

CANCAM 2019

27th Canadian Congress of Applied Mechanics

May 27-30, 2019 | Sherbrooke (QC), Canada



UNIVERSITÉ DE
SHERBROOKE



Symposium on Respiratory Flows

The 27th of May, 2019 at Université de Sherbrooke

Symposium Chairs: Prof. J. Favier (Julien.Favier@univ-amu.fr) & P. Micheau (Philippe.Micheau@USherbrooke.ca)

The characterisation and physical analysis of transport phenomena and liquid flow occurring in lungs are research topics of increasing interest in the mechanical engineering community. The purpose of this symposium on respiratory flows is to propose a general state-of-the-art of the research efforts ongoing on these topics. The presentation of clinical aspects related to the experimental, theoretical and numerical approaches is strongly encouraged, as well as biomedical applications.

The transport phenomena is closely related to the major health burden of respiratory diseases such as cystic fibrosis, severe asthma or chronic obstructive pulmonary disease (COPD), which affect almost one billion of patients worldwide. Understanding and improving the treatments of these lung disorders implies to study the complex dynamics of the biochemical transfers in the bronchial tree, and improve the actual knowledge on several aspects such as the gas exchanges occurring at the epithelium surface, the rheological nature of bronchial mucus, and the coordinated beating of epithelial cilia transporting mucus for instance.

The liquid flow in lungs is related to the liquid ventilation of lungs which consists in ventilate lungs with a perfluorocarbon liquid (PFC). Clinicians favorably consider that liquid ventilation could provide radically new benefits in critically ill patients requiring lung lavage or ultra-fast cooling after cardiac arrest. The study of the fluid flow and heat exchange in PFC-filled lungs is a radically new research topic.

A non exhaustive list of potential contributions includes:

- Advanced experimental, analytical and numerical tools dedicated to airway modelling.
- Biophysical mechanisms involved in the gas exchanges in lungs;
- Airway clearance devices for patients suffering from COPD, asthma or cystic fibrosis;
- Dynamics and breaking of liquid plugs in the bronchial tree;
- Flow and particle deposition in airways with bifurcations;
- Physics and hydrodynamics mechanisms of mucociliary clearance;
- Characterization of the non-Newtonian rheology of bronchial mucus;
- Microfluidic airway models;
- Liquid flow limitation in airways;
- Pulmonary repartition of liquid;
- Effects of total liquid ventilation;
- Heat transfers in lungs;
- Control of liquid flow in airways;
- Lung lavage by total liquid ventilation;
- Hypothermia induction by total liquid ventilation...



Please visit: <http://cancam2019.evenement.usherbrooke.ca/symposium.html>

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From flow signal acquisition to incorporation into computerized clinical decision systems for human respiratory support

Dr Philippe Jovet

Keynote, Symposium on Respiratory flows,
27th of May 2019, CANCAM 2019, Université de Sherbrooke

The development of Information Technology tools in support of the different professional sectors is carried out in all the fields of activity of our society and health is one of them. Gas flow measurement is routinely performed in the management of mechanically ventilated patients in critical care units. Flow accuracy has been improved with time, integrated into respirators, transmitted to electronic medical devices and is now used in algorithms for the automatic management of respiratory support. This presentation summarizes the current knowledge from signal acquisition to the use of computer tools to provide clinical decision support to caregivers using flow measurements.



Dr Philippe Jovet obtained his MD in 1989 at Paris V University and MD speciality in Pediatrics and MD subspeciality in Intensive Care at Paris V University in 1991. He completed a PhD in 2001 at Paris VII University and a Master in Business Administration in 2004 at Paris VII University. He joined the pediatric intensive care unit of Sainte Justine Hospital in Montreal, in 2004. Dr Philippe Jovet is full professor in Pediatrics at the University of Montreal, director of the Innovative Platform and scientific director of the Health Technology Assessment Unit of Sainte Justine Hospital. He is clinician researcher with a salary award for research from Quebec Public Research Agency (FRSQ), Quebec Ministry of Health and Ste-Justine Hospital. Dr Philippe Jovet research program is on evaluative research on new technologies in University Hospital including research on artificial intelligence and clinical decision support systems. He has published more than 180 papers in peer reviewed journals, 60 book sections and gave more than 130 lectures in congresses (https://www.researchgate.net/profile/Philippe_Jovet).

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