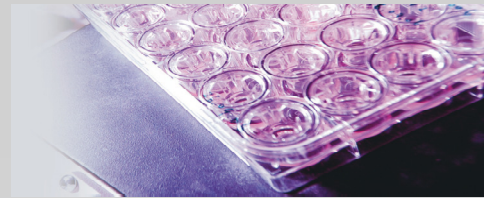




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in vitro Solutions for Respiratory Diseases and Chemical Testing

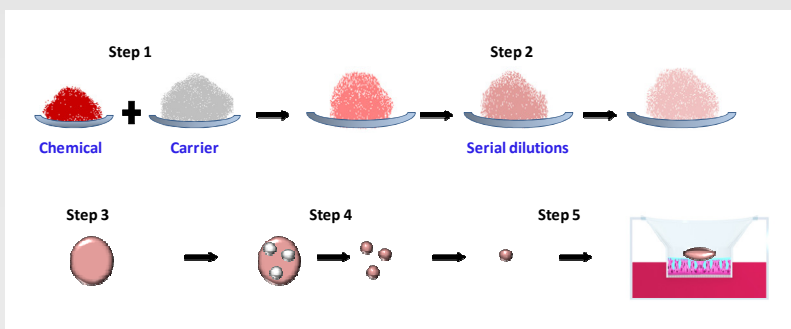


A simple method for testing the toxicity of nanomaterials on 3D Air-Liquid Interface Human Airway Epithelia (MucilAir™)

Samuel Constant, Song Huang, Mireille CaulFuty, Rosy Bonfante, Mélany Monachino, Rebecca Frauenfelder and Ludovic Wiszniewski
Epithelix Sàrl, 14 chemin des aulx, CH-1228 Plan-les-Ouates, Switzerland, email: epithelix@epithelix.com

We developed a simple method to deliver nanoparticles to air-liquid interface (ALI) culture systems. This patented method (PCT/IB2010/053956) uses Dextran as carrier, which allows testing a wide range of doses of nanoparticles. Briefly, the nanoparticles were diluted and mixed with the Dextran powder; small pellets were made and then applied onto the apical surface of the ALI culture. We tested the toxicity of several nanoparticles, such as ZnO, on an *in vitro* cell model of the human airway epithelium (MucilAir™). MucilAir™ closely mimics the morphology and functions of the normal human airway epithelium. Moreover, it has a unique shelf-life of one year, allowing chronic/long term toxicity testing. Using multiple endpoints, like trans-epithelial electrical resistance (TEER), cell viability assay (LDH), cilia beating frequency, morphology, cytokine release, etc, we determined the dose response curve of ZnO nanoparticles on MucilAir™. Toxicity of ZnO (9 nm) was observed at doses higher than 9 µg/cm². Interestingly, at 9 µg/cm² of ZnO, the epithelia had the potential to recover/repair after the exposure, while at 45 µg/cm² of ZnO, it was not the case.

Dextran Tablets Preparation

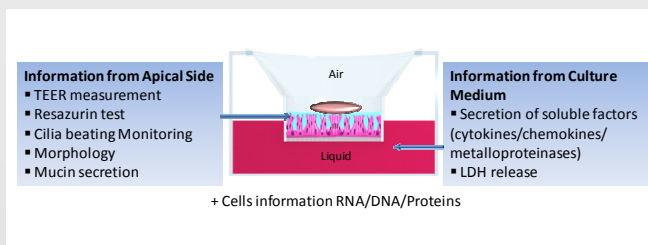


- 1- Dilute the chemical with the carrier at the targeted concentration and mix.
- 2- Make serial dilutions.
- 3- Compress the powder into a mold to obtain a large tablet.
- 4- Stamp out smaller tablets with a biopsy punch.
- 5- Apply on MucilAir™, incubate at 37 °C for 24 hours and measure end-points.

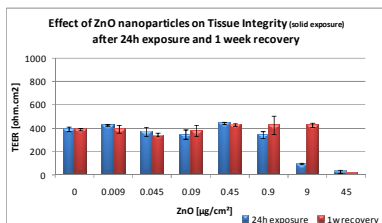
The advantages of MucilAir™

- It is composed of **primary human respiratory cells**.
- It **mimics** the morphology and functions of the native human airway epithelium.
- It has a **unique shelf-life of 12 months**.
- Epithelia from **different pathologies** are available (asthma, COPD, CF, allergic rhinitis).
- It is **ready and easy to use**.

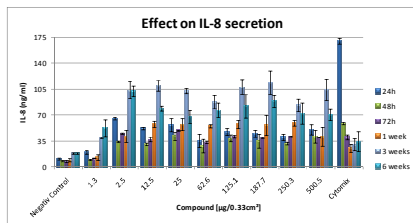
Testing Strategy



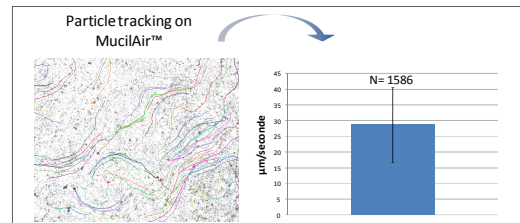
Acute Toxicity Testing



Long Term Effect



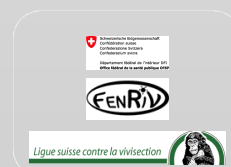
Mucociliary Clearance Analysis



Conclusions

- 1: Dextran Carrier Method is an easy and powerful method for delivering nanomaterials and/or insoluble material on apical surface ALI cultures.
- 2: In combination with MucilAir™, this methodology allows performing acute as well as long term and repeated dose toxicity or efficacy testing of solid chemicals or mixtures.
- 3: Standard Operating procedures are accessible.

Acknowledgements



More Information

