



UNIVERSITÉ
PARIS-EST CRÉTEIL
VAL DE MARNE



Postdoctoral position close to Paris/France

Risk assessment of airborne pathogens produced during tracheotomy procedures: Numerical (CFD) and experimental study of aerosol dispersion and deposition in surgery rooms.

This postdoctoral position is proposed in the frame of a two-years project involving a French consortium with a Hospital (HIAL), a university laboratory specialized in aerosols physics (CERTES) and a research institute (IRSN) expert in fluid dynamics for particulate contamination in the air and on surfaces.

Description of the research project:

The project concerns the studies on the risk of contamination of healthcare workers (HCW) by the aerosolization of bronchial secretions. It focuses on the characterization of chirurgical tracheotomy procedures which are known for aerosols generation. The procedures involve inserting a cannula into the trachea at neck level to allow the patient to breath by shunting the upper respiratory airways. To minimize HCW contamination risk, the objectives of the project are to quantify the aerosolization of bronchial secretions when a tracheotomy is performed, and to study the HCW exposure to the aerosols generated during the two types of tracheotomy procedures used over the world.

The future candidate will work on the experimental reproduction and physical characterization (particles emission) of a tracheotomy procedure performed on a synthetic breathing human model (3D printed). This synthetic model will need to generate an aerosol containing droplets simulating the mucus coating the deep lung. The procedure will be performed in a controlled laboratory environment representative of an operating theatre or an intensive care room. This experimental work will be combined with CFD simulations of the generated aerosol flow, using the commercial ANSYS software (Fluent). The candidate will perform the numerical simulations in two steps: one step of detailed flow simulation in the near field around the patient body/neck, and a second step of large-scale simulations of the whole hospital room.

For the project achievement, the future candidate will need interact with the three partners: the hospital for the development of the synthetic human model, the aerosol lab for the aerosol generation, and the fluid-dynamics lab for the numerical simulations and associated experiments.

Candidate profile:

A PhD / Postdoc in fluid dynamics and/or aerosol physics with a proven experience in CFD simulations and interest in experimental work. The candidate should also have aptitude for team working and project management. A moral engagement on the two-years contract is expected.

Starting time: March 2023

Main location: Paris (Saclay and Créteil) – trips to Marseille (south of France) expected.

Salary: 2 720 € brutto (2 131 € netto), paid by the University for a 2-year contract

Contacts: Jeanne.malet@irsn.fr ; gehin@u-pec.fr