Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

The spatiotemporal organization of cilia activity drives multiscale circular flows of mucus in reconstituted human bronchial epithelium[1] ETIENNE LOISEAU, Aix Marseille Univ, CNRS, CINAM, Marseille, France, DELPHINE GRAS, PASCAL CHANEZ, Aix-Marseille Univ, CNRS, LAI Inserm UMR 1067, 13288, Marseille, France, ANNIE VIALLAT, Aix Marseille Univ, CNRS, CINAM, Marseille, France — Chronic respiratory diseases affect hundreds of millions of people worldwide. The bronchial epithelium is the first barrier to protect the respiratory tract via an innate mechanism called mucociliary clearance. It consists in the active transport of a sticky fluid, the mucus, via a myriad of cilia at the epithelial surface of the airways. The mucus traps inhaled pathogens and the protective role of the mucociliary clearance relies on the ability of the cilia to self-organize and coordinate their beating to transport the mucus over the full bronchial tree till its elimination through swallowing or expectoration. Despite a rich corpus of clinical studies, chronic respiratory diseases remain poorly understood and quantitative biophysical studies are still missing. Here we will present the physical mechanisms underlying the mucociliary transport. We will show how the cilia self-organize during the ciliogenesis and how the coordination of their beating direction leads to the formation of fluid flow patterns at the macroscopic scale. Finally, we will discuss the role of long range hydrodynamics interactions in this intricate coupled system.

[1]ANR MUCOCIL project, grant ANR-13-BSV5-0015 and European Unions Seventh Framework Programme (FP7/2007-2013) under REA grant agreement n. PCOFUND-GA-2013-609102

Etienne Loiseau
Aix Marseille Univ, CNRS, CINAM, Marseille, France

Date submitted: 31 Jul 2017 Electronic form version 1.4