

# Dosimetry models to align nanoparticle dose across systems for better risk assessment

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# The dose makes the poison



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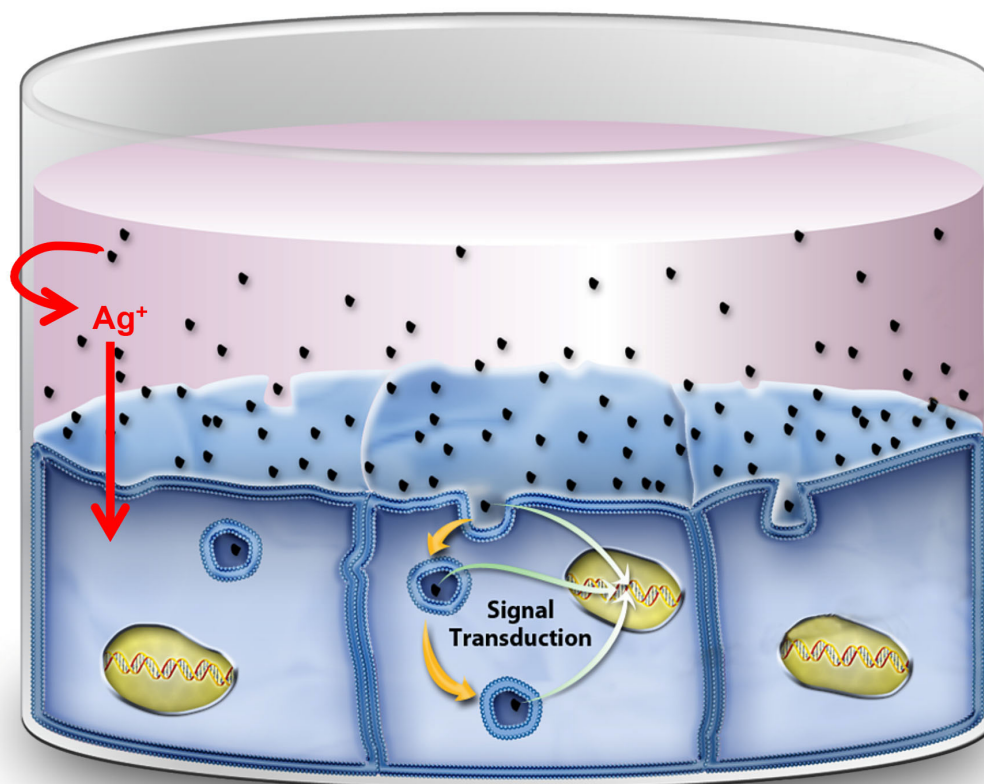


# *In vitro* nanotoxicology

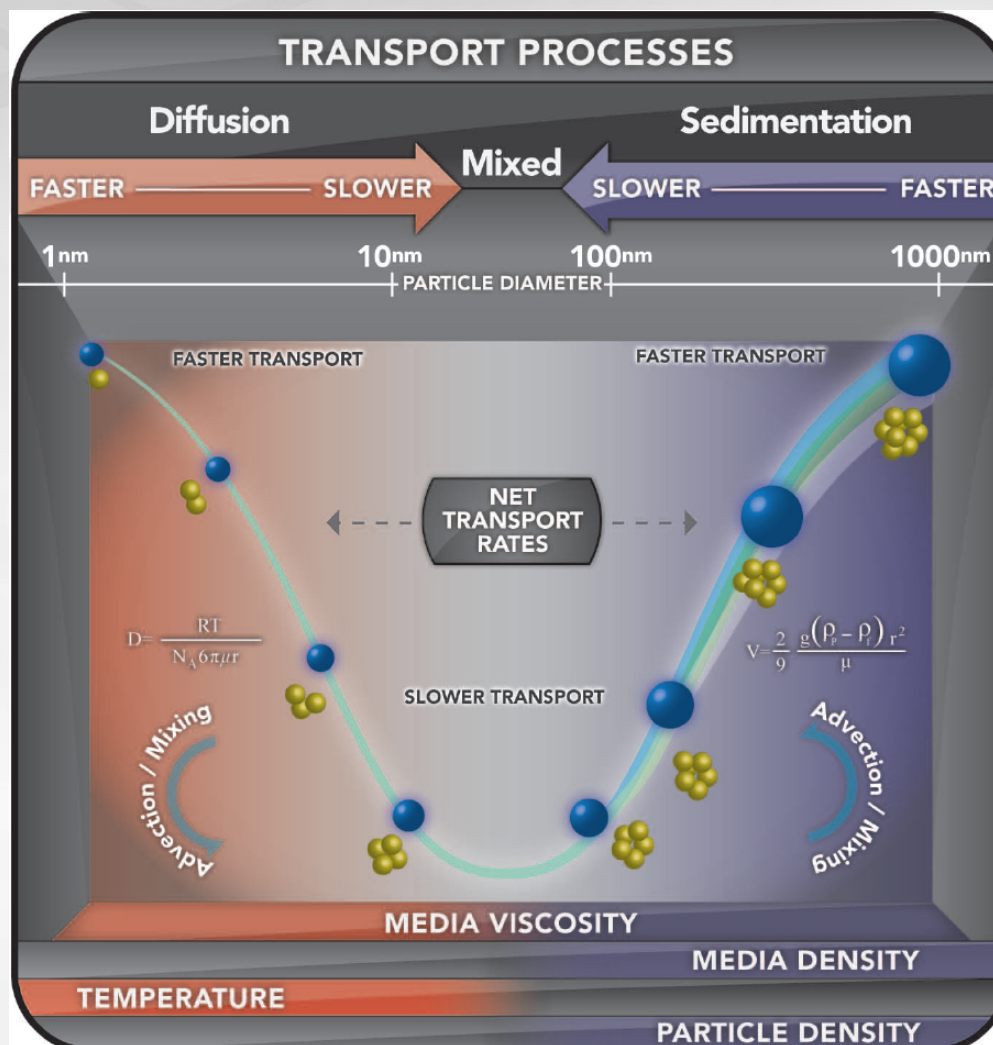


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# Nanoparticle transport processes

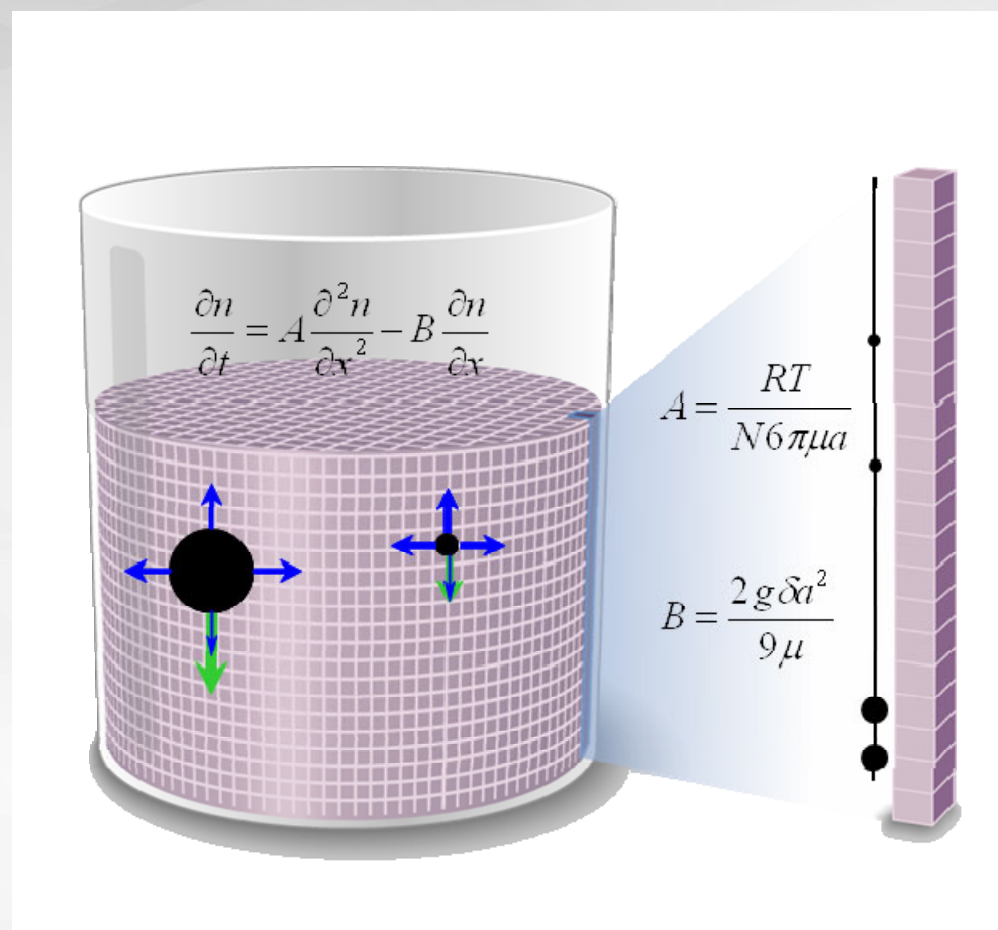


Teeguarden et al. 2007. *Toxicol. Sci.* 95(2): 300-312

DeLoid et al. 2014. *Nat. Commun.* 5, 3514



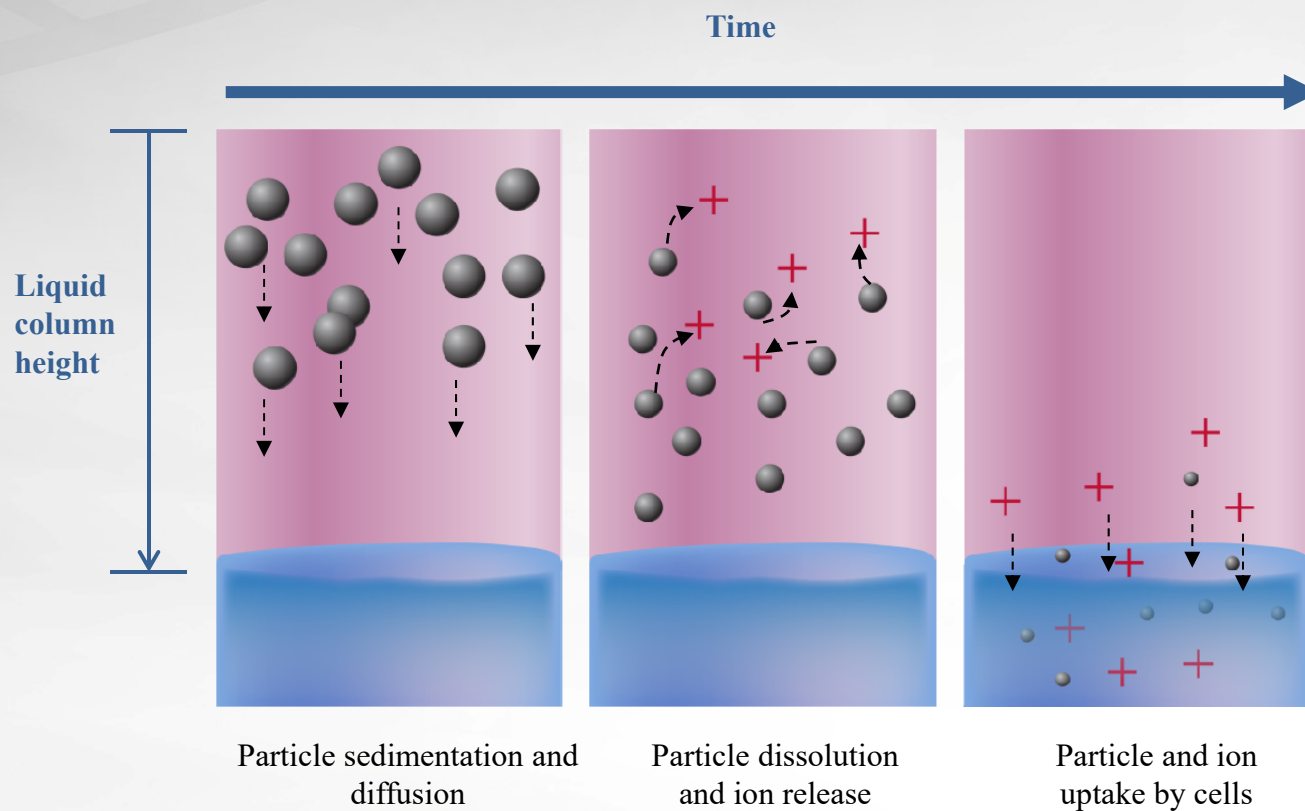
# *In vitro* sediment diffusion and dosimetry (ISDD) model



<https://nanodose.pnnl.gov/default.aspx?topic=ISDD>

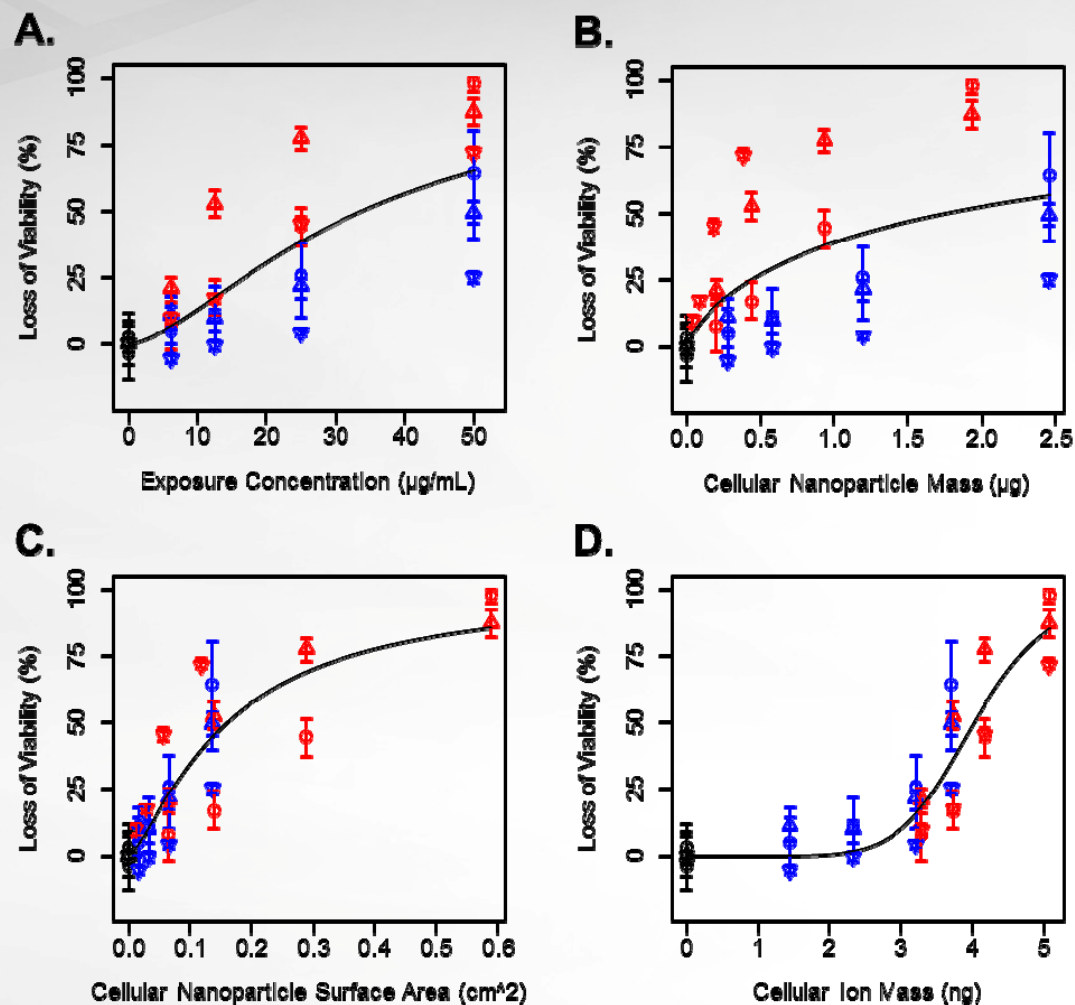
Hinderliter et al. 2010. *Part Fibre Toxicol.* 7(1) 36  
Cohen et al. 2014. *Part Fibre Toxicol.* (11) 20

# ISD3: Implications of dissolution

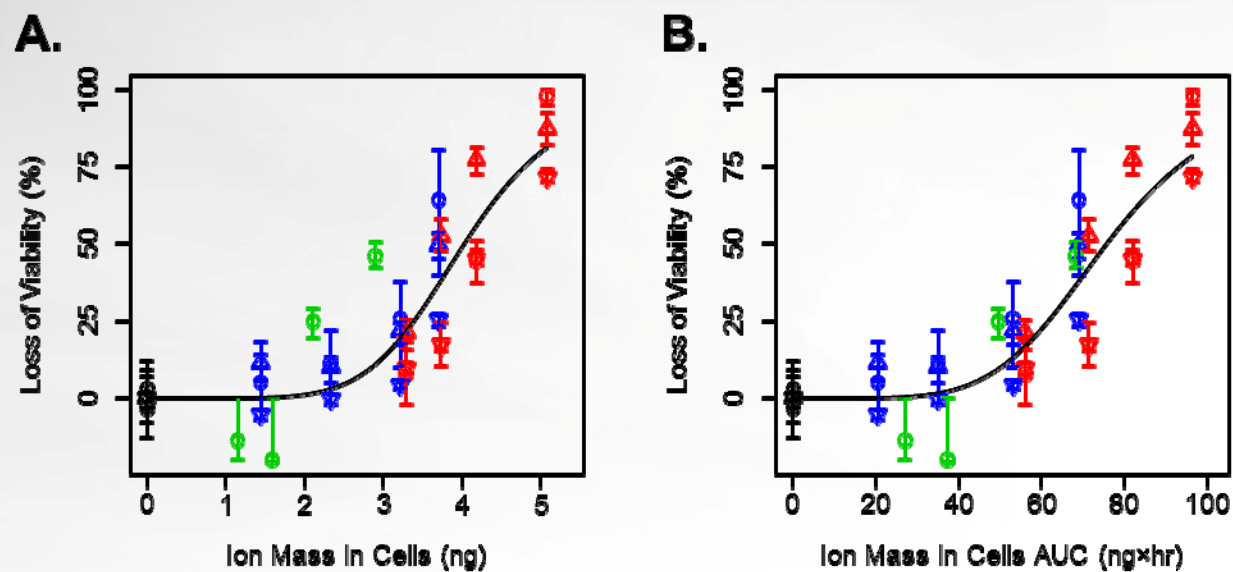


<https://nanodose.pnnl.gov/default.aspx?topic=ISD3>

# Enables dose response analysis with various dose metrics



# Including ion only exposures

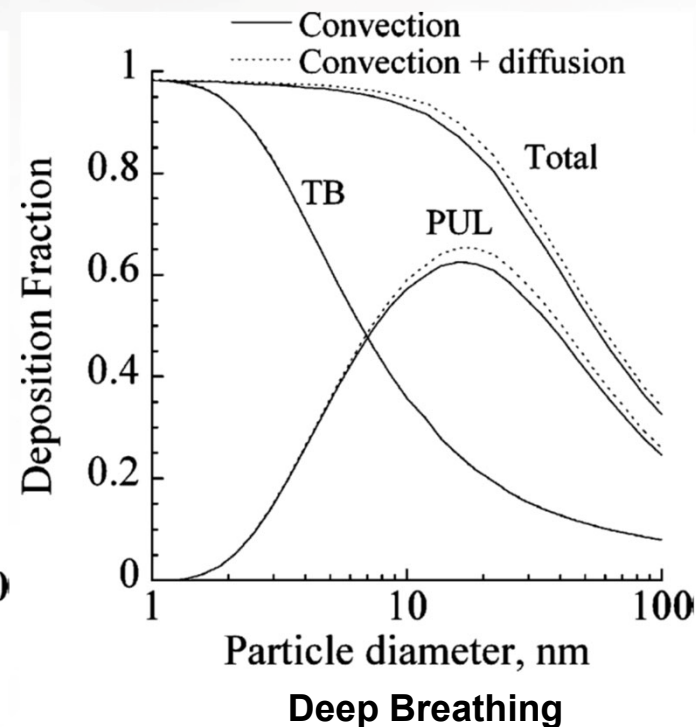
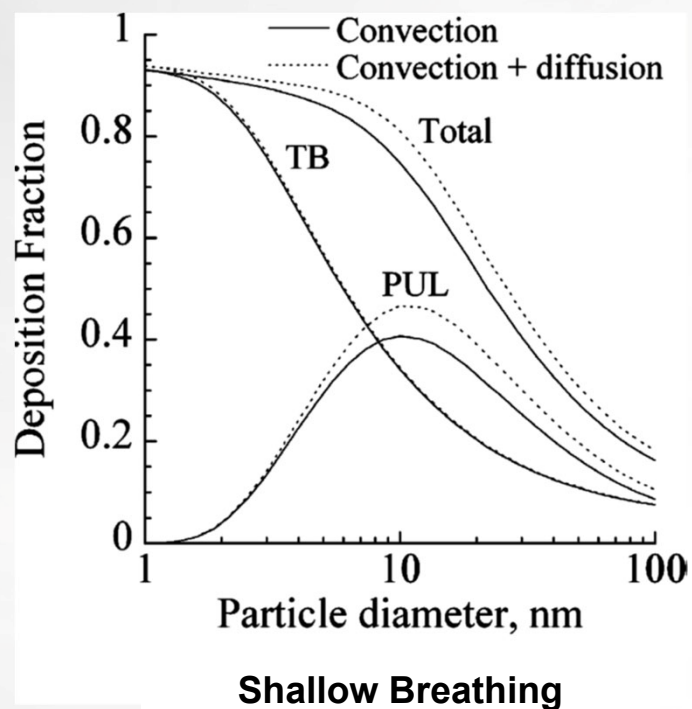
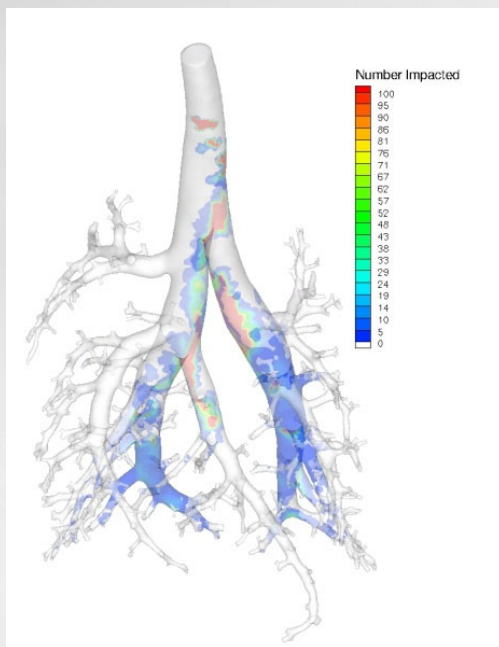




# Animal models and humans



<https://www.ara.com/products/multiple-path-particle-dosimetry-model-mppd-v-304>



Anjilvel *et al.* 1995. *Fundam. Appl. Toxicol.* 28, 41-50.  
Asgharian *et al.* 2001 *Aerosol Sci and Tech* 34:4, 332-339.  
Asgharian and Price 2007 *Inhal. Toxicol.* 19: 1045-1054.  
Miller *et al.* 2016. *J. Aerosol Sci.* 99, 14-26.

# Conclusions

- ▶ Dose makes the poison
- ▶ In order to realize Tox 21 vision, we need to understand nanoparticle dose
- ▶ Dosimetry models exist to predict nano dose
  - Conventional cell cultures
    - MPPD version needed for air liquid interface assays?
  - Animal models
  - Humans
    - Includes children geometries
- ▶ Models can be used to design toxicity *in vitro* assays based on exposure assessments
- ▶ Aligning dose across systems is essential for successful risk assessment

# Questions?



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