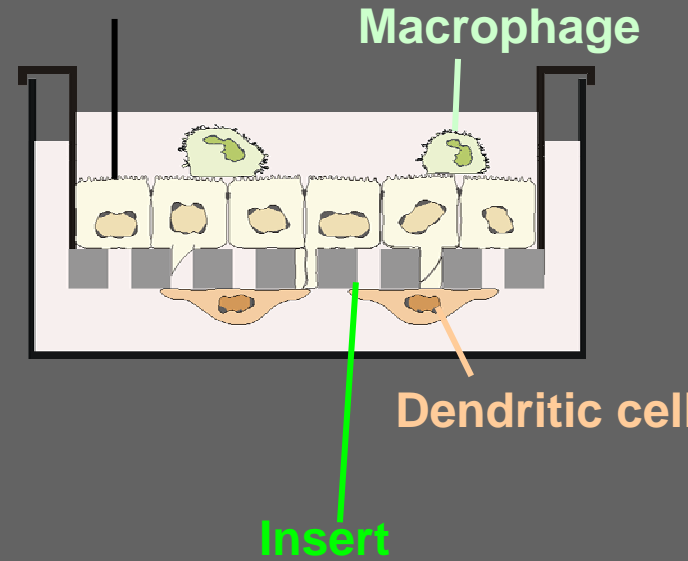
9<sup>th</sup> ETH Conference on Combustion Generated Nanoparticles,  
15<sup>th</sup>-17<sup>th</sup> August 2005, Zurich

# Epithelial airway wall – *in vitro* system



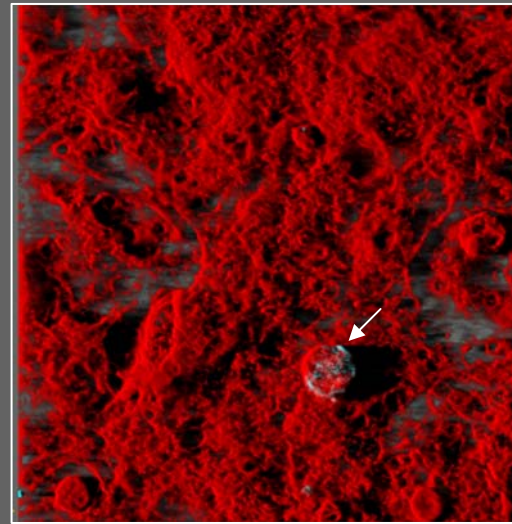
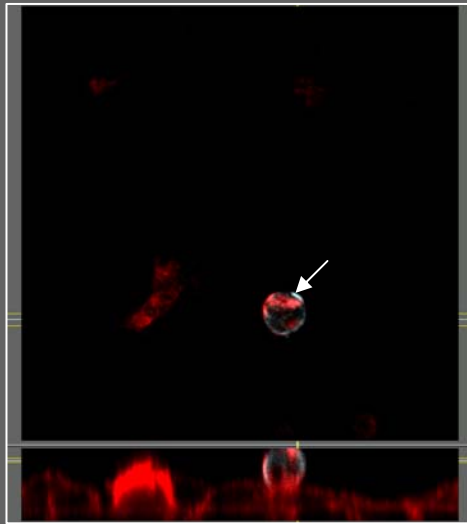
P. Gehr

## Epithelial cell monolayer

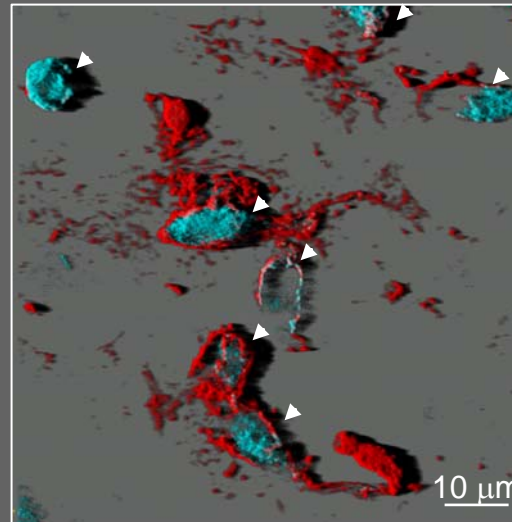
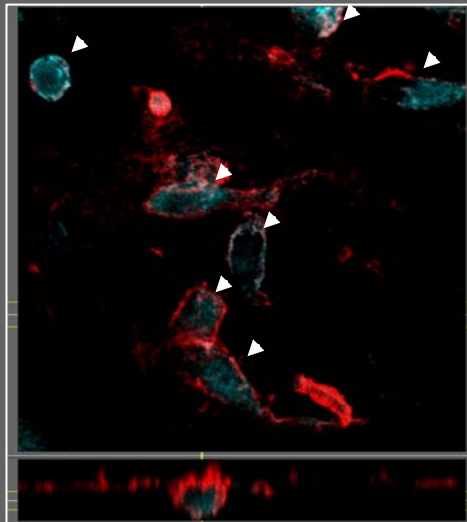


# Triple cell co-culture:

■ F-Actin  
■ CD14



■ F-Actin  
■ CD86



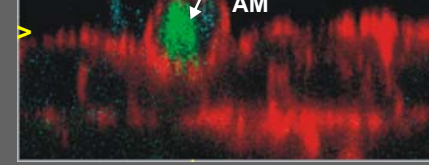
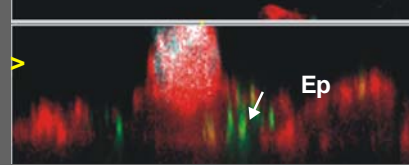
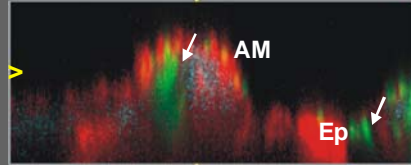
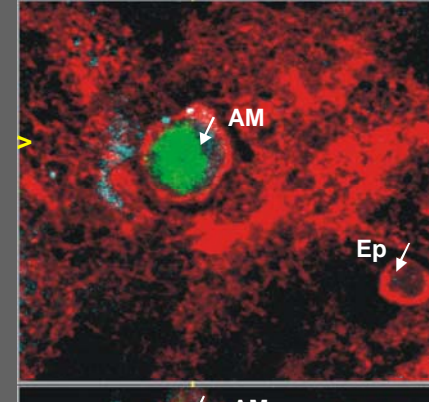
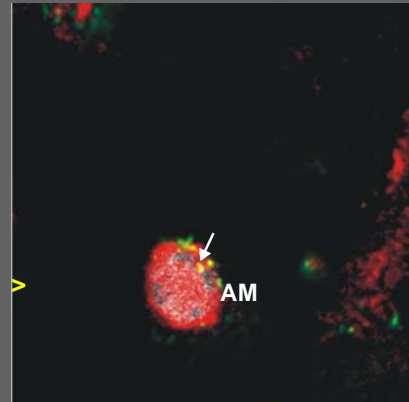
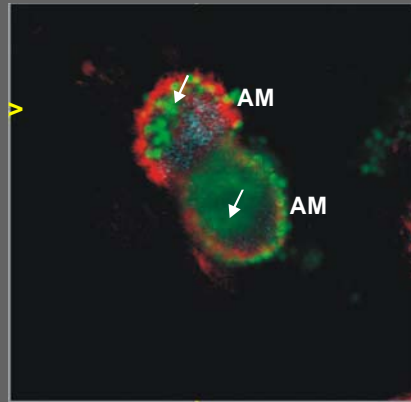
Polystyrol particles

■ 1 $\mu$ m

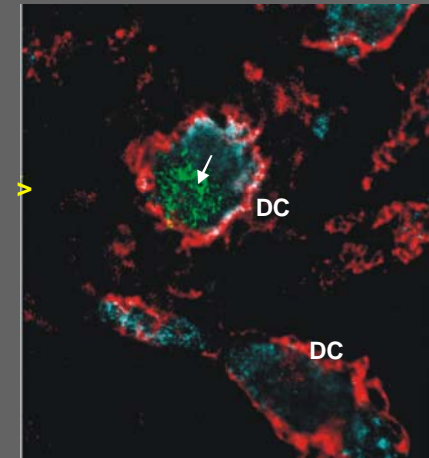
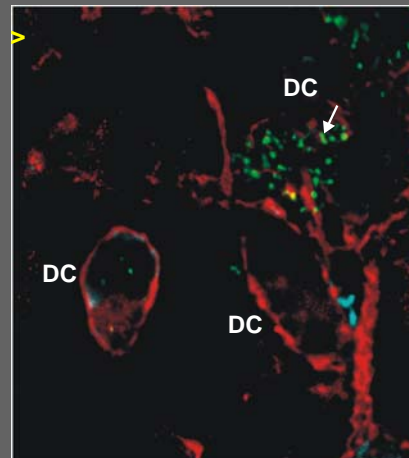
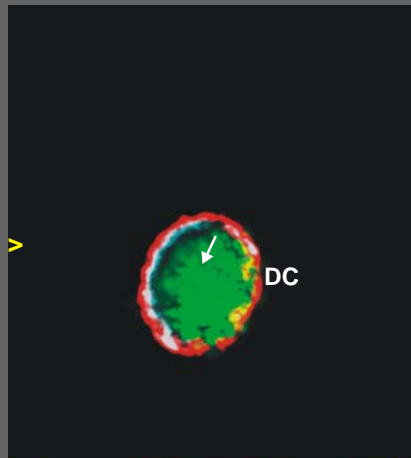
■ 0.2 $\mu$ m

■ 0.078 $\mu$ m

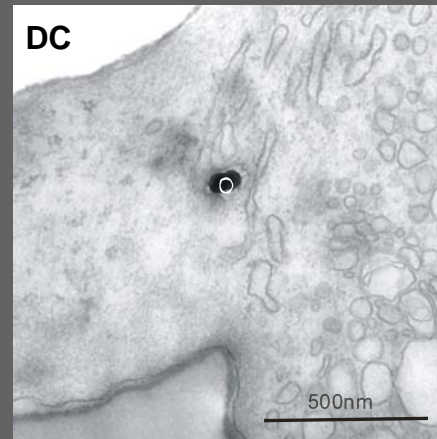
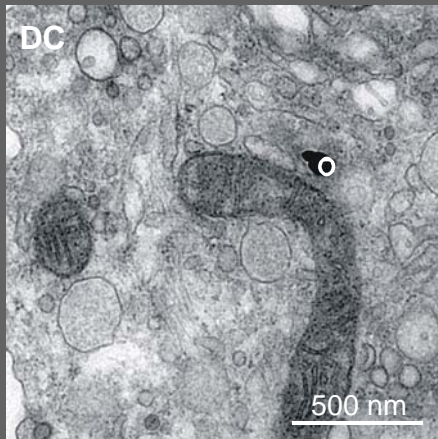
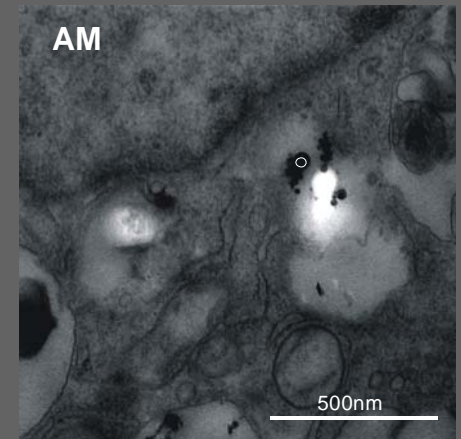
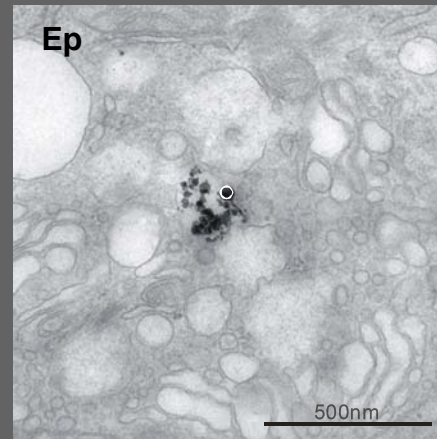
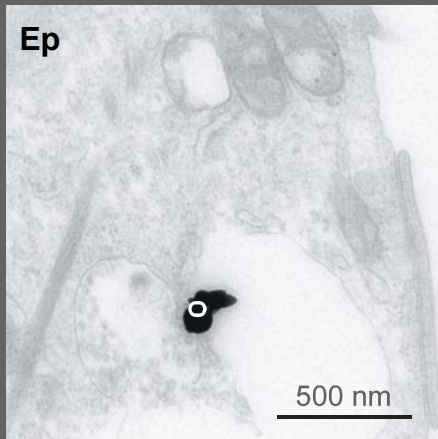
■ F-Actin  
■ CD14



■ F-Actin  
■ CD86

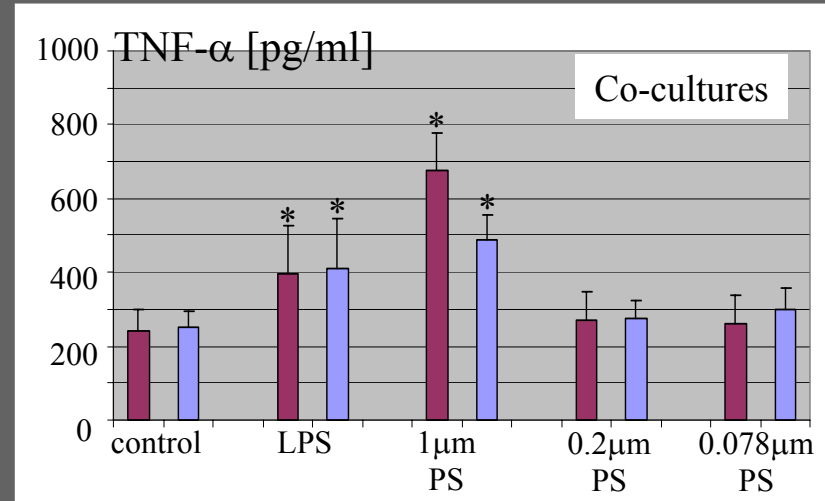
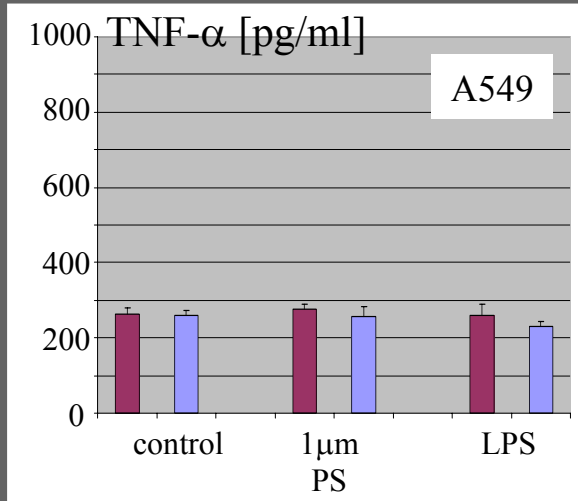


## 25 nm Gold particles

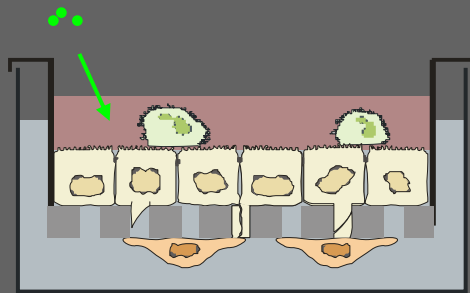


## 30 nm Titanium dioxide particles

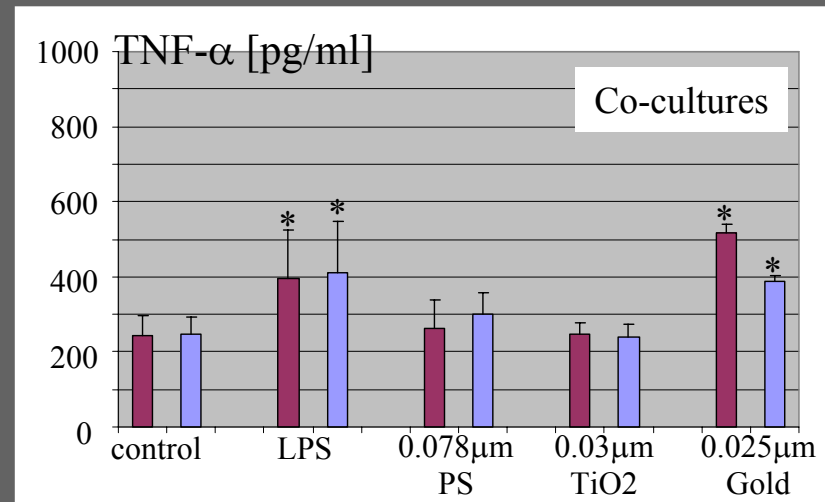
size



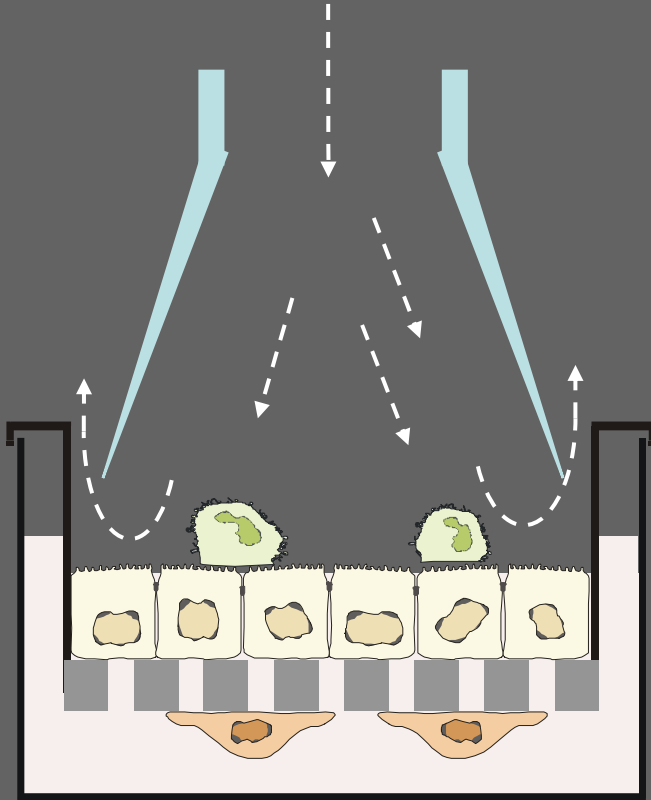
material



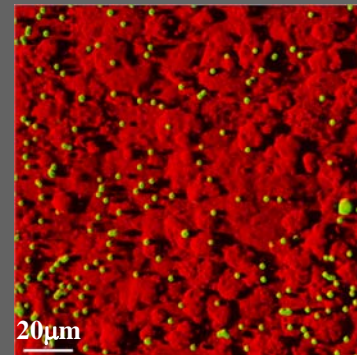
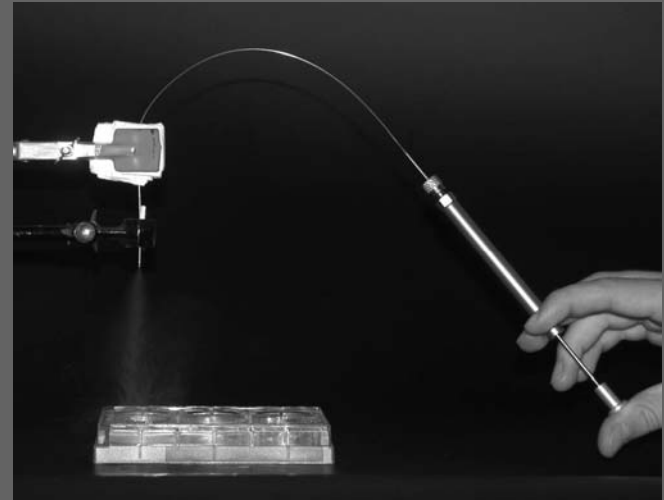
Determination of TNF- $\alpha$  in the supernatants



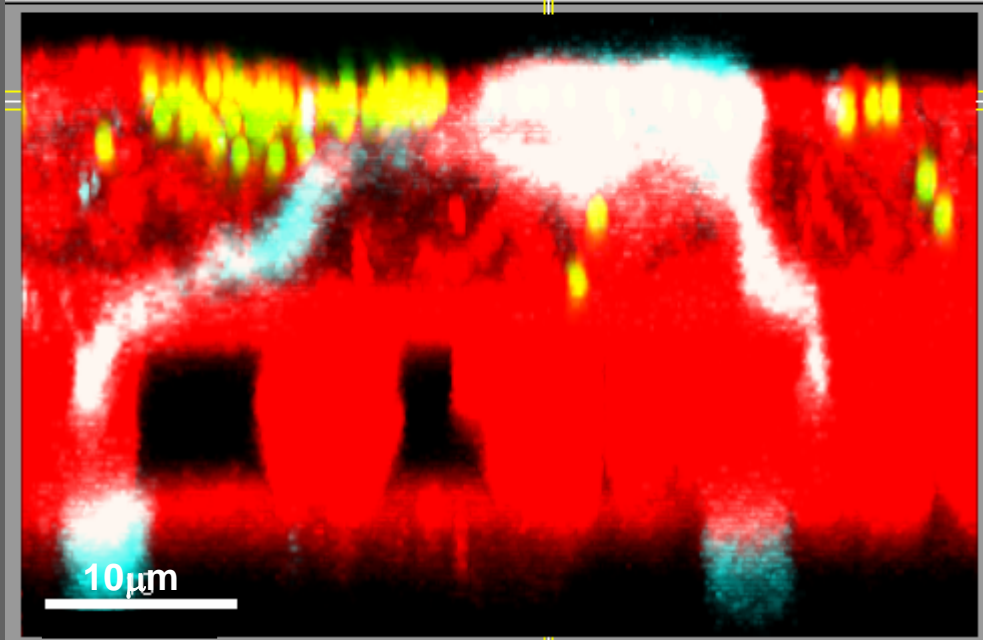
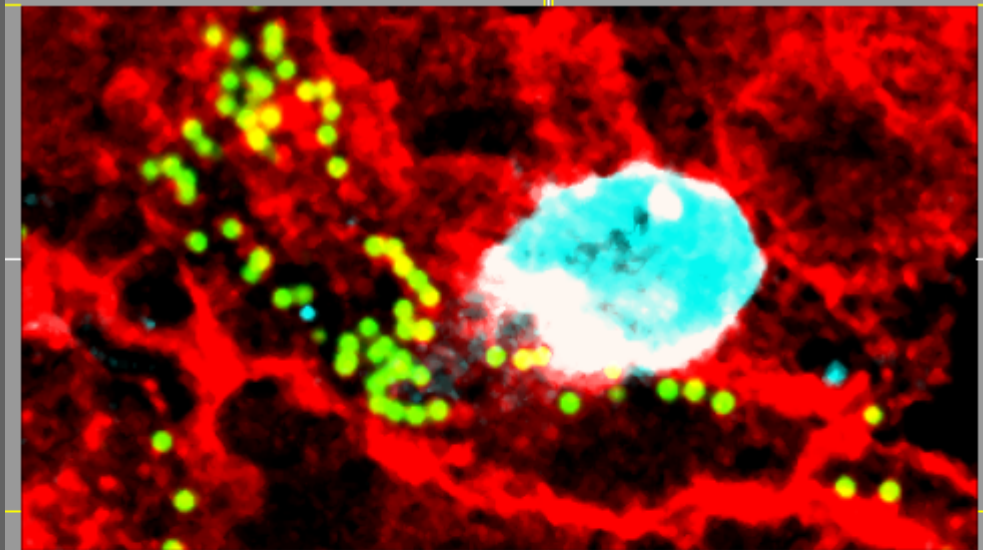
# Aerosol exposure



Cell culture at  
air-liquid interface



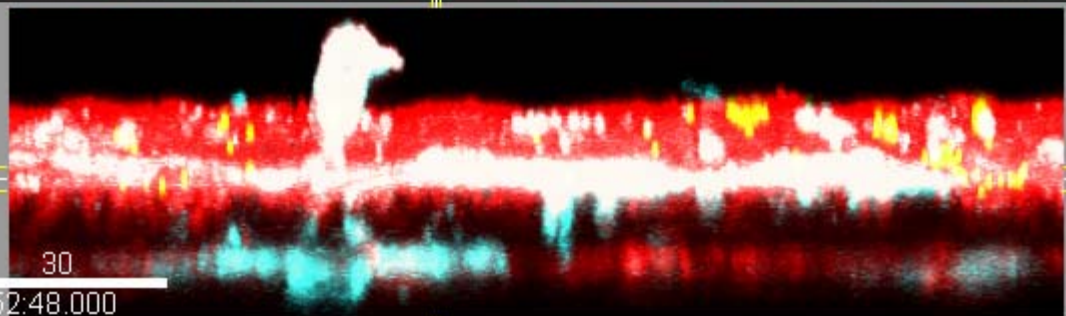
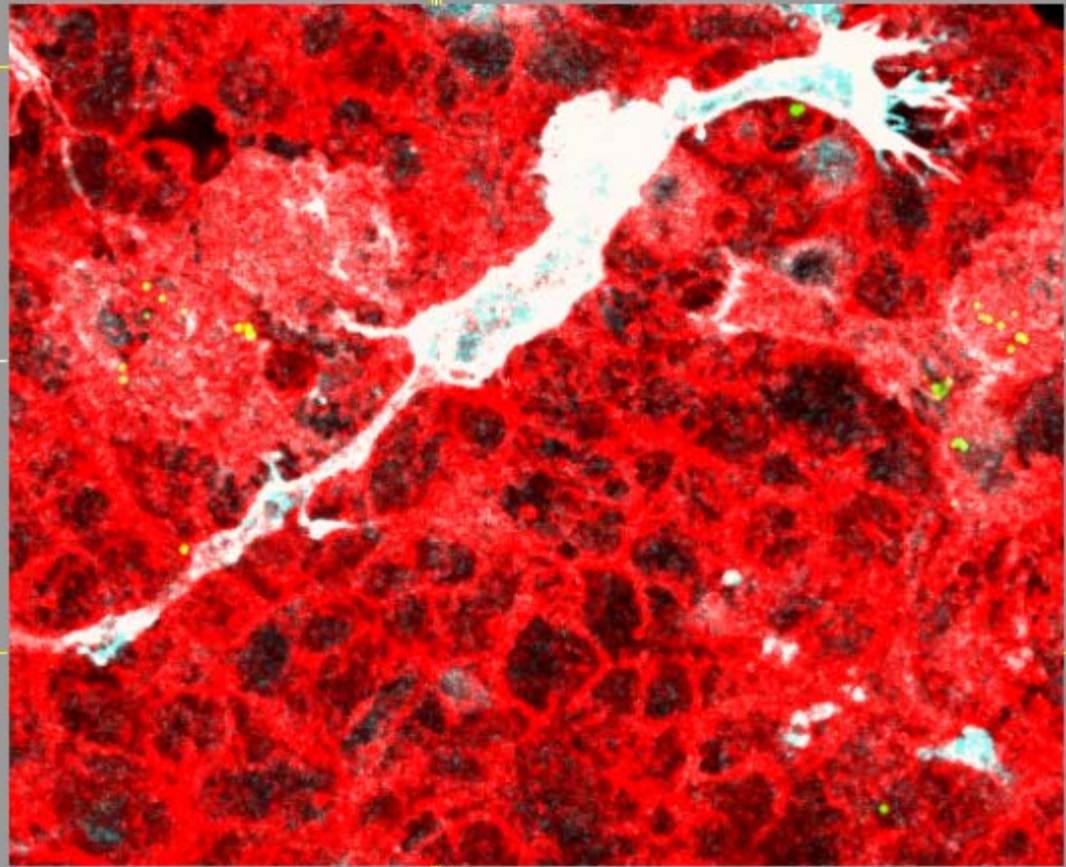
- 1 $\mu$ m Particles
- F-Actin
- CD14

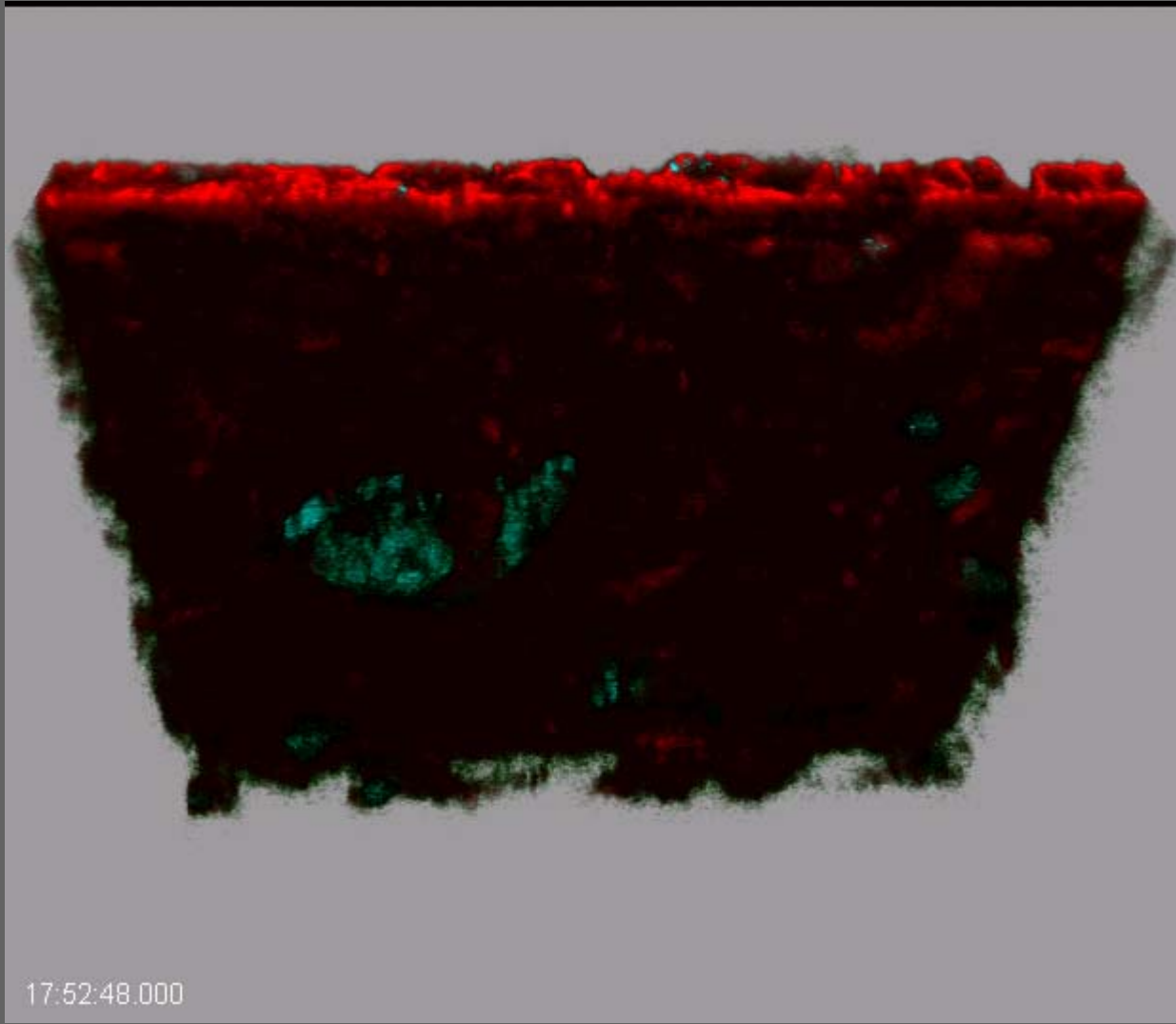




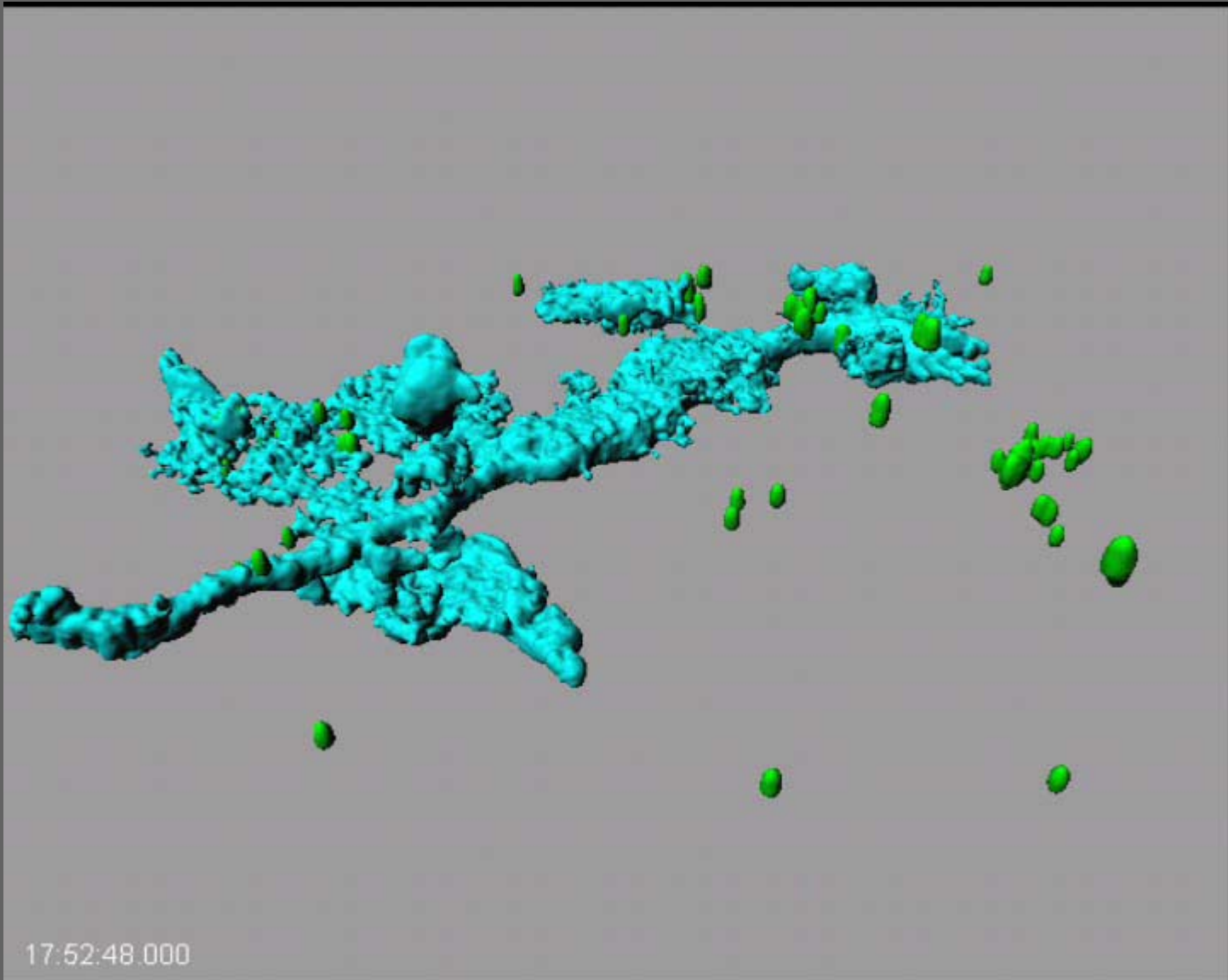


- 1  $\mu\text{m}$  Particles
- F-Actin
- CD86





17:52:48.000

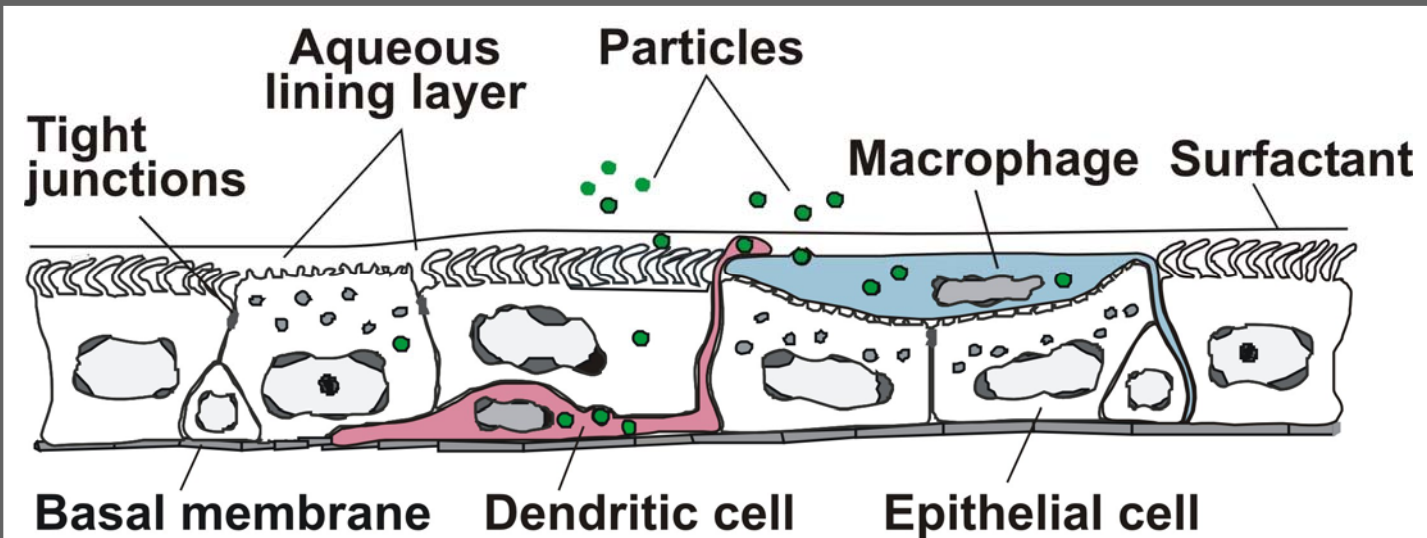


## Conclusions:

Particles  $\leq 1\mu\text{m}$  are found within all three cell types  
more in macrophages and dendritic cells

TNF- $\alpha$  release is dependent on size and material

The cellular interplay can be studied with the triple  
cell co-culture system



# Acknowledgements

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