Investigating the Effects of Obstructive Sleep Apnea (OSA) and Rostral Fluid Shift on the Pathophysiology of Asthma

Xiaoshu (Caren) Cao (University of Toronto)

Asthma Canada - AllerGen Bastable-Potts Graduate Student Research Award

Supervisor: T. Douglas Bradley

Xiaoshu Cao, a PhD student at the University of Toronto, will investigate the causal link between asthma and obstructive sleep apnea. Her findings could contribute to potential clinical trial design to determine whether treatment of OSA can improve patient outcomes and reduce healthcare utilization.

Investigating the Effects of Obstructive Sleep Apnea (OSA) and Rostral Fluid Shift on the Pathophysiology of Asthma

Chronic respiratory disorders cause disability, morbidity, and poor quality of life. Both asthma and obstructive sleep apnea (OSA) are highly prevalent respiratory disorders and a significant overlap between asthma and OSA (12-50%) is observed but the reason for this remains unclear. Cao's research group has established that body fluid moving from the legs to the upper body during sleep is one of the causes of OSA. In a previous study, Cao's colleagues also showed that increases in chest fluid are associated with lower airway narrowing in asthmatics. Therefore, Cao suggests that OSA could worsen asthma by increasing chest fluid volume.

Cao's proposed studies will first investigate the causal link between these two disorders. Preliminary data from her first project shows that mimicking OSA draws fluid into the lungs and increases airway narrowing. This finding provides strong evidence that there may indeed be a causal link between the two disorders. The second study will determine if people with asthma with nocturnal asthma symptoms are likely have greater fluid displacement into the chest overnight and also more likely to have OSA. The last study examines whether preventing the fluid displacement into the chest would help to reduce the lower airway narrowing in people with asthma.

The outcome of research could contribute to a novel approach to treating some cases of asthma and may involve treating co-existing OSA. This could help both patients and physicians to recognize the overlap between asthma and OSA and whether managing one disease may improve the control of the other. Therefore, patients with poor asthma

control may benefit from OSA screening. Furthermore, this study can lead to identification of subgroups of patients with asthma and OSA who are at high risk for adverse outcomes. Consequently, clinical trials can be designed in the near future to determine whether treatment of OSA can improve patient-centred outcomes and reduce healthcare utilization.

About Xiaoshu (Caren) Cao

Caren began her PhD in the Institute of Biomaterials and Biomedical Engineering at University of Toronto in January 2018 under the supervision of Dr. Azadeh Yadollahi and Dr. Douglas Bradley. She completed both her Honours Bachelor of Science in Chemistry with high distinction and Master of Science in Chemical Engineering and Applied Chemistry at University of Toronto.

Her research interests include understanding the physiology and mechanisms of nocturnal asthma and potential mechanisms that link sleep apnea to nocturnal asthma.

Prior to her PhD study, she worked on the commercialization of an innovative technology for sleep apnea testing at home. She also designed and managed a clinical pilot program to provide early diagnosis and treatment of sleep apnea in stroke population.

Caren is also the captain of a Chinese basketball team and led the team to several championships. She is part of a basketball non-governmental organization, and initiated a coaching program for children that was recently accepted as an official host for the Junior NBA Youth Basketball program.